City of Sweet Home
1400 24th Avenue
Sweet Home, OR 97386

Mahler Water Reclamation Facility (MWRF) Interim Improvements

Sludge Blend Tank Design-Build

December 2022

WEST YOST
Water. Engineered.

5 Centerpointe Dr #130,
Lake Oswego, OR 97035
(530) 756-5905
FAX (530) 756-5991

MWRF Interim Improvements Project Sludge Blend Tank Design-Build
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ADVERTISEMENT FOR BIDS

CITY OF SWEET HOME, OREGON
MAHLER WATER RECLAMATION FACILITY
SLUDGE BLEND TANK DESIGN-BUILD

General Notice

City of Sweet Home (Owner) is requesting Bids for the construction of the following Project:

MAHLER WATER RECLAMATION FACILITY
SLUDGE BLEND TANK DESIGN-BUILD

Bids for the construction of the Project will be received at Sweet Home City Hall located at 3225 Main Street, Sweet Home, OR 97386, until **January 24, 2023 at 2:00 pm** local time. At that time the Bids received will be publicly opened and read.

The Project includes the following Work:

Improvements and modifications to the City of Sweet Home Mahler Water Reclamation Facility (Mahler WRF) includes furnishing all labor, materials, and equipment necessary for the design and construction of new Sludge Blend Tank and appurtenances. Site work includes general excavation with onsite and offsite disposal and installation of structural base rock.

Obtaining the Bidding Documents for Bidders

For Bidders, the Contract Documents may be examined at Sweet Home City Hall. Electronic copies of the Contract Documents will be provided by the Owner. Hard copies of the Contract Documents will be provided to the successful Bidder following Bid Award.

Instructions to Bidders

For all further requirements regarding bid submittal, qualifications, procedures, and contract award, refer to the Instructions to Bidders included in the Bidding Documents.

American Iron and Steel

Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A - Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference applies an American Iron and Steel requirement to this project. All iron and steel products used in this project must be produced in the United States. The term “iron and steel products” means the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and Construction Materials.

The following waivers apply to this Contract:

1. De Minimis,
2. Minor Components, and
3. Pig iron and direct reduced iron.

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This Advertisement is issued by:

Owner: **City of Sweet Home, Oregon**
By: **Greg Springman**
Title: **Public Works Director**
Date: **December 14, 2022**

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INSTRUCTIONS TO BIDDERS FOR DESIGN-BUILD CONTRACT

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ARTICLE 1—DEFINED TERMS

1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:

A. *Issuing Office*—The office from which the Bidding Documents are to be issued, and which registers plan holders.

ARTICLE 2—BIDDING DOCUMENTS

2.01 Bidder shall obtain a complete set of Bidding Requirements and proposed Contract Documents (together, the Bidding Documents). See the Agreement for a list of the Contract Documents. It is Bidder's responsibility to determine that it is using a complete set of documents in the preparation of a Bid. Bidder assumes sole responsibility for errors or misinterpretations resulting from the use of incomplete documents, by Bidder itself or by its prospective Subcontractors and Suppliers.

2.02 Bidding Documents are made available for the sole purpose of obtaining Bids for completion of the Project and permission to download or distribution of the Bidding Documents does not confer a license or grant permission or authorization for any other use. Authorization to download documents, or other distribution, includes the right for plan holders to print documents solely for their use, and the use of their prospective Subcontractors and Suppliers, provided the plan holder pays all costs associated with printing or reproduction. Printed documents may not be re-sold under any circumstances.

2.03 Owner has established a Bidding Documents Website as indicated in the Advertisement or invitation to bid. Owner recommends that Bidder register as a plan holder with the Issuing Office at such website and obtain a complete set of the Bidding Documents from such website. Bidders may rely that sets of Bidding Documents obtained from the Bidding Documents Website are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.

2.04 Bidder may register as a plan holder and obtain complete sets of Bidding Documents, in the number and format stated in the Advertisement or invitation to bid, from the Issuing Office. Bidders may rely that sets of Bidding Documents obtained from the Issuing Office are complete, unless an omission is blatant. Registered plan holders will receive Addenda issued by Owner.

2.05 Plan rooms (including construction information subscription services, and electronic and virtual plan rooms) may distribute the Bidding Documents, or make them available for examination. Those prospective Bidders that obtain an electronic (digital) copy of the Bidding Documents from a plan room are encouraged to register as plan holders from the Bidding Documents Website or Issuing Office. Owner is not responsible for omissions in Bidding Documents or other documents obtained from plan rooms, or for a Bidder's failure to obtain Addenda from a plan room.

2.06 *Electronic Documents*

A. When the Bidding Requirements indicate that electronic (digital) copies of the Bidding Documents are available, such documents will be made available to the Bidders as Electronic Documents in the manner specified.

1. Bidding Documents will be provided in Adobe PDF (Portable Document Format) (.pdf) that is readable by Adobe Acrobat Reader. It is the intent of the Engineer and Owner that such Electronic Documents are to be exactly representative of the paper copies of

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the documents. However, because the Owner and Engineer cannot totally control the transmission and receipt of Electronic Documents nor the Contractor's means of reproduction of such documents, the Owner and Engineer cannot and do not guarantee that Electronic Documents and reproductions prepared from those versions are identical in every manner to the paper copies.

B. Unless otherwise stated in the Bidding Documents, the Bidder may use and rely upon complete sets of Electronic Documents of the Bidding Documents, described in Paragraph 2.06.A above. However, Bidder assumes all risks associated with differences arising from transmission/receipt of Electronic Documents versions of Bidding Documents and reproductions prepared from those versions and, further, assumes all risks, costs, and responsibility associated with use of the Electronic Documents versions to derive information that is not explicitly contained in printed paper versions of the documents, and for Bidder's reliance upon such derived information.

C. After the Contract is awarded, the Owner will provide or direct the Engineer to provide for the use of the Contractor documents that were developed by Engineer as part of the Project design process, as Electronic Documents in native file formats.

1. Electronic Documents that are available in native file format include:

a. Electronic Drawing files in Revit, AutoCAD MEP and AutoCAD Civil3D.

b. Digital Elevation Model (DEM) for the construction site

2. Release of such documents will be solely for the convenience of the Contractor. No such document is a Contract Document.

3. Unless the Contract Documents explicitly identify that such information will be available to the Successful Bidder (Contractor), nothing herein will create an obligation on the part of the Owner or Engineer to provide or create such information, and the Contractor is not entitled to rely on the availability of such information in the preparation of its Bid or pricing of the Work. In all cases, the Contractor shall take appropriate measures to verify that any electronic/digital information provided in Electronic Documents is appropriate and adequate for the Contractor's specific purposes.

4. In no case will the Contractor be entitled to additional compensation or time for completion due to any differences between the actual Contract Documents and any related document in native file format.

ARTICLE 3—RESERVED

ARTICLE 4— RESERVED

ARTICLE 5—SITE AND OTHER AREAS; EXISTING SITE CONDITIONS; EXAMINATION OF SITE; OWNER'S SAFETY PROGRAM; OTHER WORK AT THE SITE

5.01 *Site and Other Areas*

A. The Site is identified in the Bidding Documents. By definition, the Site includes rights-of-way, easements, and other lands furnished by Owner for the use of the Contractor. Any additional lands required for temporary construction facilities, construction equipment, or storage of

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materials and equipment, and any access needed for such additional lands, are to be obtained and paid for by Contractor.

5.02 *Existing Site Conditions*

A. *Subsurface and Physical Conditions; Hazardous Environmental Conditions*

1. The General Conditions identify the following regarding existing conditions at or adjacent to the Site:

a. Those reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data.

b. Those drawings known to Owner of existing physical conditions at or adjacent to the Site, including those drawings depicting existing surface or subsurface structures at or adjacent to the Site (except Underground Facilities), that contain Technical Data.

c. Reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site.

d. Technical Data contained in such reports and drawings.

2. Owner will make electronic copies of reports and drawings referenced above available to any Bidder on request. These reports and drawings are not part of the Contract Documents, but the Technical Data contained therein upon whose accuracy Bidder is entitled to rely, as provided in the General Conditions. Bidder is responsible for any interpretation or conclusion Bidder draws from any Technical Data or any other data, interpretations, opinions, or information contained in such reports or shown or indicated in such drawings.

3. *Geotechnical Report:* The Bidding Documents contain a Geotechnical Data Report (GDR) for use by Bidders (Supplemental Information – bound separately).

a. As set forth in the General Conditions, the GDR describes certain select subsurface conditions that are anticipated to be encountered by Contractor during construction in specified locations ("Baseline Conditions"). The GDR is a Contract Document.

b. The Baseline Conditions in the GDR are intended to reduce uncertainty and the degree of contingency in submitted Bids. However, Bidders cannot rely solely on the Baseline Conditions. Bids should be based on a comprehensive approach that includes an independent review and analysis of the GDR, all other Contract Documents, Technical Data, other available information, and observable surface conditions. Not all potential subsurface conditions are baselined.

c. Nothing in the GDR is intended to relieve Bidders of the responsibility to make their own determinations regarding construction costs, bidding strategies, and Bid prices, nor of the responsibility to select and be responsible for the means, methods, techniques, sequences, and procedures of construction, and for safety precautions and programs incident thereto.

B. *Underground Facilities:* Underground Facilities are shown or indicated on the Drawings, pursuant to Paragraph 5.05 of the General Conditions, and not in the drawings referred to in Paragraph 5.02.A of these Instructions to Bidders. Information and data regarding the

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presence or location of Underground Facilities are not intended to be categorized, identified, or defined as Technical Data.

5.03 *Other Site-related Documents*

A. Documents regarding existing Site conditions referred to in Paragraph 5.02.A are listed in the General Conditions 10.01(A.4). Owner will make copies of these other Site-related documents available to any Bidder on request.

B. Bidder shall consider information contained on these other site-related documents to be un-verified and shall not rely on the accuracy of any data or information in such documents. Bidder is responsible for any interpretation or conclusion Bidder draws from the other Site-related documents.

C. The other Site-related documents are not part of the Contract Documents.

D. Bidders are encouraged to review the other Site-related documents, but Bidders will not be held accountable for any data or information in such documents. The requirement to review and take responsibility for documentary Site information is limited to information in (1) the Contract Documents and (2) the Technical Data.

5.04 *Site Visit and Testing by Bidders*

A. Bidder may schedule a site visit. During the visit the Bidder must not disturb any ongoing operations at the Site.

B. Bidders visiting the Site are required to arrange their own transportation to the Site.

C. All access to the Site other than during a regularly scheduled Site visit must be coordinated through the following Owner or Engineer contact for visiting the Site: Mr. Steven Haney, Utilities Manager, (541) 818-8003.

D. Bidder is not required to conduct any subsurface testing, or exhaustive investigations of Site conditions.

E. On request and schedule permitting, the Owner will provide Bidder general access to the Site to conduct such additional examinations, investigations, explorations, tests, and studies as Bidder deems necessary for preparing and submitting a successful Bid. Owner will not have any obligation to grant such access if doing so is not practical because of existing operations, security or safety concerns, or restraints on Owner's authority regarding the Site. Bidder is responsible for establishing access needed to reach specific selected test sites.

F. Bidder must comply with all applicable Laws and Regulations regarding excavation and location of utilities, obtain all permits, and comply with all terms and conditions established by Owner or by property owners or other entities controlling the Site with respect to schedule, access, existing operations, security, liability insurance, and applicable safety programs.

G. Bidder must fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies.

5.05 *Owner's Safety Program*

A. Site visits and work at the Site is governed Oregon OSHA requirements.

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5.06 *Other Work at the Site*

A. Reference is made to Article 8 of the General Conditions for the identification of the general nature of other work of which Owner is aware (if any) that is to be performed at the Site by Owner or others (such as utilities and other prime contractors) and relates to the Work contemplated by these Bidding Documents. If Owner is party to a written contract for such other work, then on request, Owner will provide to each Bidder access to examine such contracts (other than portions thereof related to price and other confidential matters), if any.

ARTICLE 6— BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Express Representations and Certifications in Bid Form, Agreement*

A. The Bid Form that each Bidder will submit contains express representations regarding the Bidder's examination of Project documentation, Site visit, and preparation of the Bid, and certifications regarding lack of collusion or fraud in connection with the Bid. Bidder should review these representations and certifications, and assure that Bidder can make the representations and certifications in good faith, before executing and submitting its Bid.

B. If Bidder is awarded the Contract, Bidder (as Design-Builder) will make similar express representations and certifications when it executes the Agreement.

ARTICLE 7—INTERPRETATIONS AND ADDENDA

7.01 Owner on its own initiative may issue Addenda to clarify, correct, supplement, or change the Bidding Documents.

7.02 Bidder shall submit all questions about the meaning or intent of the Bidding Documents to Owner and Engineer in writing.

7.03 Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda delivered to all and registered plan holders. Questions received less than seven days prior to the date for opening of Bids may not be answered.

7.04 Only responses set forth in an Addendum will be binding. Oral and other interpretations or clarifications will be without legal effect. Responses to questions are not part of the Contract Documents unless set forth in an Addendum that expressly modifies or supplements the Contract Documents.

ARTICLE 8—BID SECURITY

8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of 5% percent of Bidder's maximum Bid price (determined by adding the base bid and all alternates) and in the form of a Bid bond issued by a surety meeting the requirements of Paragraph 6.01 of the General Conditions. Such Bid bond will be issued in the form included in the Bidding Documents. Bid security must be at least 5% of the Bidder's maximum price.

8.02 The Bid security of the apparent Successful Bidder will be retained until Owner awards the contract to such Bidder, and such Bidder has executed the Contract, furnished the required Contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be released. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Contract security within 15 days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder

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will be forfeited, in whole in the case of a penal sum bid bond, and to the extent of Owner's damages in the case of a damages-form bond. Such forfeiture will be Owner's exclusive remedy if Bidder defaults.

8.03 The Bid security of other Bidders that Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Contract or 91 days after the Bid opening, whereupon Bid security furnished by such Bidders will be released.

8.04 Bid security of other Bidders that Owner believes do not have a reasonable chance of receiving the award will be released within 7 days after the Bid opening.

ARTICLE 9—CONTRACT TIMES

9.01 The number of days within which, or the dates by which, the Work is to be (a) substantially completed and (b) ready for final payment, and (c) Milestones (if any) are to be achieved, are set forth in the Agreement.

9.02 Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

ARTICLE 10—SUBSTITUTE AND "OR EQUAL" ITEMS

10.01 The Contract for the Work, as awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration during the bidding and Contract award process of possible substitute or "or-equal" items. In cases in which the Contract allows the Contractor to request that Engineer authorize the use of a substitute or "or-equal" item of material or equipment, application for such acceptance may not be made to and will not be considered by Engineer until after the Effective Date of the Contract.

10.02 All prices that Bidder sets forth in its Bid will be based on the presumption that the Contractor will furnish the materials and equipment specified or described in the Bidding Documents, as supplemented by Addenda. Any assumptions regarding the possibility of post-Bid approvals of "or-equal" or substitution requests are made at Bidder's sole risk.

10.03 Substitutes and "or-equal" materials and equipment may be proposed by Contractor in accordance with Paragraphs 7.05 and 7.06 of the General Conditions after the Effective Date of the Contract. Each such request shall include Manufacturer's Certification letter to document compliance with AIS requirements of Section 746 of Title VII of the Consolidated Appropriations Act of 2017 (Division A - Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2017) and subsequent statutes mandating domestic preference, if applicable. Refer to Manufacturer's Certification Letter provided in these Contract Documents.

ARTICLE 11—SUBCONTRACTORS, SUPPLIERS, AND OTHERS

11.01 The apparent Successful Bidder, and any other Bidder so requested, must submit to Owner the First-Tier Subcontractor Disclosure within 2 hours following the Bid Opening.

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ARTICLE 12—PREPARATION OF BID

12.01 The Bid Form is included with the Bidding Documents.

A. All blanks on the Bid Form must be completed in ink and the Bid Form signed in ink. Erasures or alterations must be initialed in ink by the person signing the Bid Form. A Bid price must be indicated for each section, Bid item, alternate, adjustment unit price item, and unit price item listed therein.

B. If the Bid Form expressly indicates that submitting pricing on a specific alternate item is optional, and Bidder elects to not furnish pricing for such optional alternate item, then Bidder may enter the words "No Bid" or "Not Applicable."

C. Bidders shall provide pricing for all "A-listed" or first-named equipment suppliers in the Bid Form.

12.02 If Bidder has obtained the Bidding Documents as Electronic Documents, then Bidder shall prepare its Bid on a paper copy of the Bid Form printed from the Electronic Documents version of the Bidding Documents. The printed copy of the Bid Form must be clearly legible, printed on 8½ inch by 11-inch paper and as closely identical in appearance to the Electronic Document version of the Bid Form as may be practical. The Owner reserves the right to accept Bid Forms which nominally vary in appearance from the original paper version of the Bid Form, providing that all required information and submittals are included with the Bid.

12.03 A Bid by a corporation must be executed in the corporate name by a corporate officer (whose title must appear under the signature), accompanied by evidence of authority to sign. The corporate address and state of incorporation must be shown.

12.04 A Bid by a partnership must be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership must be shown.

12.05 A Bid by a limited liability company must be executed in the name of the firm by a member or other authorized person and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown.

12.06 A Bid by an individual must show the Bidder's name and official address.

12.07 A Bid by a joint venture must be executed by an authorized representative of each joint venturer in the manner indicated on the Bid Form. The joint venture must have been formally established prior to submittal of a Bid, and the official address of the joint venture must be shown.

12.08 All names must be printed in ink below the signatures.

12.09 The Bid must contain an acknowledgment of receipt of all Addenda, the numbers of which must be filled in on the Bid Form.

12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid must be shown.

12.11 The Bid must contain evidence of Bidder's authority to do business in the state where the Project is located, or Bidder must certify in writing that it will obtain such authority within the time for acceptance of Bids and attach such certification to the Bid.

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12.12 If Bidder is required to be licensed to submit a Bid or perform the Work in the state where the Project is located, the Bid must contain evidence of Bidder's licensure, or Bidder must certify in writing that it will obtain such licensure within the time for acceptance of Bids and attach such certification to the Bid. Bidder's state contractor license number, if any, must also be shown on the Bid Form.

ARTICLE 13—BASIS OF BID

13.01 *Lump Sum*

A. Bidders must submit a Bid on a lump sum basis for each bid item as set forth in the Bid Form.

13.02 *Additive and Deductive Unit Price Work Bid Items*

A. Bidders must submit unit prices for bid items with additional work beyond the quantities included in the Lump Sum Bid.

1. Additive and Deductive Unit Price Work Items shall include:

a. None

B. Costs for Additive and Deductive Unit Price Work Bid Items will be considered by the Owner in the evaluation of bids based on the potential impact of increased or decreased quantities for these Bid items in the course of executing the Work.

C. Bidders shall not unbalance bids for Additive and Deductive Unit Price Work Items.

ARTICLE 14—SUBMITTAL OF BID

14.01 The Bidding Documents include one separate unbound copy of the Bid Form, and, if required, the Bid Bond Form. The unbound copy of the Bid Form and the First-Tier Subcontractor Disclosure Form are to be completed and submitted with the Bid security and the other documents required to be submitted under the terms of the Bid Form.

14.02 A Bid must be received no later than the date and time prescribed and at the place indicated in the Advertisement or invitation to bid and must be enclosed in a plainly marked package with the Project title, the name and address of Bidder, the date of opening, the applicable words "SEALED BID" or "FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM" and must be accompanied by the Bid security and other required documents. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid must be enclosed in a separate package plainly marked on the outside with the notation "BID ENCLOSED" or "FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM." A mailed Bid must be addressed to the location designated in the Advertisement.

14.03 Bids received after the date and time prescribed for the opening of bids, or not submitted at the correct location or in the designated manner, will not be accepted and will be returned to the Bidder unopened.

14.04 All responses submitted are the property of the City of Sweet Home, thus subject to disclosure pursuant to Oregon Public Records law, as qualified by ORS 279B.060(6) for similar contracts. Except for information marked "Proprietary", all documents received by City shall be available for public disclosure. The City will attempt to maintain the confidentiality of materials marked "Proprietary" to the extent permitted under the Oregon Public Records law. By responding to this solicitation, Bidders waive any challenge to the City's decisions in this regard.

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14.05 **Marking all, or substantially all, or your response as "Proprietary" is not permitted and may be grounds for the City considering your bid nonresponsive, at the City's sole discretion.** If your response contains proprietary information protected under this section, please provide an additional redacted copy.

ARTICLE 15—MODIFICATION AND WITHDRAWAL OF BID

15.01 An unopened Bid may be withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids. Upon receipt of such notice, the unopened Bid will be returned to the Bidder.

15.02 If a Bidder wishes to modify its Bid prior to Bid opening, Bidder must withdraw its initial Bid in the manner specified in Paragraph 15.01 and submit a new Bid prior to the date and time for the opening of Bids.

15.03 If within 24 hours after Bids are opened any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, the Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, if the Work is rebid, the Bidder will be disqualified from further bidding on the Work.

ARTICLE 16—OPENING OF BIDS

16.01 Bids will be opened at the time and place indicated in the advertisement or invitation to bid and, unless obviously non-responsive, read aloud publicly. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 17—BIDS TO REMAIN SUBJECT TO ACCEPTANCE

17.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 18—EVALUATION OF BIDS AND AWARD OF CONTRACT

18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner also reserves the right to waive all minor Bid informalities not involving price, time, or changes in the Work.

18.02 Owner will reject the Bid of any Bidder that Owner finds, after reasonable inquiry and evaluation, to not be responsible.

18.03 If Bidder purports to add terms or conditions to its Bid, takes exception to any provision of the Bidding Documents, or attempts to alter the contents of the Contract Documents for purposes of the Bid, whether in the Bid itself or in a separate communication to Owner or Engineer, then Owner will reject the Bid as nonresponsive.

18.04 If Owner awards the contract for the Work, such award will be to the responsible Bidder submitting the lowest responsive Bid.

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18.05 *Evaluation of Bids*

A. In evaluating Bids, Owner will consider whether the Bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

B. For determination of the apparent lowest responsive and responsible Bidder, Bids will be compared on the basis of the Lump Sum Price along with potential additional costs for Additive or Deductive Additional Work Bid Items determined at the Owner's discretion.

18.06 *Protests of Solicitation*

A. Bidders are directed to the protest procedures contained in OAR 137-049-260:

1. (3)(a) An Offeror may protest Specifications or Contract terms and conditions. Unless otherwise specified in the Solicitation Document, an Offeror must deliver a Written protest on those matters to the Contracting Agency not less than 10 Days prior to Closing;

2. (b) Content of Protest.

a. (A) An Offeror's Written protest shall include:

1) (i) A detailed statement of the legal and factual grounds for the protest;

2) (ii) A description of the resulting prejudice to the Offeror; and

3) (iii) A statement of the desired changes to the Contract terms and conditions, including any Specifications.

18.07 *Protests of Contract Award*

A. Bidders are directed to the protest procedures contained in OAR 137-049-450:

1. (4) Right to Protest Award.

a. (a) An adversely affected or aggrieved Offeror may submit to the Contracting Agency a Written protest of the Contracting Agency's intent to Award within seven Days after issuance of the notice of intent to Award the Contract, unless a different protest period is provided under the Solicitation Document.

b. (b) The Offeror's protest must be in Writing and must specify the grounds upon which the protest is based.

c. (c) An Offeror is adversely affected or aggrieved only if the Offeror is eligible for Award of the Contract as the Responsible Bidder submitting the lowest Responsive Bid or the Responsible Proposer submitting the best Responsive Proposal and is next in line for Award, i.e., the protesting Offeror must claim that all lower Bidders or higher-scored Proposers are ineligible for Award:

1) (A) Because their Offers were nonresponsive; or

2) (B) The Contracting Agency committed a substantial violation of a provision in the Solicitation Document or of an applicable Procurement statute or administrative rule, and the protesting Offeror was unfairly evaluated and would have, but for such substantial violation, been the Responsible Bidder

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offering the lowest Bid or the Responsible Proposer offering the highest-ranked Proposal.

d. (d) The Contracting Agency shall not consider a protest submitted after the time period established in this rule or such different period as may be provided in the Solicitation Document. A Proposer may not protest a Contracting Agency's decision not to increase the size of the Competitive Range above the size of the Competitive Range set forth in the RFP.

2. (5) Right to Protest Competitive Range.

a. (a) An adversely affected or aggrieved Bidder may submit to the Contracting Agency a Written protest of the Contracting Agency's decision to exclude the Bidder from the Competitive Range within seven Days after issuance of the notice of the Competitive Range, unless a different protest period is provided under the Solicitation Document. (See procedural requirements for the use of RFPs at OAR 137-049-0650.)

b. (b) The Bidder's protest shall be in Writing and must specify the grounds upon which the protest is based.

c. (c) A Bidder is adversely affected only if the Bidder is responsible and submitted a Responsive Bid and is eligible for inclusion in the Competitive Range, i.e., the protesting Bidder must claim it is eligible for inclusion in the Competitive Range if all ineligible higher-scoring Bidders are removed from consideration, and that those ineligible Bidders are ineligible for inclusion in the Competitive Range because:

1) (A) Their Bids were not responsive; or

2) (B) The Contracting Agency committed a substantial violation of a provision in the RFP or of an applicable Procurement statute or administrative rule, and the protesting Bidder was unfairly evaluated and would have, but for such substantial violation, been included in the Competitive Range.

ARTICLE 19—BONDS AND INSURANCE

19.01 Article 6 of the General Conditions sets forth Owner's requirements as to performance and payment bonds, other required bonds (if any), and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it must be accompanied by required bonds and insurance documentation.

19.02 Article 8, Bid Security, of these Instructions, addresses any requirements for providing bid bonds as part of the bidding process.

ARTICLE 20—SIGNING OF AGREEMENT

20.01 When Owner issues a Notice of Award to the Successful Bidder, it will be accompanied by the unexecuted counterparts of the Agreement along with the other Contract Documents as identified in the Agreement. Within 15 days thereafter, Successful Bidder must execute and deliver the required number of counterparts of the Agreement and any bonds and insurance documentation required to be delivered by the Contract Documents to Owner. Within 10 days thereafter, Owner will deliver one fully executed counterpart of the Agreement to Successful

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Bidder, together with printed and electronic copies of the Contract Documents as stated in Paragraph 2.02 of the General Conditions.

ARTICLE 21— PREVAILING WAGES

21.01 The Contractor shall abide by ORS 279c.800 through 279c.870 which relate to the prevailing wage rates for the building and construction trades in the state of Oregon. These prevailing wage rates are shown in the published Oregon Bureau of Labor and Industries (BOLI) documentation, which is described in these Contract Documents. Federal Davis-Bacon act requirements also apply, as executed by the United States Department of Labor (DOL). The higher of the two wages shall be paid to all workers as applicable on this project. The Contractor shall be aware of the requirements described elsewhere in these Contract Documents. Both items are referenced and described in the Oregon DEQ form "Prevailing Wage Agreement" included in these Contract Documents, which is a form that is required to be completed by the Contractor and submitted at the time of bid placement.

21.02 Bidders are advised to examine and to be thoroughly familiar with such requirements. No claim for additional compensation will be allowed that is based upon a lack of knowledge of these requirements or a failure to include adequate increases in such wages over the term of this Contract in the Bidder's bid price.

ARTICLE 22— PREVAILING WAGE RATE FORMS

22.01 Before payment is made by the Owner of any sums due under this Contract, the Owner must receive from the Contractor and each subcontractor or agent a copy of all required BOLI & DOL forms and Weekly Certified Payrolls from the Contractor and each subcontractor or agent.

22.02 Upon completion of this contract, the Owner must receive from the Contractor and each subcontractor a copy of all required BOLI and DOL forms for project closeout.

22.03 These forms and any required affidavits will be required before any funds retained are released to the Contractor. Forms may be obtained from BOLI and DOL. In some cases fees are required to accompany forms submitted. The Contractor is responsible for payment of these fees and shall make all applications directly to BOLI/DOL. These fees shall be incidental to all bid items of this Contract.

ARTICLE 23—NONDISCRIMINATION

23.01 During the performance of this contract, the Contractor shall comply with all federal and state nondiscrimination laws, including, but not limited to 42 U.S.C. 12101 et seq, the Americans with Disabilities Act (ADA).

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SECTION 00 40 00 - BID FORM

(To be submitted with Bid)

MAHLER WATER RECLAMATION FACILITY
SLUDGE BLEND TANK DESIGN-BUILD
CITY OF SWEET HOME, OREGON

THIS BID IS SUBMITTED TO: City of Sweet Home
Attn: Greg Springman, Public Works Director
3225 Main Street
Sweet Home, OR 97386

1.01 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

2.01 Bidder accepts all of the terms and conditions of the Advertisement for Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. The Bid will remain subject to acceptance for 30 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of OWNER.

2.02 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.06 of the General Conditions on or before the **dates or within the number of calendar days indicated in the Agreement.**

2.03 Bidder agrees to complete the Work in accordance with the contract times provided in Article 3 of the Agreement.

2.04 Bidder accepts the provisions of the Agreement as to liquidated damages as stipulated in Article 2~~3~~.03 of the Agreement and in the General Conditions.

3.01 Refer to the Instructions to Bidders for forms and documents that must be executed in full and submitted with the bid.

3.02 The terms used in this Bid with initial capital letters have the meanings indicated in the Instructions to Bidders, and the General Conditions.

3.03 In submitting this Bid, Bidder represents, as set forth in the Agreement, that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data and documents identified in the Bidding Documents, and the following Addenda, receipt of all which is hereby acknowledged.

Addendum No.	**Addendum Date**

B. Bidder has become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.

D. Bidder has carefully studied all conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site.

E. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

F. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.

I. Bidder has given OWNER written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by OWNER is acceptable to Bidder.

J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

4.01 Bidder further represents that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any individual or entity to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.

5.01 Bidder will complete the Work in accordance with the Contract Documents for the price described in the following bid schedule within the time of completion specified in the Agreement.

BID SCHEDULE

Bidder shall submit a Bid as set forth in the Bid form. Submission of Bids on this schedule signifies Bidder's willingness to enter into a Contract for the price offered. Bidders offering a Bid on this schedule must be capable of completing the Work within the time period stated in the Agreement. OWNER may elect to delete any bid item from the work.

1.01 LUMP SUM WORK

A. Bidder proposes and agrees to accept as full payment the following bid amount for the Mahler WRF Sludge Blend Tank Design-Build proposed within the Bidding Documents, and certifies that this amount is based upon the undersigned's own estimate of quantities and costs and includes sales, consumer, use, and other taxes, except as provided below, overhead and profit.

B. Lump Sum Bid Price: $_____

1.02 ADDITIVE AND DEDUCTIVE UNIT PRICE WORK BID ITEMS

Provide unit prices for increased (additive) or reduced (deductive) quantities of the following Additive and Deductive (AD) Unit Price Work Bid Items. Lump Sum Bid Price shall include the Base Bid Quantity noted for each AD Bid Item. Additive (Add) Unit Prices shall be for actual construction quantities in excess of the Base Bid Quantity. Deductive (Deduct) Unit Prices shall be for quantities less than the Base Bid Quantity. Engineer shall confirm all quantities for Additive or Deductive Unit Price Work Bid Items.

AD-1. Rock Excavation
Base Bid Quantity included with Lump Sum Bid: **Quantity Undetermined**
Add $_____ per Cubic Yard for additional Rock Excavation Write in Amount:

Bidder Identification and Signatures

Name of Firm: _____

Federal Tax ID No: _____

State of Incorporation and Oregon CCB License No: _____

Bidder ☐ IS / ☐ IS NOT a "Resident Bidder" as defined by ORS 279.029.

Signature and Printed Name(s): *(If Bidder is a partnership or joint venture, all parties must sign below)*

_____ _____

_____ _____

Title _____

Date _____

END OF SECTION

BID BOND (PENAL SUM FORM)

Bidder	**Surety**
Name:	Name:
Address *(principal place of business)*:	Address *(principal place of business)*:
Owner	**Bid**
Name: City of Sweet Home, Oregon	Project *(name and location)*:
Address *(principal place of business)*:	Mahler Water Reclamation Facility Sludge Blend Tank Design-Build 1357 Pleasant Valley Road Sweet Home, OR 97386
3225 Main Street Sweet Home, OR 97386	Bid Due Date: January 24, 2023
Bond	
Penal Sum:	
Date of Bond:	

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth in this Bid Bond, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

Bidder	Surety
_____	_____
(Full formal name of Bidder)	*(Full formal name of Surety) (corporate seal)*
By: _____	By: _____
(Signature)	*(Signature) (Attach Power of Attorney)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title: _____	Title: _____
Attest: _____	Attest: _____
(Signature)	*(Signature)*
Name: _____	Name: _____
(Printed or typed)	*(Printed or typed)*
Title:	Title:

Notes: (1) Note: Addresses are to be used for giving any required notice. (2) Provide execution by any additional parties, such as joint venturers, if necessary.

EJCDC® C-430, Bid Bond (Penal Sum Form).
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1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond will be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder occurs upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation will be null and void if:
    3.1. Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
    3.2. All Bids are rejected by Owner, or
    3.3. Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions does not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action will be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety, and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond will be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder must be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Postal Service registered or certified mail, return receipt requested, postage pre-paid, and will be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond will be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute governs and the remainder of this Bond that is not in conflict therewith continues in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

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SECTION 00 43 37 - FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM

(To Be Submitted After Bid)

FOR

CITY OF SWEET HOME
MAHLER WATER RECLAMATION FACILITY
SLUDGE BLEND TANK DESIGN-BUILD

Bid Closing: **January 24, 2023** at 2:00 p.m.

Disclosure Submittal Deadline**: January 24, 2023** at 4:00 p.m.

This form must be completed, signed and submitted at the location specified in the Invitation to Bid on the advertised bid closing date and within two working hours after the advertised bid closing time.

Bidders are required to disclose information about certain first-tier subcontractors (see ORS 279C.370). Specifically, when the contract amount of a first-tier subcontractor furnishing labor and material would be greater than or equal to: (i) 5% of the project Bid, but at least $15,000; or (ii) $20,000 regardless of the percentage, the Bidder must disclose the following information about that subcontractor either in its Bid submission, or within two hours after Bid Closing.

List below the names of each subcontractor that will be furnishing labor or furnishing labor and materials and that are required to be disclosed, the category of work that the subcontractor will be performing and the dollar value of the subcontract. Enter 'NONE' if there are no subcontractors that are required to be disclosed. (ATTACH ADDITIONAL SHEETS IF NEEDED).

Subcontractor Name	Dollar Value	Category of Work

Failure to submit this form by the disclosure deadline will result in a nonresponsive bid. A nonresponsive bid will not be considered for award.

Form Submitted by (Bidder Name): _____

Contact Name: _____ **Phone No.:** _____

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SECTION 00 45 19 – NON-COLLUSION AFFIDAVIT

(To be submitted with Bid)

MAHLER WATER RECLAMATION FACILITY
SLUDGE BLEND TANK DESIGN-BUILD
CITY OF SWEET HOME, OREGON

STATE OF OREGON
COUNTY OF LINN

I state that I am_____(title) of_____(name of firm) and that I am authorized to make this affidavit on behalf of my firm and its owners, directors, and officers. I am the person responsible in my firm for the price(s) and the amount of this bid.

I state that:

(1) The price(s) and amount of this bid have been arrived at independently and without consultation, communication, or agreement with any other contractor, bidder, or potential bidder, except as disclosed on the attached appendix.

(2) Neither the price(s) nor the amount of this bid, and neither the approximate price(s) nor approximate amount of this bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be disclosed before bid opening.

(3) No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, to submit a bid higher than this bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.

(4) The bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive bid.

(5) _____(name of firm), its affiliates, subsidiaries, officers, directors and employees are not currently under investigation by any governmental agency for violating any non-collusion statutes and have not in the last four years been convicted of or found liable for any act prohibited by state or federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as described in the attached appendix.

I state that_____(name of firm) understands and acknowledges that the above representations are material and important and will be relied on by the City of Sweet Home in awarding the contract(s) for which this bid is submitted. I understand, and my firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from the City of Sweet Home of the true facts relating to the submission of bids for this contract.

_____
Authorized Signature

_____
Name of Company / Position

Sworn to and subscribed before me this_____day of_____, 20____.

_____ _____
Notary Public for the State of Oregon My Commission Expires

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AGREEMENT
BETWEEN OWNER AND DESIGN-BUILDER
ON THE BASIS OF A STIPULATED PRICE

THIS AGREEMENT is by and between City of Sweet Home, Oregon ("Owner"), and [ ] ("Design-Builder").

PROJECT INFORMATION

Project: Mahler Water Reclamation Facility Interim Improvements Project

Design-Build Contract: Mahler Water Reclamation Facility Sludge Blend Tank Design-Build ("Contract")

Owner's Consultant: West Yost Associates, Inc .

Engineer: Design-Builder has retained [ ] ("Engineer") for the performance of professional engineering services under this Contract.

Authorized Representatives: Owner and Design-Builder each hereby designates a specific individual authorized to act as representative with respect to the performance of responsibilities under this Contract. Such an individual shall have authority to transmit instructions, receive formal notices, receive information, and render decisions relative to this Contract on behalf of the respective party that the individual represents.

1. Owner's Authorized Representative:
   West Yost Associates, Inc.
   Preston Van Meter, Principal Engineer
   5 Centerpointe Dr #130, Lake Oswego, OR 97035

   503.451.2161
   pvanmeter@westyost.com

2. Design-Builder's Authorized Representative: [ ] ***[include mailing and delivery addresses, e-mail address, telephone numbers]***

Owner and Design-Builder further agree as follows:

ARTICLE 1 – THE WORK

1.01 *General Description of Work*

A. Design-Builder shall complete all Work as specified or indicated in the Contract. The Work is generally described as the design and construction of the following: new 100,000-gallon cast-in-place concrete Sludge Blend Tank including appurtenances and associated site work.

ARTICLE 2 – CONTRACT TIMES

2.01 *Time of the Essence*

A. All time limits for Design-Builder's attainment of Milestones, if any, Substantial Completion, and completion and readiness for final payment, as stated in the Contract, are of the essence of the Contract.

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2.02 *Contract Times: Dates*

A. Design-Builder will substantially complete the Work on or before April 27, 2023.

B. Design-Builder will have the Work completed and ready for final payment, in accordance with Paragraph 14.06 of the General Conditions, on or before June 16, 2023.

C. Design-Builder shall attain the following Milestone(s):

1. Milestone 1: Design-Builder shall have submitted tank shop drawings and all associated Project submittals on or before February 9, 2023.

2.03 *Liquidated Damages*

A. Design-Builder and Owner recognize that time is of the essence as stated in Paragraph 2.01 above, and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the times specified in Paragraph 2.02 above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving, in a lawsuit or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Design-Builder agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Design-Builder shall pay Owner $500 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified in Paragraph 2.02.A above for Substantial Completion until the Work is substantially complete.

2. Completion of Remaining Work: After Substantial Completion, if Design-Builder shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Design-Builder shall pay Owner $500 for each day that expires after such time until the Work is completed and ready for final payment.

3. Liquidated damages for failing to timely attain Substantial Completion, final completion, and Milestones (if applicable) are not additive, and will not be imposed concurrently. Liquidated damages for failing to attain Substantial Completion shall take precedence.

ARTICLE 3 – CONTRACT PRICE

3.01 *Stipulated Sums*

A. Owner shall pay Design-Builder for completion of the Work in accordance with the Contract Documents the amounts that follow, subject to adjustment under the Contract:

1. For all Work other than Unit Price Work, a lump sum of: $[ ].

3.02 *Changes in Contract Price Based on Cost of the Work*

A. If the price of Design Professional Services covered by a Change Order or an adjustment in the Contract Price is determined on the basis of Cost of the Work, then for such Design Professional Services (exclusive of reimbursable expenses, if any) the Engineer, Project Design Professional, or other design entity performing the Design Professional Services (regardless of tier) may invoice no more than the direct labor cost of each employee providing services multiplied by a factor of 2.7, which covers labor costs, overhead, and profit.

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B. If the value of Work covered by a Change Order or an adjustment in the Contract Price is determined on the basis of Cost of the Work, and involves Work performed under Construction Subcontracts or Design Agreements, the allowable mark-ups on lower tier invoices shall be limited as stated in Paragraph 11.05.D.2.c and d of the General Conditions.

ARTICLE 4 – PAYMENT PROCEDURES

4.01 *Submittal and Processing of Payments*

A. Design-Builder shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Owner will process Applications for Payment as provided in the General Conditions.

4.02 *Progress Payments; Retainage*

A. Owner shall make progress payments on account of the Contract Price on the basis of Design-Builder's Applications for Payment on or about the 10th day of each month during performance of the Work as provided in Paragraph 4.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.

a. 95 percent of Work completed (with the balance being retainage). If the Work has been 50 percent completed as determined by Owner, and if the character and progress of the Work have been satisfactory to Owner, then as long as the character and progress of the Work remain satisfactory to Owner, there will be no additional retainage; and

b. 95 percent of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Design-Builder to 100 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 14.01.G of the General Conditions, and less 200 percent of Owner's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

C. Notwithstanding the provisions above, no retainage shall be withheld with respect to the portion of a payment application pertaining to engineering, design, and other professional services.

4.03 *Final Payment*

A. Upon final completion and acceptance of the Work in accordance with Paragraph 14.06 of the General Conditions, Owner shall pay the remainder of the Contract Price.

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ARTICLE 5 – INTEREST

5.01 *Interest Rate*

A. All amounts not paid when due shall bear interest at the rate of 6 percent per annum, or if applicable at the rate stated in a governing prompt payment statute.

ARTICLE 6 – DESIGN-BUILDER'S REPRESENTATIONS

6.01 *Representations*

A. Design-Builder makes the following representations for Owner's reliance:

1. Design-Builder has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.

2. Design-Builder has become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

3. Design-Builder is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

4. Design-Builder has carefully studied all: (a) reports of explorations and tests of subsurface conditions at or adjacent to the Site, and all drawings of physical conditions relating to existing surface or subsurface structures at the Site, if any, that Owner has identified or made available to Design-Builder, especially with respect to Technical Data in such reports and drawings, and (b) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site, that Owner has identified or made available to Design-Builder, especially with respect to Technical Data in such reports and drawings.

5. Design-Builder has considered the information known to Design-Builder itself, and to Construction Subcontractors and Project Design Professionals that Design-Builder has selected as of the Effective Date; information commonly known to design professionals, design-builders, and contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings (if any) identified in the Contract Documents or otherwise made available to Design-Builder, with respect to the effect of such information, observations, and documents on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Design-Builder; and (c) Design-Builder's safety precautions and programs.

6. Based on the information and observations referred to in the preceding paragraph, Design-Builder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary prior to entry into the Contract at the Contract Price, subject to the Contract Times.

7. Design-Builder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

8. Design-Builder has given Owner written notice of all conflicts, errors, ambiguities, or discrepancies that Design-Builder has discovered in the Contract Documents, and the written response from Owner is acceptable to Design-Builder.

9. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

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10. Design-Builder's entry into this Contract constitutes an incontrovertible representation by Design-Builder that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

ARTICLE 7 – CONTRACT DOCUMENTS

7.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement.
2. Performance bond.
3. Payment bond.
4. Design-Builder's Exhibit of Warranty Guarantee.
5. General Conditions.
6. Technical Specifications
7. Conceptual Documents:
    a. Cover Sheet, Vicinity and Location Maps
    b. Overall Site Plan and Staging Areas Plan
    c. Solids Area Detail Plan & Details
    d. Tank Mechanical Sections and Details
    e. Structural Design Criteria
8. Addenda (numbers [ ] to [ ], inclusive).
9. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:
    a. Work Change Directives.
    b. Change Orders.
    c. Record Drawings and Record Specifications

B. The documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 7.

D. The Contract Documents may only be amended, modified, or supplemented as provided in the General Conditions.

ARTICLE 8 – MISCELLANEOUS

8.01 *Terms*

A. Terms used in this Agreement will have the meanings stated in the General Conditions and Supplementary Conditions.

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8.02 *Assignment of Contract*

A. Unless expressly agreed to elsewhere in the Contract, no assignment by a party hereto of any rights under or interests in the Contract will be binding on the other party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, money that may become due and money that is due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract.

8.03 *Successors and Assigns*

A. Owner and Design-Builder each binds itself, its successors, assigns, and legal representatives to the other party hereto, and its successors, assigns, and legal representatives, in respect to all covenants, agreements, and obligations contained in the Contract.

8.04 *Severability*

A. Any provision or part of the Contract held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Design-Builder, who agree that the Contract shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

8.05 *Design-Builder's Certifications*

A. Design-Builder certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.05:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

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IN WITNESS WHEREOF, Owner and Design-Builder have signed this Agreement.

This Agreement will be effective on _____ (which is the Effective Date of the Contract).

OWNER:	DESIGN-BUILDER:
City of Sweet Home, Oregon	
By:	By:
Title:	Title:
	[If Design-Builder is a corporation, partnership, LLC, or a joint venture, attach evidence of authority to sign. In the case of a joint venture, expand the signature section to accommodate execution of the Agreement by an authorized representative of each joint venturer.]
Attest:	Attest:
Title:	Title:
Address for giving notices:	Address for giving notices:
3225 Main Street	
Sweet Home, OR 97386	
	License No.: _____ *(where applicable)*
[If Owner is a corporation, partnership, or LLC, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.]	***NOTE(S) TO USER: Use in those states or other jurisdictions where licensing is applicable or required.***

EJCDC® D-520, Agreement Between Owner and Design-Builder on the Basis of a Stipulated Price.
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ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

DESIGN-BUILD PERFORMANCE BOND

DESIGN-BUILDER *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER: **City of Sweet Home**
1400 24th Ave., Sweet Home, OR 97386

DESIGN-BUILD CONTRACT
Effective Date of the Contract:
Amount:
Description *(name and location)*:

BOND
Bond Number:
Date *(not earlier than the Effective Date of the Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☐ See Paragraph 16

Surety and Design-Builder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Design-Build Performance Bond to be duly executed by an authorized officer, agent, or representative. ***[Note: Provide supplemental execution by any additional parties, such as joint venturers.]***

DESIGN-BUILDER AS PRINCIPAL	**SURETY**
_____	_____
Design-Builder's Name	Surety's Name
By: _____	**By:** _____
Signature	Signature *(attach power of attorney)*
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	**Attest:** _____
Signature	Signature
_____	_____
Title	Title

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1. The Design-Builder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Design-Build Contract, which is incorporated herein by reference.

2. If the Design-Builder performs the Design-Build Contract, the Surety and the Design-Builder shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Design-Build Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Design-Builder and the Surety that the Owner is considering declaring a Design-Builder Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Design-Builder, and Surety to discuss the Design-Builder's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Design-Builder, and the Surety agree, the Design-Builder shall be allowed a reasonable time to perform the Design-Build Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Design-Builder Default;

3.2 The Owner declares a Design-Builder Default, terminates the Design-Build Contract, and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Design-Build Contract Price in accordance with the terms of the Design-Build Contract to the Surety, or to a design-builder or contractor selected to perform the Design-Build Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Design-Builder, with the consent of the Owner, to perform and complete the Design-Build Contract;

5.2 Undertake to perform and complete the Design-Build Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified design-builders or contractors acceptable to the Owner for a contract for performance and completion of the Design-Build Contract, arrange for a contract to be prepared for execution by the Owner and a design-builder or contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Design-Build Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Design-Build Contract Price incurred by the Owner as a result of the Design-Builder Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new design-builder or contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

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7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Design-Builder under the Design-Build Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Design-Build Contract. Subject to the commitment by the Owner to pay the Balance of the Design-Build Contract Price, the Surety is obligated, without duplication, for:

7.1 the responsibilities of the Design-Builder for correction of defective work and completion of the Design-Build Contract;

7.2 additional legal, design professional, and delay costs resulting from the Design-Builder's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Design-Build Contract, actual damages caused by delayed performance or non-performance of the Design-Builder.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Design-Builder that are unrelated to the Design-Build Contract, and the Balance of the Design-Build Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Design-Build Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction where the construction portion of the Project is located, and shall be instituted within two years after a declaration of Design-Builder Default, or within two years after the Design-Builder ceased working, or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice under this Bond to the Surety, the Owner, or the Design-Builder shall be in writing, and mailed or delivered to the recipient's address as shown in this Bond.

13. When this Bond has been furnished to comply with a statutory or other legal requirement where the construction portion of the Project is located, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted from this Bond and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Design-Build Contract Price: The total amount payable by the Owner to the Design-Builder under the Design-Build Contract after all proper adjustments have been made including allowance for the Design-Builder for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Design-Builder is entitled, reduced by all valid and proper payments made to or on behalf of the Design-Builder under the Design-Build Contract.

14.2 Design-Build Contract: The agreement between the Owner and Design-Builder identified as such in this Bond, including all Contract Documents and changes duly made to such Design-Build Contract.

14.3 Design-Builder Default: Failure of the Design-Builder, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Design-Build Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Design-Builder as required under the Design-Build Contract, or to perform and complete or comply with the other material terms of the Design-Build Contract.

14.5 Contract Documents: All the documents that comprise the contract between the Owner and Design-Builder.

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15. Any singular reference to Design-Builder, Surety, Owner, or other party shall be considered plural where applicable.

16. Modifications to this Bond are as follows:

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DESIGN-BUILD PAYMENT BOND

DESIGN-BUILDER *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*: **City of Sweet Home**
1400 24th Ave., Sweet Home, OR 97386

DESIGN-BUILD CONTRACT

Effective Date of the Contract:
Amount:
Description *(name and location)*:

BOND

Bond Number:
Date *(not earlier than the Effective Date of the Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☐ See Paragraph 18

Surety and Design-Builder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative. ***[Note: Provide supplemental execution by any additional parties, such as joint venturers.]***

DESIGN-BUILDER AS PRINCIPAL	**SURETY**
_____	_____
Design-Builder's Name	Surety's Name
By: _____	**By:** _____
Signature	Signature *(attach power of attorney)*
_____	_____
Print Name	Print Name
_____	_____
Title	Title
Attest: _____	**Attest:** _____
Signature	Signature
_____	_____
Title	Title

EJCDC® D-615, Design-Build Payment Bond.
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1. The Design-Builder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, services, materials, and equipment furnished for use in the performance of the Design-Build Contract, which is incorporated herein by reference, subject to the following terms.

2. If the Design-Builder promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, services, materials, or equipment furnished for use in the performance of the Design-Build Contract, then the Surety and the Design-Builder shall have no obligation under this Bond.

3. If there is no Owner Default under the Design-Build Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Design-Builder and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, services, materials, or equipment furnished for use in the performance of the Design-Build Contract, and tendered defense of such claims, demands, liens, or suits to the Design-Builder and the Surety.

4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.

5. The Surety's obligations to a Claimant under this Bond shall arise after the following:

5.1 Claimants that do not have a direct contract with the Design-Builder,

5.1.1 have furnished a written notice of non-payment to the Design-Builder, stating with substantial accuracy the amount claimed and the name of the party to which the materials were, or equipment was, furnished or supplied, or for which the labor was done or performed, within ninety (90) days after having last performed labor or services, or last furnished materials or equipment included in the Claim; and

5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).

5.2 Claimants who are employed by or have a direct contract with the Design-Builder have sent a Claim to the Surety (at the address described in Paragraph 13).

6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Design-Builder, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.

7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

7.2 Pay or arrange for payment of any undisputed amounts.

7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Design-Builder may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

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8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

9. Amounts owed by the Owner to the Design-Builder under the Design-Build Contract shall be used for the performance of the Design-Build Contract and to satisfy claims, if any, under any design-build performance bond. By the Design-Builder furnishing and the Owner accepting this Bond, they agree that all funds earned by the Design-Builder in the performance of the Design-Build Contract are dedicated to satisfy obligations of the Design-Builder and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Design-Builder that are unrelated to the Design-Build Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.

11. The Surety hereby waives notice of any change, including changes of time, to the Design-Build Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction where the construction portion of the Project is located, or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Design-Build Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Design-Builder shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

14. When this Bond has been furnished to comply with a statutory or other legal requirement where the construction portion of the Project is located, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted from this Bond and provisions conforming to such statutory or other legal requirement shall be deemed incorporated here. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Design-Builder and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. **Definitions**

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the individual or entity for which the labor or services were done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, services, materials, or equipment were furnished for use in the performance of the Design-Build Contract;
4. A brief description of the labor, services, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or services, or last furnished materials or equipment, for use in the performance of the Design-Build Contract;
6. The total amount earned by the Claimant for labor, services, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and

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8. The total amount due and unpaid to the Claimant for labor, services, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Design-Builder or with a subcontractor of the Design-Builder to furnish labor, services, materials, or equipment for use in the performance of the Design-Build Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, services, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Design-Build Contract, architectural and engineering services required for performance of the work of the Design-Builder and the Design-Builder's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Design-Build Contract:** The agreement between the Owner and Design-Builder identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default**: Failure of the Owner, which has not been remedied or waived, to pay the Design-Builder as required under the Design-Build Contract, or to perform and complete or comply with the other material terms of the Design-Build Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Design-Builder.

17. Any singular reference to Design-Builder, Surety, Owner, or other party shall be considered plural where applicable.

18. Modifications to this Bond are as follows:

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STANDARD GENERAL CONDITIONS OF THE CONTRACT BETWEEN OWNER AND DESIGN-BUILDER

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STANDARD GENERAL CONDITIONS OF THE CONTRACT BETWEEN OWNER AND DESIGN-BUILDER

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Wherever used in the Contract Documents and printed with initial capital letters, the following terms have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda:* Written or graphic instruments issued by Owner prior to the opening of Proposals which clarify, correct, or change the Request for Qualifications, Request for Proposals, or the proposed Contract Documents, including the Conceptual Documents.

2. *Agreement:* The written instrument, executed by Owner and Design-Builder, that sets forth the Contract Price and Contract Times, identifies the parties, and designates the specific items that are Contract Documents.

3. *Application for Payment:* The form which is to be used by Design-Builder during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

4. *Authorized Representative:* The individual designated by a party to represent it with respect to this Contract, as indicated in the Agreement.

5. *Change Order:* A document which is signed by Design-Builder and Owner and authorizes an addition, deletion, or revision in the Work, or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.

6. *Claim:* A demand or assertion by Owner or Design-Builder seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A request or proposal for a Change Order is not a Claim.

7. *Conceptual Documents:* The documents prepared by or for the Owner to describe the Work to be performed, issued to Proposers during the design-builder selection process, and expressly identified in the Agreement.

8. *Constituent of Concern:* Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. ("CERCLA"); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. ("RCRA"); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other Laws or Regulations regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.

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9. *Construction:* The part of the Work that consists generally of making physical improvements at the Site, and is the result of performing or furnishing of labor, the furnishing and incorporating of materials and equipment into the Work (including any correction of defective Construction), and the furnishing of services (other than Design Professional Services) and documents, all as required by the Contract Documents and Construction Drawings and Construction Specifications, as duly modified.

10. *Construction Drawings:* Documents prepared by or for Design-Builder, and approved by Owner for purposes of allowing Design-Builder to proceed with the Construction or specific portions of the Construction, and consisting of drawings, diagrams, illustrations, schedules, and other data that graphically show the scope, extent, and character of the Construction (or specific portions of the Construction) to be performed by or for Design-Builder. Construction Drawings are not Contract Documents.

11. *Construction Specifications:* Documents prepared by or for Design-Builder, and approved by Owner for purposes of allowing Design-Builder to proceed with the Construction or a specific portion of the Construction, and consisting of written requirements for materials, equipment, systems, standards, workmanship, and administrative procedures as applied to the Construction (or a specific portion of the Construction). Construction Specifications are not Contract Documents.

12. *Construction Subcontract:* A written agreement between Design-Builder and a Construction Subcontractor for provision of all or a portion of the Construction, and any delegated Design Professional Services.

13. *Construction Subcontractor:* An individual or entity (other than a Supplier) having a direct contract with Design-Builder or with any other Construction Subcontractor for the performance of a part of the Construction, and any delegated Design Professional Services.

14. *Contract:* The entire and integrated written agreement between Owner and Design-Builder concerning the Work.

15. *Contract Documents:* Those items so designated in the Agreement, and which together comprise the Contract.

16. *Contract Price:* The money that Owner has agreed to pay Design-Builder for completion of the Work in accordance with the Contract Documents.

17. *Contract Times:* The numbers of days or the dates stated in the Agreement to (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.

18. *Design-Builder:* The individual or entity with which Owner has contracted for performance of the Work, as designated in the Agreement.

19. *Design Professional Services:* That part of the Work comprised of the furnishing of engineering, surveying, architecture, and other design services, and including but not limited to providing research, analysis, and conclusions regarding engineering and related matters; exercising professional judgment with respect to technical issues; the preparation of plans, reports, calculations, models, schematics, drawings, specifications, Design Submittals, the Construction Drawings, Construction Specifications, and other instruments of service; other services included in the Contract Documents and required to be performed by or under the responsible charge of licensed design professionals; and

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the review of shop drawings, observation of construction, response to requests for information or interpretation, analysis of the technical aspects of Change Orders, and other engineering and related professional services provided by or for licensed design professionals during Construction.

20. *Design Agreement:* A written agreement between Design-Builder and a design firm or entity for provision of Design Professional Services.

21. *Design Submittal:* A Submittal that pursuant to Laws and Regulations or this Contract must be prepared by or under the supervision of a licensed engineer or other licensed design professional, including drawings, specifications, Construction Drawings, Construction Specifications, and revisions to such documents (but not including Record Documents).

22. *Effective Date of the Contract:* The date indicated in the Agreement on which the Contract becomes effective, but if no such date is indicated it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

23. *Engineer:* The Project Design Professional identified as Engineer in the Agreement, and engaged by Design-Builder to provide engineering and related professional services under a Design Agreement.

24. *Hazardous Environmental Condition:* The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.

25. *Laws and Regulations; Laws or Regulations:* Any and all applicable laws, statutes, rules, regulations, ordinances, binding resolutions, codes, decrees, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

26. *Liens:* Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.

27. *Milestone:* A principal event in the performance of the Work that the Contract requires Design-Builder to achieve by an intermediate completion date or by a time prior to Substantial Completion of Construction.

28. *Notice of Award:* The written notice by Owner to a Proposer stating that Owner will enter into the design-build contract with the Proposer.

29. *Notice to Proceed*: A written notice by Owner to Design-Builder fixing the date on which the Contract Times will commence to run and on which Design-Builder shall start to perform the Work.

30. *Owner:* The individual or entity with which Design-Builder has contracted regarding the Work, and which has agreed to pay Design-Builder for the performance of the Work, pursuant to the terms of the Contract.

31. *Owner's Consultant:* An individual or entity with which the Owner has contracted to furnish services (typically including planning, preparation of Conceptual Documents, and

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advisory services) to Owner with respect to the Project, and which is identified as such in the Agreement.

32. *Owner's Site Representative:* A representative of Owner at the Site, as indicated in Paragraph 10.05.

33. *Project:* The total undertaking to be accomplished for Owner by engineers, consultants, Design-Builder, subcontractors, and others, including planning, study, design, construction, testing, start-up, and commissioning, and of which the Work to be performed under the Contract Documents is a part.

34. *Project Design Professionals:* The Engineer and any other independent entities or individuals, or employees of Design-Builder, engaged by Design-Builder or a Construction Subcontractor to provide Design Professional Services with respect to a portion of the Work.

35. *Proposal:* The documents submitted by Design-Builder in response to the Request for Proposals, setting forth technical concepts, proposed prices, and other conditions for the Work to be performed, and stating any proposed revisions, modifications, clarifications, exceptions, or supplements to the proposed Contract Documents.

36. *Proposal Amendment:* A Contract Document that is prepared after submittal of Design-Builder's Proposal; identifies mutually agreed revisions, modifications, exceptions, supplements, and clarifications to the Proposal or proposed Contract Documents; and is executed by Owner and Design-Builder.

37. *Proposer:* An entity that submits a Statement of Qualifications or Proposal to Owner.

38. *Record Documents:* The record copy of all Construction Drawings, Construction Specifications, Addenda, Change Orders, Work Change Directives, and approved Submittals maintained by Design-Builder at the Site, including any annotations to such documents made by Design-Builder during Construction.

39. *Record Drawings and Record Specifications:* Documents depicting the completed Project, or a specific portion of the completed Project, based on or comprised of the Record Documents delivered to Owner by Design-Builder at the completion of the Construction.

40. *Request for Proposals:* The document prepared by or for Owner specifying and describing Owner's objectives, the procedures to be followed in preparing and submitting a Proposal, and the process for evaluating Proposals and awarding a contract.

41. *Request for Qualifications:* The document prepared by or for Owner requesting that Proposers submit a Statement of Qualifications with respect to their candidacy for selection as Design-Builder.

42. *Schedule of Values:* A schedule, prepared and maintained by Design-Builder, allocating portions of the Contract Price to various portions of the Work, and used as the basis for reviewing Design-Builder's Applications for Payment.

43. *Site:* Lands or areas indicated in the Contract Documents as being furnished by Owner upon which Construction is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for use of Design-Builder.

44. *Statement of Qualifications:* The document submitted by a Proposer in response to the Request for Qualifications, including any completed forms, attachments, and exhibits.

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45. *Submittal*: A written or graphic document, prepared by or for Design-Builder, which the Contract Documents require the Design-Builder to submit to the Owner. Submittals may include reports, preliminary drawings and specifications, cost estimates, proposed Construction Drawings and Construction Specifications, progress schedules, cash flow projections, Schedules of Values, shop drawings, product data, samples, delegated designs, certifications, proposed modifications to the Construction Drawings and Construction Specifications, results of tests and evaluations, results of source quality control testing and inspections, results of field or Site quality control testing and evaluations, sustainable design information, information on special procedures, operations and maintenance data, sustainable design closeout information, record documents, records of spare parts and extra stock materials, and other such documents required by the Contract Documents. Submittals, whether approved or accepted by Owner or not, are not Contract Documents. Claims, notices, Change Orders, Applications for Payment, and requests for information/interpretation are not Submittals.

46. *Substantial Completion:* The time at which the Construction (or a specified part thereof) has progressed to the point where it is sufficiently complete, in accordance with the Contract Documents, so that the Construction (or the specified part thereof) can be utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to all or part of the Construction refer to Substantial Completion thereof.

47. *Supplementary Conditions:* The part of the Contract Documents which amends or supplements these General Conditions.

48. *Supplier:* A manufacturer, fabricator, supplier, distributor, or vendor having a direct contract with Design-Builder or with any Construction Subcontractor to furnish materials or equipment to be incorporated in the Work by Design-Builder or a Construction Subcontractor, and any lessor of rental equipment used by Design-Builder or a Construction Subcontractor during Construction at the Site.

49. *Technical Data:* Data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding (a) subsurface conditions at the Site, (b) physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities), or (c) environmental conditions at the Site, that are set forth in any geotechnical or environmental report prepared for the Project and relied upon by Design-Builder in agreeing to a price (either stipulated, or a Guaranteed Maximum Price) that includes Construction.

50. *Underground Facilities:* All underground lines, pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or systems, including but not limited to those that produce, transmit, distribute, or convey telephone or other communications, cable television, fiber optic transmissions, power, electricity, light, heat, gases, oil, crude products, liquid petroleum products, water, steam, waste, wastewater, storm water, other liquids or chemicals, fire or police signal systems, or traffic or other control systems; and any encasements containing such facilities or systems.

51. *Underground Facilities Data:* Information and data shown or indicated in the Contract Documents or otherwise provided to Design-Builder by Owner with respect to existing Underground Facilities at or adjacent to the Site.

52. *Unit Price Work:* Work to be paid for on the basis of unit prices.

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53. *Work:* The entire design and construction or the various separately identifiable parts thereof required to be performed or furnished by Design-Builder under the Contract Documents. Work includes and is the result of performing or furnishing Design Professional Services and Construction required by the Contract Documents and all labor, services, and documentation necessary to produce such Design Professional Services and Construction; furnishing, installing, and incorporating all materials and equipment into such Construction; and related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

54. *Work Change Directive:* A written directive to Design-Builder, issued on or after the Effective Date of the Contract, signed by Owner, ordering an addition, deletion or revision in the Work.

1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B are not defined terms that require initial capital letters, but when used in the Contract Documents have the indicated meanings.

B. *Intent of Certain Terms or Adjectives:*

1. The word "day" shall constitute a calendar day of 24 hours measured from midnight to the next midnight.

2. The word "defective," when modifying the word "Construction" refers to Construction that is unsatisfactory, faulty, or deficient in that it does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to Owner's final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion) provided that the defect was not caused by Owner.

3. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.

4. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials or equipment or equipment complete and ready for intended use.

5. The words "perform" or "provide" when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.

6. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Design-Builder, "provide" is implied.

7. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with that meaning.

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ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

A. *Bonds:* When Design-Builder delivers the executed Agreements to Owner, Design-Builder shall also deliver to Owner such Bonds as Design-Builder may be required to furnish in accordance with Paragraph 6.01.A.

B. *Evidence of Insurance*: Before any Work is started, Design-Builder and Owner shall each deliver to the other those certificates of insurance that Design-Builder and Owner respectively are required to purchase and maintain in accordance with Article 6.

2.02 *Copies of Documents*

A. Owner shall furnish to Design-Builder four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.

B. Owner shall maintain and safeguard at least one original printed record version of the Contract. Owner shall make such original printed record version of the Contract available to Design-Builder for review.

2.03 *Conceptual Documents*

A. *Design-Builder's Review of Conceptual Documents:*

1. Design-Builder acknowledges that the Conceptual Documents furnished by Owner are preliminary and incomplete, and subject to stated limitations and reservations.

2. Design-Builder shall carefully review, analyze, and verify the contents and suitability of the Conceptual Documents before proceeding with the Work (including but not limited to the Design Professional Services).

3. Design-Builder shall promptly report in writing to Owner any conflict, error, ambiguity, or discrepancy that Design-Builder may discover in the Conceptual Documents, whether during such review or at any later point.

4. Upon receipt of a report from Design-Builder that there is a conflict, error, ambiguity, or discrepancy in the Conceptual Documents, Owner shall either provide a written interpretation, clarification, or correction to Design-Builder, or authorize Design-Builder to correct or resolve the issue under a Change Order providing an equitable adjustment in Contract Times or Contract Price, or both.

5. Design-Builder shall not proceed with any Work affected by a reported conflict, error, ambiguity, or discrepancy in the Conceptual Documents until the issue is resolved.

B. Owner shall not be responsible for any deficiency in the Conceptual Documents that Design-Builder does not discover or report to Owner.

C. Subject to the foregoing review and reporting obligations, Design-Builder may use the Conceptual Documents as a partial basis for performing or furnishing Design Professional Services, including the preparation of Design Submittals such as the Construction Drawings and Construction Specifications, but despite any such use of the Conceptual Documents the Design-Builder nonetheless shall be responsible to Owner for the quality and soundness of the Design Professional Services.

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2.04 *Before Starting the Work*

A. *Preliminary Schedules:* Within 10 days after commencement of the Contract Times (unless otherwise specified in the Contract Documents), Design-Builder shall submit the following to Owner for Owner's timely review:

1. Three (3) copies of a preliminary progress schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2. A preliminary schedule of Submittals (including Design Submittals) which will list each required Submittal and the times for submitting, reviewing, and processing each Submittal;

3. A preliminary Schedule of Values for all of the Work which will include quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work; and

4. A preliminary cash flow projection estimating that portion of the Contract Price to be due during each month of performance.

2.05 *Authorized Representatives*

A. The Authorized Representative for each party has been designated in the Agreement. A party may change its Authorized Representative at any time by giving notice to the other party of the name, mailing and delivery addresses, e-mail address, and telephone numbers of the new Authorized Representative.

2.06 *Initial Conference*

A. Within 20 days after the Contract Times start to run, Design-Builder will arrange a conference attended by Owner and Design-Builder and others as appropriate to establish a working understanding among the parties as to the Work and to discuss the design concepts, schedules referred to in Paragraph 2.04.A, procedures for handling Submittals, processing Applications for Payment, maintaining required records, and other matters.

2.07 *Review of Schedules*

A. Not less than 10 days before submission of the first Application for Payment (unless otherwise provided in the Contract Documents), Design-Builder will arrange a conference attended by Design-Builder, Owner, and others as appropriate to review and discuss the schedules submitted in accordance with Paragraph 2.04.A. Design-Builder shall have an additional 10 days after the conference to make corrections and adjustments and to complete and resubmit the schedules for Owner's acceptance. No progress payment shall be made to Design-Builder until Design-Builder submits schedules that comply with the following requirements:

1. Design-Builder's progress schedule shall provide an orderly progression of the Work to completion within any specified Milestones and the Contract Times.

2. Design-Builder's schedule of Submittals shall provide a workable arrangement for submitting, reviewing, and processing Submittals in accordance with Article 8.

3. Design-Builder's Schedule of Values shall provide a reasonable allocation of the Contract Price to component parts of the Work.

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2.08 *Electronic Transmittals*

A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Design-Builder may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Submittals, in electronic media or digital format, either directly, or through access to a secure Project website.

B. Electronic Documents Protocol: The parties shall conform to the following provisions in Paragraphs 2.08.B and 2.08.C, together referred to as the Electronic Documents Protocol ("EDP" or "Protocol") for exchange of electronic transmittals.

1. Basic Requirements

a. To the fullest extent practical, the parties agree to and will transmit and accept Electronic Documents in an electronic or digital format using the procedures described in this Protocol. Use of the Electronic Documents and any information contained therein is subject to the requirements of this Protocol and other provisions of the Contract.

b. The contents of the information in any Electronic Document will be the responsibility of the transmitting party.

c. Electronic Documents as exchanged by this Protocol may be used in the same manner as the printed versions of the same documents that are exchanged using non-electronic format and methods, subject to the same governing requirements, limitations, and restrictions, set forth in the Contract Documents.

d. Except as otherwise explicitly stated herein, the terms of this Protocol will be incorporated into any other agreement or subcontract between a party and any third party for any portion of the Work on the Project, or any Project-related services, where that third party is, either directly or indirectly, required to exchange Electronic Documents with a party or with Engineer. Nothing herein will modify the requirements of the Contract regarding communications between and among the parties and their subcontractors and consultants.

e. When transmitting Electronic Documents, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the receiving party's use of software application packages, operating systems, or computer hardware differing from those established in this Protocol.

f. Nothing herein negates any obligation 1) in the Contract to create, provide, or maintain an original printed record version of Drawings and Specifications, signed and sealed according to applicable Laws and Regulations; 2) to comply with any applicable Law or Regulation governing the signing and sealing of design documents or the signing and electronic transmission of any other documents; or 3) to comply with the notice requirements of Paragraph 17.01 of the General Conditions.

2. System Infrastructure for Electronic Document Exchange

a. Owner will provide hardware, operating system(s) software, internet, e-mail, and large file transfer functions ("System Infrastructure") at its own cost and sufficient for complying with the EDP requirements. With the exception of minimum

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standards set forth in this EDP, and any explicit system requirements specified by attachment to this EDP, it is the obligation of each party to determine, for itself, its own System Infrastructure.

1) The maximum size of an email attachment for exchange of Electronic Documents under this EDP is 7 MB. Attachments larger than that may be exchanged using large file transfer functions or physical media.

2) 2) Each Party assumes full and complete responsibility for any and all of its own costs, delays, deficiencies, and errors associated with converting, translating, updating, verifying, licensing, or otherwise enabling its System Infrastructure, including operating systems and software, for use with respect to this EDP.

b. Each party is responsible for its own system operations, security, back-up, archiving, audits, printing resources, and other Information Technology ("IT") for maintaining operations of its System Infrastructure during the Project, including coordination with the party's individual(s) or entity responsible for managing its System Infrastructure and capable of addressing routine communications and other IT issues affecting the exchange of Electronic Documents.

c. Each party will operate and maintain industry-standard, industry-accepted, ISO standard, commercial-grade security software and systems that are intended to protect the other party from: software viruses and other malicious software like worms, trojans, adware; data breaches; loss of confidentiality; and other threats in the transmission to or storage of information from the other parties, including transmission of Electronic Documents by physical media such as CD/DVD/flash drive/hard drive. To the extent that a party maintains and operates such security software and systems, it shall not be liable to the other party for any breach of system security.

d. In the case of disputes, conflicts, or modifications to the EDP required to address issues affecting System Infrastructure, the parties shall cooperatively resolve the issues; but, failing resolution, the Owner is authorized to make and require reasonable and necessary changes to the EDP to effectuate its original intent. If the changes cause additional cost or time to Contractor, not reasonably anticipated under the original EDP, Contractor may seek an adjustment in price or time under the appropriate process in the Contract.

e. Each party is responsible for its own back-up and archive of documents sent and received during the term of the contract under this EDP, unless this EDP establishes a Project document archive, either as part of a mandatory Project website or other communications protocol, upon which the parties may rely for document archiving during the specified term of operation of such Project document archive. Further, each party remains solely responsible for its own post-Project back-up and archive of Project documents after the term of the Contract, or after termination of the Project document archive, if one is established, for as long as required by the Contract and as each party deems necessary for its own purposes.

f. If a receiving party receives an obviously corrupted, damaged, or unreadable Electronic Document, the receiving party will advise the sending party of the incomplete transmission.

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g. The parties will bring any non-conforming Electronic Documents into compliance with the EDP. The parties will attempt to complete a successful transmission of the Electronic Document or use an alternative delivery method to complete the communication.

h. The Owner will operate a Project information management system (also referred to in this EDP as "Project Website") for use of Owner, Engineer and Design-Builder during the Project for exchange and storage of Project-related communications and information. Except as otherwise provided in this EDP or the General Conditions, use of the Project Website by the parties as described in this Paragraph will be mandatory for exchange of Project documents, communications, submittals, and other Project-related information. The following conditions and standards will govern use of the Project Website:

1) Describe the period of time during which the Project Website will be operated and be available for reliance by the parties;

2) Provide any minimum system infrastructure, software licensing and security standards for access to and use of the Project Website;

3) Describe the types and extent of services to be provided at the Project Website (such as large file transfer, email, communication and document archives, etc.); and

4) Include any other Project Website attributes that may be pertinent to Design-Builder's use of the facility and pricing of such use.

C. Software Requirements for Electronic Document Exchange; Limitations

1. Each party will acquire the software and software licenses necessary to create and transmit Electronic Documents and to read and to use any Electronic Documents received from the other party (and if relevant from third parties), using the software formats required in this section of the EDP.

a. Prior to using any updated version of the software required in this section for sending Electronic Documents to the other party, the originating party will first notify and receive concurrence from the other party for use of the updated version or adjust its transmission to comply with this EDP.

2. The parties agree not to intentionally edit, reverse engineer, decrypt, remove security or encryption features, or convert to another format for modification purposes any Electronic Document or information contained therein that was transmitted in a software data format, including Portable Document Format (PDF), intended by sender not to be modified, unless the receiving party obtains the permission of the sending party or is citing or quoting excerpts of the Electronic Document for Project purposes.

3. Software and data formats for exchange of Electronic Documents will conform to the requirements set forth in Exhibit A to this EDP, including software versions, if listed.

D. Requests by Design-Builder for Electronic Documents in Other Formats

1. Release of any Electronic Document versions of the Project documents in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be at the sole discretion of the Owner.

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2. To extent determined by Owner, in its sole discretion, to be prudent and necessary, release of Electronic Documents versions of Project documents and other Project information requested by Design-Builder ("Request") in formats other than those identified in the Electronic Documents Protocol (if any) or elsewhere in the Contract will be subject to the provisions of the Owner's response to the Request, and to the following conditions to which Design-Builder agrees:

    a. The content included in the Electronic Documents created by Engineer and covered by the Request was prepared by Engineer as an internal working document for Engineer's purposes solely, and is being provided to Design-Builder on an "AS IS" basis without any warranties of any kind, including, but not limited to any implied warranties of fitness for any purpose. As such, Design-Builder is advised and acknowledges that the content may not be suitable for Design-Builder's application, or may require substantial modification and independent verification by Design-Builder. The content may include limited resolution of models, not-to-scale schematic representations and symbols, use of notes to convey design concepts in lieu of accurate graphics, approximations, graphical simplifications, undocumented intermediate revisions, and other devices that may affect subsequent reuse.

    b. Electronic Documents containing text, graphics, metadata, or other types of data that are provided by Engineer to Design-Builder under the request are only for convenience of Design-Builder. Any conclusion or information obtained or derived from such data will be at the Design-Builder's sole risk and the Design-Builder waives any claims against Engineer or Owner arising from use of data in Electronic Documents covered by the Request.

    c. Design-Builder shall indemnify and hold harmless Owner and Engineer and their subconsultants from all claims, damages, losses, and expenses, including attorneys' fees and defense costs arising out of or resulting from Design-Builder's use, adaptation, or distribution of any Electronic Documents provided under the Request.

    d. Design-Builder agrees not to sell, copy, transfer, forward, give away or otherwise distribute this information (in source or modified file format) to any third party without the direct written authorization of Engineer, unless such distribution is specifically identified in the Request and is limited to Design-Builder's subcontractors. Design-Builder warrants that subsequent use by Design-Builder's subcontractors complies with all terms of the Contract Documents and Owner's response to Request.

3. In the event that Owner elects to provide or directs the Engineer to provide to Design-Builder any Contractor-requested Electronic Document versions of Project information that is not explicitly identified in the Contract Documents as being available to Design-Builder, the Owner shall be reimbursed by Design-Builder on an hourly basis at $250 per hour for any engineering costs necessary to create or otherwise prepare the data in a manner deemed appropriate by Engineer.

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ARTICLE 3 – DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Contract Documents*

A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.

B. It is the intent of the Contract Documents to require the design and construction of a functionally complete project (or part thereof).

C. Design-Builder shall prepare or furnish Construction Drawings and Construction Specifications that are in accord with the Contract Documents and that describe a functionally complete Project (or part thereof) to be constructed in accordance with such Construction Drawings and Construction Specifications, as duly modified.

D. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

E. Design-Builder will furnish or perform all labor, documentation, services (including professional services), materials, and equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result whether or not specifically called, for at no additional cost to Owner.

3.02 *Reference Standards*

A. *Standards, Specifications, Codes, Laws or Regulations:*

1. Reference to standards, specifications, manuals or codes of any technical society, organization or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect on the Effective Date except as may be otherwise specifically stated in the Contract Documents.

2. No provision of any such standard, specification, manual, or code, or instruction of a Supplier, shall be effective to change the duties and responsibilities of Owner, Design-Builder, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall it be effective to assign to Owner or its officers, directors, members, partners, employees, agents, consultants, or subcontractors any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Resolving Discrepancies*

A. If there is a discrepancy between (1) the Conceptual Documents or other Contract Documents issued with the Request for Qualifications or Request for Proposals and (2) the Proposal, the Proposal will control.

B. If there is a discrepancy between (1) the Conceptual Documents, other Contract Documents issued with the Request for Qualifications or Request for Proposals, or the Proposal and (2) the Proposal Amendment, the Proposal Amendment will control.

C. If there is a discrepancy between (1) the Contract Documents and (2) the Construction Drawings and Construction Specifications, the Contract Documents will control unless Design-Builder gave notice of the discrepancy in a Submittal, and Owner approved the Submittal, pursuant to the provisions of Article 8.

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3.04 *Ownership and Reuse of Documents*

A. All documents prepared for or furnished to Owner by Design-Builder pursuant to this Contract (including but not limited to Design Submittals) are instruments of service. With respect to such documents:

1. Design-Builder shall have and retain the ownership, title, and property rights, including copyright, patent, intellectual property, and common law rights, in the documents.

2. During the course of the Project, Design-Builder will provide copies of Design Submittals to Owner for purposes of review and comment. Owner may retain copies of such documents for its records.

3. Owner may use its copy of the Record Drawings and Record Specifications for Owner's purposes in operating and maintaining the constructed facilities.

4. Upon Owner's termination of this Contract for cause pursuant to Paragraph 15.02, Owner shall receive a limited, non-exclusive license to use any completed Design Submittals in continuing the Project, subject to the limitations in this Paragraph 3.04.

5. The documents prepared or furnished by Design-Builder under this Contract, regardless of ownership, transfer, license, completion status, or termination of the Contract, are for Design-Builder's use, and are not intended or represented to be suitable for use on the Project by Owner or any party other than Design-Builder, or for reuse by Owner or others on extensions of the Project or on any other project, except as otherwise stated in this Contract. Any use or reuse by Owner or others on Owner's behalf will be at Owner's sole risk, and without liability or legal exposure to Design-Builder, the Project Design Professionals, or their subconsultants, and Owner shall indemnify and hold harmless Design-Builder, the Project Design Professionals, and their subconsultants from all claims, damages, losses and expenses, including attorneys' fees, arising out of or resulting from any such use or reuse.

3.05 *Order of Precedence of Contract Documents*

A. In resolving conflicts resulting from errors or discrepancies in any of the Contract Documents, the order of precedence shall be as follows:

1. Permits from other agencies as may be required by law;

2. Addenda, Supplemental Agreements and Change Orders, the one dated later having the precedence over another dated earlier;

3. Agreement;

4. Owner's Special Provisions;

5. General Conditions (Section 00700);

6. General Requirements (Sections 01010 through 01999);

7. Other Technical Specifications (Section 02000 and all other Sections following);

8. Drawings;

9. Instructions to Bidders;

10. Bid Forms;

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11. Invitation to Bid.

B. With reference to the Drawings, the order of precedence is as follows:

1. Enumerated dimensions govern over scaled dimensions
2. Detail drawings govern over general drawings
3. Addenda/Change Order drawings govern over any other drawings
4. Contract Drawings govern over standard drawings/plans
5. Specific notes take precedence over schedules
6. Notes, descriptions or schedules take precedence over graphic representations

C. The provisions of the Contract Documents shall take precedence over any Laws or Regulations applicable to the performance of the work unless such an interpretation of the provisions of the Contract Documents would result in a violation of such Law or Regulation.

3.06 *American Iron and Steel (AIS) Requirements*

A. The Design-Builder acknowledges to and for the benefit of the City of Sweet Home ("Purchaser") and the State of Oregon (the "State") that it understands the goods and services under this Agreement are being funded with monies made available by the Clean Water State Revolving Fund and/or Drinking Water State Revolving Fund that have statutory requirements commonly known as "American Iron and Steel;" that requires all of the iron and steel products used in the project to be produced in the United States ("American Iron and Steel Requirement") including iron and steel products provided by the Design-Builder pursuant to this Agreement. The Design-Builder hereby represents and warrants to and for the benefit of the Purchaser and the State that (a) the Design-Builder has reviewed and understands the American Iron and Steel Requirement, (b) all of the iron and steel products used in the project will be and/or have been produced in the United States in a manner that complies with the American Iron and Steel Requirement, unless a waiver of the requirement is approved, and (c) the Design-Builder will provide any further verified information, certification or assurance of compliance with this paragraph, or information necessary to support a waiver of the American Iron and Steel Requirement, as may be requested by the Purchaser or the State. Notwithstanding any other provision of this Agreement, any failure to comply with this paragraph by the Design-Builder shall permit the Purchaser or State to recover as damages against the Design-Builder any loss, expense, or cost (including without limitation attorney's fees) incurred by the Purchaser or State resulting from any such failure (including without limitation any impairment or loss of funding, whether in whole or in part, from the State or any damages owed to the State by the Purchaser). While the Design-Builder has no direct contractual privity with the State, as a lender to the Purchaser for the funding of its project, the Purchaser and the Design-Builder agree that the State is a third-party beneficiary and neither this paragraph (nor any other provision of this Agreement necessary to give this paragraph force or effect) shall be amended or waived without the prior written consent of the State.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times*

A. The Contract Times will commence to run on the Effective Date of the Contract.

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4.02 *Starting the Work*

A. Design-Builder shall start to perform the Work as of the Effective Date of the Contract. No Construction shall be done at the Site prior to the Effective Date of the Contract.

4.03 *Progress Schedule*

A. Owner may rely on the progress schedule established in accordance with Paragraph 2.04, as duly adjusted, in planning and conducting ongoing operations and other work at the Site.

B. Design-Builder shall adhere to the progress schedule established in accordance with Paragraph 2.04 as it may be adjusted from time to time, as provided below:

1. Once each month, prior to the processing of the monthly progress payment, Design-Builder shall submit to the Engineer and Owner proposed adjustments in the progress schedule that will not change the Contract Times (or Milestones). Updates must accurately reflect as-built schedule. Owner shall accept such adjustments provided that Owner, in planning and conducting ongoing operations and other work at the Site, has not reasonably relied on the schedule element that is proposed to be adjusted. If Owner has so relied, then Owner and Design-Builder shall promptly meet and seek a resolution that addresses the objectives of both parties, or adjust the Contract Price.

2. In addition, a three-week rolling "look-ahead" schedule shall be updated and provided to the Engineer at the beginning of each work week. The two-week rolling schedule shall include the Design-Builder's proposed daily activities and location(s) of work during the coming two-week period. No work shall commence at the beginning of each workweek until the updated two-week rolling schedule is submitted. During the contract period, the Design-Builder shall also coordinate his activities daily with the Engineer.

3. Design-Builder shall submit proposed adjustments in the progress schedule that will change the Contract Times (including Milestones) in accordance with the requirements of Paragraph 11.06. Such adjustments may only be made by a Change Order.

C. *Continuing the Work:* Design-Builder shall continue the Work and adhere to the progress schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as Design-Builder and Owner may otherwise agree in writing.

4.04 *Delays in Design-Builder's Progress*

A. If Owner or anyone for whom Owner is responsible delays, disrupts, or interferes with the performance or progress of the Work, then Design-Builder shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Design-Builder's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Design-Builder's ability to complete the Work within the Contract Times.

B. Design-Builder shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference within the control of Design-Builder. Delay, disruption, and interference attributable to and within the control of a Project Design Professional, Construction Subcontractor, or Supplier shall be deemed to be delays within the control of Design-Builder.

C. If Design-Builder's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Design-Builder, and

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those for which they are responsible, then Design-Builder shall be entitled to an equitable adjustment in Contract Times. Design-Builder's entitlement to such an adjustment of the Contract Times is conditioned on such adjustment being essential to Design-Builder's ability to complete the Work within the Contract Times. Such an adjustment shall be Design-Builder's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:

1. Severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
2. Abnormal weather conditions;
3. Acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 9); and
4. Acts of war or terrorism.
5. Weather-Related Delays
    a. If "abnormal weather conditions" as set forth in Paragraph 4.04.C.2 of the General Conditions are the basis for a request for an equitable adjustment in the Contract Times, such request must be documented by data substantiating each of the following: 1) that weather conditions were abnormal for the period of time in which the delay occurred, 2) that such weather conditions could not have been reasonably anticipated, and 3) that such weather conditions had an adverse effect on the Work as scheduled.
    b. The existence of abnormal weather conditions will be determined on a month-by-month basis in accordance with the following:
        1) Every workday on which one or more of the following conditions exist will be considered a "bad weather day":
            i) Total precipitation (as rain equivalent) occurring between 7:00 p.m. on the preceding day (regardless of whether such preceding day is a workday) through 7:00 p.m. on the workday in question equals or exceeds 1.0 inches of precipitation (as rain equivalent, based on the snow/rain conversion indicated in the table entitled Foreseeable Bad Weather Days; such table is hereby incorporated in this SC 4.05.C by reference.
            ii) Ambient outdoor air temperature for 60 minutes between the hours of 10:00 a.m. and 3:00 p.m. is equal to or less than the following low temperature threshold: 15 degrees Fahrenheit; or, at 3:00 p.m. the ambient outdoor temperature is equal to or greater than the following high temperature threshold: 100 degrees Fahrenheit.
        2) Determination of actual bad weather days during performance of the Work will be based on the weather records measured and recorded by the City of Sweet Home Public Works Department.
        3) Design-Builder shall anticipate the number of foreseeable bad weather days per month indicated in the table below —Foreseeable Bad Weather Days.

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4) Design-Builder shall include the following Foreseeable Bad Weather Days in the Progress Schedule as follows:

i) January – 3 Days

ii) February – 2 Days

iii) March – 1 Day

iv) April – 1 Days

v) May – 0 Days

vi) June – 0 Days

vii) July – 1 Days

viii) August – 2 Days

ix) September – 1 Days

x) October – 1 Day

xi) November – 2 Days

xii) December – 3 Days

5) In each month, every bad weather day exceeding the number of Foreseeable Bad Weather Days will be considered as "abnormal weather conditions." The existence of abnormal weather conditions will not relieve Design-Builder of the obligation to demonstrate and document that delays caused by abnormal weather are specific to the planned work activities or that such activities thus delayed were on Design-Builder's then-current Progress Schedule's critical path for the Project.

6) If mutually agreed upon by Owner and Design-Builder, working hours during days with anticipated abnormal weather periods can be adjusted to allow work earlier or later in the day depending on the type of abnormal weather expected.

D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.

E. Paragraph 9.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.

F. Design-Builder shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Design-Builder.

G. If Design-Builder seeks an adjustment in Contract Price or Contract Times under this paragraph, Design-Builder shall submit a request for a Change Order to Owner within 30 days of the commencement of the delaying, disrupting, or interfering event.

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ARTICLE 5 – SITE; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

A. Owner shall furnish the Site. Owner shall notify Design-Builder of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Design-Builder will have to comply in performing the Work.

B. Upon reasonable written request, Owner shall furnish Design-Builder with a current statement of record legal title and legal description of the lands upon which the Construction is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws or Regulations.

C. Design-Builder shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

1. Design-Builder shall confine construction equipment, the storage of materials and equipment and operations of workers to the work and staging areas as shown on the drawings and shall not unreasonably encumber the site and other areas with construction equipment or other materials or equipment. Design-Builder shall be responsible for keeping driveways and other main access points to the site open. Design-Builder shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work. Use of additional areas onsite or offsite may be allowed if authorized in writing by the Owner.

2. Should any claim be made by any such owner or occupant because of the performance of Work, Design-Builder shall promptly settle with such other party by negotiation, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law.

3. To the fullest extent permitted by Laws or Regulations, Design-Builder shall indemnify and hold harmless Owner, Owner's consultants, and anyone directly or indirectly employed by any of them from and against all claims, costs, losses and damages (including, but not limited to, fees of engineers, architects, attorneys and other professionals and court and arbitration or other dispute resolution costs) arising out of or resulting from any claim brought by any such owner or occupant against Owner, or any other party indemnified hereunder to the extent caused by or based upon Design-Builder's performance of the Construction.

B. *Removal of Debris:* During the performance of the Construction, Design-Builder shall keep the premises free from accumulations of waste materials, rubbish, and other debris resulting from the Construction. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws or Regulations.

C. *Cleaning:* Prior to Substantial Completion, Design-Builder shall clean the Site and make it ready for utilization by Owner. At completion of Construction, Design-Builder shall remove all tools, appliances, construction equipment, temporary construction and machinery, and

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surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* Design-Builder shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Design-Builder subject any part of the Construction or adjacent property to stresses or pressures that will endanger it.

5.03 *Reference Points*

A. Design-Builder shall be responsible for laying out the Work and shall protect and preserve reference points and property monuments established by Owner, and shall make no changes or relocations of such reference points or monuments without the prior written approval of Owner. Design-Builder shall report to Owner whenever any reference point or property monument is lost or destroyed, or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

5.04 *Differing Site Conditions*

A. Design-Builder shall promptly, and before the conditions are disturbed, give a written notice to Owner of (i) subsurface or latent physical conditions at the Site (whether discovered during investigation of the Site or during Construction) which differ materially from those indicated in the Contract Documents, or in any Technical Data, or (ii) unknown physical conditions at the Site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in work of the character called for by the Contract Documents.

B. Owner will investigate the Site conditions promptly after receiving the notice. Design-Builder shall supplement the notice by promptly submitting to Owner any additional information regarding schedule and cost impacts, and a specific request for a Change Order. Owner shall then make a determination regarding the site condition and the impact, if any, on Contract Price and Contract Times. If the conditions do materially so differ and cause an increase or decrease in the Design-Builder's cost of, or the time required for, performing any part of the Work, whether or not changed as a result of the conditions, an equitable adjustment shall be made under this clause and the Contract Price or Times modified in writing by Change Order in accordance with Article 11.

C. No request by Design-Builder for an equitable adjustment under this Paragraph 5.04 shall be allowed unless Design-Builder has given the written notice required.

D. The provisions of this Paragraph 5.04 are not intended to apply to a Hazardous Environmental Condition or Underground Facility uncovered or revealed at the Site.

5.05 *Underground Facilities*

A. *Procedure for Identifying Underground Facilities:* Promptly after the Effective Date of the Contract, Design-Builder shall review the Underground Facilities Data furnished by Owner and use ASCE 38, "Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data," as a basis for establishing a procedure ("Underground Facilities Procedure") for the further identification, investigation, and mapping of Underground Facilities at or adjacent to the Site. Design-Builder shall establish and use the Underground Facilities Procedure to aid in the provision of Design Professional Services and the performance of Construction, and to

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reduce and manage risks associated with Underground Facilities. Such Underground Facilities Procedure shall take into account the Site and the nature of the Project.

1. The Underground Facilities Procedure shall include a plan to keep Underground Facilities information current as Design-Builder proceeds with the provision of Design Professional Services, and to add new or relocated Underground Facilities information to the base utility or Site drawings.

2. To manage the potential impact of design changes on Underground Facilities, Design-Builder shall modify or reapply the Underground Facilities Procedure as the design progresses and changes.

B. *Design-Builder's Responsibilities:* Unless otherwise expressly provided in the Contract, Design-Builder shall have full responsibility for the following; and, subject to the provisions of Paragraphs 5.05.C, D, and E, the cost of all of the following will be included in the Contract Price:

1. Establishing and executing the Underground Facilities Procedure referred to in Paragraph 5.05.A, including updating, modification, and reapplication duties;

2. Coordinating the Work with the owners (including Owner) of such Underground Facilities, during the provision of Design Professional Services and Construction;

3. Verifying the actual location of specific Underground Facilities through exposure, as needed for the Design Professional Services;

4. Complying with applicable state and local utility damage prevention Laws and Regulations during Construction; and

5. The safety and protection of all existing Underground Facilities at the Site, and repairing any damage to such Underground Facilities resulting from the Construction, subject to the provisions of Paragraph 5.05.D.

C. *Results of Design-Builder's Execution of Underground Facilities Procedure:* If, during the execution of the Underground Facilities Procedure referred to in Paragraph 5.05.A, the Design-Builder identifies an Underground Facility that was not shown or indicated in the Underground Facilities Data, or was not shown or indicated with reasonable accuracy, causing an increase or decrease in the Design-Builder's cost of, or the time required for, providing Design Professional Services or performing the Construction, then Design-Builder shall submit to Owner a request for a Change Order seeking an equitable adjustment to the Contract Price or Times under this clause. Such request shall be made within 30 days of the identification of the Underground Facility in question.

D. *Underground Facility Found During Construction*: If Design-Builder believes that an Underground Facility that is uncovered, exposed, or revealed at the Site during Construction was not shown or indicated in the Underground Facilities Data, or was not shown or indicated with reasonable accuracy, and also that such Underground Facility was not identified or mapped with reasonable accuracy despite Design-Builder's adequate establishment and execution of the Underground Facilities Procedure referred to in Paragraph 5.05.A, then Design-Builder shall promptly give written notice to Owner, and supplement the notice by submitting to Owner a request for a Change Order seeking an equitable adjustment to the Contract Price or Times under this clause. Such request shall be made within 30 days of the uncovering or revealing of the Underground Facility in question.

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1. *Owner's Review:* Owner will investigate the Underground Facility found during Construction promptly after receiving the notice. If Owner concurs with Design-Builder that the Underground Facility that is uncovered, exposed, or revealed at the Site was not shown or indicated in the Underground Facilities Data, or was not shown or indicated with reasonable accuracy, and further was not identified or mapped with reasonable accuracy despite Design-Builder's adequate establishment and execution of the Underground Facilities Procedure referred to in Paragraph 5.05.A, causing an increase or decrease in the Design-Builder's cost of, or the time required for, performing any part of the Work, whether or not changed as a result of the actual location, then an equitable adjustment shall be made under this clause and the Contract Price or Times modified in writing by Change Order in accordance with Article 11. If Owner does not concur with Design-Builder, then Owner shall so indicate in writing, with a specific explanation of the reason for non-concurrence.

2. No request by Design-Builder for an equitable adjustment under Paragraph 5.05.D shall be allowed unless Design-Builder has given the written notice required.

E. *Inadequate Establishment or Execution of Underground Facilities Procedure:* If Design-Builder does not establish an Underground Facilities Procedure that is (1) adequate for the Site and the nature of the Project and (2) consistent with the guidelines set forth in ASCE 38, "Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data," or Design-Builder does not adequately execute a duly established Underground Facilities Procedure, then Design-Builder shall bear all costs associated with the presence of an Underground Facility that was not identified or located with reasonable accuracy, including but not limited to delay, redesign, relocation, and increased Construction costs, if such Underground Facility would have been identified and located with reasonable accuracy by an adequate and properly executed Underground Facilities Procedure that was consistent with ASCE 38.

5.06 *Hazardous Environmental Conditions at Site*

A. *Reliance by Design-Builder on Technical Data Authorized:* Design-Builder may rely on the accuracy of the Technical Data with respect to environmental conditions at the Site.

B. Design-Builder shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.

C. Design-Builder shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Design-Builder, Project Design Professionals, Construction Subcontractors, Suppliers, or anyone else for whom Design-Builder is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.

D. If Design-Builder encounters, uncovers, or reveals a Hazardous Environmental Condition (whether during Site investigation or during Construction) whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Design-Builder or anyone for whom Design-Builder is responsible creates a Hazardous Environmental Condition, then Design-Builder shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.16); and (3) notify

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Owner (and promptly thereafter confirm such notice in writing). Owner shall promptly determine whether to retain a qualified expert to evaluate such condition or take corrective action, if any, and take such actions as are necessary to permit Owner to timely obtain required permits and provide Design-Builder the written notice required by Paragraph 5.06.E. If Design-Builder or anyone for whom Design-Builder is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

E. Design-Builder shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Design-Builder either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.

F. If after receipt of such written notice Design-Builder does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then the portion of the Work that is in the area affected by such condition shall be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 9.

G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Design-Builder, Project Design Professionals, Construction Subcontractors, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Contract Documents or the Technical Data, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Design-Builder or by anyone for whom Design-Builder is responsible. Nothing in this Paragraph 5.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

H. To the fullest extent permitted by Laws and Regulations, Design-Builder shall indemnify and hold harmless Owner and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the Design-Builder's failure to control, contain, or remove a Constituent of Concern brought to the Site by Design-Builder or by anyone for whom Design-Builder is responsible, or to a Hazardous Environmental Condition created by Design-Builder or by anyone for whom Design-Builder is responsible. Nothing in this Paragraph 5.06.H shall obligate Deign-Builder to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

5.07 *Reports and Drawings*

A. The following drawings and reports are available for the Design-Builder:

1. Record Drawings for the Sweet Home Wastewater Treatment Plant.

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a. Contract Documents dated June 1973 consisting of 2 volumes, prepared by CH2M Hill, entitled " Sweet Home Wastewater Treatment Plant".

b. Construction Documents dated October 1992, prepared by Kramer Chin and Mayo, entitled "City of Sweet Home Wastewater Facilities Improvements".

c. Contract Documents dated February 1997, prepared by HGE, Inc., entitled "City of Sweet Home Wastewater Treatment Plant Improvements".

2. Site surveying completed by Udell Engineers located in Lebanon, Oregon.

3. Geotechnical Data Report (GDR) prepared by McMillen Jacobs Associates, Final dated June 2022.

4. 4No other information on existing subsurface or physical conditions is available for the Contractor.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

A. Bonds shall be furnished in accordance with the City of Sweet Home Contract requirements. These shall include, but not be limited to, performance bond and payment bond.

1. Required Performance Bond Form: The performance bond that Contractor furnishes will be in the form of EJCDC® D 610, Performance Bond (2009 or 2016 edition).

2. Required Payment Bond Form: The payment bond that Contractor furnishes will be in the form of EJCDC® D 615, Payment Bond (2009 or 2016 edition).

B. Design-Builder shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of Design-Builder's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due, or until completion of the correction period specified in Paragraph 14.08, whichever is later, except as provided otherwise by Laws or Regulations, the terms of a prescribed bond form, the Supplementary Conditions, or other specific provisions of the Contract. Design-Builder shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.

1. Contractor shall furnish an exhibit of their warranty guarantee.

C. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.

D. Design-Builder shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.

E. If the surety on a bond furnished by Design-Builder is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the

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Project is located, or the surety ceases to meet the requirements above, then Design-Builder shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.

F. If Design-Builder has failed to obtain a required bond, Owner may exclude the Design-Builder from the Site and exercise Owner's termination rights under Article 15.

G. Upon request to either Owner or Design-Builder from any Construction Subcontractor, Project Design Professional, Supplier, or other person or entity claiming to have furnished labor, services, materials, or equipment used in the performance of the Work, the recipient of the request shall provide a copy of the payment bond to such person or entity.

6.02 *Insurance—General Provisions*

A. Owner and Design-Builder shall obtain and maintain insurance as required in this Article and City of Sweet Home Special Provisions.

B. Design-Builder's insurance required by the Contract shall be primary over Owner's insurance and shall include a waiver of subrogation against Owner and Engineer.

C. All insurance required by the Contract to be purchased and maintained by Owner or Design-Builder shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.

D. All insurance required by the Contract to be purchased and maintained by Design-Builder shall be primary and without contribution by insurance maintained by Owner.

E. Alternative forms of insurance coverage, including but not limited to self-insurance and "Occupational Accident and Excess Employer's Indemnity Policies," are not sufficient to meet the insurance requirements of this Contract.

F. Design-Builder shall require (a) its Construction Subcontractors and Engineer (and any other Project Design Professional that is an independent individual or entity) to purchase and maintain commercial general liability, automobile liability, workers' compensation, employer's liability, professional liability (as applicable), and umbrella or excess liability insurance, and (b) its Construction Subcontractors to purchase and maintain contractor's pollution liability insurance. All such required insurance shall meet the same requirements for the applicable category of insurance established in this Contract for Design-Builder, unless otherwise indicated in the Supplementary Conditions.

G. Design-Builder shall deliver to Owner, with copies to each additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Design-Builder has obtained and is maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Design-Builder shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, documentation of applicable self-insured retentions (if permitted) and deductibles, and evidence of insurance required to be purchased and maintained by Design-Builder's Construction Subcontractors, Engineer, and any other Project Design Professional that is an independent individual or entity. Design-

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Builder may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

H. Owner shall deliver to Design-Builder, with copies to each additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Design-Builder or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

I. Failure of Owner or Design-Builder to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Design-Builder to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.

J. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.

K. If Design-Builder has failed to obtain and maintain required insurance, Owner may exclude the Design-Builder from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 15.

L. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.

M. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Design-Builder or Design-Builder's interests.

N. The insurance and insurance limits required herein shall not be deemed as a limitation on Design-Builder's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Design-Builder's Insurance*

A. Required Insurance: Design-Builder shall purchase and maintain Worker's Compensation, Commercial General Liability, Builders Risk and other insurance pursuant to the specific requirements set forth herein.

B. General Provisions: The policies of insurance required by this Paragraph 6.03 must:

1. include at least the specific coverages required;

2. be written for not less than the limits provided, or those required by Laws or Regulations, whichever is greater;

3. remain in effect at least until the Work is complete (as set forth in Paragraph 14.06.D), and longer if expressly required elsewhere in this Contract, and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty

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or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract;

4. apply with respect to the performance of the Work, whether such performance is by Design-Builder, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable; and

5. include all necessary endorsements to support the stated requirements.

C. Additional Insureds: The Design-Builder's commercial general liability, automobile liability, employer's liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies, if required by this Contract, must:

1. include and list as additional insureds the following:

a. OWNER: "City of Sweet Home, its officers, employees, agents, and consultants"; AND

b. ENGINEER: "West Yost Associates Inc., its officers, employees, agents, and consultants"; AND

c. any individuals or entities identified as additional insureds herein.

2. afford primary coverage to these additional insureds for all claims covered thereby (including as applicable those arising from both ongoing and completed operations);

3. not seek contribution from insurance maintained by the additional insured; and

4. as to commercial general liability insurance, apply to additional insureds with respect to liability caused in whole or in part by Design-Builder's acts or omissions, or the acts and omissions of those working on Design-Builder's behalf, in the performance of Contractor's operations.

D. *Other Additional Insureds*: As a supplement to the provisions of Paragraph 6.03.C of the General Conditions, the commercial general liability, automobile liability, umbrella or excess, pollution liability, and unmanned aerial vehicle liability policies must include as additional insureds the Owner and Engineer.

E. *Workers' Compensation and Employer's Liability Insurance:* Design-Builder shall purchase and maintain Worker's Compensation and Employer's Liability Insurance. This insurance shall protect Design-Builder against all claims under applicable state workers' compensation laws, including coverage as necessary for the benefits provided under the United States Longshoremen's and Harbor Workers' Act and the Jones Act. Design-Builder shall also be protected against claims for injury, disease, or death of employees which, for any reason, may not fall within the provisions of a workers' compensation law. This policy shall include an "all states" or "other states" and waiver of subrogation endorsements. The liability limits, as required by state law shall be not less than:

1. Workers' Compensation: Statutory

2. Employer's Liability: $1,000,000 each occurrence

F. Commercial General Liability—Claims Covered: Design-Builder shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Design-Builder, on an occurrence basis, against claims for:

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1. damages because of bodily injury, sickness or disease, or death of any person other than Design-Builder's employees,
2. damages insured by reasonably available personal injury liability coverage, and
3. damages because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.

G. *Commercial General Liability—Form and Content:* Design-Builder's commercial liability policy must be written on a 1996 (or later) Insurance Services Organization, Inc. (ISO) commercial general liability form (occurrence form) and include the following coverages and endorsements:

1. Products and completed operations coverage.
    a. Such insurance must be maintained for three years after final payment.
    b. Design-Builder shall furnish Owner and each other additional insured (as identified in the General Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
2. Blanket contractual liability coverage, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.19.
3. Severability of interests and no insured-versus-insured or cross-liability exclusions.
4. Underground, explosion, and collapse coverage.
5. Personal injury coverage.
6. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together). If Design-Builder demonstrates to Owner that the specified ISO endorsements are not commercially available, then Contractor may satisfy this requirement by providing equivalent endorsements.
7. For design professional additional insureds, ISO Endorsement CG 20 32 07 04 "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.

H. Commercial General Liability Insurance Coverage: This insurance shall be occurrence type written in comprehensive form and shall protect DESIGN-BUILDER, OWNER, and ENGINEER as additional insureds, against claims arising out of performance of the Work. The policy shall also include personal injury liability coverage, contractual liability coverage, completed operations and products liability coverage, and coverage for blasting, explosion, collapse of buildings, and damage to underground property. The liability limits for bodily injury and property damage shall be not less than:

1. Combined Single Limit for each occurrence: $2,000,000
2. General aggregate: $2,000,000

I. Automobile Liability: Design-Builder shall purchase and maintain automobile liability insurance for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy must be written on an occurrence basis.

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Automobile Liability	Policy limits of not less than:
Bodily Injury	
Each Person	$1,000,000
Each Accident	$1,000,000
Property Damage	
Each Accident	$1,000,000
[or]	
Combined Single Limit	
Combined Single Limit (Bodily Injury and Property Damage)	$2,000,000

J. Umbrella Liability Insurance: Design-Builder shall purchase and maintain umbrella liability insurance. This insurance shall protect DESIGN-BUILDER, OWNER, and ENGINEER as additional insureds, against claims in excess of the limits provided under workers' compensation and employer's liability, comprehensive automobile liability, and commercial general liability policies. The umbrella policy shall follow the form of the primary insurance, including the application of the primary limits. The liability limits for bodily injury and property damage shall be not less than:

1. Combined Single Limit for each occurrence: $5,000,000
2. General aggregate: $5,000,000

K. Pollution Liability Insurance: If not otherwise included in the Design-Builder's Commercial General Liability Insurance coverage, Design-Builder shall purchase and maintain pollution liability insurance for claims arising from the discharge, dispersal, release, escape of any irritant or contaminant into or upon land, any structure, the atmosphere, watercourse, or body of water including groundwater. This shall include coverage for claims of: (a) clean up, either on-site or off site; (b) third party liability, including bodily injury, property damage, natural resource damage, third party property loss of use/revenue, and clean up; and/or (c) costs incurred for regulatory fines and/or the investigation, defense, or settlement of claims. The liability limits for pollution shall not be less than:

1. Combined Single Limit for each occurrence: $5,000,000
2. General aggregate: $5,000,000

L. Railroad Protective Liability Insurance: Prior to commencing any Work within 50 feet of railroad-owned and controlled property, Design-Builder shall (1) endorse its commercial general liability policy with ISO CG 24 17, removing the contractual liability exclusion for work within 50 feet of a railroad, (2) purchase and maintain railroad protective liability insurance meeting the following requirements, (3) furnish a copy of the endorsement to Owner, and (4) submit a copy of the railroad protective policy and other railroad-required documentation to the railroad, and notify Owner of such submittal.

Railroad Protective Liability Insurance	Policy limits of not less than:
Each Claim	$ 1,000,000
Aggregate	$ 2,000,000

M. Unmanned Aerial Vehicle Liability Insurance: If Design-Builder uses unmanned aerial vehicles (UAV—commonly referred to as drones) at the Site or in support of any aspect of the Work, Design-Builder shall obtain UAV liability insurance in the amounts stated; name Owner, Engineer, and all individuals and entities identified in the General Conditions as additional

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insureds; and provide a certificate to Owner confirming Design-Builder's compliance with this requirement. Such insurance will provide coverage for property damage, bodily injury or death, and invasion of privacy.

Unmanned Aerial Vehicle Liability Insurance	Policy limits of not less than:
Each Claim	$ 100,000
General Aggregate	$ 250,000

6.04 *Builder's Risk and Other Property Insurance*

A. Builder's Risk: Design-Builder shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the Work's full insurable replacement cost (subject to such deductible amounts as may be provided in the General Conditions or required by Laws and Regulations). The specific requirements applicable to the builder's risk insurance are set forth in the General Conditions.

B. Property Insurance for Facilities of Owner Where Work Will Occur: Owner is responsible for obtaining and maintaining property insurance covering each existing structure, building, or facility in which any part of the Work will occur, or to which any part of the Work will attach or be adjoined. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, providing coverage consistent with that required for the builder's risk insurance, and will be maintained until the Work is complete, as set forth in Paragraph 15.06.D.

C. Property Insurance for Substantially Complete Facilities: Promptly after Substantial Completion, and before actual occupancy or use of the substantially completed Work, Owner will obtain property insurance for such substantially completed Work, and maintain such property insurance at least until the Work is complete, as set forth in Paragraph 15.06.D. Such property insurance will be written on a special perils (all-risk) form, on a replacement cost basis, and provide coverage consistent with that required for the builder's risk insurance. The builder's risk insurance may terminate upon written confirmation of Owner's procurement of such property insurance.

D. Partial Occupancy or Use by Owner: If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Design-Builder) will provide advance notice of such occupancy or use to the builder's risk insurer, and obtain an endorsement consenting to the continuation of coverage prior to commencing such partial occupancy or use.

E. Insurance of Other Property; Additional Insurance: If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, then the entity or individual owning such property item will be responsible for insuring it. If Design-Builder elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.04, it may do so at Design-Builder's expense.

F. Builder's Risk Requirements: The builder's risk insurance must:

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1. be written on a builder's risk "all risk" policy form that at a minimum includes insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment stored and in transit, and must not exclude the coverage of the following risks: fire; windstorm; hail; flood; earthquake, volcanic activity, and other earth movement; lightning; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; and water damage (other than that caused by flood).

    a. Such policy will include an exception that results in coverage for ensuing losses from physical damage or loss with respect to any defective workmanship, methods, design, or materials exclusions.

    b. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake, volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance will be provided through other insurance policies acceptable to Owner and Design-Builder.

2. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.

3. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of contractors, engineers, and architects).

4. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier). If this coverage is subject to a sublimit, such sublimit will be a minimum of $2,000,000.

5. extend to cover damage or loss to insured property while in transit. If this coverage is subject to a sublimit, such sublimit will be a minimum of $2,000,000.

6. allow for the waiver of the insurer's subrogation rights, as set forth in this Contract.

7. allow for partial occupancy or use by Owner by endorsement, and without cancellation or lapse of coverage.

8. include performance/hot testing and start-up, if applicable.

9. be maintained in effect until the Work is complete, as set forth in Paragraph 15.06.D of the General Conditions, or until written confirmation of Owner's procurement of property insurance following Substantial Completion, whichever occurs first.

10. include as named insureds the Owner, Design-Builder, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such

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builder's risk policy. Parties required to be insured will be referred to collectively as "insureds." In addition to Owner, Design-Builder, and Subcontractors of every tier, include as insureds the following:

a. West Yost Associates, Inc.

Charles Duncan, President
2020 Research Park Drive, Suite 100
Davis, CA 95618
503.756.5905; CDuncan@westyost.com

11. If debris removal in connection with repair or replacement of insured property is subject to a coverage sublimit, such sublimit will be a minimum of $5,000,000.

6.05 *Property Losses; Subrogation*

A. The builder's risk insurance policy purchased and maintained, at Contactor's expense, in accordance with Paragraph 6.04 (or an installation floater policy if authorized), will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

1. Owner and Design-Builder waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils, risks, or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all individuals or entities identified in the General Conditions as builder's risk or installation floater insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused.

2. None of the above waivers extends to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Design-Builder as trustee or fiduciary, or otherwise payable under any policy so issued.

B. Any property insurance policy maintained by Owner covering any loss, damage, or consequential loss to Owner's existing structures, buildings, or facilities in which any part of the Work will occur, or to which any part of the Work will attach or adjoin; to adjacent structures, buildings, or facilities of Owner; or to part or all of the completed or substantially completed Work, during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06, will contain provisions to the effect that in the event of payment of any loss or damage the insurer will have no rights of recovery against any insureds thereunder, or against Design-Builder, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them, and that the insured is allowed to waive the insurer's rights of subrogation in a written contract executed prior to the loss, damage, or consequential loss.

1. Owner waives all rights against Design-Builder, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and

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subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from fire or any of the perils, risks, or causes of loss covered by such policies.

C. The waivers in this Paragraph 6.05 include the waiver of rights due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other insured peril, risk, or cause of loss.

D. Design-Builder shall be responsible for assuring that each Subcontract contains provisions whereby the Subcontractor waives all rights against Owner, Design-Builder, all individuals or entities identified in the General Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from fire or other peril, risk, or cause of loss covered by builder's risk insurance, installation floater, and any other property insurance applicable to the Work.

6.06 *Receipt and Application of Property Insurance Proceeds*

A. Any insured loss under the builder's risk and other policies of property insurance required by Paragraph 6.04 will be adjusted and settled with the Design-Builder and Owner. Design-Builder and Owner shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

B. Proceeds for such insured losses may be made payable by the insurer to the Design-Builder and Owner as the fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. Design-Builder and Owner receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.04 shall maintain such proceeds in a segregated account, and distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.

C. If no other special agreement is reached, Design-Builder shall repair or replace the damaged Work, using allocated insurance proceeds

ARTICLE 7 – DESIGN-BUILDER'S RESPONSIBILITIES

7.01 *Design Professional Services*

A. Design-Builder shall provide the Design Professional Services needed to successfully perform and complete the Work required under this Contract.

B. *Standard of Care:* The standard of care for all Design Professional Services performed or furnished by Design-Builder under this Contract will be the care and skill ordinarily used by members of the subject profession practicing under similar circumstances at the same time and in the same locality.

7.02 *Construction*

A. Design-Builder shall perform and furnish the Construction pursuant to the Contract Documents, the Construction Drawings, and the Construction Specifications, as duly modified.

B. Design-Builder shall keep Owner advised as to the progress of the Construction.

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7.03 *Supervision and Superintendence of Construction*

A. Design-Builder shall supervise, inspect, and direct the Construction competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to provide the Construction in accordance with the Contract Documents. Design-Builder shall be solely responsible for the means, methods, techniques, sequences, and procedures of Construction.

B. At all times during the progress of Construction, the Design-Builder shall assign a competent resident superintendent who shall not be replaced without written notice to Owner except under extraordinary circumstances.

7.04 *Labor; Working Hours*

A. Design-Builder shall provide competent, suitably qualified personnel to perform the Work as required by the Contract Documents. Design-Builder shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise indicated in the Contract Documents, and in the absence of any Laws or Regulations to the contrary, Design-Builder may perform the Construction on legal holidays, during any or all hours of the day, and on any or all days of the week, at Design-Builder's sole discretion.

7.05 *Services, Materials, and Equipment*

A. Unless otherwise specified in the Contract Documents, Design-Builder shall furnish or cause to be furnished and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.

B. All materials and equipment incorporated into the Work shall be as specified by Owner or in the Construction Drawings or Construction Specifications, and unless specified otherwise shall be new and of good quality. All warranties and guarantees specifically called for by the Contract Documents shall expressly run to the benefit of Owner. If required by Owner, Design-Builder shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise provided in the Contract Documents.

7.06 *"Or Equals" and Substitutions*

A. If an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, then during the preparation of the proposed Construction Drawings and Construction Specifications, the Design-Builder may request that Owner authorize the use of other items of material or equipment, or items from other proposed suppliers, by including the proposed items in the proposed Construction Drawings or Construction Specifications, with required notice to Owner that the Submittal contains a variation from the Contract Documents. Owner in its sole discretion may approve the use of the item if Owner determines that the item is functionally

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equal to that named and sufficiently similar so that no change in related Work will be required, taking into consideration whether the item:

1. Is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
2. Will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
3. Has a proven record of performance and availability of responsive service; and
4. Is not objectionable.

B. *Effect of Owner's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.

C. *Substitutes:* During the preparation of the proposed Construction Drawings and Construction Specifications, the Design-Builder may propose a substitute to an item of material or equipment that is required to be furnished by the Contract Documents. Any such proposal shall be made in a transmittal to Owner that is separate from and independent of any Design Submittals. The proposal shall describe the advantages, disadvantages, and changes in Contract Price or Contract Time associated with the proposed substitute. Approval of the proposed substitute shall be at Owner's sole discretion. If approved, the substitute item shall be incorporated in the Construction Drawings and Construction Specifications.

D. *Design Professional Review:* Before Design-Builder transmits its proposal to Owner, the Project Design Professional that designed the portion of the Work affected by the proposed "or equal" or substitute shall review and approve the proposal.

E. *Construction Drawings and Construction Specifications:* "Or equal" or substitute proposals with respect to items of material or equipment that are required in the Construction Drawings and Construction Specifications shall be considered proposed modifications of the Construction Drawings and Construction Specifications, and shall be governed by the provisions of Paragraph 8.02.H.

7.07 *Concerning Project Design Professionals, Construction Subcontractors, Suppliers, and Others*

A. Design-Builder may retain Project Design Professionals, Construction Subcontractors, and Suppliers for the performance of parts of the Work. Such Project Design Professionals, Construction Subcontractors, and Suppliers must be acceptable to Owner.

B. Design-Builder shall retain specific Project Design Professionals, Construction Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required to do so by the Contract Documents (including but not limited to the Proposal Amendment) as of the Effective Date.

C. Prior to entry into any binding Design Agreement, Construction Subcontract, or purchase order, Design-Builder shall submit to Owner the identity of the proposed Project Design Professional, Construction Subcontractor, or Supplier (unless Owner has already deemed such proposed contractual party acceptable, during the bidding process or otherwise). Such proposed contractual party shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within 5 days.

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D. Owner may require the replacement of any Project Design Professional, Construction Subcontractor, Supplier, or other entity retained by Design-Builder to perform any part of the Work solely on the basis of substantive, reasonable objection after due investigation. Design-Builder shall submit an acceptable replacement for the rejected Project Design Professional, Construction Subcontractor, Supplier, or other entity.

E. If Owner requires the replacement of any Project Design Professional, Construction Subcontractor, Supplier, or other entity retained by Design-Builder to perform any part of the Work, then Design-Builder shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement.

F. No acceptance by Owner of Engineer or of any Project Design Professional, Construction Subcontractor, Supplier, or other entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.

G. Design-Builder shall be fully responsible to Owner for all acts and omissions of the Project Design Professionals, Construction Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work, just as Design-Builder is responsible for Design-Builder's own acts and omissions.

H. Design-Builder shall be solely responsible for scheduling and coordinating the services and work of the Project Design Professionals, Construction Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.

I. Design-Builder shall restrict all Project Design Professionals, Construction Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating directly with Owner, except in case of an emergency or a matter involving public health, safety, or welfare, or as otherwise expressly allowed herein.

J. Owner may furnish to any Project Design Professional, Construction Subcontractor, or Supplier, to the extent practicable, information about amounts paid to Design-Builder on account of Work performed for Design-Builder by the requesting party.

K. Nothing in the Contract Documents:

1. Shall create for the benefit of any Project Design Professional, Construction Subcontractor, Supplier, or other third-party individual or entity any contractual relationship between Owner and such third-party individual or entity; nor

2. Shall create any obligation on the part of Owner to pay or to see to the payment of any money due any Project Design Professional, Construction Subcontractor, Supplier, or other third-party individual or entity except as may otherwise be required by Laws and Regulations.

7.08 *Patent Fees and Royalties*

A. Design-Builder shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Conceptual Documents or other Contract Documents for use in the performance of the Construction, and if to the actual knowledge of Owner its use is subject to patent rights or copyrights calling for

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the payment of any license fee or royalty to others, then Owner has disclosed the existence of such rights to Design-Builder in the Conceptual Documents or other Contract Documents.

B. To the fullest extent permitted by Laws or Regulations, Design-Builder shall indemnify and hold harmless Owner and Owner's Consultant, and the officers, directors, partners, employees or agents, and other consultants of each and any of them from and against all claims, costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) arising out of or resulting from any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the specification or incorporation in the Work of any invention, design, process, product or device, except those required by the Contract Documents.

C. To the fullest extent permitted by Laws or Regulations, Owner shall indemnify and hold harmless Design-Builder and its officers, directors, members, partners, employees or agents, Project Design Professionals, Construction Subcontractors, and Suppliers from and against all claims, costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) arising out of or resulting from any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product or device required by the Contract Documents, but not identified by Owner as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.

7.09 *Permits and Utility Charges*

A. The Contract Documents allocate responsibility for obtaining and paying for specified permits, licenses, certificates of occupancy, and approvals of governmental authorities having jurisdiction over the Work. Each party shall assist the other, when necessary, in obtaining such permits, licenses, certificates, and approvals.

B. Design-Builder shall pay all charges of utility owners for temporary service to the Work. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work, and for capital costs related thereto.

7.10 *Taxes*

A. Design-Builder shall pay all sales, consumer, use, and other similar taxes required to be paid by Design-Builder in accordance with the Laws or Regulations of the place of the Project which are applicable during the performance of the Work.

7.11 *Laws and Regulations*

A. Design-Builder shall give all notices required by and comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, Owner shall not be responsible for monitoring Design-Builder's compliance with any Laws or Regulations.

B. If Design-Builder performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Design-Builder shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work.

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C. Changes in Laws or Regulations that occur after the date on which the Design-Builder committed to the Contract Price (whether by negotiation or making an offer or proposal) and affect the cost or time of performance shall be the subject of an equitable change in Contract Price or Contract Times.

7.12 *Record Documents*

A. Design-Builder shall maintain the Record Documents in good order, in a safe place at the Site. Design-Builder shall annotate the Record Documents to show all changes and clarifications made (whether in the field or otherwise) during performance of Construction. The Record Documents, as annotated, will be available to Owner for reference. Upon completion of the Construction, Design-Builder shall deliver the Record Documents, as annotated, to Owner.

B. After receipt and review of the Record Documents from Design-Builder upon completion of Construction, the Owner may comment on any possible inaccuracies. After Owner and Design-Builder collaboratively address any such comments, the Record Documents shall be deemed to be Record Drawings and Record Specifications.

C. The Record Drawings and Record Specifications are Contract Documents, and are binding upon Design-Builder with respect to its obligations to comply with the Contract Documents, including but not limited to correction period responsibilities and warranty obligations.

7.13 *Safety and Protection*

A. Design-Builder shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Construction Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Design-Builder shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

1. All persons on the Site or who may be affected by the Work;

2. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and

3. Other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and Underground Facilities not designated for removal, relocation, or replacement in the course of Construction.

B. Design-Builder shall comply with applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Design-Builder shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.

C. Design-Builder shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.

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D. Design-Builder shall inform Owner of the specific requirements of Design-Builder's safety program with which Owner and its employees and representatives must comply while at the Site.

E. All damage, injury, or loss to any property referred to in Paragraph 7.13.A.2 or 7.13.A.3 caused, directly or indirectly, in whole or in part, by Design-Builder, any Construction Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Design-Builder.

F. Design-Builder's duties and responsibilities for safety and for protection of the Construction shall continue until such time as all the Work is completed, Owner has issued a notice to Design-Builder in accordance with Paragraph 14.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion), and Design-Builder has left the Site.

G. Design-Builder's duties and responsibilities for safety and protection shall resume whenever Design-Builder or any Construction Subcontractor, Supplier, or other representative returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.14 *Safety Representative*

A. Design-Builder shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.15 *Hazard Communication Programs*

A. Design-Builder shall be responsible for coordinating any exchange of safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.16 *Emergencies*

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Design-Builder is obligated to act to prevent threatened damage, injury or loss. Design-Builder shall give Owner prompt written notice if Design-Builder believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If a change in the Contract Documents is required because of the action taken by Design-Builder in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.17 *Post-Construction Phase*

A. Design-Builder shall:

1. Provide assistance in connection with the start-up and testing of any equipment or system.

2. Assist Owner in training staff to operate and maintain the Work.

7.18 *Design-Builder's General Warranty and Guarantee*

A. Design-Builder warrants and guarantees to Owner that Design-Builder will perform and complete the Construction as required by the Contract Documents, and that all Construction

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will be in accordance with the Contract Documents, the Construction Drawings, and the Construction Specifications (as duly modified in accordance with the Contract), and will not be defective.

B. Design-Builder's warranty and guarantee hereunder excludes defects or damage caused by:

1. Abuse, modification or improper maintenance or operation by persons other than Design-Builder, Construction Subcontractors, or Suppliers or any other individual for whom Design-Builder is responsible; or

2. Normal wear and tear under normal usage.

C. None of the following will constitute an acceptance by Owner of Work that is not in accordance with the Contract Documents or a release of Design-Builder's obligation to perform the Work in accordance with the Contract Documents, unless expressly stated otherwise in writing:

1. Observations by Owner;

2. The making of any progress or final payment;

3. The issuance of a certificate of Substantial Completion;

4. Use or occupancy of the Work or any part thereof by Owner;

5. Any review and approval of a Submittal;

6. Any inspection, test, or approval by others; or

7. Any correction of defective Construction by Owner.

7.19 *Indemnification*

A. To the fullest extent permitted by Laws and Regulations, Design-Builder shall indemnify and hold harmless Owner, Owner's Consultant, and their officers, directors, members, partners, employees, agents, consultants, and subcontractors, from losses, damages, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising from third-party claims or actions relating to or resulting from the performance or furnishing of the Work, provided that any such claim, action, loss, damages, or judgment is attributable to bodily injury, sickness, disease, or death, or to damage to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom, but only to the extent caused by any negligent act or omission of Design-Builder, a Project Design Professional, any Construction Subcontractor, any Supplier, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors.

B. In any and all claims or actions against Owner, Owner's Consultant, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, by any employee (or the survivor or personal representative of such employee) of Design-Builder, a Project Design Professional, any Construction Subcontractor, any Supplier, any individual or entity directly or indirectly employed or retained by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.19.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Design-Builder, a Project Design Professional, or any Construction Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

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C. The indemnification obligations of Design-Builder under Paragraph 7.19.A shall not extend to the liability of Owner's Consultant, other consultants or design professionals of Owner, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, designs, or specifications.

ARTICLE 8 – SUBMITTALS

8.01 *Design-Builder's Preparation of Submittals*

A. Design Submittals shall be prepared by Project Design Professionals, on behalf of Design-Builder.

B. The appropriate Project Design Professional shall review and approve each Submittal (including but not limited to all Design Submittals), other than those Submittals not involving technical or engineering matters, before Design-Builder's transmittal of such Submittal to Owner. Such review and approval shall account for the following, as appropriate:

1. That any items covered by such Submittal will, after installation or incorporation in the Construction, comply with the information and requirements in the Contract Documents and the Construction Drawings and Construction Specifications, as duly modified, and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents, Construction Drawings, and Construction Specifications, as duly modified.

2. That if the Submittal includes any proposed modification of the Contract Documents, Construction Drawings, or Construction Specifications, or any proposed variation from the requirements of such documents, such proposed modification or variation is acceptable based on the standards of the engineering profession (or other applicable design profession), and if implemented will be supported by signing or sealing by a licensed design professional, as necessary.

C. Before Design-Builder's transmittal of a Submittal to Owner, the Design-Builder shall, as applicable:

1. Review and coordinate the Submittal with other Submittals and with the requirements of the Work, the Contract Documents, the Construction Drawings, and the Construction Specifications, as duly modified;

2. Determine and verify all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect to the Submittal, and confirm that the Submittal is complete with respect to all related data included in the Submittal;

3. Determine and verify the suitability of proposed materials and equipment with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation; and

4. Determine and verify all information relative to Design-Builder's responsibilities for the means, methods, techniques, sequences, and procedures of construction, and for safety precautions and programs incident thereto.

D. Design-Builder shall give Owner specific written notice of any proposed modification of the Contract Documents, Construction Drawings, or Construction Specifications, and any

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variations that a Submittal may have from the requirements of the Contract Documents, Construction Drawings, and Construction Specifications, as duly modified. This notice shall be set forth in a written communication separate from the Submittal; and, in addition, in the case of a Submittal in drawing form, by a specific notation made on the drawing itself.

E. Each Submittal shall bear a stamp or specific written certification by Design-Builder that it has satisfied its obligations under the Contract Documents with respect to preparation of the Submittal, and that Design-Builder approves the Submittal.

F. All Submittals must be acceptable based on compliance with form and content requirements of the Contract Documents. Design-Builder shall submit Design Submittals for Owner's review and approval. Other Submittals shall not require express approval, except as indicated in the Supplementary Conditions or elsewhere in the Contract Documents.

8.02 *Owner's Review of Submittals*

A. Owner will review all Submittals, and may comment on any Submittal. Any response to a Submittal by Owner shall be in accordance with the schedule of required Submittals accepted by Owner as required by Paragraph 2.07, and the provisions of the Contract Documents.

B. For those Submittals requiring Owner's review and approval, Owner's response will be in writing and will indicate either that Owner approves the Submittal or rejects the Submittal. Owner may also include comments regarding the approved or rejected Submittal. For those Submittals that do not require approval, the Submittal shall be deemed acceptable to Owner unless Owner responds with a timely objection or adverse comment.

C. Unless a specific provision of the Contract Documents expressly provides otherwise, Owner's review of a Submittal will be to determine if the Submittal complies with and is consistent with the Contract Documents. If Owner concludes that a Submittal requiring approval complies with and is consistent with the Contract Documents, the Owner shall approve such Submittal.

D. Owner's approval, rejection, or acceptance of a Submittal will not extend to the means, methods, techniques, sequences, or procedures of Construction, or to safety precautions or programs incident thereto.

E. Owner's review, comments, approval, rejection, or acceptance of Submittals shall not relieve Design-Builder from responsibility for (1) performance of the Work in accordance with the Contract Documents, (2) the scheduling and progress of the Work, (3) the means, methods, sequences, techniques, and procedures of Construction, and safety precautions and programs incident thereto, or (4) any variation from the requirements of the Contract Documents, unless Design-Builder has in a separate written communication at the time of submission called Owner's attention to each such variation, and Owner has given written approval of each such variation; nor shall Owner's review, comments, approval, rejection, or acceptance of a Submittal impose any such responsibility on Owner.

F. Construction tasks and expenditures by Design-Builder prior to Owner's review and approval or acceptance of any Submittal will be at the sole risk of Design-Builder.

G. In reviewing, approving, rejecting, accepting, or commenting on any Design Submittal, Owner does not assume responsibility for the design, for any deficiencies in the Design Submittal or in the Design Professional Services by which they were prepared, or for constructability, cost, or schedule problems that may arise in connection with the Design Submittal.

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H. The parties acknowledge that Design-Builder's design responsibilities continue after commencement of Construction. During the course of Construction, the Design-Builder may propose modifications to the Construction Drawings and Construction Specifications. Owner shall approve such proposed modifications if (1) they comply with and are consistent with the Contract Documents, (2) Design-Builder has demonstrated that the modification is minor in character, or will not be detrimental to the quality and function of the Work, (3) the appropriate Project Design Professional has reviewed and approved the proposed modification with respect to any technical or engineering matters, and (4) Owner has not relied on the previously-approved Construction Drawings and Construction Specifications, such that the proposed modification would be detrimental to the Owner's interests. At its option, Owner may also approve more substantial or divergent proposed modifications, provided that the appropriate Project Design Professional has reviewed and approved the proposed modification with respect to any technical or engineering matters.

ARTICLE 9 – OTHER CONSTRUCTION

9.01 *Other Work*

A. In addition to and apart from the Work to be performed and furnished by Design-Builder under the Contract Documents, the Owner may perform other construction work at or adjacent to the Site during the course of the Project. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.

B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Design-Builder written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any third-party utility work at or adjacent to the Site, Owner shall provide such information to Design-Builder.

C. Design-Builder shall afford proper and safe access to the Site to each contractor that performs such other work, each utility owner performing other work, and to Owner, if Owner is performing other work with Owner's employees, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Design-Builder shall do all cutting, fitting, and patching of the Construction that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Design-Builder shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Design-Builder may cut or alter others' work with the written consent of Owner and the others whose work will be affected.

D. If the proper execution or results of any part of the Construction depends upon work performed by others under this Article 9, Design-Builder shall inspect such other work and promptly report to Owner in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of the Construction. Design-Builder's failure to so report will constitute an acceptance of such other work as fit and proper for integration with the Construction, except for latent defects and deficiencies in such other work.

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9.02 *Coordination*

A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Design-Builder prior to the start of any such other work:

1. The identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;

2. An itemization of the specific matters to be covered by such authority and responsibility; and

3. The extent of such authority and responsibilities.

B. If the Supplementary Conditions do not identify the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors, Owner shall have sole authority and responsibility for such coordination.

9.03 *Legal Relationships*

A. If, in the course of performing other work for Owner at or adjacent to the Site, the Owner's employees, any other contractor working for Owner, or any utility owner that Owner has arranged to perform work, causes damage to the Construction or to the property of Design-Builder or the Construction Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Construction, through actions or inaction, then Design-Builder shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Design-Builder in the Contract Documents, and any provisions in Laws or Regulations concerning utility action or inaction, or related remedies. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Design-Builder assigning to Owner all Design-Builder's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Design-Builder's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Design-Builder's ability to complete the Work within the Contract Times.

B. Design-Builder shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Design-Builder fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Design-Builder, and assign to such other contractor or utility owner the Owner's contractual rights against Design-Builder with respect to the breach of the obligations set forth in this paragraph.

C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Design-Builder shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Design-Builder's failure to take reasonable and customary measures with respect to Owner's other

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work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Design-Builder.

D. If Design-Builder damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Design-Builder's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Design-Builder's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Design-Builder or Owner, then Design-Builder shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and its officers, directors, members, partners, employees, agents, consultants and subcontractors from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 10 – OWNER'S RESPONSIBILITIES

10.01 *General*

A. Owner shall do the following in a timely manner so as not to delay the services of Design-Builder:

1. If requested in writing by Design-Builder, furnish reasonable evidence satisfactory to Design-Builder that sufficient funds are available and committed for the entire cost of the Project. Unless such reasonable evidence is furnished, Design-Builder is not required to commence or continue any Work, or may, if such evidence is not presented within a reasonable time, stop Work upon 15 days' notice to the Owner;

2. Make payments to Design-Builder promptly when they are due, as provided in Paragraph 14.01 and 14.06;

3. Furnish the Site as set forth in Paragraph 5.01; arrange for safe access to and make all provisions for Design-Builder to enter upon public and private property as may reasonably be required for Design-Builder to perform Work under the Contract.

4. Furnish to Design-Builder, as required for performance of the Work, the following, all of which Design-Builder may use and rely upon in performing services under this Agreement:

   a. Environmental assessment and impact statements;

   b. Property, boundary, easement, right-of-way, and other special engineering surveys or data;

   c. Property descriptions;

   d. Zoning, deed, and other land use restrictions;

   e. Utility and topographic mapping and surveys;

   f. Explorations and tests of subsurface conditions at or adjacent to the Site; geotechnical reports and investigations; drawings of physical conditions relating to existing surface or subsurface structures at the Site; any information or data known to Owner concerning underground facilities at the Site; hydrographic surveys,

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laboratory tests and inspections of samples, materials, and equipment; with appropriate professional interpretation of such information or data;

g. Any other available information pertinent to the Project including reports and data relative to previous designs, or investigation at or adjacent to the Site;

h. Engineering surveys to establish reference points which in Owner's judgment are necessary to enable Design-Builder to proceed with the Work;

i. Assistance to Design-Builder in filing documents required to obtain necessary permits, licenses, and approvals of governmental authorities having jurisdiction over the Project; and

j. Permits, licenses, and approvals of government authorities that the Contract Documents expressly require Owner to obtain.

5. Provide information known to Owner relating to the presence of materials and substances at the Site that could create a Hazardous Environmental Condition.

B. If an obligation ascribed to Owner in Paragraph 10.01.A is expressly assigned to Design-Builder, in the description of the Work or elsewhere in the Contract Documents, then such express assignment to Design-Builder shall supersede the provision in Paragraph 10.01.A.

C. Recognizing and acknowledging that Design-Builder's services and expertise do not include the following services, Owner shall furnish or obtain, as required for the Project:

a. Accounting, bond and financial advisory (including, if applicable, "municipal advisor" services as described in Section 975 of the Dodd-Frank Wall Street Reform and Consumer Protection Act (2010) and the municipal advisor registration rules issued by the Securities and Exchange Commission), independent cost estimating, and insurance counseling services.

b. Legal services with regard to issues pertaining to the Project as Owner requires, or Design-Builder reasonably requests.

c. Such auditing services as Owner requires to review cost submittals or ascertain how or for what purpose Design-Builder has used the money paid.

D. Examine all studies, reports, alternate solutions, sketches, drawings, specifications, proposals, Submittals (including Design Submittals), and other documents presented by Design-Builder (including obtaining advice of an attorney, insurance counselor, and other consultants as Owner deems appropriate with respect to such examination), and if a decision is required with respect to any such document, render such decision in writing pursuant to any specific schedule, or if no specific schedule pertains, within a reasonable time after receipt of the document.

10.02 *Insurance*

A. Owner's responsibilities with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

10.03 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Design-Builder's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Design-Builder

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to comply with Laws or Regulations applicable to the furnishing or performance of the Work. Owner will not be responsible for Design-Builder's failure to perform the Work in accordance with the Contract Documents.

10.04 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility with respect to undisclosed Hazardous Environmental Conditions uncovered or revealed at the Site is set forth in Paragraph 5.06.

10.05 *Owner's Site Representative*

A. Owner may furnish an Owner's Site Representative to observe the performance of Construction. The duties, responsibilities and limitations of authority of any such Owner's Site Representative and assistants will be as provided in the Supplementary Conditions.

10.06 *Owner's Consultants and Managers*

A. Owner's Consultant, if any, is identified in the Agreement.

B. Owner shall advise Design-Builder of the identity and scope of services of any other independent consultants or managers retained by Owner to perform or furnish services in regard to the Project, including, but not limited to, cost estimating, project peer review, value engineering, constructability review, program management, project management, or contract administration.

C. Neither Owner's Consultant, Owner's Site Representative, nor any other consultant or manager retained by Owner, has any duties, responsibilities, or authorities with respect to Design-Builder, unless expressly provided in this Contract. Owner's Consultant and such other consultants and managers shall not supervise, direct, or have control or authority over, nor be responsible for, Design-Builder's means, methods, techniques, sequences, or procedures of construction or the safety precautions and programs incident thereto, or for any failure of Design-Builder to comply with Laws or Regulations applicable to the furnishing or performance of the Work; and will not be responsible for Design-Builder's failure to perform the Work in accordance with the Contract Documents.

10.07 *Safety Programs*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Design-Builder's safety programs of which Owner has been informed pursuant to Paragraph 7.13.D.

B. Owner shall inform Design-Builder of any specific requirements of safety or security programs that are applicable to Design-Builder while at the Site.

10.08 *Permits and Approvals*

A. Owner shall obtain reviews, approvals, certificates, and permits from governmental authorities having jurisdiction over the Project as indicated in the Contract Documents.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

A. The Contract Documents may be amended or supplemented by a Change Order or a Work Change Directive.

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1. *Change Orders:* If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.

2. *Work Change Directives*: The Work modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order. When a Work Change Directive is issued, the parties will promptly meet to attempt to negotiate the Work Change Directive's effect, if any, on the Contract Times and Contract Price. The effect, if any, on Contract Times and Contract Price, together with the Work Change Directive's addition, deletion, or revision to the Work, will be set forth in a subsequently issued Change Order.

B. Either Owner or Design-Builder may propose or request a Change Order. With respect to certain events, this Contract may indicate specific times in which such requests or proposals must be submitted to the other party. With respect to all other events, the request or proposal shall be submitted to the other party within 30 days of the event giving rise to the request or proposal.

11.02 *Authorized Changes in the Work*

A. Without invalidating the Contract and without notice to any surety, and notwithstanding any other provision of the Contract, Owner may, at any time or from time to time, order or authorize additions, deletions, or revisions in the Work within the general scope of the Contract. Such changes may be accomplished by a Change Order, if Owner and Design-Builder have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Design-Builder shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Design-Builder to undertake work that Design-Builder reasonably concludes cannot be performed in a manner consistent with Design-Builder's safety or professional obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

A. Design-Builder shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any Work performed that is not required by the Contract Documents, as duly amended, except in the case of an emergency as provided in Paragraph 7.16, or in the case of uncovering Construction as provided in Paragraph 13.03.A.3.

11.04 *Changes Involving the Design*

A. To the extent a change, whether proposed by Design-Builder or Owner, ordered by Owner, or set forth in a proposed Change Order or in a Work Change Directive, involves the design (as set forth in the Construction Drawings, Construction Specifications, or otherwise) or other engineering or technical matters, such changes must be reviewed and approved by the applicable Project Design Professional. The review and approval may occur at the time the change occurs, or as part of Design-Builder's provision of Professional Design Services in response to the change.

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11.05 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim regarding an adjustment in the Contract Price shall be presented by written notice to the other party in accordance with Paragraph 16.01.

B. If the Contract Price is based on Cost of the Work, then the provisions in the Agreement regarding Cost of the Work and changes in the Design-Builder's fee, Contract Price, Guaranteed Maximum Price, and Guaranteed Maximum Fee, apply.

C. The value of any Work covered by a Change Order or of any adjustment in the Contract Price will be determined as follows:

1. Where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 12.02); or

2. Where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.05.D); or

3. Where the Work involved is not covered by unit prices contained in the Contract Documents, and agreement to a lump sum is not reached under Paragraph 11.05.C.2, then on the basis of the Cost of the Work for price adjustments (determined as provided in the Cost of the Work provisions in the Agreement, if applicable, or in Paragraph 12.01), plus a Design-Builder's Fee for overhead and profit (determined as provided in Paragraph 11.05.D).

D. *Design-Builder's Fee:* The Design-Builder's fee for overhead and profit on Change Orders shall be determined as follows:

1. A mutually acceptable fixed fee; or

2. If a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

a. For costs incurred under Paragraphs 12.01.B.1.a. and 12.01.B.2, the Design-Builder's fee shall be 15 percent;

b. For costs incurred under Paragraph 12.01.B.3, 12.01.B.4, 12.01.B.5, and 12.01.B.6, the Design-Builder's fee shall be 5 percent;

c. With respect to Construction Subcontracts, where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of this Contract is that the Design-Builder's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraph 12.01 by the subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Design-Builder itself, and to any Construction Subcontractors of a tier higher than that of the Construction Subcontractor that actually performs the Work, a fee of 5 percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Construction Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Construction Subcontractor that actually performs the Work;

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d. With respect to Design Agreements, the Engineer or other invoicing Project Design Professional under a Design Agreement may add a fee of 5 percent to an invoice from a lower tier design entity , and Design-Builder may add a fee of 5 percent to an invoice from Engineer or other invoicing Project Design Professional; Owner shall not be responsible for any other mark-up at any tier (other than those incorporated in a factor, multiplier, hourly rate, or stipulated sum from the entity performing the subject Design Professional Services);

e. No fee will be payable on the basis of costs itemized in Paragraph 12.01.B.7 or 12.01.C;

f. The amount of credit to be allowed by Design-Builder to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Design-Builder's fee by an amount equal to 5 percent of such net decrease; and

g. When both additions and credits are involved in any one change, the adjustment in Design-Builder's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.05.D.2.a through 11.05.D.2.e., inclusive.

11.06 *Change of Contract Times*

A. The Contract Times may only be changed by a Change Order. Any Claim regarding an adjustment of the Contract Times shall be presented by written notice to the other party pursuant to Paragraph 16.01.

B. Design-Builder's entitlement to an adjustment of the Contract Times under this Contract is conditioned on such adjustment being essential to Design-Builder's ability to complete the Work within the Contract Times.

11.07 *Execution of Change Orders*

A. Owner and Design-Builder shall execute appropriate Change Orders covering:

1. Changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;

2. Changes in Contract Price resulting from an Owner set-off, unless Design-Builder has duly contested such set-off;

3. Changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's correction of defective Work under Paragraph 13.05 or Owner's acceptance of defective Work under Paragraph 13.07, or (c) agreed to by the parties (all subject to the need for review and approval by the applicable Project Design Professional pursuant to Paragraph 11.04); and

4. Changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Article 16.

B. If Owner or Design-Builder refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

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11.08 *Notice to Sureties*

A. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be Design-Builder's responsibility. The amount of each applicable Bond will be adjusted to reflect the effect of any such change.

ARTICLE 12 – COST OF THE WORK ADJUSTMENTS; UNIT PRICE WORK

12.01 *Cost of the Work*

A. *Costs of the Work Adjustment:* When the price of Work covered by a Change Order or an adjustment in Contract Price is to be determined on the basis of Cost of the Work, the Cost of the Work adjustment means the sum of all costs necessarily incurred and paid by Design-Builder in the proper performance of the specific portion of the Work. The costs to be reimbursed to Design-Builder will be only those additional or incremental costs required because of the change of the Work or because of the event giving rise to the adjustment. If the Agreement contains Cost of the Work provisions, such provisions shall govern in determining the Cost of the Work for Change Order or adjustment purposes. If the Agreement does not contain Cost of the Work provisions, then the provisions in Paragraph 12.01 shall apply.

B. *Costs Included:* The Cost of the Work adjustment does not include any of the costs itemized in Paragraph 12.01.C, and shall include only the following items with respect to the subject Work:

1. Payroll costs for employees in the direct employ of Design-Builder in the performance of the subject Work, under schedules of job classifications agreed upon by Owner and Design-Builder in advance of such performance.

    a. Such employees shall include without limitation superintendents, foremen, and other personnel employed full-time at the Site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the subject Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation, and holiday pay applicable thereto. The expenses of performing the subject Work outside the hours or days permitted by this Contract shall be included in the above to the extent such performance of Work is authorized by Owner.

    b. Such employees shall also include engineers, engineering technicians, architects, and others providing Design Professional Services as employees of Design-Builder. For purposes of this Paragraph 12.01.B.1.b, Design-Builder shall be entitled to payment for such employees an amount equal to salary costs times a factor, as designated in the Agreement, for services in the performance of the subject Work.

2. Cost of all materials and equipment furnished and incorporated in the subject Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Design-Builder unless Owner deposits funds with Design-Builder with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and

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returns from sale of surplus materials and equipment shall accrue to Owner, and Design-Builder shall make provisions so that they may be obtained.

3. Cost of permits obtained by Design-Builder.

4. Payments made by Design-Builder to Construction Subcontractors for subject Work performed or furnished by such Construction Subcontractors. If any subcontract provides that the Construction Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Construction Subcontractor's Cost of the Work and fee shall be determined in the same manner as Design-Builder's Cost of the Work and fee.

5. Payments made by Design-Builder for Design Professional Services provided or furnished with respect to the subject Work under a Design Agreement.

6. Costs of special consultants (not including Project Design Professionals), including but not limited to testing laboratories, attorneys, and accountants, retained for services specifically related to the subject Work.

7. Supplemental costs including the following items:

    a. The proportion of necessary transportation, travel, and subsistence expenses of Design-Builder's employees incurred in discharge of duties connected with the Work.

    b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the Site and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed that remain the property of Design-Builder.

    c. Rentals of all construction or engineering equipment and machinery, and their parts, whether rented from Design-Builder or from others in accordance with rental agreements approved by Owner, and the costs of transportation, loading, unloading, installation, dismantling and removal of such equipment, machinery, and parts. All such costs shall be in accordance with the terms of such rental agreements. The rental of any such equipment, machinery, or parts shall cease when its use is no longer necessary for the Work.

    d. Sales, consumer, use, and other similar taxes related to the subject Work, and for which Design-Builder is liable, imposed by Laws or Regulations.

    e. Deposits lost for causes other than negligence of Design-Builder, any Construction Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

    f. Losses, damages, and related expenses caused by damage to the subject Work not compensated by insurance or otherwise, sustained by Design-Builder in connection with the furnishing and performance of the Work provided they have resulted from causes other than the negligence of Design-Builder, any Construction Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Design-Builder's fee.

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g. The cost of utilities, fuel, and sanitary facilities at the Site, as applicable to the subject Work.

h. Minor expenses such as long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.

i. Cost of premiums for all Bonds and insurance Design-Builder is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Design-Builder's officers, executives, principals (of partnerships and sole proprietorships), general managers, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Design-Builder whether at the Site or in Design-Builder's principal or a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 12.01.B.1, all of which are to be considered administrative costs covered by the Design-Builder's fee.

2. Expenses of Design-Builder's principal and branch offices other than Design-Builder's office at the Site.

3. Any part of Design-Builder's capital expenses, including interest on Design-Builder's capital employed for the subject Work and charges against Design-Builder for delinquent payments.

4. Costs due to the negligence of Design-Builder, any Construction Subcontractor, Engineer or other Project Design Professionals, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

5. Other overhead or general expense costs of any kind, and the costs of any item not specifically and expressly included in Paragraph 12.01.B.

D. *Design-Builder's Fee*: When the value of the Work covered by a Change Order is determined on the basis of Cost of the Work, Design-Builder's fee shall be determined as set forth in Paragraph 11.05.D.

E. *Documentation:* Whenever the cost of any Work is to be determined pursuant to Paragraph 12.01.B and 12.01.C, Design-Builder will establish and maintain cost records in accordance with generally accepted accounting practices and submit in a form acceptable to Owner an itemized cost breakdown together with supporting data.

12.02 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all of Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of

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determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Design-Builder will be made by Owner.

B. If Design-Builder's compensation is based on Cost of the Work, this Contract will not include compensation under unit prices unless expressly stated otherwise.

C. Each unit price will be deemed to include an amount considered by Design-Builder to be adequate to cover Design-Builder's overhead and profit for each separately identified item.

D. Design-Builder or Owner may seek an adjustment in the Contract Price if:

1. The quantity of any item of Unit Price Work performed by Design-Builder differs materially and significantly from the estimated quantity of such item indicated in the Agreement;

2. Such an adjustment would not duplicate, and is coordinated with, any other related adjustments of Contract Price; and

3. Design-Builder has incurred additional expense, or less expense, as a result of the variation in quantity.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE CONSTRUCTION

13.01 *Access to Construction*

A. Owner, Owner's Consultant, Owner's Site Representative, and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Construction at reasonable times for their observation, inspecting, and testing. Design-Builder shall provide them proper and safe conditions for such access and advise them of Design-Builder's Site safety procedures and programs so that they may comply therewith as applicable.

13.02 *Tests, Inspections, and Approvals*

A. Design-Builder shall be responsible for arranging, obtaining, and paying for all inspections and tests required:

1. By the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;

2. By Laws and Regulations, unless the Contract Documents or Laws and Regulations expressly allocate responsibility for a specific inspection or test to Owner;

3. To attain Owner's acceptance of materials or equipment to be incorporated in the Construction;

4. By manufacturers of equipment furnished under the Contract Documents;

5. To meet the requirements of the Construction Drawings and Construction Specifications;

6. For testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Construction; and

7. For acceptance of materials, mix designs, or equipment submitted for approval prior to Design-Builder's purchase thereof for incorporation in the Construction.

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B. Owner shall be responsible for arranging, obtaining, and paying for all inspections and tests expressly required by the Contract Documents or Laws and Regulations to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Construction shall be governed by the provisions of Paragraph 13.03.

C. All inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Design-Builder.

D. If the Contract Documents require the Construction (or part thereof) to be approved by Owner or another designated individual or entity, then Design-Builder shall assume full responsibility for arranging and obtaining such approvals.

E. Design-Builder shall give Owner reasonable notice of the planned schedule for all required inspections, tests, and approvals.

F. Design-Builder shall give Owner timely notice of readiness of the Construction (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.

G. Each party shall provide the other with copies of any certificates of inspection or approval obtained with respect to tests and inspections.

H. Both parties may rely on the results of inspections and tests, performed pursuant to this paragraph and the governing provisions of the Contract Documents, Laws and Regulations, and the Construction Drawings and Construction Specifications.

I. If any Construction (or the construction work of others) that is required to be inspected, tested, or approved is covered by Design-Builder without written concurrence of Owner, then Contractor shall, if requested by Owner, uncover such Construction for observation. Such uncovering shall be at Design-Builder's expense unless Design-Builder has given Owner timely notice of Design-Builder's intention to cover the same and Owner has not acted with reasonable promptness in response to such notice.

13.03 *Uncovering Construction*

A. If Owner considers it necessary or advisable that covered Construction be observed by Owner or inspected or tested by others, then Design-Builder, at Owner's request, shall uncover, expose or otherwise make available for observation, inspection, or testing, as Owner may require, that portion of the Construction in question, furnishing all necessary labor, material, and equipment.

1. If the Construction had been covered contrary to the written request of Owner or a requirement of the Contract Documents, then uncovering it for Owner's observation and re-covering it shall be at Design-Builder's expense, regardless of whether it is defective.

2. If it is found that the covered Construction is defective, Design-Builder shall pay all costs and damages caused by or resulting from such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement, re-covering, or reconstruction (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals, all court or arbitration or other dispute resolution costs, and all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price.

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3. If the covered Construction is not found to be defective, Design-Builder shall be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, re-covering, and reconstruction, subject to the provisions of Paragraph 13.03.A.1.

13.04 *Defective Construction*

A. It is Design-Builder's obligation to assure that the Construction is not defective.

B. Owner shall give Design-Builder prompt written notice of all defective Construction of which Owner has actual knowledge. Owner may reject, accept, or correct defective Construction.

C. Promptly after receipt of written notice of defective Construction, unless Owner expressly indicates that it will accept the defective Construction, Design-Builder shall correct all such defective Construction, whether or not fabricated, installed, or completed; or, if Owner has rejected the defective Construction, remove it from the Project and replace it with Construction that is not defective.

D. When correcting defective Construction, Design-Builder shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Construction.

13.05 *Owner May Correct Defective Construction*

A. If Design-Builder fails within a reasonable time after written notice from Owner to correct defective Construction or to remove and replace rejected Construction, or if Design-Builder fails to perform the Construction in accordance with the Contract Documents, or if Design-Builder fails to comply with any other provision of the Contract Documents, Owner may, after 7 days' written notice to Design-Builder, correct and remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.05 Owner shall proceed expeditiously. In connection with such corrective and remedial action, Owner may exclude Design-Builder from all or part of the Site, take possession of all or part of the Construction, and suspend Design-Builder's services related thereto, and incorporate in the Construction all materials and equipment stored at the Site or for which Owner has paid Design-Builder but which are stored elsewhere. Design-Builder shall allow Owner, Owner's Consultant, Owner's Site Representative, and Owner's other representatives, agents, employees, and contractors, access to the Site to enable Owner to exercise the rights and remedies under this paragraph.

13.06 *Costs*

A. Design-Builder shall bear all costs arising out of or relating to the correction, removal, or replacement of defective Construction, including but not limited to repair of adjacent Work or property; delay costs and impacts; fees and charges of engineers, architects, attorneys, and other professionals; and all court, arbitration, or other dispute resolution costs.

B. All costs, losses, and damages (included but not limited to fees and charges of engineers, architects, attorneys and other professionals, all court or arbitration or other dispute resolution costs, and all costs of repair or replacement of work of others) incurred or sustained by Owner in exercising its rights and remedies arising from defective Construction under this Article will be charged against Design-Builder, by set-off against payment or otherwise.

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C. Design-Builder shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to defective Construction.

13.07 *Owner's Acceptance of Defective Construction*

A. If, instead of requiring correction or removal and replacement of defective Construction, Owner prefers to accept it, Owner may do so. If such acceptance is proposed prior to final payment, it shall be subject to confirmation by the applicable Project Design Professional that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety. Design-Builder shall pay all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Construction. If any such acceptance occurs prior to final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents, and Owner shall be entitled to an appropriate decrease in the Contract Price reflecting the diminished value of the Construction so accepted.

13.08 *Owner May Stop Construction*

A. If Construction is defective, or Design-Builder fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform Construction in such a way that the completed Construction will conform to the Contract Documents, Owner may order Design-Builder to stop Construction or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop Construction will not give rise to any duty on the part of Owner to exercise this right for the benefit of Design-Builder or any other party.

ARTICLE 14 – PAYMENTS TO DESIGN-BUILDER; COMPLETION

14.01 *Progress Payments*

A. *Basis for Progress Payments:* The Schedule of Values established as provided in Paragraph 2.04 will serve as the basis for progress payments. Progress payments on account of Unit Price Work will be based on the number of units completed.

B. *Application for Progress Payment:* On or about the date established in the Agreement for submission of each application for progress payment (but not more often than once a month), Design-Builder shall submit to Owner for review an Application for Payment filled out and signed by Design-Builder covering the Work completed as of the date indicated on the Application and accompanied by supporting documentation as required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect Owner's interest therein, all of which will be satisfactory to Owner.

C. *Payment of Obligations:*

1. Beginning with the second Application for Payment, each Application shall include an affidavit of Design-Builder stating that all previous progress payments received on

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account of the Work have been applied on account to discharge Design-Builder's legitimate obligations associated with prior Applications for Payment.

2. If Design-Builder contends that it has withheld payment of underlying obligations for good cause, then Design-Builder shall inform Owner of the identity of the entity from which Design-Builder has withheld payment, the amount of the withholding, and the reason for the withholding.

D. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

E. *Review of Applications:*

1. Owner will, within 10 days of receipt of each Application for Payment, either indicate in writing its acceptance of the Application and state that the Application is being processed for payment, or return the Application to Design-Builder indicating in writing its reasons for refusing to accept the Application.

F. Not more than 10 days after accepting such Application the amount will become due and when due will be paid by Owner to Design-Builder.

1. If Owner should fail to pay Design-Builder at the time the payment of any amount becomes due, then Design-Builder may, at any time thereafter, upon serving written notice that he will stop the Work within 7 days after receipt of the notice by Owner, and after such 7-day period, stop the Work until payment of the amount owing has been received. Written notice shall be deemed to have been duly served if sent by certified mail to the last known business address of Owner.

2. Payments due but unpaid shall bear interest at the rate specified in the Agreement.

3. No Progress Payment nor any partial or entire use or occupancy of the Project by Owner shall constitute an acceptance of any Work not in accordance with the Contract Documents.

G. *Reduction in or Refusal to Make Payment:*

1. Owner may impose a set-off against the whole or any part of any such payment, or nullify any previous payment because of subsequently discovered evidence or the results of subsequent inspections or tests, to the extent that is reasonably necessary to protect Owner from loss because:

a. Claims have been made against Owner on account of Design-Builder's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Design-Builder's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from breach of warranty, workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;

b. Design-Builder has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;

c. Design-Builder has failed to provide and maintain required bonds or insurance;

d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Design-Builder is responsible;

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e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;

f. The Construction is defective, requiring correction or replacement;

g. Owner has been required to correct defective Construction in accordance with Paragraph 13.05, or has accepted defective Construction pursuant to Paragraph 13.07;

h. The Contract Price has been reduced by Change Orders;

i. An event that would constitute a default by Design-Builder and therefore justify a termination for cause has occurred;

j. Liquidated damages, special damages, or performance damages have accrued under the Contract Documents as a result of Design-Builder's failure to achieve Milestones, Substantial Completion, final completion of the Work, or performance requirements, as applicable;

k. Liens have been filed in connection with the Work, except where Design-Builder has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such liens; or

l. There are other items entitling Owner to a set off against the amount recommended.

2. If Owner imposes any set-off against payment, Owner will give Design-Builder immediate written notice stating the reasons for such action and the specific amount of the reduction, and promptly pay Design-Builder any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Design-Builder the amount so withheld, or any adjustment thereto agreed to by Owner and Design-Builder, if Design-Builder remedies the reasons for such action. The reduction imposed shall be binding on Design-Builder unless it duly presents a written notice of Claim contesting the reduction.

14.02 *Design-Builder's Warranty of Title*

A. Design-Builder warrants and guarantees that title to all Construction, materials, and equipment covered by any Application for Payment, whether already incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.03 *Substantial Completion*

A. When Design-Builder considers the Work ready for its intended use Design-Builder shall notify Owner in writing that the Work is substantially complete (except for items specifically listed by Design-Builder as incomplete) and request that Owner issue a certificate of Substantial Completion. Promptly thereafter, Owner and Design-Builder shall make an inspection of the Work to determine the status of completion. If Owner does not consider the Work substantially complete, Owner will notify Design-Builder in writing giving the reasons therefor.

B. If Owner considers the Work substantially complete:

1. Owner and Design-Builder will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and

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Design-Builder agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

2. Owner will prepare and deliver to Design-Builder a certificate of Substantial Completion which shall fix the date of Substantial Completion. Owner shall attach to the certificate a punch list of items to be completed or corrected before final payment.

C. After Substantial Completion the Design-Builder shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Design-Builder may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.

D. Owner shall have the right to exclude Design-Builder from the Site after the date of Substantial Completion subject to allowing Design-Builder reasonable access to remove its property and complete or correct items on the punch list.

14.04 *Partial Use or Occupancy*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Construction which (1) has specifically been identified in the Contract Documents, or (2) Owner and Design-Builder agree constitute a separately functioning and usable part of the Construction that can be used by Owner for its intended purpose without significant interference with Design-Builder's performance of the remainder of the Construction, subject to the following:

1. Owner at any time may request Design-Builder in writing to permit Owner to use or occupy any such part of the Construction that Owner believes to be ready for its intended use and substantially complete. If Design-Builder agrees that such part of the Work is substantially complete, Design-Builder and Owner will follow the procedures of Paragraph 14.03 for that part of the Construction.

2. Design-Builder at any time may notify Owner in writing that Design-Builder considers any such part of the Work ready for its intended use and substantially complete and request Owner to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner and Design-Builder shall make an inspection of that part of the Work to determine its status of completion. If Owner does not consider that part of the Work to be substantially complete, Owner will notify Design-Builder in writing giving the reasons therefor. If Owner considers that part of the Work to be substantially complete, the provisions of Paragraph 14.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy of part of the Construction will be accomplished prior to compliance with the requirements of Paragraph 6.05 regarding property insurance.

14.05 *Final Inspection*

A. Upon written notice from Design-Builder that the entire Work or an agreed portion thereof is complete, Owner will make a final inspection with Design-Builder and will notify Design-Builder in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Design-Builder shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

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14.06 *Final Payment*

A. *Application for Payment:*

1. After Design-Builder has completed all such corrections to the satisfaction of Owner and delivered in accordance with the Contract Documents all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance, certificates of inspection, and Record Documents, Design-Builder may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (unless previously delivered) by:

   a. All documentation called for in the Contract Documents;

   b. Consent of the surety, if any, to final payment;

   c. Satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment;

   d. A list of all disputes that Design-Builder believes are unsettled; and

   e. Complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.

3. In lieu of such releases or waivers of Liens specified in Paragraph 14.06.A.2, and as approved by Owner, Design-Builder may furnish receipts or releases in full and an affidavit of Design-Builder that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed, and (b) all payrolls, material and equipment bills and other indebtedness connected with the Work for which Owner might in any way be responsible, or which in any way might result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Project Design Professional, Construction Subcontractor, or Supplier fails to furnish such a release or receipt in full, Design-Builder may furnish a Bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Final Payment and Acceptance:* If Owner is satisfied that the Work has been completed and Design-Builder's other obligations under the Contract Documents have been fulfilled, Owner will, within 10 days after receipt of the final Application for Payment, give written notice to Design-Builder that the Work is acceptable. Otherwise, Owner will return the Application to Design-Builder, indicating in writing the reasons for refusing to process final payment, in which case Design-Builder shall make the necessary corrections and resubmit the Application.

C. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment.

D. *Payment Becomes Due*: The amount will become due and will be paid by Owner to Design-Builder 30 days after the presentation to Owner of the acceptable Application and accompanying documentation, in appropriate form and substance and with Owner's notice of acceptability.

14.07 *Waiver of Claims*

A. The making of final payment will not constitute a waiver by Owner of claims or rights against Design-Builder. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.05, from Design-

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Builder's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from unresolved disputes or Claims presented by Owner, or from Design-Builder's continuing obligations under the Contract.

B. The acceptance of final payment by Design-Builder will constitute a waiver by Design-Builder of all claims and rights against Owner other than those pending matters that have been duly submitted to dispute resolution under the provisions of Article 16.

14.08 *Correction Period*

A. If within one year after the date of Substantial Completion of the entire Work or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Construction is found to be defective, Design-Builder shall promptly, without cost to Owner and in accordance with Owner's written instructions, (1) correct such defective Construction, or, if it has been rejected by Owner, remove it from the Site and replace it with Construction that is not defective, and (2) satisfactorily correct or remove and replace any damage to other Construction or the work of others resulting therefrom. If Design-Builder does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Construction corrected or the rejected Construction removed and replaced, and all costs, losses, and damages caused by or resulting from such removal and replacement (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals, all court or arbitration or other dispute resolution costs, and all costs of repair or replacement of work of others) will be paid by Design-Builder.

B. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Conceptual Documents.

C. Where defective Construction (and damage to other Construction resulting therefrom) has been corrected, or removed or replaced, under this Paragraph 14.08, the correction period hereunder with respect to such Construction will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 days by notice in writing to Design-Builder, which will fix the date on which Work will be resumed. Design-Builder shall resume the Work on the date so fixed. Design-Builder shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events justifies termination for cause:

1. Design-Builder's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the progress schedule as duly adjusted).

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2. Design-Builder's disregard of Laws or Regulations of any public body having jurisdiction.

3. Design-Builder's violation in any substantial way of provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occurs, Owner may, after giving Design-Builder (and the surety, if any) 7 days' written notice, terminate the services of Design-Builder, take possession of any completed Design Submittals prepared by or for Design-Builder (subject to the limited license and indemnification provisions of Paragraph 3.04), exclude Design-Builder from the Site, take possession of the Work, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Design-Builder but which are stored elsewhere, and finish the Work as Owner may deem expedient. In such case Design-Builder shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all costs, losses and damages sustained by Owner arising out of or resulting from completing the Work (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) such excess will be paid to Design-Builder. If such costs, losses and damages exceed such unpaid balance, Design-Builder shall pay the difference to Owner. Such costs, losses and damages incurred by Owner will be incorporated in a Change Order. When exercising any rights or remedies under this paragraph Owner shall not be required to obtain the lowest price for the Work performed.

C. Notwithstanding Paragraph 15.02.B, Design-Builder's services will not be terminated if Design-Builder begins, within 7 days of receipt of notice of intent to terminate, to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

D. Where Design-Builder's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Design-Builder then existing or which may thereafter accrue. Any retention or payment of moneys due Design-Builder by Owner will not release Design-Builder from liability.

15.03 *Owner May Terminate for Convenience*

A. Upon 7 days' written notice to Design-Builder, Owner may, without cause and without prejudice to any other right or remedy of Owner, elect to terminate the Contract. In such case, Design-Builder shall be paid (without duplication of any items) for:

1. Completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. Expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. Amounts paid in settlement of terminated contracts with Project Design Professionals, Construction Subcontractors, Suppliers and others (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs incurred in connection with such terminated contracts); and

4. Reasonable expenses directly attributable to termination.

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B. Design-Builder shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Design-Builder May Stop Work or Terminate*

A. If, through no act or fault of Design-Builder, the Work is suspended for a period of more than 90 days by Owner or under an order of court or other public authority, Owner fails to act on any Application for Payment within 30 days after it is submitted, or Owner fails for 30 days to pay Design-Builder any sum finally determined to be due, then Design-Builder may, upon 7 days' written notice to Owner, and provided Owner does not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.A. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Owner has failed for 30 days to pay Design-Builder any sum finally determined to be due, Design-Builder may upon 7 days' written notice to Owner stop the Work until payment is made of all such amounts due Design-Builder, including interest thereon. The provisions of this paragraph are not intended to preclude Design-Builder from obtaining an increase in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Design-Builder's stopping Work as permitted by this paragraph.

ARTICLE 16 – DISPUTES

16.01 *Methods and Procedures*

A. *Notice of Claim:* If Owner and Design-Builder are not in agreement regarding a proposed or requested Change Order, other proposed adjustment of Contract Price or Contract Times, a Work Change Directive issued by Owner, or any other relief proposed or requested under the Contract, then either party may provide written notice of a Claim to the other party. Such notice of Claim shall be given within 90 days of: the proposal or request for a Change Order; such other proposed adjustment of Contract Price or Contract Times; the issuance of the Work Change Directive; or the proposal or request for other relief under the Contract. The notice of Claim shall be given within the 90 days regardless of whether the other party has responded to such proposal, request, or issuance, and regardless of whether discussions or negotiations are in progress; provided, however, that the parties may extend the time to give such notice of Claim by mutual written agreement. The notice of Claim shall include a statement of position, specification of the remedy sought, and supporting documentation.

B. *Response:* Within 30 days of the date of notice of Claim, the receiving party shall respond with a written statement of position and any supporting documentation.

C. *Direct Negotiations:* Owner and Design-Builder agree to directly negotiate all Claims between them in good faith for a period of 60 days from the date of notice of Claim.

D. *Mediation:* If direct negotiations are unsuccessful in resolving a Claim, then Owner and Design-Builder shall submit the unsettled Claim to mediation by a mutually agreeable mediator or mediation service. Owner and Design-Builder agree to participate in the mediation process in good faith. The process shall be conducted on a confidential basis, and shall be completed within 120 days.

1. The fees and expenses, including filing fees, of the mediator and any mediation service shall be shared equally by Owner and Design-Builder.

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2. The mediation shall be held in the locality where the Project is located, unless another location is mutually agreed upon by the parties.

3. A settlement (if any) resulting from such mediation will be specifically enforceable under the prevailing law, by any court having jurisdiction.

4. Participation in the mediation process in good faith is a condition precedent to commencing final or binding dispute resolution.

E. If mediation is unsuccessful in resolving a Claim, then within 120 days of the completion of the mediation (1) the parties may mutually agree to a binding dispute resolution process of their choice, or (2) the claimant may give notice to the other that the claimant will seek to have the dispute resolved by a binding dispute resolution method established in this Contract, or if no such method has been established, by a court of competent jurisdiction. Failure by claimant to give such notice in a timely manner shall result in a waiver of the Claim.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice to the other party to this Contract, it will be deemed to have been validly given if delivered to the Authorized Representative of the other party:

1. In person, by a commercial courier service or otherwise; or

2. By registered or certified mail, postage prepaid; or

3. By e-mail, with the words "Formal Notice" or similar in the e-mail's subject line.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. Unless expressly stated otherwise in this Contract, the duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, or waiver of, any rights and remedies available to any or all of them which are otherwise imposed or available by:

1. Laws or Regulations; or

2. Any special warranty or guarantee; or

3. Other provisions of the Contract.

B. The provisions of Paragraph 17.03.A will be as effective as if repeated specifically in the Contract in connection with each particular duty, obligation, right and remedy to which they apply.

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17.04 *Limitation of Damages*

A. With respect to this Contract and any and all Claims and other matters at issue, Owner shall not be liable to Design-Builder for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Design-Builder on or in connection with any other project or anticipated project.

17.05 *No Waiver*

A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

17.06 *Survival of Obligations*

A. All representations, indemnifications, warranties and guarantees made in, required by or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Contract.

17.07 *Controlling Law*

A. The Contract Documents will be construed in accordance with the law of the place of the Project.

17.08 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

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SECTION 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

A. Requirements for the submittal of information that will enable determination of whether the Contractor's proposed materials, equipment or methods of work are in general conformance to the design concept and in compliance with the Contract Documents.

B. Furnish drawings, specifications, descriptive data, certificates, samples, test results, methods, schedules, manufacturer's installation instructions and other information as indicated.

1.02 REFERENCED SECTIONS

A. The following Sections are referenced in this Section

1. Section 01 99 00 – Reference Forms

1.03 CONTRACTOR'S RESPONSIBILITIES

A. Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the materials and equipment incorporated into the Work, or the methods of performing the Work shall be as described in the accepted submittals.

B. Verify that all features of all products conform to the specified requirements. Submittal documents shall be clearly edited to indicate only those items, models, or series of equipment that are being submitted for review. Extraneous materials shall be crossed out or otherwise obliterated.

C. Coordinate submittals among subcontractors and suppliers. Ensure that there is no conflict with other submittals and notify the Engineer in each case where this submittal may affect the work of another contractor or the Owner, including those submittals complying with unit responsibility requirements specified in applicable technical sections.

D. Coordinate submittals with the Work so that work will not be delayed. Coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly schedule submittals.

E. Do not proceed with work related to a submittal until the submittal process is complete and the submittal has received a response "No Exceptions Taken" or "Make Corrections Noted."

F. Certify on each submittal document that the Contractor has reviewed the submittal, verified field conditions, and complied with the contract documents.

1. Include a copy of the specification section with addendum updates, all referenced and applicable sections, and each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements.

a. Use check marks (✓) to denote full compliance with a paragraph as a whole.

b. If deviations from the specifications are indicated and therefore requested by the Contractor, underline each deviation, and denote by a number in the margin to the right of the identified paragraph.

c. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications.

d. Include a detailed, written justification for each deviation.

2. Failure to comply with this paragraph is sufficient cause to reject the entire submittal.

1.04 REVIEW COSTS

A. The Owner's cost for review of submittals for the same proposed materials, equipment or work will be apportioned as follows:

1. The cost of review of the initial submittal and the first revised submittal will be borne by the Owner.

2. The cost to review all additional revised submittals after the first revised submittal will be charged to the Contractor. The cost of review shall include, without limitation, administrative, design and engineering activities directly related to review of submittals.

1.05 SUBMITTAL INDEX

A. Within 30 days of the Notice to proceed, submit a list, by specification section, of all submittals to be submitted.

B. Update and resubmit the submittal index on a monthly basis where additional submittals are identified, or as necessary

1.06 CATEGORIES OF SUBMITTALS

A. General

1. Submittals fall into two general categories;

a. Submittals for review and comment require action by the Engineer.

b. Submittals that are primarily for information only do not require Engineer's approval.

B. Submittals for Review and Comment

1. Transmit submittals for review and comment to the Engineer. The Engineer will review the submittal for compliance with the Contract requirements and will provide written comments regarding acceptability.

C. Submittals for Information Only

1. Where specified, furnish submittals to the Engineer for information only. The Engineer may, at the Engineer's option, review, and comment on any product data.

2. Incomplete or inadequate product data will be returned to the Contractor for resubmittal.

1.07 TRANSMITTAL PROCEDURES

A. General

1. Transmit submittals regarding material and equipment under cover of a Shop Drawing/Transmittal Form See Section 01 99 00.

2. Use a separate form for each specific item, class of material, equipment, and items specified in separate, discrete sections, for which the submittal is required.

3. Identify submittal documents common to more than one piece of equipment with all the appropriate equipment numbers.

4. Make submittals for various items with a single form when the items taken together constitute a manufacturer's package or are so functionally related that expediency indicates checking or review of the group or package as a whole.

5. Assign a unique sequential number on the transmittal form accompanying each item submitted.

a. Use the following format for original submittal numbers: "XXX"; where "XXX" is the sequential number assigned by the Contractor.

b. Use the following format for resubmittals: "XXX-Y"; where "XXX" is the originally assigned submittal number and "Y" is a sequential letter assigned for resubmittals, i.e., A, B, or C being the 1st, 2nd, and 3rd resubmittals, respectively. Submittal 25B, for example, is the second resubmittal of submittal 25.

B. Electronic Submittals

1. Electronic submittals are preferred except as otherwise indicated.

2. Prepare electronic submittals and Shop Drawings in electronic (*.pdf) format including half-sized and full-sized drawings, catalog information and other required submittal information.

3. Break down submittals that are larger than 10 megabytes into smaller sections, using logical division points to create sections.

4. Electronically bookmark electronic submittals greater than 30 pages in length by major submittal section to facilitate ease of navigation.

C. Paper copy submittals are not an acceptable alternative to electronic submittals except for samples.

D. Deviation from Contract

1. If the Contractor proposes to provide material, equipment, or method of work that deviates from the project manual, so indicate under "Proposed Deviations" on the transmittal form accompanying the submittal copies.

E. Submittal Completeness

1. Submittals that do not have all the information required to be submitted, including deviations, are not acceptable and will be returned without review.

1.08 SUBMITTAL CONTENT

A. Prepare submittals in compliance with individual Specification Sections and as indicated herein.

B. Shop Drawings:

1. Develop project-specific, scaled drawings to fully identify materials and products that will be provided and their relationship to other products that will be furnished and installed.

2. Do not utilize reproductions of the Contract Documents as the basis for the submittal.

3. Identify products, assemblies, equipment, and systems.

4. Provide equipment identification numbers or tag numbers, wiring diagrams, and setting diagrams.

5. Identify critical dimensions.

C. Product Data:

1. Provide information necessary to demonstrate conformance with the specified requirements. Include performance curves, specifications, and wiring diagrams.

2. Product data may consist of manufacturer's standard catalog information and data sheets, marked to indicate the specific products that will be provided.

3. Provide supplemental information as necessary to fully demonstrate how products will be modified from the manufacture's standard products to meet the specification requirements.

D. Manufacturer's Instructions: Written or published information that establishes the manufacturer's recommendations, guidelines and procedures for handling and installation of products, equipment, and assemblies.

E. Samples: Mount, display or package samples in a manner that will facilitate review and establish workmanship and quality of materials.

1.09 SUBMITTAL REQUIREMENTS

A. When the Contract Documents require a submittal, submit the specified information as follows:

1. Submittals for Review and Comment:

a. Electronic Submittal: Submit one electronic (*.pdf) submittal.

2. Submittals for Information Only:

a. Electronic Submittal: Submit one electronic (*.pdf) submittal.

1.10 REVIEW PROCEDURE

A. General

1. The Engineer will review submittals within the processing time identified in paragraph “Processing Time” and return:

a. Electronic Submittal – a signed submittal response document, in (*.pdf) format.

b. Paper Copy Submittal – Two marked up copies of the submitted copies. The reproducible original will be retained by the Engineer.

B. Submittals for Review and Comment

1. The returned submittal will indicate one of the following actions:

a. "NO EXCEPTIONS TAKEN" – The material, equipment or work method complies with the project manual.

b. "MAKE CORRECTIONS NOTED" – Limited corrections are required.

1) Provide a corrected copy where:

a) The information is to be included in the O&M data.

b) If requested by the Engineer.

c. "AMEND AND RESUBMIT" – The submittal is insufficient or contains incorrect data.

d. "REJECTED – SEE REMARKS" – The material, equipment, or work method does not comply with the project manual. Submittals with deviations that have not been identified clearly may be rejected.

2. For submittals marked "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED.

a. The Contractor may begin implementing the work method or incorporating the material and equipment covered by the submittal in accordance with any noted corrections.

3. For submittals marked "AMEND AND RESUBMIT" or "REJECTED – SEE REMARKS"

a. Contractor shall provide a typed letter responding to each of the Engineer’s review comments with each resubmittal.

b. Except at its own risk, the Contractor shall not undertake the work covered by such submittals until a new submittal is submitted and returned marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED."

C. Submittals for Information Only

1. The returned submittal will indicate ACCEPTED FOR RECORD” if the submittal is complete and adequate.

2. Engineer may return comments on information submittals to identify concerns with what was submitted, in such case, Contractor shall address concerns in writing and return a revised submittal.

1.11 PROCESSING TIME

A. Prepare submittals and transmit to Engineer for review in sufficient time to allow Engineer's review; manufacture, fabrication or assembly of materials and systems; and shipping of material to the site in time for installation in accordance with the Contractor's schedule.

B. Engineer's time for review will begin upon receipt of a complete and comprehensive submittal containing all required information.

C. Engineer will review submitted information and transmit a response to Contractor within 21 days after receipt, subject to the following:

1. In some instances, review times for specific submittals may be modified by the individual specification Section.

2. Resubmittals will be subject to the same review time.

D. No adjustment of Contract Time or Contract Price will be allowed due to delays in the progress of the Work that are caused by rejected submittals and subsequent resubmittals.

1.12 EFFECT OF REVIEW OF CONTRACTOR'S SUBMITTALS

A. The purpose of submittals is to demonstrate how Contractor intends to conform to the Contract Documents and design concepts. Engineer is entitled to rely upon the accuracy and completeness of designs, calculations, or certifications made by licensed professionals whether or not a stamp or seal is required by the Contract Documents.

B. The review procedure is based on the Contractor's guarantee that all features and characteristics not requiring submittals conform to the contract documents.

C. Review of contract drawings, methods of work, or information regarding materials or equipment the Contractor proposes to provide, does not relieve the Contractor of its responsibility for

1. Fulfilling the requirements of the Contract,

2. Proper operation of the equipment,

3. Correction of defective work

D. Reviews shall not be regarded as an assumption of risk or liability by the Engineer or the Owner.

E. A mark of "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED" means that the Owner has no objection to the Contractor, upon its own responsibility, using the plan or method of work proposed, or providing the materials or equipment proposed.

F. The Engineer's review of shop drawings, samples, or test procedures will be only for conformance with design concepts and for compliance with information given in Contract Documents. The Engineer's review does not extend to:

1. Accuracy of dimensions, quantities, or performance of equipment and systems designed by Contractor.

2. Contractor's means, methods, techniques, sequences, or procedures except when specified, indicated on the Drawings, or required by Contract Documents.

3. Safety precautions or programs related to safety which shall remain the sole responsibility of the Contractor.

G. Review of a separate item does not indicate approval of the assembly in which the item functions.

1.13 SUBSTITUTIONS OR "OR EQUAL" ITEMS

A. Named or Sole Source Times

1. Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the naming of the item is intended to establish the type, function, and quality required.

2. Unless the name designated a "sole source" and/or is followed by words indicating that no substitution is permitted, materials, or equipment of other Suppliers may be accepted by Engineer. Follow the procedures in the General Conditions.

B. Modification due to Substitutions

1. All costs for redesign required by the implementation of the proposed substitute shall be borne by the Contractor.

2. All costs associated with incorporating a substitution into the project shall be borne by the Contractor.

PART 2 - NOT USED

PART 3 - NOT USED

END OF SECTION

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SECTION 02 41 00

DEMOLITION, SALVAGE AND ABANDONMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Demolition, salvage, and abandonment of existing facilities.

1.02 REFERENCED SECTIONS

A. The following Section is referenced in this Section

1. Section 01 33 00 – Submittals
2. Section 31 00 00 – Earthwork

1.03 SUBMITTALS

A. Comply with Section 01 33 00.

B. Description of removal procedures for careful removal of materials and equipment and the protection of facilities which are to remain undisturbed.

C. Time schedule for demolition work. Show demolition in relation to new construction, including any temporary facilities.

1.04 EXISTING CONDITIONS

A. Prior to the submittal of Bids, Contractor shall visit the site and inspect all facilities to become familiar with existing conditions and utilities.

1.05 REGULATORY REQUIREMENTS

A. Dispose of debris offsite in accordance with the requirements of agencies having jurisdiction.

B. Comply with applicable air quality control regulations.

C. Obtain necessary permits for building demolition, transportation of debris to disposal site(s) and dust control.

D. Erect appropriate safety devices to protect the general public, Owner's operations personnel, and workers from the hazards of demolition activities. Install barriers, guard rails and fences, and provide appropriate warning signs.

1.06 BURNING

A. The use of burning at the project site for the disposal of refuse, debris, and waste materials will not be permitted.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

A. The Drawings identify the major equipment and facilities to be demolished, salvaged, or abandoned. Auxiliary utilities such as water, air, drainage, lubrication oil, electrical wiring, controls, and instrumentation are not necessarily shown. Remove auxiliary utilities, as well as equipment and pipe supports and associated instrumentation devices pertaining to piping or equipment designated to be removed.

3.02 PROTECTION OF EXISTING FACILITIES

A. Before beginning any cutting, trenching, or demolition work, carefully survey the existing work and examine the Contract Documents to determine the extent of the Work.

B. Take precautions to prevent damage to facilities which are to remain in place or are to be salvaged, and be responsible for any damages to these facilities resulting from this work. Repair or replace damages to such work to return the facilities to its pre-existing condition at no additional cost to the Owner.

3.03 DEMOLITION

A. Demolish structures and equipment in an orderly and safe manner.

B. Dispose of material not identified for salvage or re-installation at a new location.

C. Minimize dust by sprinkling with water.

D. Backfill excavations caused by demolition in accordance with Section 31 00 00.

3.04 SALVAGE

A. Carefully remove and salvage, for reuse by the Owner, items, if any, identified on the Drawings

B. Remove salvage items in their largest pieces that can be easily handled and stored by Owner's personnel. Remove these items from their existing location and deliver them to a location designated by the Owner.

C. Remove items to be salvaged in a workmanlike manner and take the necessary precautions to prevent damage to the materials and equipment.

3.05 BURIED PIPELINES

A. Where buried pipelines are shown to be removed on the Drawings, they may be abandoned in place if there is no conflict with proposed construction and they are not located under or within 10 feet of any proposed structure.

3.06 ASBESTOS CEMENT PIPE

A. Remove and dispose of asbestos cement pipe disturbed during the performance of the Work. Remove and dispose in accordance with all Federal, State, and local laws, regulations, requirements, and guidelines.

B. Notify all appropriate authorities prior to performing work related to removal and disposal of asbestos cement pipe.

C. Provide landfill disposal weight records to Engineer for use as the basis of unit price payment.

D. Where necessary to connect into existing City asbestos cement potable water lines, perform work in accordance with all Federal, State, and local laws, codes, requirements, and guidelines.

3.07 DISPOSAL OF DEMOLISHED MATERIALS

A. Concrete, site debris, rubbish, and other materials resulting from demolition operations, as well as mechanical and electrical equipment designated to be demolished, shall be the property of the Contractor and shall be legally disposed of at the Contractor's expense.

3.08 CLEANING

A. During and upon completion of the demolition operations, promptly remove unused tools and equipment, surplus materials, rubbish, debris, and dust and shall leave work areas in a clean condition.

B. Do not sweep, grade, or flush surplus materials, rubbish, or debris into storm drains, channels, lakes, or streams.

END OF SECTION

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SECTION 05 50 01

ANCHOR BOLTS AND ANCHORING DEVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Anchor bolts, concrete anchors, adhesive anchors, and other anchoring devices.

1.02 REFERENCED SECTIONS

A. The following Section is referenced in this Section

1. Section 01 33 00 – Submittals

1.03 SUBMITTALS

A. Comply with Section 01 33 00.

B. Product Data: Manufacturer's data for nuts, bolts, concrete anchors, chemical anchors and other fasteners.

C. Catalog data and ICC reports for each type of anchor bolt.

1.04 QUALITY ASSURANCE

A. For applications that require special inspection in accordance with building codes, coordinate the progress of the Work with the required inspection activities.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Unless otherwise specified or indicated on the Drawings, materials of construction for anchoring devices shall conform to the following:

1. Anchor bolts and other anchoring devices, nuts and washers installed indoors: Type 304 stainless steel.

2. Anchor bolts and other anchoring devices, nuts and washers installed outdoors or in locations exposed to wastewater: Type 316 stainless steel.

a. Locations exposed to wastewater includes:

1) Below tops of walls of water-containing structures.

2) Underside of roof, slab or walkways of enclosed water-containing structures.

3) Dry side of walls on water-containing structures.

2.02 CAST-IN-PLACE ANCHOR BOLTS

A. Locations for use of cast-in-place anchor bolts:

1. In locations indicated on the Drawings.

2. To anchor engine-driven equipment and equipment with motors 3 horsepower and larger.

B. Cast-in-Place Anchor Bolts

1. Material: Stainless steel conforming to ASTM A320.

2. Minimum Length of Bolt: As indicated on the Drawings. When not indicated, provide bolt length such that the length of the embedded anchor is at least 10 bolt diameters.

3. Minimum length of 90-degree hook: 4 bolt diameters.

2.03 CONCRETE ANCHORS

A. Concrete Anchors: Drilled in place wedge-type anchors with threaded stud body, stainless steel expansion clip, nut and washer.

B. Materials: Type 304 or Type 316 stainless steel, depending upon installed location.

C. Code Compliance: Test in accordance with, and comply with requirements of, ASTM E488 and ICC-ES AC193.

D. Manufacturers: One of the following or equal:

1. Hilti Kwik Bolt 3.

2. ITW Redhead, Trubolt Wedge Anchor.

3. Dewalt Fasteners, Power-Stud SD4 or SD6.

4. Simpson Strong Tie, Strong-Bolt 2 Wedge Anchors.

2.04 STUDS

A. Material: Conforming to ASTM A108 with 50,000 pounds per square inch minimum yield strength, and 60,000 pounds per square inch minimum tensile strength.

B. Manufacturers: One of the following or equal:

1. Nelson Stud Welding Company, S3L Shear Connectors or H4L Concrete Anchors.

2. Stud Welding Products, Headed Concrete Anchors and Shear Connectors or Concrete Anchors.

2.05 ADHESIVE ANCHORS

A. Applications: Use for bonding threaded rods and concrete reinforcing bars to hardened concrete and grouted cement masonry. Do not use in overhead applications, in chlorine gas environments, or where anchor may be exposed to machine oil or diesel oil.

B. Code Compliance: Test in accordance with, and comply with requirements of, ASTM E488 and ICC-ES AC58.

C. Materials

1. Epoxy Adhesive: Two component, injectable epoxy adhesive.

2. Concrete Reinforcing Bars: Grade 60.

3. Threaded Rods: Type 304 stainless steel all-thread rod conforming to ASTM F593.

D. Manufacturers: One of the following or equal:

1. Hilti HVA Adhesive Anchor System.

2. ITW Redhead G6+ Adhesive Anchoring System.

3. Dewalt Fasteners PE1000+ Epoxy Anchoring System.

4. Simpson Strong Tie, SET-XP Epoxy Adhesive.

PART 3 - EXECUTION

3.01 GENERAL ANCHORING REQUIREMENTS

A. Use equipment shop drawings, anchorage layout drawings, and anchor bolt layout templates to accurately position anchor bolts.

B. Install anchor bolts, concrete anchors and other anchoring devices with at least 2 threads projecting beyond the nut, but no more than 1/2-inch projecting beyond the nut.

C. Prior to installing nuts, coat threads of stainless steel bolts with material to prevent galling of threads.

1. Manufacturers: One of the following or equal:

a. Never Seez Compound Corporation, Never-Seez.

b. Oil Research, Inc., WLR No. 111.

D. Tighten nuts on anchor bolts, concrete anchors and other anchoring devices to the "snug-tight" condition, defined as tightness attained by a few impacts of an impact wrench or the full effort of a man using an ordinary wrench.

3.02 CAST-IN-PLACE ANCHOR BOLTS

A. Do not use expansion type concrete anchors or adhesive anchors as substitution for cast-in-place anchor bolts.

B. Accurately place anchor bolts to be embedded in concrete within the formwork and perpendicular to surface from which they will project. Secure in correct position while concrete is placed.

C. Do not allow anchor bolts to touch reinforcing steel. Where anchor bolts are within 1/4 inch of reinforcing steel, isolate with a minimum of 4 wraps of 10 mil polyvinyl chloride tape in area adjacent to reinforcing steel.

D. In anchoring machinery bases subject to heavy vibration, use 2 nuts, with 1 serving as a locknut.

E. Where bolts are indicated on the Drawings for future use, first coat thoroughly with non-oxidizing wax, then turn nuts down full depth of thread and neatly wrap exposed thread with waterproof polyvinyl tape.

F. Where indicated on the Drawings, set anchor bolts in metal sleeves having inside diameter approximately 2 inches greater than the bolt diameter and a minimum of 10 bolt diameters deep. Fill sleeves with grout when equipment is grouted in place.

3.03 CONCRETE ANCHORS AND ADHESIVE ANCHORS

A. Cast-in-place anchor bolts may be used in place of concrete anchors and adhesive anchors at Contractor’s option.

B. Installation

1. Drill holes using concrete drill bits and impact type drill motors. Hole diameter shall be in accordance with the manufacturer's recommendations.

2. Clean drilled hole using compressed air to dislodge and remove drilling dust.

3. Accurately locate concrete anchors and set anchors with axis perpendicular to surfaces from which they will project.

4. Do not disturb adhesive anchors until cure time has elapsed.

5. Unless otherwise indicated on the Drawings or as required by structural calculations prepared by the equipment supplier, comply with minimum embedment lengths identified in the following table.

Minimum Embedment Lengths for Concrete and Adhesive Anchors

Diameter of Anchor or Bar, inches	Embedment Length for Concrete Anchors, inches	Embedment Length for Adhesive Anchors or Reinforcing Bars
1/4	1-3/4	As indicated on the Drawings
3/8	1-7/8	
1/2	2-1/4	
5/8	2-3/4	
3/4	3-1/4	
(1) Provide longer embedment where otherwise indicated		

END OF SECTION

SECTION 05 52 00

HANDRAIL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Aluminum handrail.

1.02 REFERENCED SECTIONS

A. The following Section is referenced in this Section:

1. Section 01 33 00 – Submittals

1.03 PERFORMANCE REQUIREMENTS

A. Design railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Aluminum Handrails: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.

B. Structural Performance: Provide railings capable of withstanding the following loads and stresses:

1. Handrails:

a. Uniform load of 50 pounds per lineal foot applied in any direction.

b. Concentrated load of 200 pounds applied in any direction.

c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Top Rails of Guards:

a. Uniform load of 50 pounds per lineal foot applied horizontally and concurrently with 100 pound load applied vertically downward.

b. Concentrated load of 200 pounds applied in any direction.

c. Uniform and concentrated loads need not be assumed to act concurrently.

C. Thermal Movement: Provide exterior railings that allow for thermal movements resulting from a change in surface temperature of 120 degrees.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.04 SUBMITTALS

A. Comply with Section 01 33 00.

B. Product Data: Manufacturer's standard catalog data for mechanically connected railings.

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

D. Calculations: Structural analyses signed and sealed by the qualified professional engineer, licensed in the State of Oregon, responsible for their preparation.

E. Samples for selection of surface color or texture.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E894 and ASTM E935.

1.05 QUALITY ASSURANCE

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

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication. Indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: One of the following or equal:

1. Aluminum Pipe and Tube Railings:

a. AlumaGuard Corp.

b. CraneVeyor Corp.

c. Blum, Julius & Co., Inc.

d. Moultrie Manufacturing Company.

2.02 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

2.03 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

B. Extruded Bars and Tubing: ASTM B221, Alloy 6063-T5/T52.

C. Extruded Structural Pipe and Round Tubing: ASTM B429, Alloy 6063-T6.

1. Provide Standard Weight (Schedule 40) pipe, unless otherwise indicated.

D. Drawn Seamless Tubing: ASTM B210, Alloy 6063-T832.

E. Plate and Sheet: ASTM B209, Alloy 6061-T6.

F. Die and Hand Forgings: ASTM B247, Alloy 6061-T6.

G. Castings: ASTM B26/B26M, Alloy A356.0-T6.

2.04 FASTENERS

A. General: Provide the following:

1. Aluminum Railings: Type 316 stainless-steel fasteners.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Anchors: Provide chemical or expansion-type anchors, fabricated from Type 316 stainless steel with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.

2.05 FABRICATION

A. Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with either welded or nonwelded connections, unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove flux immediately.

4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

J. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

K. Form changes in direction by bending or by inserting prefabricated elbow fittings.

L. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.

M. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

N. For removable railing posts, fabricate slip-fit sockets from stainless steel tube or pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.

1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.

2.06 FINISHES, GENERAL

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Finishes

1. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.

2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.

3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.02 RAILING CONNECTIONS

A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.

C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to 1 side, and locate joint within 6 inches of post.

3.03 ANCHORING POSTS

A. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.

B. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.04 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work.

END OF SECTION

SECTION 13 34 00

REINFORCED, CAST-IN-PLACE CONCRETE TANK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Design, engineering, calculations, drawings, fabrication, and construction of a new reinforced concrete tank, and includes designing, furnishing, constructing, testing, bonding, cleaning, and permitting.

B. Tank and foundation shall be reinforced concrete, cast-in-place construction with a roof as indicated and specified in this specification section and in the project drawings.

1.02 REFERENCED SECTIONS

A. The following Section is referenced in this Section

1. Section 01 33 00 – Submittals

1.03 QUALITY ASSURANCE

A. Tank Design-Builder Qualifications

1. All work in connection with design and construction of the tank shall be performed by a competent and experienced Tank Design-Builder who has at least ten years' experience.

2. All work in connection with design, engineering, fabrication, and construction of the tank shall be performed by a competent and experienced Tank Design-Builder with a minimum of ten years' experience.

3. Must have previously constructed a minimum of ten (10) similar tanks of a similar size or larger within the last five years.

4. Hold a current Oregon state contracting license and supply with the bid proof of the license and a list of references of previously constructed tanks.

B. Design Responsibility

1. The Tank Design-Builder shall provide certification, signed by a Oregon Registered Structural Engineer, stating that all members, elements and connections of and to the tank are designed to withstand required loads and forces. Certification shall list the codes and specifications to which structural design conforms. Tank construction drawings and calculations, noted under Submittals of these specifications, shall bear the stamp of a Oregon Registered Structural Engineer.

C. The Tank Design-Builder shall use all new tank materials when manufacturing and constructing the reinforced concrete tank and any of its appurtenances.

D. Construction of the tank is to be by the Tank Design-Builder and must be fully responsible for the entire installation including tank construction, and the ultimate water tightness of the complete installation.

1.04 REFERENCES

A. The publications referred to hereinafter form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. The latest edition of referenced publications in effect at the time of the bid shall govern. In case of conflict between the requirements of this section and the listed standards, the requirements of this section shall prevail.

Standard	Title
AASHTO T210	Aggregate Durability Index
ACI 214	Evaluation of Strength Test Results of Concrete
ACI 301	Structural Concrete for Buildings
ACI 304	Measuring, Mixing, Transporting, and Placing Concrete
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 347R	Concrete Formwork
ASTM C31	Making and Curing Concrete Test Specimens in the Field
ASTM C33	Concrete Aggregates
ASTM C39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C42	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C94	Ready-Mixed Concrete
ASTM C117	Materials Finer Than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C142	Clay Lumps and Friable Particles in Aggregates
ASTM C143	Slump of Portland Cement Concrete
ASTM C150	Portland Cement
ASTM C157	Length Change of Hardened Cement Mortar and Concrete
ASTM C172	Sampling Freshly Mixed Concrete
ASTM C231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Air-Entraining Admixtures for Concrete
ASTM C289	Potential Reactivity of Aggregates (Chemical Method)
ASTM C595	Blended Hydraulic Cements
ASTM C618	Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
CRD-C572	Corps of Engineers Specifications for Polyvinylchloride Waterstop
NSF/ANSI 61	Drinking Water System Components – Health Effects

1.05 SUBMITTALS

A. Comply with Section 01 33 00 and submit the following:

1. Complete detailed design and drawings of tank including roof, wall, foundation, concrete mix, reinforcement, anchoring, appurtenances, earthwork, erosion control, and all other required design within the construction limits on the Drawings. Detailed design shall include any other pertinent data concerning the construction of the tank.

2. Structural calculations of the tank, accessory items, tank foundation, and tank anchor bolts shall be prepared and signed by a Structural Engineer currently licensed in the State of Oregon. The name and address of the responsible engineer shall appear on the cover of the submitted calculations. The submittal shall include a description of structural design, loading conditions, seismic anchorage calculations and details, and codes used in establishing the allowable stresses and safety factors.

3. Horizontal and vertical loadings, erection and settlement tolerances.

4. Concrete submittals to be submitted in accordance with the Contract Documents.

5. Hydraulic testing report.

1.06 DESIGN CRITERIA

A. Tank Specifications

1. Refer to project drawings

2. Inside Diameter: 26.0 feet

3. Side Wall Height (top of foundation to top of roof): 25 feet

4. Max WSE: 23.5 feet

5. Design Capacity: 93,318 gallons at max WSE

1.07 WARRANTY

A. The Tank Design-Builder must include a warranty on tank materials and workmanship for a specified period. As a minimum, the warranty must provide assurance against defects in material, coatings and workmanship for a period of five (5) year after Notice of Acceptance has been issued or the tank is placed into service (whichever comes first.

PART 2 - PRODUCTS

2.01 TANK SUPPLIERS

A. Named Manufacturers

1. Baker Silo, Inc.

2. Or Approved Equal

2.02 APPURTENANCES

A. Design tank and accessories to applicable federal, state, and local health and safety requirements including but not limited to OSHA.

B. Top Access Hatch

1. The top access hatch shall be a double leaf 30”x48” aluminum hatch with lift assist and provisions for a padlock, fall blocks and weather stripping installed on the roof.

2. Manufacturers

a. Halliday Products, Inc.

b. Bilco, Inc.

c. Or Approved Equal

C. Grade Level Maintenance Access Hatch

1. Provide a 30”x30” minimum flanged side maintenance access hatch with a self-supporting hinge system.

D. Ladder & Safety Cage

1. Exterior ladder shall be provided per the Drawings and shall comply with current OSHA regulations.

E. Air Vent

1. The air vent shall be 8-inch diameter gooseneck located in the center of the roof with a non-corrosive screen (24 mesh).

2. Air vent design calculations shall be provided.

F. Overflow and Tank Drain

1. The overflow shall be 6-inch diameter in the sidewall as shown in the drawings.

2. The overflow shall include a non-corrodible screen.

3. The overflow shall be provided with a pipe thread at the exterior wall surface.

4. The overflow shall be piped to ground level directed away from the reservoir base.

5. The tank drain shall be 6-inch diameter in the sidewall as shown in the Drawings.

G. Roof Guardrail

1. Provide roof guardrails and toeboard in accordance with Drawings.

PART 3 - EXECUTION

3.01 GENERAL

A. In accordance with requirements set forth by regulatory agencies applicable to the construction industry and in accordance with manufacturer’s instructions, the Tank Design-Builder shall provide and require the use of personal lifesaving equipment for persons working on or about the site. As a minimum, personal lifesaving equipment shall properly address protection of those persons in the following categories:

1. Head and face protection

2. Respiratory devices (for painting)

3. Ventilation

4. Sound levels

5. Lighting

6. Temporary ladders and scaffolding

7. Welding safety practices

B. The Tank Design-Builder shall conduct all operations in a clean and sanitary manner. Special care shall be taken to keep the tank interior free of waste materials.

C. The Tank Design-Builder shall clear the area within the foundation of all leaves, trash, and other debris prior to installation of tank. All cleared materials shall be disposed of in a manner, and in areas, as directed by the Owner.

D. The Tank Design-Builder must field verify the foundation elevation and the tolerances of the in-place foundation. Any deviations must be reported to the Engineer for correction before proceeding with any work. All tank underground piping must be in place prior to the commencement of tank construction.

3.02 SITE PREPARATION & EARTHWORK

A. Complete site preparation and earthwork in accordance with the Contract Documents.

3.03 REINFORCED CONCRETE

A. Complete all concrete work in accordance with the Contract Documents.

B. Sack finish to interior tank shall be in accordance with the Contract Documents.

C. All welding work for the tank appurtenances must be done in accordance with the Contract Documents.

3.04 FIELD QUALITY CONTROL

A. Test cylinders shall be cast for each concrete pour by either the Tank Design-Builder or a certified test lab.

B. All field quality control must be done according to contract documents.

3.05 TANK HYDRAULIC TESTING & CLEANUP

A. Upon completion of all tank, the Tank Design-Builder shall remove all staging, scaffolding, containers, surplus materials and rubbish from the premises in a manner approved by the Owner and shall leave the premised in a clean and orderly condition.

B. Sack finish the walls per Contract Documents.

C. Cleaning and pressure washing.

D. Disposal of abrasive blast residue shall be in a manner consistent with guidelines set forth by the U.S. Environmental Protection Agency (USEPA).

E. See drawing sheet S-001.

3.06 PERMITS

A. Tank Design-Builder shall be responsible for obtaining building permitting from the City of Sweet Home. Owner will assist in obtaining timely permit reviews and will pay permit fees.

3.07 ACCEPTANCE

A. Acceptance by the Owner of the completed work as herein specified is subject to a guarantee by the Tank Design-Builder against any repairs, leaks or damage caused by defective workmanship or materials furnished by the Tank Design-Builder for a period of 5 (five) year after Notice of Acceptance has been issued.

END OF SECTION

SECTION 31 00 00

EARTHWORK

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Earthwork requirements for sitework, structures, roads and general earthwork, including excavation, fill, backfill, grading, and compaction; import of material; and disposal of surplus and unsuitable materials.

1.02 REFERENCED SECTIONS

A. The following Sections are referenced in this Section

1. Section 01 33 00 – Submittals
2. Section 31 10 00 – Site Preparation
3. Section 31 23 16.26 – Rock Excavation
4. Section 31 23 19 – Dewatering
5. Section 31 50 00 – Excavation Support and Protection

1.03 DEFINITIONS

A. Backfill: Earthwork necessary to add fill between new structures and the excavation up to the sub or finish grade.

B. Borrow Area: Area identified from which to obtain earthwork materials.

C. Cut: Earthwork necessary to remove existing material to lower the existing grade in elevation to sub or finish grade.

D. Embankment: Materials placed to form the subgrade for roadways or site improvements.

E. Excavation: Earthwork necessary to remove existing material for the installation of structures.

F. Fill: Earthwork necessary to add material to bring the existing grade up in elevation to sub or finish grade.

G. Finish Grade: Final surface following placement of surfacing, if any, as indicated.

H. Subgrade: The surface of the earthwork on which pavement, surfacing, base, subbase, or a layer of any other material is placed.

1.04 SUBMITTALS

A. Prepare submittals and submit in accordance with Section 01 33 00.

B. For imported materials, provide certification and source.

C. For excavations 5 feet or deeper: Submit detailed plan of all shoring, bracing, side sloping, or other provisions for worker protection against the hazard of caving ground during excavations in accordance with Section 31 50 00.

1.05 QUALITY ASSURANCE

A. Materials and Compaction Testing.

1. Source testing of materials: Provided and paid for by Contractor.

2. Field testing of compaction: Provided and paid for by Owner.

B. Compaction Testing Standards

1. In-place Density of Compacted Fill Material: Density determined in the field in accordance with ASTM D6938 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

2. Maximum Dry Density of Compacted Material: determined in the laboratory in accordance with Method C of ASTM D1557-12e1 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

C. Material Testing Standards:

1. Particle size analysis of soils and aggregates: ASTM D6913 – Standard Test Methods for Particle-Size Distribution of Soils Using Sieve Analysis. ASTM D7928– Standard Test Method for Particle-Size Distribution of Fine-Grained Soils Using the Sedimentation Analysis.

2. Determination of sand equivalent value: ASTM D2419 – Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.

3. Liquid limit, plastic limit, and plasticity index: ASTM D4318 – Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

4. The testing for organic matter: ASTM D2974 – Standard Test methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils.

D. References in this section to soil classification types and standards shall have the meanings and definitions indicated in ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes. Contractor shall be bound by all applicable provisions of ASTM D2487 in the interpretation of soil classifications.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General fill, backfill, and embankment materials:

1. Selected or processed clean earth, rock, or sand, free from grass, roots, brush, other vegetation, corrosive and hazardous materials, manmade objects, and debris.

2. Materials not defined as unsuitable as indicated below, except some materials listed as unsuitable may be used, if indicated on the Drawings or when acceptable to the Engineer, when thoroughly mixed with suitable materials to form a stable composite.

3. Obtain suitable materials from one or more of the following:

4. Onsite excavations and designated borrow areas.

5. Processed on-site materials.

6. Onsite soils are not suitable for use as structural fill.

7. Imported from offsite borrow areas and processing plants.

8. If imported materials are required by this Section, or to meet the quantity requirements of the Project, provide the imported materials at no additional expense to Owner, unless a unit price item is included for imported materials in the Bidding Schedule.

9. Large rocky material: When embankment material consists of large rocky material, or hard lumps, such as hardpan or cemented gravel which cannot be broken down readily, distribute such material evenly throughout the embankment. Place sufficient earth or other fine material around the larger material as it is deposited so as to fill the interstices and produce a dense, compact embankment. Do not place rocks larger than 6 inches in diameter within the upper 2 feet of the embankment subgrade.

10. Further condition fill, backfill, and embedment materials as described below or as indicated on the Drawings.

B. Structural Fill

1. 1.5 inch or ¾ inch minus Dense Graded Aggregates as Defined in Section 02630-10 of the Oregon Standard Specifications for Construction

C. Structure Backfill Material

1. Open Graded Aggregate as defined in Section 2630.11 of the Oregon State Standard Specifications for Construction

D. Subgrade Stabilization material

1. Well graded granular material

2. Maximum size of 4 inches

3. Less than 5 percent passing the No. 4 Sieve

4. Free of organic material

E. Reinforcement Geotextile:

1. Permeable, woven

2. Polypropylene, polyester or a combination of both

3. Meeting requirements of Type 2 Woven Riprap Geotextile, as defined in Table 02320-2 of the Oregon State Standard Specification for Construction

4. Approved manufacturers

a. TenCate Mirafi, RS 380i

F. Sand:

1. Clean, coarse, natural sand free from organic material, suitable for the purpose intended.

2. Gradation: 90 percent to 100 percent will pass a No. 4 sieve and not more than 5 percent will pass a No. 200 sieve.

2.02 UNSUITABLE MATERIALS

A. Unsuitable materials include the materials listed below:

1. Soils which, when classified under ASTM D2487, fall in the classifications of Pt, OH, CH, MH, or OL, or in a classification that contains Pt, OH, CH, MH, or OL in combination with any other letter designation, such as CH/CL.

2. Soils which cannot be compacted sufficiently to achieve the density specified for the intended use, or are unstable or pump regardless of the degree of compaction.

3. Materials that contain hazardous or designated waste materials including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable regulations.

4. Soils that contain greater concentrations of chloride or sulfate ions, or have a soil resistivity or pH less than the average values for existing onsite soils.

5. Topsoil, sludge and sludge-entrained soils.

6. Rocks, stones, and boulders larger than 6-inches in diameter.

7. Onsite soils are not suitable for use as structural fill.

2.03 SOURCE QUALITY CONTROL

A. Materials source testing will be performed by a testing laboratory by a third-party special inspections and testing firm retained by the Owner.

B. Minimum Frequency of sampling:

1. Fill, backfill and embankment material generated from earthwork activities:

2. Two soil samples every 500 cubic yard of material used.

3. Two soil samples whenever the character of the soil changes.

4. One soil sample when directed by the Engineer.

5. Obtain samples that represent the predominate character of the soil that is encountered.

6. Sampling of Imported Material

7. Obtain representative samples of product from supplier.

8. After initial testing demonstrated that the proposed borrow material meets the specified requirements, obtain and test one additional sample for every 500 cubic yard of imported material.

C. Testing:

1. Test all materials used in the Work to confirm they meet the requirements indicated.

2. Prepare moisture-density curves for use in determining the optimum moisture content and in-place density of the compacted backfill.

PART 3 - EXECUTION

3.01 EXCAVATION – GENERAL

A. Excavation includes the removal of all materials of whatever nature encountered, including all obstructions of any nature.

B. Excavation shall conform to the lines and grades indicated on the Drawings.

C. Clear, grub and strip and remove topsoil in construction and borrow areas in accordance with Section 31 10 00.

D. Excavation Stability

1. Slope excavated faces or otherwise support in a safe manner in accordance with applicable State safety requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926) and in accordance with Section 31 50 00.

2. Furnish, and place the supports and shoring required to maintain stability of all sides of the excavations.

E. Notify Engineer at least 1 working day in advance of completion of any structure excavation to allow inspection of the exposed subgrade before it is covered with backfill or with any construction materials.

F. Erosion Control:

1. Maintain earthwork surfaces true and smooth and protected from erosion.

2. Construct erosion control measures identified in the Erosion and Sediment Control Plan prior to any clearing or grading activity.

G. Control of Water: Control water entering the excavation as indicated in Section 31 23 19.

H. Existing Underground Utilities:

1. Known existing underground utilities are generally shown on the Drawings in their approximate locations based on information of varying accuracy.

2. Exercise care to avoid damage to all existing utilities whether shown or not.

3. Conduct field explorations to locate all underground utilities in the vicinity of the Earthwork activities in accordance with Section 31 10 00.

4. Alert the Engineer of the presence of existing utilities that are not shown on the Drawings or are in locations different than those shown on the Drawings.

I. Existing Overhead Utilities: There may be existing overhead utilities in the vicinity of the Work which may or may not be shown on the Drawings. Identify existing overhead utilities, if any, and use extreme caution when working in the vicinity of overhead utilities.

3.02 EXCAVATION FOR FILLS AND EMBANKMENTS

A. Benching and Keyways:

1. Where fill is to be placed against existing subgrade or existing grade that is sloped, excavate horizontal benches a minimum of 5 feet wide and located at vertical intervals of not more than 5 feet to provide for placement and compaction of the new fill on horizontal surfaces.

2. Excavate keyway along the base of the existing slope:

3. Extend the keyway at least 3 feet into competent native soil.

4. Width of Keyway: Minimum of 15 feet.

5. Keyway Side Slopes: Inclined at approximately 0.75:1.

6. Keyway Subgrade: Scarify the upper 8-inches of the exposed surface, moisture condition and re-compact.

B. Subgrade Preparation:

1. Subgrade Beneath Embankments:

2. Expose competent native soil within the planned new embankment footprint.

3. Scarify the exposed subgrade to a depth of 12 inches or depth to bedrock, moisture condition as necessary and re-compact.

4. Subgrade Beneath Paved Areas:

   a. Excavate to the subgrade soils beneath the bottom of the subbase.

   b. Place reinforcement geotextile as shown on drawings.

   c. Finished subgrade shall be even, self-draining, and in conformance with the slope of the finished pavement.

5. Subgrade Beneath Structures:

6. At grade structures

   1) Excavate 3 feet of undocumented fill or to basalt rock layer and replace with compacted imported structural fill.

   2) Extend imported structural fill horizontally beyond the exterior perimeter of the building and footing a distance equal to the height of the fill or 3 feet whichever is greater.

7. Below grade structures

   1) Excavate to basalt rock layer and replace with compacted imported structural fill.

   2) Provide a minimum of 2 and a maximum of 12 inches of imported structural fill as leveling course for spread and continuous footing over the basalt rock subgrade.

   3) Provide a 6-inch layer of imported structural fill for mat foundation over the basalt rock subgrade.

4) Extend imported structural fill horizontally beyond the exterior perimeter of the building and footing a distance equal to the height of the fill or 3 feet whichever is greater.

3.03 EXCAVATION IN VICINITY OF TREES

A. Except where trees are indicated to be removed, protect trees form injury during construction.

B. Do not cut tree roots over 2 inches in diameter without permission of the Engineer.

C. Support trees during excavation by means approve by the Engineer.

3.04 OVER-EXCAVATION NOT ORDERED OR INDICATED

A. Backfill areas over-excavated with the materials indicated for the backfill above the over-excavation or Aggregate Base.

B. Backfill the over-excavation to restore the required subgrade elevation and compact.

C. Any over-excavation carried below the grade indicated on the Drawings will be at no additional cost to Owner.

3.05 OVER-EXCAVATION WHERE ORDERED BY ENGINEER

A. Where ordered by the Engineer, over-excavate beyond the depth of subgrade indicated to the dimensions ordered.

B. Backfill areas over-excavated with the materials indicated for the backfill above the over-excavation or Aggregate Base.

C. Backfill the over-excavation to restore the required subgrade elevation.

D. Over-excavation less than 6 inches below the limits indicated: At no increase in cost to Owner.

E. Over-excavation greater than 6 inches below the limits indicated: Payment will be made under separate unit price bid items for over-excavation if such bid items have been established. Otherwise, payment will be made in accordance with a negotiated price.

F. Measurement and Payment

1. Measurement of quantities for payment of over-excavation: By calculation by Engineer of the volume of materials removed as over-excavation based on the difference between the excavation dimensions before and after the over-excavation work. No compensation will be made for removal of materials beyond the limits of the additional excavation ordered by Engineer or for materials which may come into the excavation from outside the designated limits. No compensation will be made for removal of materials that are outside of the minimum horizontal dimensions indicated.

2. Payment for over-excavation will be made by the cubic yard. The payment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in excavating and backfilling the over-excavation completely. Payment shall also include full compensation for the removal and disposal of the excavated materials, import and installation of backfill materials, control of water in the excavation, excavation support, and all

costs associated with interruption of construction operations during the review of the foundations, over-excavation, backfill, and all other operations required for, or as a result of, over-excavation.

3.06 ROCK EXCAVATION

A. Perform rock excavation in accordance with Section 31 23 16.26.

3.07 DISPOSAL OF UNSUITABLE, EXCESS EXCAVATED AND OTHER MATERIALS

A. The Owner has identified a site for disposal of clean excess excavated earth materials located at Quarry Park, 3101 Zelkova Street, Sweet Home, Oregon 97386. The Contractor may use a different disposal site with written authorization from the property owner of the disposal site. Clean materials shall meet the requirements of Section 2.01.A.1.

B. Dispose unsuitable materials at an appropriate site selected by Contractor unless otherwise indicated.

C. Obtain required permits, landowner, and agency approvals for disposal of unsuitable and excess excavated materials and pay costs associated with the removal and disposal of the materials.

3.08 FILL AND EMBANKMENT CONSTRUCTION

A. Scarify foundation soils for fills and embankments bring to optimum moisture content, and re-compact with heavy compaction equipment to obtain compaction indicated.

B. Place and compact fill and embankments in horizontal layers so that when compacted layers to not exceed thickness indicated.

C. Provide keyways or benches where an embankment or fill is to be placed against slopes, hillsides, or fill slopes.

D. Slopes: Construct slopes as indicated except construct no permanent fill or embankment slopes with slope inclinations that exceed 2:1 (horizontal: vertical) unless specifically indicated otherwise

E. Over-construct fills and embankments beyond the horizontal dimensions than indicated. Cut back slope following placement and compaction to expose well compacted fill.

F. Construct the first 3 feet of embankment or fills over pipelines using placement and compaction equipment that do not damage the pipe. Keep heavy construction equipment a minimum distance of the edge of the trench equal to the depth of the trench until at least 3 feet of fill over the pipe has been placed and compacted.

3.09 STRUCTURE BACKFILL

A. Provide Structure Backfill material within 12-inches of all structures to be backfilled unless otherwise indicated.

B. Place a 6-inch layer of structural fill below all structures, unless otherwise indicated.

C. Do not drop backfill upon any structure or pipe.

D. Confirm concrete structures have attained sufficient strength to withstand the backfill loads imposed.

E. Do not place backfill around water retaining structures until structures have been tested and approved for backfill. Fill structures with water during backfill operations.

F. Place backfill after all water has been removed from the excavation and the excavation sidewalls and subgrade soils have dried to a moisture content suitable for compaction.

G. Remove all loose, sloughing, or caving soils and rock materials prior to placement of backfill.

H. Place geotextile fabric as indicated.

I. Promptly after removal, fill voids created by the extraction of sheetpile or shoring indicated in Section 31 50 00.

J. Place backfill and spread evenly in layers so that when compacted layers do not exceed thickness indicated.

K. Thoroughly mix layers as necessary to promote uniformity of material in each layer.

L. Add water to backfill material such that moisture content is below the optimum moisture content and mix with the soil until the proper moisture content is achieved throughout the soil layer.

M. Where backfill material moisture content is too high to permit the specified degree of compaction, dry backfill material until moisture content is satisfactory.

3.10 COMPACTION OF FILL, BACKFILL, AND EMBANKMENT MATERIALS

A. Adjust moisture condition of soils to achieve a water content of 2 percent, plus or minus 0.5 percent, above the optimum moisture content as determined through moisture density testing of the soil.

B. Compact each layer in a uniform and systematic manner.

C. For materials with less than 10 percent passing the No. 4 sieve, compact by means of at least 2 passes from a flat plate vibratory compactor.

D. For materials with 10 percent or more passing the No. 4 sieve, mechanically compact to the indicated percentage of density each layer of backfill materials.

1. Use equipment that is consistently capable of achieving the required degree of compaction.

2. Compact each layer over its entire area while the material is at the required moisture content.

E. For wall backfill placed within 3 feet of the wall use hand-operated tamping equipment, such as jumping jack or vibratory plate compactors.

F. Do not use flooding, ponding, or jetting as a method of compaction.

G. Do not use equipment weighing more than 10,000 lbs closer to structure walls than a horizontal distance equal to the depth of the fill at the time. Use hand operated power compaction equipment where use of heavier equipment is impractical or restricted due to weight limitations.

H. Compaction Requirements:

1. Where agency or utility company requirements govern, the highest compaction standards shall apply.

2. Compact finish and subgrades in compliance with the following table:

Location or Use of Fill	Limit/Layer Thickness	Percentage of Maximum Dry Density of Compacted Material per ASTM D1557
Imported Structural Fill General Use	8 in. Layers	92
Backfill within 3 feet of walls	Less than 6 in Layers	90
Upper 2 feet of backfill within 3 feet of walls when sidewalks or pavements are placed above the backfill	Less than 6 in Layers	95
Embankment Fill	12 in. Layers	90(1)
Subgrade beneath embankments or fill areas (upper 8 inches)	Upper 12 in.	92
Subgrade beneath structures	8 in. Layers.	92
Subgrade beneath keyway (upper 8 inches)	Upper 8 in.	95
Finish grade in unimproved or landscape areas	Upper 12 in.	85
(1) If embankment fill is non-moisture-density testable, compaction shall be assessed by proof-rolling per ODOT TM158 or other visual means per the Engineer.		

3.11 FIELD QUALITY CONTROL AND TESTING

A. Field quality control testing for compaction confirmation will be done by a testing laboratory of the Owner's choice at the Owner's expense except as indicated below.

B. If requested by the Owner, remove soil above the level at which the Owner wishes to test. Backfill and re-compact material after testing is completed.

C. If compaction fails to meet specified requirements, perform remedial work by one of the following methods:

1. Remove and replace backfill at proper density.

2. Bring density up to specified level by other means acceptable to Owner.

3. Retesting:

a. Costs for conducting additional tests to confirm and verify that remedial work has brought compaction within specified requirements shall be borne by the Contractor.

b. Conduct compaction tests at twice as frequently specified for the initial confirmation tests.

D. Where soil compaction is specified as a percentage of maximum dry density, determine the maximum dry density at optimum moisture content by laboratory testing in accordance with Method C of ASTM D1557.

E. Where compaction of cohesionless, free draining soil is specified as a percentage of relative density, determine relative density by laboratory testing in accordance with ASTM D1557.

F. Determine In-Place Density of Compacted Fill Material by performing field tests of soil density in accordance with ASTM D6938.

G. Frequency of Compaction Confirmation Testing at intervals not less than as follows:

1. Each lift shall be tested prior to placing a subsequent lift.

3.12 FINISH GRADES

A. Surface: Reasonably smooth and free of grade breaks, irregular surface changes, protrusions and other defects.

B. Restore un-improved areas back to pre-construction grades.

C. Backfill topsoil in all areas where the topsoil was removed as part of the site preparation.

D. Restore drainage swales and water courses to their pre-construction alignments and grades unless otherwise modified by the Work. Grade surface to drain away from structures. Direct drainage to collection points.

E. Provide smooth transitions to existing grades.

F. Repair and reestablish grades to required elevations and slopes due to any settlement or erosion that may occur prior to final acceptance.

G. Vertical Tolerance:

1. Subgrade under paved areas: 0.0 feet above and 0.08 feet below.

2. Subgrade under structures: 0.0 feet above and 0.08 feet below.

3. Landscaped areas: 0.1 feet above and 0.1 feet below.

4. Unimproved areas: 0.1 feet above and 0.1 feet below.

END OF SECTION

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SECTION 31 10 00

SITE PREPARATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Site preparation work, as follows:

1. Locating existing facilities.
2. Installing safety and protective barriers.
3. Constructing temporary access roads, work areas and storage areas.
4. Clearing, grubbing, stripping, and other initial work required for earthwork and trenching operations.

1.02 REFERENCED SECTIONS

A. The following Section is referenced in this Section

1. Section 01 33 00 – Submittals

1.03 DEFINITIONS

A. Clearing and Grubbing: Consists of removal of natural obstructions and man-made objects and features including foundations, buildings, fences, lumber, stumps, debris, rubbish, brush, trees, boulders, and other items that interfere with construction operations or are specifically designated for removal.

B. Stripping: Includes the removal and disposal of sod, grass, weeds, roots, and other organic material remaining after clearing has been completed.

1.04 SUBMITTALS

A. Comply with Section 01 33 00.

B. Submit:

1. Materials used and layout of temporary fences
2. Proposed staging and stockpile locations.

PART 2 - PRODUCTS

2.01 TEMPORARY FENCES

A. Type: Heavyweight, high visibility, flat laminar mesh design.

B. Material: High-density polyethylene.

C. Height: 48 inches.

D. Posts: Wood or metal posts at 10-foot spacing. Secure fence to posts with plastic cable ties.

PART 3 - EXECUTION

3.01 LOCATING EXISTING FACILITIES

A. Review the design drawings, maps, and other sources of information and identify existing facilities at the site to determine and mark the approximate locations of underground facilities.

B. Follow rules adopted by the Oregon Utility Notification Center regarding locating and marking existing buried utilities and contact owners of existing underground utilities prior to beginning work in the vicinity of their utilities.

C. Locate all existing utilities by exploratory excavations after field marking by the utility agencies and prior to any excavations in the affected areas.

3.02 SAFETY AND PROTECTIVE BARRIERS

A. Along Public Roadways:

1. Install appropriate barriers such as temporary fencing, plastic drums, or concrete traffic barriers to protect public from construction areas and to protect workers and existing facilities from danger of passing vehicles.

B. Temporary Fences:

1. Prior to beginning excavation, erect temporary fences along boundaries of the work area indicated on the Drawings.

2. Maintain work activities within the confines of the temporary fences.

3. Remove temporary fences when work in the vicinity is substantially complete.

C. Existing Trees: Erect temporary fences around trees at the drip line that are adjacent to the Work and may be subject to damage unless protected. Maintain work activities outside of protected areas.

D. Provide protective concrete slabs, steel plates or encasements for existing buried facilities that may be damaged by Contractor's equipment and vehicles.

3.03 PRIMARY SITE ACCESS, WORK AND STORAGE AREAS

A. Coordinate with the Owner and Engineer to develop primary access routes, work areas and storage areas.

B. Protect subgrade soils in stripped and graded areas as follows:

1. Place a minimum of 12 inches of crushed rock base material in temporary construction traffic areas.

2. Place a 18-24 inches of crushed rock base material to as necessary to protect subgrade soils in heavily traveled construction traffic areas.

3. Place a minimum of 4 inches of crushed rock base material in pedestrian areas.

C. Clean up areas at the conclusion of the project and return the areas to their original or better condition.

3.04 CLEARING

A. Clear construction areas of objectionable items and material, which, if left in place, would interfere with the proper performance of the work.

B. Remove loose boulders within 10 feet from the tops of cut slopes. Incorporate boulders into landscaping or remove from the site.

C. Dispose of material from clearing operations in an acceptable off-site location.

3.05 STRIPPING

A. Remove the top layer of soil containing sod, grass, weeds, other vegetation, and organic material to a depth of 6 inches from areas that will be affected by construction and site grading operations.

B. Extend stripped areas at least 4 feet beyond the limits of cut and fill areas.

C. Protect soils in stripped areas as described in Section 3.03.

D. Dispose of stripped material in an acceptable off-site location.

3.06 REMOVAL OF EROSION CONTROL DEVICES

A. Remove erosion control devices when bare soils are sufficiently revegetated to prevent on-site or off-site soil erosion, if authorized by the Engineer.

B. Straw wattles containing plastic netting, including plastic specified as phot-degradable, may not remain on site. Remove entire wattle or remove and dispose of plastic netting and spread straw from wattle across vegetated areas of site.

3.07 TREE REMOVAL

A. Remove specific trees indicated on the Drawings for removal.

B. Timber Salvage: Property owners have the rights to any tree with caliper of 6 inches and larger that are felled. The Engineer will notify property owners at least 48 hours prior to tree removal. If property owners elect to keep felled trees, they will be granted 7 calendar days after the tree is felled to remove the timber. If timber is not removed after 7 calendar days, the ownership of the timber shall revert back to Contractor.

END OF SECTION

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SECTION 31 23 16.26

ROCK EXCAVATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Rock excavation exceeding the capability of conventional equipment.

B. Blasting requirements.

1.02 REFERENCED SECTIONS

A. The following Sections are referenced in this Section:

1. Section 01 33 00 – Submittals

2. Section 31 00 00 – Earthwork

1.03 DEFINITIONS

A. Rock Excavation.

1. General:

a. Removal of solid material which by actual demonstration cannot, in Owner's Representative's opinion, be reasonably removed using conventional excavation equipment and must be systematically broken by power-operated hammer, hydraulic rock breaker, expansive compounds, blasting, or other similar means prior to removal.

b. For excavation of solid material that cannot be removed using an excavator or tractor in good working condition having a minimum flywheel power of 220-mechanical horsepower (164 kilowatt) and equipped with manufacturer's standard boom, single tooth rock ripper, and rock points on a rock ripping bucket no wider than 36 inches, or similar approved equipment, will be considered rock for the purpose of payment.

2. Term "rock excavation" indicates removal of solid material, as specified above, and does not necessarily correspond to "rock" or "bedrock" as implied by names, geologic formations, or other definitions provided in the Oregon Standard Specifications for Construction or other documents outside of this specification.

1.04 SUBMITTALS

A. Submit the following shop drawings, plans and product information per Section 01 33 00:

1. Permits: The Contractor shall obtain all required local, State, Federal, and the utility owners' permits and shall submit to the Owner's Representative, a copy of all applicable permits for transportation, storage, and use of explosives.

2. At least 28 days prior to drilling any blast hole, the submit the resumes for the Owner's Representative's approval the resumes of the Contractor's Blasting Consultant, Blasting Supervisors (Blasters-In-Charge), and personnel performing preconstruction blast surveys.

3. At least 28 days prior to drilling any blast holes, the submit a Project-specific General Blasting Plan to the Owner's Representative for review. The Contractor's Blasting Consultant shall visit the Site and prepare the Plan. The plan should include:

    a. A scaled plan drawing showing the approximate location and extent of the Contractor's blasting operations.

    b. A schedule of neighborhood pre-blast advisories, notifications and pre-blast structural surveys; a description of shot clearing and guarding procedures.

    c. A description of the anticipated road closures required during blasting operation,

    d. A tabulation of the nearest distances to structures within the specified blast generated seismic influence zone.

    e. A description of the drill and blast operation providing: the blast hole diameters and range of depths, the types of explosive to be used, the length of the stemming columns and the type of stemming material, the type of initiation system to be used, the methods used to control fly rock and sufficient information to determine the acceptability of the proposed blasting, and conformance with Paragraph 3.03.D, Blasting Limitations, hereinafter.

4. For each kind of blasting agents and explosives to be used, submit the perchlorate content provided by the suppliers and/or manufacturers. The Contractor has to obtain written permission from the Owner's Representative to use perchlorate-containing explosive products.

5. At least 14 days prior to drilling any blast holes the submit to the Owner's Representative manufacturer's product information sheets and Material Safety Data Sheets (MSDS) for all explosives, blasting agents, primers, and initiating products the Contractor proposes to use.

6. At least 24 hours before drilling any blast holes, the submit a Site-Specific Pre-blasting Blast Plan to the Owner's Representative for review and approval. The Pre-blasting Site-Specific Blast Plan shall include the following minimum information:

    a. A Site-specific plan view showing the blast area(s) and distances from the blast to all structures within 300 feet. The plan shall show the locations and distance to buried structures including buried utilities and pipelines within 100 feet of blast areas. Should the rock excavation require more than one blast, the plan shall show the anticipated footprint of each blast and the sequence in which the blasting will occur.

    b. A section view or profile of the blast area showing the top of ground, the rock/overburden contact and the bottom elevation limits of the excavation.

    c. The maximum weight of explosives to be detonated in any discrete 8 millisecond incremental time period.

7. Review and approval of any blasting plan by the Owner's Representative shall not relieve the Contractor of their responsibility for obtaining adequate rock breakage and limiting rock breakage to within the design excavation final lines and grades.

8. Submit a Blast Report Form or approved equal to the Owner's Representative before 9 am the day following each blast. The report shall contain the information required in Paragraph 3.03.G, Blasting Records.

9. Pre-blast Survey: At least 7 days prior to loading blastholes, submit Pre-blast Inspection Report including the information described in Section 1.07.

1.05 REFERENCES

A. Oregon Occupational Safety and Health Code (OR-OSHA), Division 3 Construction, Subdivision U – "Blasting and Use of Explosives," Sections 1926.900 through 1926.914.

B. Oregon Revised Statutes for Explosives, 480.010 through 480.290 and Administrative rules 837-12-1200 through 837-12-1420. The rules are administered by Oregon's Office of State Fire Marshal and govern the sale, possession, transfer of explosives, and the required certificates.

C. Code of Federal Regulations (CFR): Bureau of Alcohol, Tobacco, and Firearms (ATF): 27 CFR 555.

D. National Fire Protection Association:

1. 495: Explosive Materials Code.

E. Blast Vibration Monitoring:

1. International Society of Explosive Engineers (ISEE), 2011, Blaster's Handbook, 18th edition, Appendix E, Seismograph Field Practice Guidelines.

1.06 QUALIFICATION OF BLASTING PERSONNEL

A. Provide the services of an independent, qualified Blasting Consultant, experienced in controlled and sinking cut blasting techniques for similar civil and hydraulic works, to prepare blasting plans, to supervise the installation of instruments, and to supervise the interpretation of recorded results. The Blasting Consultant shall have at least 10 years of experience and demonstrate satisfactory experience on 5 similar projects. These projects shall include blasting within 100 feet of occupied dwellings or utilities where good relations with owners of nearby private structures or utility and the public were maintained. The Blasting Consultant shall not be an employee of the Contractor, explosives manufacturer, or explosives distributor. The Owner's Representative shall review and approve or reject the Blasting Consultant.

B. Use experienced, competent Supervisors (Blasters-In-Charge) for all blasting operations. All blasting supervisors shall have at least 10 years of experience and be able to demonstrate satisfactory experience on at least 5 similar projects, including blasting within 100 feet of occupied dwellings or utilities. All blasters and blasting supervisors shall be properly qualified and licensed in accordance with applicable federal, state, and local regulations. The Contractor shall not allow prohibited persons as defined by the BATF (27 CFR Part 555) to transport, handle, or use explosive materials.

C. Use experienced and qualified personnel for conducting pre-blast condition surveys. Personnel conducting pre-blast surveys shall have at least 5 years of experience in conducting pre-blast condition surveys of structures and be able to demonstrate satisfactory experience on at least 3 similar projects. Personnel conducting pre-blast surveys shall be the employees of a firm regularly engaged in conducting such surveys and shall not be an employee of the Contractor or any explosives manufacturer or distributor.

1.07 QUALITY CONTROL AND ASSURANCE

A. Pre-blast/Post-blast Inspections:

1. Coordinate all necessary notifications with utility owners of any utilities within 100 feet of the blast.

2. Prior to blasting, inspections shall be made of residences and other private structures existing within a 300-foot radius of all blasting locations. Notify the Owner's Representative at least 7 days prior to the inspections so a representative of the Owner's Representative may be present.

3. Inspections shall meet the following conditions: The survey shall include documentation of interior subgrade and above grade accessible walls, ceilings, floors, roof, and visible exterior as viewed from grade level. It shall detail by videotape or photographs and notes and sketches the existing condition or structures. Existing crack damage, other structural problems or defects occurring inside and outside the structure shall be documented as follows:

   a. The location of the feature shall be noted on a scaled drawing,

   b. Feature dimensions (e.g. width, length, depth) shall be measured and documented.

   c. Feature shall be photo-documented. A scale such as a ruler or crack meter shall be included in the photograph.

4. Develop a pre-blast inspection report, including videotapes and photographs, and shall be submitted to the Owner's Representative. Photographs shall be electronically imported and included in the report. Scans of photographs shall not be allowed.

5. As construction progresses, reinspect, as often as necessary to verify that controlled blasting methods are not causing any new damage.

6. In the event any property owner denies access for the survey of structures within the specified limits, notify such property owner by certified mail, on the intent of the survey. If after 2 weeks, access is still denied, notify the property owner once again that this is the final notification. Submit two copies of all such correspondence to the Owner's Representative. Upon review of the correspondence, the Owner's Representative may waive the inspection requirements for property owned by the owners refusing access.

7. Post blast inspections shall be required for property where written or verbal damage complaints were made by property owners.

B. Damage Repair

1. In case damage from blasting occurs to existing structures, to any portion of the Work, or to the material surrounding or supporting the same that is intended to remain, remove such damaged Work, repair the work, and replace the material and perform such Work for repair or replacement as the Owner's Representative deems necessary. Repair all damage promptly, completely, and satisfactorily, at the Contractor 's sole expense.

2. Nothing contained herein shall relieve the Contractor of their responsibility for claims arising from the Contractor's construction operations, including blasting operations. Failure to inspect any structure required by these Contract Documents, or inadequacy of inspections shall not relieve the Contractor of their responsibility. The Contractor shall indemnify the Owner and the Owner's Representative for such claims.

1.08 SAFETY REQUIREMENTS

A. Explosives shall be handled, transported, used, controlled, and monitored as prescribed by the most stringent of rules specified in the referenced OSHA and ATF Standards, Oregon's Office of State Fire Marshal explosives regulations, this Section, and local codes and ordinances.

B. Keep explosives on the Site only in such quantity as needed for Work under way and only during time as being used. No overnight magazine storage of explosives shall be allowed within the Project limits. Only the amount of explosives to be used each day shall be on the Site. Promptly remove from premises remaining unused explosives and explosive product packaging materials when need for explosives has ended. All loaded blast holes are to be shot the day they are loaded.

C. Conform to State, Federal, and municipal laws, ordinances, and regulations relating to transportation, handling, and use of explosives. If any of above-mentioned laws, ordinances, or regulations require a licensed blaster to perform or supervise the Work of blasting, employ a licensed blaster. Require them to have a license on Site and permit examination by Owner's Representative or other officials having jurisdiction.

D. Conduct operations involving explosives with all possible care to avoid injury to persons and property. Do blasting only with such quantities and strengths of explosives and in such manner as will break rock approximately to intended lines and grades, leaving rock not to be excavated in an unshattered condition. Avoid excessive cracking of rock upon or against which any structure will be built. Prevent injury to existing pipes, structures, and property above or below ground. Cover rock with logs or mats, or both. Give sufficient warning to persons in vicinity of Work before a charge is exploded.

E. Complete blasting within a distance of 50 feet (15 m) before any portion of a masonry structure is placed or any pipe is laid.

F. Determine presence of two-way-radios, stray electrical currents and other conditions adversely affecting blasting operations and implement necessary precautions to prevent accidents and premature blasts.

1.09 SITE CONDITIONS

A. Protect structures, underground utilities, and other construction from damaged caused by blasting.

B. Subsurface conditions at the wastewater treatment plant are described in the Geotechnical Data Report prepared for this Project – see Supplementary Information in Volume 3 of the Contract Documents. It is the responsibility of the Contractor and the Contractor's Blasting Consultant to review and understand the rock mass characteristics at the Site.

PART 2 - MATERIALS

2.01 EXPLOSIVE PRODUCTS

A. To the extent practical, avoid the use of perchlorate-containing explosive products when surface or groundwater can be affected.

2.02 WARNING SYSTEMS

A. Institute a system of audible signals to warn of impending blasts.

B. Erect signboards of adequate size stating that blasting operations are taking place in the area. Such signs shall be clearly visible at all points of access to the area and shall clearly describe the audible signal system for warning of impending blasts.

C. Mark all day storage places and explosives transport vehicles with signs stating clearly and boldly, DANGEROUS EXPLOSIVES.

2.03 BLAST MONITORING INSTRUMENTATION

A. The Contractor with the assistance of the Contractor's Blasting Consultant shall provide and operate a minimum of three blast monitoring seismographs, at locations shown on the Drawings, to record particle velocity simultaneously along three mutually perpendicular axes.

B. Provide and operate a minimum of two approved air blast overpressure/sound monitoring devices at locations as directed by the Owner's Representative.

C. Blast monitoring instrumentation shall be 4-channel, (1 overpressure and 3 seismic channels) units capable of digitally storing collected data. Equipment shall be capable of printing ground motion time histories and summaries of peak motion intensities, frequencies, and USBM RI8507 ppv-frequency plots. Printed report records shall include date, time of recording, operator name, instrument-number, and date of last calibration. Instruments shall have a flat frequency response between 2 and 250 hertz (Hz) for particle velocity and from 2 to 200 Hz for air pressure.

D. Seismographs shall be capable of recording overpressure from 88 to 148 decibels (dBL), and a particle velocity from 0.005 to 10.0 ips, and shall be capable of performing a self-test of velocity transducers and printed event record shall indicate whether or not the sensor test was successful.

E. Blast monitoring equipment shall have been calibrated within 1 year of any blast monitoring.

F. Blast vibration monitoring shall be performed in general agreement with the 18th edition of the Blaster's Handbook, Appendix E, Seismograph Field Practice Guidelines, published by the International Society of Explosive Engineers (ISEE), 2011.

2.04 BLASTING MATS

A. Blasting mats shall weigh at least 25 pounds per square foot. Mats shall be a minimum of 6 feet by 10 feet and shall be equipped with suitable placement attachments.

PART 3 - EXECUTION

3.01 ROCK EXCAVATION

A. Conduct excavation in accordance with Section 31 00 00 and this Section 31 26 16.13.

B. If material is encountered that cannot be excavated by conventional equipment, notify Engineer immediately. Provide performance tests of the specified conventional or equivalent equipment demonstrating the equipment can perform to at least the level specified. If Engineer confirms in writing that the specified conventional equipment cannot perform at the production rates specified, the excavation shall be considered rock excavation.

C. A boulder may be considered rock excavation if, after the boulder has been exposed by excavation on all sides, neither type of conventional equipment can break up the boulder into pieces sufficiently small to enable removal by the specified equipment.

3.02 MEASUREMENT AND PAYMENT

A. Payment for rock excavation will be as provided in the Bid form as a unit price item for quantities in excess of the base bid quantity included in Contractor's lump sum bid. Payment for additional rock excavation shall be at the additive or deductive unit prices provided on the Bid Form.

B. Measurement and Payment

1. Measurement of quantities for payment of rock excavation shall be by calculation by Engineer of the volume of in-place materials removed as rock excavation. No compensation will be made for removal of materials beyond the limits of the rock excavation in the project drawings or ordered by Engineer or for materials which may come into the excavation from outside the designated limits. No compensation will be made for excavation wider or deeper than the minimum indicated.

2. Payment for rock excavation will be made by the cubic yard unless otherwise indicated. The payment shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in excavating and backfilling the excavation completely, subgrade elevation indicated. Payment shall also include full compensation for the removal and disposal of the excavated materials, control of water in the excavation, excavation support, performance tests, costs associated with interruption of construction operations during performance tests and confirmation by Engineer, costs associated with the additional time required for excavation, and all other costs and operations required for, or as a result of, rock excavation.

3.03 EXPLOSIVES AND BLASTING

A. General

1. Conduct blasting, storage and handling of explosives in accordance with the Oregon Occupational Safety and Health Division (Oregon OSHA), Oregon Administrative Rules, Chapter 437, Division 3 Construction, Subdivision U, and Section 00335 of the Oregon Standard Specifications for Construction and any other authorities having jurisdiction.

2. Obtain all necessary permits and furnish copies to Engineer before explosives are transported to the Site.

3. Pay for permits at no additional cost to Owner.

4. Perform blasting only by skilled operators under the direction of a licensed blasting supervisor.

5. Submit blasting plan prepared by qualified person. Blasting plan to include

   a. Details of drilling and blasting pattern

   b. Vibration, flyrock and noise reduction methods

   c. Blast area security measures

   d. Traffic control

6. Identify all property, structures, and persons that may be affected by blasting and take all safety precautions and protective measures to prevent damage or injury to same.

7. All personal injury or damage to persons or property of any nature, whether in the Work or appurtenant to it, shall be the responsibility of Contractor.

8. Contractor agrees by submission of a bid to indemnify and hold Owner, its officers, agents, employees, and Engineer harmless from any and all liability claims, costs, and expenses as a result of blasting operations, including expenses of investigation and defending against same in regard thereto.

9. Perform basting only between 9:00 AM and 4:00 PM, Monday through Friday, except legal holidays, unless otherwise approved by Engineer and regulatory agencies having jurisdiction.

B. Blasting

1. Perform instrumented seismographic monitoring of blasting.

   a. Place a seismograph at the nearest structure to the blast to monitor the ground motion particle velocity and frequency during each blast.

   b. Provide one copy of each seismograph chart to Engineer.

   c. If blast results in unacceptable vibrations modify the blasting procedure.

2. Contain fly rock from blasting within the project site and prevent hazard to persons, vehicles, existing improvements, or vegetation.

3. Clean the blasting site of all debris at the end of each day.

4. Do not blast within 100 feet of concrete that has cured less than 7 days.

C. Blasting Limitations

1. The following limitations are mandatory for all blasting operations:

2. Road Closure Limitations:

   a. Road closures are required during blasting all blasts. Submit any anticipated road closures in the General Blasting Plan, per Paragraph 1.04 of tis Section. Traffic control for the road closures shall be in accordance with the most recent ODOT Traffic Control Plan Design Manual.

3. Work Hour Restrictions

   a. Blasting shall be performed between XX am and XX pm. No nighttime blasting shall be allowed.

D. Blasting Safeguards

1. The maximum charge weight per 8 millisecond (MS) delay shall be in accordance with the Scale Distance Formula, $W= (D/Sd)^2$, where W = weight of explosives per 8 MS delay, D = distance in feet to structure, Sd = selected scaled distance from test blasting, unless otherwise specified by the Owner's Representative.

2. The maximum charge weight per 8 millisecond delay (MS) delay shall be approximated by the use of the following equation, which shall be refined based on test blasts and experience gained as the Work progresses: $W = D^2 * (V/H)^{1.25}$, where W = maximum weight of explosives per delay period of 8 MS, in pounds, V = peak particle velocity, in inches per second, D = shortest distance between blast and the point of interest in feet and H = ground response factor, which equals 70 (unit-less) and shall be verified by test blasting, unless otherwise specified by the Owner's Representative.

3. The first blasting operation at each location shall be monitored by the Contractor as a test case, and the proper drill and blast parameters subsequently used shall be derived from the test results. The Scaled Distance for test shots shall be based on the Contractor's General Blasting Plan and such that the peak particle velocity at the nearest residence, private, public, community, or institutional building does not exceed 2.0 inches per second, or as directed by the Owner's Representative. Blast monitoring shall be continued for every blast round. Blast monitoring data recorded for each shot shall be furnished to the Owner's Representative prior to drilling for the next blast. Changes in drilling patterns and amount of explosives shall be made when records indicate vibration in excess of that specified herein.

4. If the measured air overpressure exceeds 0.014 psi (133 dB) at the nearest occupied dwelling adjacent to the blast zone or other designated location, the Owner's Representative may require up to a 3-day shutdown of Contractor's operations for inspection of facilities. This delay shall be at no additional cost to the Owner and shall not constitute the basis for any claim.

5. If for any blast, the measured peak particle velocity or airblast exceeds the limits in this specification, the Contractor's Blasting Specialist shall review the Contractor's blasting methods and the Contractor shall submit a revised Blasting

Plan for the Owner's Representative's approval to conducting additional blasting activities.

6. In reporting a shot, the distance from the shot to each recorder, the amount of explosives used in each delay, the total amount of explosives used, and the time shall be noted. No separate or direct payment shall be made for monitoring of blasts, as all costs shall be considered incidental to, and included in, the applicable items of the Contract.

7. Cover the area to be shot with blasting mats or other approved type of protective material that will prevent the scattering of rock or other fragments. Give ample warning to all persons within the vicinity prior to blasting and provide signals warning of danger in suitable places to alert people in vehicles before firing any blasts. If flyrock projects past the guarded area of the shot or lands on private property, all blasting operations shall cease until the Contractor's Blasting Consultant reviews the Site and determines the cause of the flyrock and submits a revised shot plan for the Owner's Representative's approval.

8. After a blast has been fired, the blaster shall make a careful inspection to determine that all charges have exploded before employees are allowed to return to the operation. Misfires shall be corrected in accordance with the requirements of the applicable portions of Federal, State, and/or local safety codes for blasting. The Contractor shall be responsible for any and all damages to property or injury to persons resulting from blasting, or accidental or premature explosions that may occur in connection with the use of explosives.

9. All loose and shattered rock or other loose material, which may endanger any structure or the workers, shall be removed and the excavation made safe before proceeding with the Work. After muck removal and before drilling of blast holes for a new round, the face shall be cleaned and thoroughly examined for missed holes and unexploded powder. Blasting techniques shall be developed and improved as Work progresses. The fact that the removal of loose or shattered rock or other loose material may enlarge the excavation beyond the required limits shall not relieve the Contractor of the responsibility for removal of such material.

10. Whenever, in the opinion of the Owner's Representative, proposed blasting may cause harm to persons or private property, cause damage to structures, or create rock face instability, cease blasting immediately and review the blast design. The Contractor can resume excavation of the rock after redesigned blast plan has been approved by the Owner's Representative or by mechanical methods.

E. Blasting Test Shots

1. The Contractor shall demonstrate that the proposed blasting method meets the Project objective to the Owner's Representative by making test shots.

2. Test shots may form final rock faces upon approval of the Owner's Representative.

3. The first sinking cut shot in the shaft shall be a test blast.

4. The Contractor's Blasting Consultant shall be present to witness each test blast.

5. The Owner's Representative shall be the sole judge as to the acceptability of the proposed method. If the test is unacceptable, the Contractor, with the assistance of the Blasting Consultant, shall modify their proposed blasting method and perform additional tests until the method is acceptable.

F. Blasting Records

1. Complete the Blast Report Form for each blast detonated, and be submit to the Owner's Representative along with a Blasting Ground Motion Record (seismograph and airblast record) before 9 AM of the following day after each blast. This record shall include the following:

   a. Depth of blast holes and the location of the blast point in relation to Project stationing; type and strength of explosives, type of blasting caps, and distribution of delays used; vibration record including USBM RI8507 ppv-frequency plot; total explosive loadings per round and per delay; comments by the blaster in charge regarding any misfires, unusual results or unusual effects; date and initiation time of blast; name and signature of the Blaster-in-Charge and any other records required by State, Federal, and local codes and/or regulations.

   b. Failure to submit the Blast Report Form shall be grounds for the Owner's Representative to suspend the Contractor's drilling and blasting operations until the required reports have been submitted.

G. Post-Blast Investigation and Report

1. Perform post-blast inspections of each structure included in the pre-blast survey.

2. Perform post-blast inspections with a qualified independent inspector provided by the Contractor.

3. Use pre-blast survey forms for each structure to indicate no damage has occurred as a result of the blasting operation, sign forms following inspection, and submit one copy to the Owner.

4. Where damage has occurred, investigate the damage and provide a written report to Engineer within 30 days of identification of the damage or receipt of the complaint.

END OF SECTION

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SECTION 31 23 19

DEWATERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Control of water and dewatering of trench and structure excavations.

1.02 RESPONSIBILITY FOR DESIGN

A. Assume responsibility for planning, design, installation and operation of temporary groundwater dewatering systems and temporary surface water control systems. Water control systems designed and installed by the Contractor shall adequately protect existing property, foundations and permanent structures.

B. Utilize the services of a Registered Hydrogeologist, Professional Civil Engineer, or Certified Engineering Geologist to develop the Groundwater Control Plan (GWCP) and the design of the groundwater and surface water control systems to achieve specified results. Professional registration shall be for the State of Oregon.

C. Assume sole responsibility for loss or damage resulting from partial or complete failure of operation of dewatering systems.

D. Assume responsibility for repairing damage to adjacent properties, buildings, structures, utilities and other work due to settlement or resultant damage caused by the groundwater control operations.

E. Determine means and methods for disposing of water removed by dewatering systems. If permit requirements specify water quality requirements that must be met before water can be disposed, provide the necessary treatment facilities to achieve the specified water quality limits

F. Modify groundwater control systems or operations if they cause or threaten to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells, or affect potentially contaminated areas.

G. When additional information is needed for design of dewatering systems, conduct subsurface investigations to identify groundwater conditions and to provide parameters for design, installation, and operation of groundwater control systems

1.03 RESPONSIBILITY FOR SECURING PERMITS

A. Obtain all necessary permits, including those required by Oregon Water Resources Department (OWRD) for dewatering wells and monitoring wells, a 1200-C Storm Water Discharge General Permit from the Oregon Department of Environmental Quality (DEQ) for discharge of groundwater, and those required by the City of Sweet Home for discharge to the local sewer system.

B. Pay all costs associated with permitting, decommissioning and removal of all dewatering systems when no longer in use.

C. Comply with the sampling, testing, monitoring, and reporting requirements specified in permits secured for dewatering operations.

1.04 PERFORMANCE REQUIREMENTS

A. General

1. Groundwater control systems may include single-stage or multiple-stage well point systems, sump pumps within excavations, shallow or deep wells, or combinations of these types of dewatering systems.

2. Locate groundwater control and drainage systems so as not to interfere with utilities, construction operations, vehicular traffic, adjacent properties, or adjacent water wells.

3. Modify dewatering procedures which cause, or threaten to cause, damage to new or existing facilities, so as to prevent further damage. Install settlement gauges, as necessary, to monitor settlement of critical structures or facilities adjacent to areas of dewatering. Control the rate of dewatering to avoid all objectionable settlement and subsidence.

4. Install piezometers to monitor groundwater in the area of the excavation, as well as the natural groundwater elevation. Install piezometers in the locations specified elsewhere in this Section.

5. Remove or abandon dewatering system when it is no longer needed in accordance with regulatory stipulations indicated in this Section.

B. Project Conditions

1. Anticipate encountering groundwater in all excavations.

2. Groundwater may be free-flowing into excavations or may be encountered in the form of saturated soil.

C. Requirements for Dewatering of Excavations:

1. Design dewatering systems of sufficient scope, size, and capacity to accomplish the following results:

a. Control the flow of surface water into trench and structure excavations by grading, dikes, or other means.

b. Lower groundwater levels and eliminate infiltration of groundwater into trench and structure excavations, allowing construction to proceed on dry, stable subgrade.

c. Lower and maintain groundwater below the lowest point of excavations.

d. Lower groundwater levels further when necessary to prevent flotation and damage from hydrostatic pressure and to obtain the specified degree of compaction. Develop substantially dry and stable subgrade for subsequent earthwork compaction and construction operations.

e. Prevent the loss of fines, seepage, boils, quick conditions, or softening of the foundation soils.

f. Maintain stability of sides and bottoms of excavations.

D. Requirements for Protection of Existing Structures

1. Provide, operate and maintain dewatering systems of sufficient size and capacity to protect existing structures from hydrostatic uplift when the structure is drained of water.

2. Protection against hydrostatic uplift entails lowering the groundwater table in the immediate vicinity of the structure to be drained until the groundwater elevation is at least 12 inches below the top of slab elevation of the structure.

E. Operation of Dewatering Systems

1. Maintain dewatering operations to control and minimize erosion, to create stable sides and bottoms of excavations, to stabilize constructed slopes and to prevent settlement and damage to structures and utilities.

2. Collect and dispose of removed water. Water removed by dewatering systems cannot be discharged into the storm water collection system which consists of pipes, catch basins, manholes and roadside drainage ditches. Discharge water to wastewater treatment plant. Coordinate discharge location, quality and quantities with City prior to discharge.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Comply with requirements of agencies having jurisdiction.

B. Comply with all laws and regulations for development, drilling, and abandonment of wells used in dewatering systems.

C. Obtain a 1200-C Storm Water Discharge General Permit from the Oregon Department of Environmental Quality (DEQ) under the National Pollutant Discharge Elimination System (NPDES) for discharge of collected groundwater from the construction site.

D. Obtain all necessary permits from agencies with regulatory jurisdiction over groundwater pumping, matters affecting well installation and the use of existing storm drains and natural water drainage courses.

E. Take early action and allow time for the review, as permitting processes may be lengthy. Take early action to pursue and submit for the required approvals.

1.06 SUBMITTALS

A. Notify the Owner's Representative immediately after any material change or proposed change in the character, volume, treatment or disposal methods of the discharge.

B. Additional Shop Drawings for Specific Locations

1. Submit design details of dewatering systems and water treatment systems that will be utilized at the specific locations listed herein.

2. Design of the dewatering system shall be prepared by a Registered Hydrogeologist, Professional Civil Engineer, or Certified Engineering Geologist registered in the state of Oregon and shall be coordinated with the design of the excavation support systems that the Contractor proposes to use at these locations.

3. Provide shop drawings that are signed and sealed by the responsible Engineer or Certified Professional licensed in Oregon.

4. Illustrate the arrangement, locations and details of the dewatering system, including wells and well points; dewatering pumps and piezometers; locations of headers, treatment systems and discharge lines; standby equipment and power supply; silt removal, pollution control and treatment facilities; and the means of conveyance, discharge and disposal of water.

5. Include a narrative report outlining the dewatering procedures and controls.

6. Submit a minimum of six weeks before any work referred to in the submittal is scheduled to commence.

C. Groundwater Control Plan (GWCP)

1. Proposed plan for the design, control, transport, treatment, operation, disposal of water, signed and sealed by the designer. Include with this proposed plan a drawing that indicates the number and location of the dewatering wells to be installed for the Work.

2. Include the following in the GWCP:

a. Calculations for the design of each system, including a statement of design assumptions, system description, and basic design criteria. Quantify the peak discharge rate of each system into receiving storm water and sanitary sewers.

b. Schedule and procedures for installation, start-up testing protocol, and removal of each system.

c. Location, dimensions, and capacity of wells, retention basins, treatment ponds, tanks, and treatment plants.

d. Sizes, locations, and types of discharge lines, ditches, sumps, and flow measurement devices.

e. Details of dewatering systems for shafts, including well sizes, locations, gradation of filter materials, and calculations for compatibility with screen and ground.

f. Types, capacities and numbers of pumps, generators, and standby units.

g. Design and construction of all electrical installations.

h. Details for the collection of water in tunnel and shafts, its conveyance to the treatment point, its treatment of the water, and its discharge from the site.

i. Methods of measuring the flows in accordance with the requirements specified herein.

j. List of substances that may be introduced into discharges or increased in concentration due to the Contractor's means and methods of performing the Work.

k. Methods of monitoring groundwater level and water quality to check its compliance with all regulatory requirements prior to its discharge from the site.

l. Methods for diverting or collecting, monitoring, and treating as necessary prior to discharge all storm water.

m. Methods for collecting, handling, treating and disposing of water and byproducts from excavated materials stockpiled on site.

n. Copy of approved permits (i.e. discharge permits).

o. Copies of all daily reports specified herein.

3. Timing: Submit GWCP within 21 calendar days of the Notice to Proceed.

1.07 QUALITY CONTROL

A. Qualifications:

1. Name, address, phone number and professional registration of the designer of the dewatering systems.

2. Company and individuals responsible for the operation of the facilities.

3. Independent testing laboratory responsible for testing treated effluent will be arranged for and provided by the City.

B. Certifications: Permit for discharge into local storm water and sewer systems.

C. Quality Control Plans

1. Method for assuring that water quality complies with regulatory requirements prior to its discharge from the site.

2. Methods demonstrating the ability of the automatic paging facilities, power transfer facilities, and backup systems to comply with specified requirements.

3. Methods for assuring that collection, handling, treatment, and discharge operations do not damage the Work in progress or impact the efficiency with which other Work is performed.

4. Calculations demonstrating capacity of system to store collected water on site to comply with permit restrictions for discharging.

5. Recordkeeping: Flow, water quality, and amount and type of treatment chemicals used on a cumulative basis. Provide daily, no later than 8 hours after records were taken.

D. Shop drawings of the dewatering system must be approved prior to beginning excavations.

1.08 QUALITY ASSURANCE

A. Reference Standards: Except as otherwise indicated the current editions of the following specifications and standards apply to the Work of this Section:

1. Oregon Administrative Regulations (OAR):

a. OAR 690-200, Well Construction and Maintenance.

b. OAR 60-210, Abandonment of Wells.

c. OAR 690-240 Construction, Maintenance, Alteration, Conversion and Abandonment of Monitoring Wells Geotechnical Wells, and Other Holes in Oregon.

2. Environmental Protection Agency (EPA)

   a. 40 CFR 136 - Guidelines Establishing Test Procedures for the Analysis of Pollutants.

   b. 40 CFR 261 - Identification and Listing of Hazardous Waste.

   c. 40 CFR 403 - General Pretreatment Regulations for Existing and New Sources of Pollution.

3. Qualifications:

   a. Designer of GWCP: Registered Hydrogeologist, Professional Civil Engineer, or Certified Engineering Geologist registered in the State of Oregon with a minimum of five years experience in the design, including monitoring and recording, of water collection, handling, and treatment systems similar to those required under this Contract.

   b. Installer and Operator:

      1) Company with at least five years experience in responsible charge of the installation and operation of water collection, handling, and treatment systems similar to those required for this project.

      2) Personnel operating and maintaining facilities with demonstrated experience in the operation of systems similar to those required for this project.

4. Preconstruction Meeting: Prior to beginning excavation, complete installation of the water treatment facility and arrange for a demonstration and test of all features, including automatic paging facilities, power transfer facilities and backup systems.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Furnish and maintain all materials, tools, equipment, facilities, and services as required for providing the necessary dewatering work and facilities.

B. Materials for Groundwater Extraction Wells and Groundwater Monitoring Wells:

1. Well Casing: Schedule 40 PVC or steel pipe. Size to be determined by Contractor, 8-inch minimum.

2. Groundwater Monitoring Well Casing: 2-inch diameter PVC pipe with 20 foot section of slotted screen.

3. Sand Pack: 10-20 silica sand.

4. Pump Size, Capacity, and Type (Extraction Wells): As selected by Contractor.

5. Provide locking security cap on top of well casing.

C. Collection and Discharge Pipes: Steel or PVC pipe and fittings.

D. Water Quality Treatment Equipment: Provide settling tanks with sufficient capacity for the flow rate and volume of water. Include chemical flocculation and filtration equipment as necessary to comply with water quality limits.

2.02 DEWATERING AND WATER CONTROL EQUIPMENT

A. Select equipment and materials necessary to achieve desired results for dewatering.

B. Use equipment that is in good repair and operating order.

C. Maintain sufficient standby equipment and materials available at the site to ensure continuous operation, where required.

2.03 GEOTEXTILE CONTAINMENT TUBES

A. Contractor may utilize a pervious geotextile containment tube for capturing and removing sediment from water collected during dewatering operations.

B. Tube Construction: Fabricated from woven, mono-filament or multi-filament pervious sheets of geotextile material and provided with filling ports and a pressure relief port.

C. Manufacturers: One of the following or equal:

1. Geocontainer, as manufactured by Ten Cate Nicolon.

2. Geotube, as manufactured by Texion Geosynthetics.

PART 3 - EXECUTION

3.01 NPDES PERMIT COMPLIANCE

A. Implement the Groundwater Control Plan as approved by the Oregon DEQ before beginning excavation.

B. Comply with all limitations and controls for water discharges, monitoring requirements and other special conditions specified in the permit.

3.02 MONITORING GROUNDWATER

A. Groundwater Monitoring Wells:

1. Install a minimum of three (3) groundwater monitoring wells for monitoring groundwater elevation upgradient and downgradient at each dewatering system location on the project site.

2. Measure and record groundwater elevation two times per week during the course of dewatering to lower the groundwater table.

3. When groundwater monitoring wells are no longer needed for monitoring ground water levels, abandon groundwater monitoring wells in accordance with Applicable laws and regulations.

B. Installation of Monitoring Devices

1. Construct well in accordance with the requirements of ASTM D5092, Standard Practice for Design and Installation of Groundwater Monitoring Wells.

2. Depth of Drilled Hole: Minimum 10 feet below required elevation of groundwater drawdown, or to the depth of bedrock.

3. Construction Methodology: Install monitoring wells using methods that do not use drilling mud.

3.03 DEWATERING

A. Perform dewatering in accordance with approved Shop Drawings. Keep the Owner's Representative advised of any changes made to accommodate field conditions and, on completion of the dewatering system installation, revise and resubmit Shop Drawings as necessary to indicate the installed configuration.

B. Organize dewatering operations to lower the groundwater level in excavations as required for prosecution of the Work, and to provide a stable, dry subgrade for the prosecution of construction operations.

C. Design, install and operate the dewatering systems so that fines are not removed from native subgrade and surrounding soils during dewatering.

D. Maintain water level at lower elevations, so that no danger to structures can occur because of buildup of excessive hydrostatic pressure, and provide for maintaining the water level below the subgrade, unless otherwise permitted by the Owner's Representative.

E. Maintain groundwater level a minimum of five feet below the prevailing level of backfill being placed.

F. Dispose of water in such a manner as to cause no injury or nuisance to public or private property, or be a menace to the public health. Dispose of the water in accordance with applicable regulatory agency requirements.

G. Dewatering of Pipe Trenches: Do not drain trench water through the pipeline under construction.

H. Maintain continuous dewatering operations so that the excavated areas are kept free from water during construction, while concrete is setting and achieves full strength, and until backfill has been placed to a sufficient height to anchor the work against possible flotation.

I. Prevent disposal of sediments to adjacent lands or waterways by employing necessary methods, including settling basins. Locate settling basins away from watercourses to prevent silt-bearing water from reaching the watercourse.

J. Where excavations may obstruct the natural flow of a watercourse, implement measures to control and dispose of the surface water that will not adversely affect water quality or beneficial uses of the watercourse. Divert watercourse flows around excavation areas by constructing barriers, temporary culverts, new channels or other appropriate means.

K. Do not allow water containing mud, silt or other pollutants from aggregate washing or other construction activities to enter a watercourse or be placed in locations that may be subjected to high storm flows.

3.04 SURFACE WATER CONTROL

A. Intercept surface water and divert it away from excavations through use of dikes, ditches, curb walls, pipes, sumps or other means. This requirement extends to temporary works required to protect adjoining properties from surface drainage caused by construction operations.

B. Implement the appropriate level of surface water control to protect water quality throughout the construction period.

C. Utilize Best Management Practices throughout the construction period.

3.05 GROUNDWATER CONTROL

A. Provide labor, material, equipment, techniques and methods to lower, control and handle groundwater in a manner compatible with construction methods and site conditions. Monitor effectiveness of the installed system and its effect on adjacent property.

B. Intercept water flowing into excavations and divert it to sumps or ditches to allow pumping of collected water out of the excavation.

C. Provide settling basins, geotextile containment devices or other sediment removal and water treatment devices for water quality control and compliance with regulatory and permit requirements.

1. Install geotextile containment devices in accordance with the manufacturer's instructions and requirements.

D. Operate and maintain groundwater control systems in accordance with the Groundwater Control Plan. Notify Engineer in writing of any changes made to accommodate field conditions and changes to the Work.

E. Provide for continuous system operation, including nights, weekends, and holidays. When deemed appropriate, provide backup power source for electrical service.

F. Monitor operations to verify that the system lowers groundwater levels at a rate required to maintain a dry excavation resulting in a stable subgrade for prosecution of subsequent operations.

G. Remove all groundwater control systems upon completion of construction or when dewatering and control of surface or groundwater is no longer required. Remove and grout piezometers when groundwater control operations are complete.

3.06 WELL ABANDONMENT

A. Abandon wells using a licensed water well contractor in accordance with OAR 690-220.

B. Include well abandonment costs, including permits and documentation, in the Lump Sum Price.

3.07 RECORDS

A. Provide a daily record of the average flow rate. Provide results of water quality testing as required by the Permit for discharge.

B. Observe and record the elevation of the groundwater during the period that the dewatering system is in operation.

END OF SECTION

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SECTION 31 50 00

EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Temporary excavation support systems.

1.02 REFERENCED SECTIONS

A. The following Sections are referenced in this Section

1. Section 01 33 00 – Submittals
2. Section 31 00 00 – Earthwork

1.03 DEFINITIONS

A. Protection Systems:

1. Sloping or benching systems for excavated slopes.
2. Structural support systems, shield systems, and other systems for preventing excavation wall failure.

1.04 SUBMITTALS

A. Prepare and submit in accordance with Section 01 33 00.

B. Submit information as a complete package. Include all items required by the Contract Documents. Incomplete submittals will not be reviewed and will be returned for resubmittal as a complete package.

C. Shop Drawings

1. Prepared, signed, and sealed by a professional engineer who is registered to practice in the state of Oregon.
2. Clearly indicate structural sections of shoring members, welding details, bolting details, and bracing details.
3. Indicate existing and new structures, pipelines and other improvements located in the vicinity and impacting the design of the shoring system.
4. Provide details for bracing, reinforcement and sealing around penetrations.

D. Calculations: Structural calculations verifying and demonstrating the structural safety and adequacy of the sheeting, shoring, and bracing to be used.

1. Prepared, signed, and sealed by a registered Professional Civil or Structural Engineer who is registered to practice in the State of Oregon.
2. Provide calculations for the different load, support and other conditions that occur during the sequence of installation, construction of facilities protected by the shoring and the sequence of removal of the internal bracing and shoring.

E. Sheet Pile Driving Equipment: Information on type of equipment to be used, including manufacturer, model number and driving energy.

F. Qualifications of registered Professional Engineer and shoring installer, including project references.

G. Prepare a detailed plan illustrating the sequence of installation and removal of shoring systems and internal bracing. Include sketches showing the various stages in the sequence.

H. Letter confirming installation of the shoring system is in accordance with the shoring design.

I. Control Points and Stability Measurements:

1. Submit proposed location and details of control points and method and schedule for obtaining stability measurements.

2. Submit field notes documenting stability measurements.

1.05 INSTALLER QUALIFICATIONS

A. Shoring installer must have a minimum of five successful past installations of shoring systems of comparable overall heights and comparable penetration of soils similar to those found on the project site.

1.06 PERFORMANCE REQUIREMENTS

A. Design and install excavation support and protection systems that are capable of:

1. Supporting excavation sidewalls and bottom to maintain the required excavation or trench section.

2. Resisting soil and hydrostatic pressure and superimposed construction loads and other live loads.

3. Protecting existing facilities in the vicinity of the excavation from damage due to settlement or movement of soil

B. Provide professional engineering services necessary to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis by a qualified professional engineer registered in the State of Oregon.

C. Install and remove excavation support and protection systems without damaging existing buildings, pavements, utilities, railroad facilities and other improvements adjacent to excavation.

D. Excavations

1. Protect workers from hazard of caving ground and other hazards.

2. Install excavation protection system in locations where:

a. Protection system is specifically indicated on the Drawings.

b. Excavations are equal to, or greater than, 5 feet deep.

c. Excavations are less than 5 feet deep, but there is a potential for cave-in.

d. When engineering analyses prepared by the Contractor indicate the stability of existing structures and facilities may be jeopardized by settlement or movement of soil.

1.07 GENERAL DESIGN REQUIREMENTS

A. Design excavation support systems to meet requirements and standards of the Occupational Safety and Health Administration (OSHA).

B. Design excavation support systems to meet the requirements of Oregon Administrative Rules, Chapter 437, Division 3, Subdivision P.

C. Design structural steel members in accordance with the American Institute of Steel Construction (AISC) Manual of Steel Construction Allowable Stress Design and the Uniform Building Code.

D. Excavation support systems for trench excavations shall be selected by the Contractor based on the soil and rock conditions, depths of trench excavations, groundwater conditions and other site conditions. No attempt has been made by Engineer to define acceptable trench shoring options.

E. Excavation support systems for structural excavations may consist of either driven steel sheet piling or drilled and/or driven soldier beam and lagging systems complying with requirements of this Section. Contractor may select from either specified system.

F. Allowable Deflection: Not more than 1/2-inch at any point on the shoring system.

G. Cantilevered Design Limits:

1. Maximum height of cantilevered shoring above the bottom of the excavation shall not exceed 15 feet.

H. Resistance to Overturning

1. Design soldier piles and sheet piles with sufficient depth below the excavation to:

a. Resist lateral movement or overturning of the pile, and

b. Act as an effective water cutoff to prevent heaving or flow of soil into the excavation.

2. Calculate the required depth of pile below the bottom of the excavation by assuming the soil immediately below the bottom of excavation does not provide passive resistance for a depth of 1.5 times the effective pile diameter.

1.08 DESIGN REQUIREMENTS FOR SOLDIER PILES AND LAGGING

A. Design soldier piles for downward loads including vertical loads from tie back anchors.

B. Flexural Strength of Lagging: In accordance with the Uniform Building Code, but not greater than 1,500 psi.

C. Wales: Use back-to-back structural members.

D. Soil Anchors, Rock Anchors and Deadmen Anchors:

1. Design tie back anchors with a safety factor of not less than 2 times the calculated load from the shoring.

2. When calculating the length of soil anchors needed to resist the load from the shoring, do not include any anchor length within the potential active pressure soil failure zone behind the face of the shoring.

3. Design anchor tie rods for 130 percent of the calculated load from the shoring.

4. When tie rod couplings are used, design anchor tie rods for 150 percent of the calculated load from the shoring.

1.09 GEOTECHNICAL DATA REPORT (GDR)

A. A geotechnical data report has been prepared for this Project and is included with specifications as a supplement for information only. Owner will not be responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for design of the excavation support systems.

2. Copies of the GDR are bound separately and are included in the Contract Documents.

1.10 GEOTECHNICAL ENGINEERING REPORT

A. A Geotechnical Engineering Report has also been prepared and it is available if requested. The geotechnical engineering report is not considered part of the Contract Documents.

1.11 PROJECT SPECIFIC DESIGN REQUIREMENTS

A. Design of Excavation Support System

1. Design Groundwater Elevation: Two feet below ground surface elevation.

2. For excavations extending into basalt bedrock the rock can be cut at slopes as steep as vertical.

3. Specialized drilling equipment may be required to pre-drill holes for soldier pile installation within bedrock.

4. Excavation support systems may be required to protect utilities and provide space for access to the site.

1.12 JOB SITE POSTINGS

A. Maintain at least one copy of the protection system design at the job site while the excavation is open in accordance with the requirements of Oregon Administrative Rules, Chapter 437, Division 3, Subdivision P.

1.13 SEQUENCE AND SCHEDULING

A. Do not begin excavations or installation of excavation supports until submittals for excavation support systems have been accepted by the Engineer and until materials necessary for installation are on site.

B. Allow a minimum of 30 calendar days for Engineer's review of submittals for excavation support systems.

C. Do not begin excavations or installation of excavation support systems until initial survey measurements on control points on existing structures and other improvements are obtained to document baseline elevations and locations.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Provide materials that are either new or in serviceable condition.

B. Structural Steel Soldier Beams: ASTM A36, ASTM A690 or ASTM A992.

C. Steel Sheet Piling: ASTM A328, ASTM A572 or ASTM A690; with continuous interlocks.

D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness as determined by design calculations, but not less than 3 inches.

E. Lean Concrete Mix:

1. Controlled Low Strength Material.

2. A mixture of sand, fine aggregate, water and 2 sacks of cement per cubic yard to create a flowable mixture that fills voids.

3. Minimum Compressive Strength: 1500 psi.

F. Sand Cement Grout:

1. Mixture of one part cement, two parts sand, proportioned by volume, admixtures for pressure grouting, and sufficient water to form workable mix.

2. Maximum slump: 4 inches.

PART 3 - EXECUTION

3.01 PREPARATION

A. Prior to beginning installation of the excavation support system, pothole to locate existing buried utilities in the vicinity of the excavation. Survey utilities and compare actual locations to those locations indicated on the Drawings and the Shop Drawings. Determine any areas of conflict and revise the design and layout of the excavation support system to eliminate these conflicts.

3.02 SLOPING AND BENCHING OF EXCAVATED FACES

A. Where structural excavation support systems are not specifically indicated on the Drawings, sloping and benching systems for exposed faces of excavations may be utilized.

B. Construct sloping and benching systems in accordance with Section 31 00 00.

3.03 TRENCHING SUPPORT SYSTEMS

A. Where structural excavation support systems are not specifically indicated on the Drawings, trench support systems consisting of hydraulic jacks and plates, trench shield systems, and other trench protection systems may be utilized.

3.04 SOLDIER BEAMS AND LAGGING

A. Before starting excavation, drive steel soldier beams or install steel soldier beams in pre-drilled holes.

1. Installation of Soldier Beams in Pre-Drilled Holes

a. Diameter of pre-drilled hole: Not to exceed the outside dimensions of the soldier beam.

b. Backfill around soldier beam using a lean concrete mix.

B. Space soldier beams at regular intervals not to exceed allowable flexural strength of the wood lagging. Align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

C. Install wood lagging within flanges of soldier beams as excavation proceeds. Trim excavation as required to install lagging.

D. Install horizontal wales at locations indicated on the shop drawings and secure to soldier beams.

E. Fill voids behind lagging with gravel, lean concrete, or other material acceptable to the Engineer.

3.05 SHEET PILING

A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock to form a continuous barrier. Align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.

3.06 BRACING

A. Locate bracing to clear temporary and permanent work and to allow lowering of material and equipment into the excavation.

B. If necessary to move brace, install new bracing before removing original brace.

C. Install internal bracing when calculations indicate bracing is required to prevent spreading or distortion of braced frames.

D. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.07 INSPECTION

A. Designer of the shoring system is responsible for confirming proper installation of the shoring system. Shoring system designer, or a representative of the designer, shall make site visits to confirm installation is in accordance with the accepted shoring design.

B. Submit letter of proper installation confirming installation is in accordance with the shoring design.

C. Remove at least the top 10 feet of excavation support systems.

D. Remove excavation support and protection systems when backfill can support the remaining open excavation and bear soil and hydrostatic pressures. Remove support and protection systems in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.

E. After removal, promptly fill voids resulting from the extraction of shoring with sand-cement grout. Repair or replace adjacent work damaged or displaced by excavation support and protection systems removal.

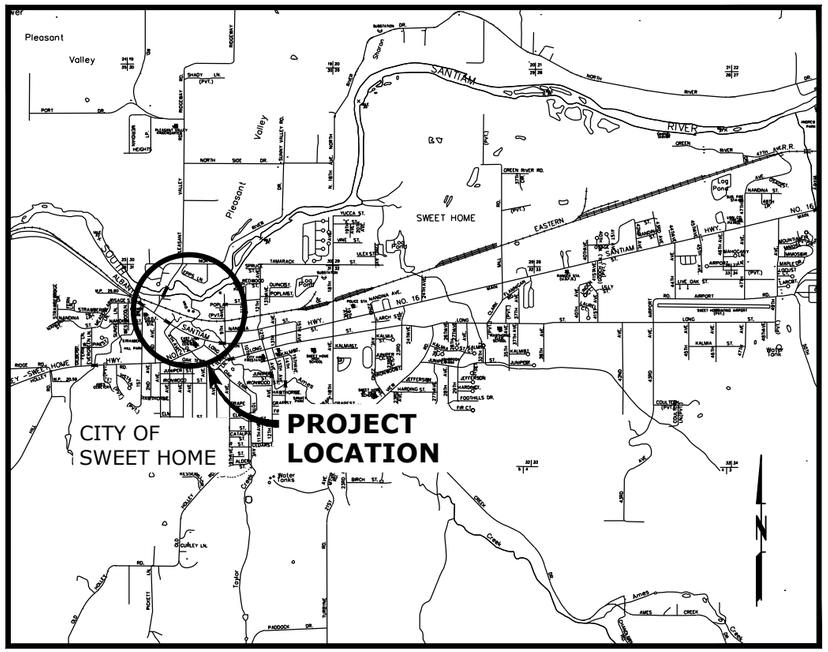
END OF SECTION

Exhibit A

Drawings

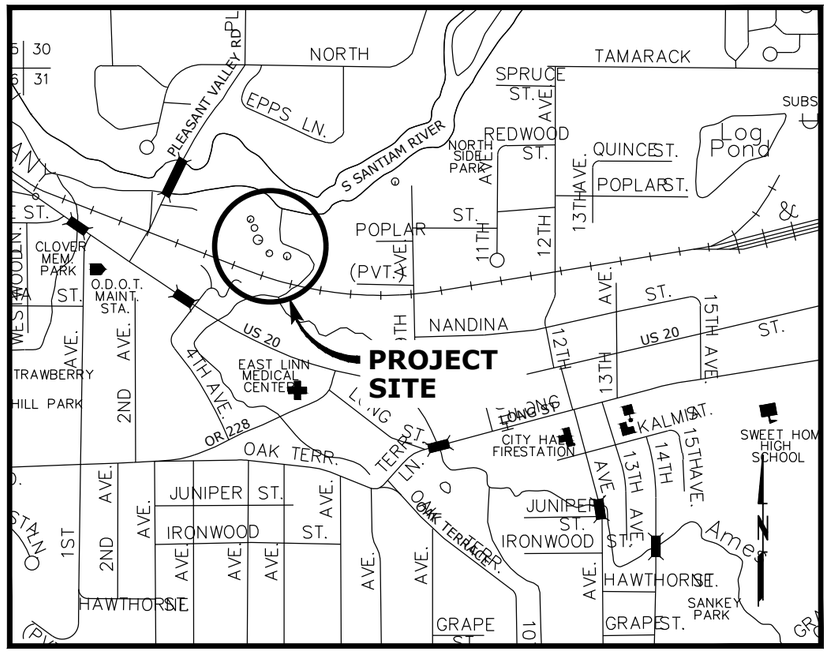
MAHLER WATER RECLAMATION FACILITY
SLUDGE BLEND TANK DESIGN BUILD

DECEMBER 2022



VICINITY MAP

SCALE: 1"=2000'



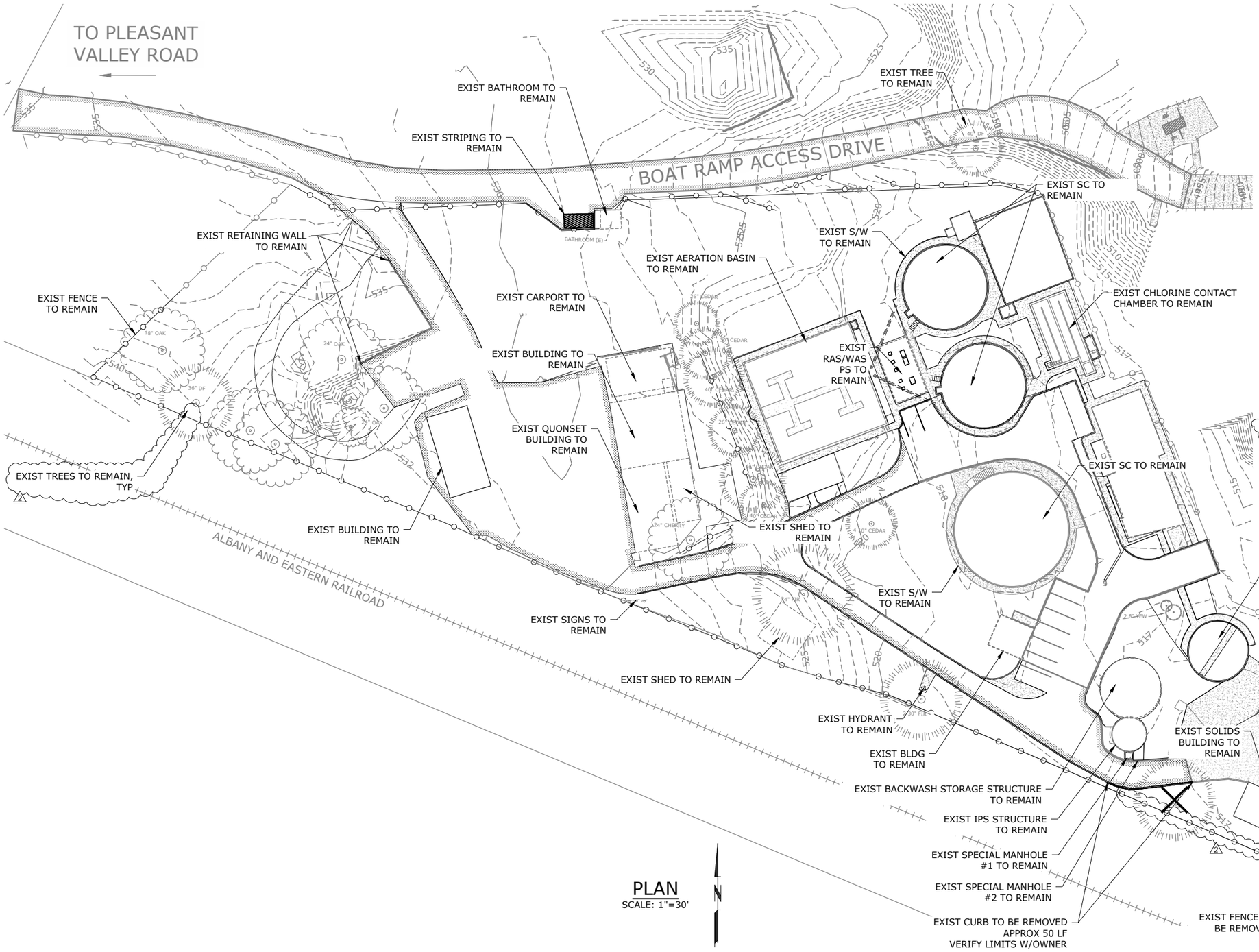
LOCATION MAP

SCALE: 1"=500'

WEST YOST
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ATTENTION: OREGON LAW REQUIRES THE CONTRACTOR TO FOLLOW THE RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. THE CONTRACTOR MAY OBTAIN COPIES OF THE RULES BY CALLING THE UTILITY NOTIFICATION CENTER. (NOTE: THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS 503-246-6699.)

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PLAN
SCALE: 1"=30'

DEMOLITION LEGEND

- FENCE/SIGN DEMOLITION
- PAVEMENT AND CURB DEMOLITION
- BUILDING AND TANK DEMOLITION
- CONCRETE FLATWORK DEMOLITION
- TREE REMOVAL

SITE DEMOLITION NOTES:

1. CONTRACTOR SHALL PROTECT ALL EXISTING SURFACES, PIPES, VALVES, EQUIPMENT, AND OTHER ITEMS NOT IDENTIFIED TO BE DEMOLISHED.
2. DEMOLITION, ABANDONMENT, SALVAGE, AND DISPOSAL OF EXISTING EQUIPMENT SHALL BE PERFORMED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.
3. SALVAGED EQUIPMENT DELIVERY POINT SHALL BE AT A LOCATION DESIGNATED BY THE CITY.
4. CONTRACTOR SHALL REPAIR AT CONTRACTOR'S EXPENSE ANY EXISTING STRUCTURES THAT WERE CALLED OUT TO REMAIN DAMAGED DURING CONSTRUCTION.
5. STRUCTURES SHALL BE REMOVED IN FULL INCLUDING ALL WALLS, FOOTINGS, SLABS, INCLUDING ANY PART OF THE STRUCTURE THAT IS BELOW GRADE UNLESS OTHERWISE NOTED.
6. MAINTAIN ACCESS TO THE EXISTING BOAT RAMP NORTH OF THE MWRF SITE AT ALL TIMES DURING CONSTRUCTION.
7. QUANTITY SHOWN IS APPROXIMATE. CONTRACTOR TO VERIFY. (2)
8. CONTRACTOR TO DISPOSE OF SOLIDIFIED LIME FROM THE LIME SILO AT AN APPROVED ENVIRONMENTAL LANDFILL. QUANTITY OF LIME IN THE LIME SILO IS UNKNOWN.
9. CONTRACTOR TO SALVAGE ECO-BLOCKS FROM THE BIOFILTER. SEE NOTE 3.

NO.	DATE	BY	REVISION
1	01/09/2023	BVB	ADDENDUM 3
2	01/18/2023	BVB	ADDENDUM 4

NOTICE
0 ½ 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

BVB DESIGNED
BVB DRAWN
WJM CHECKED

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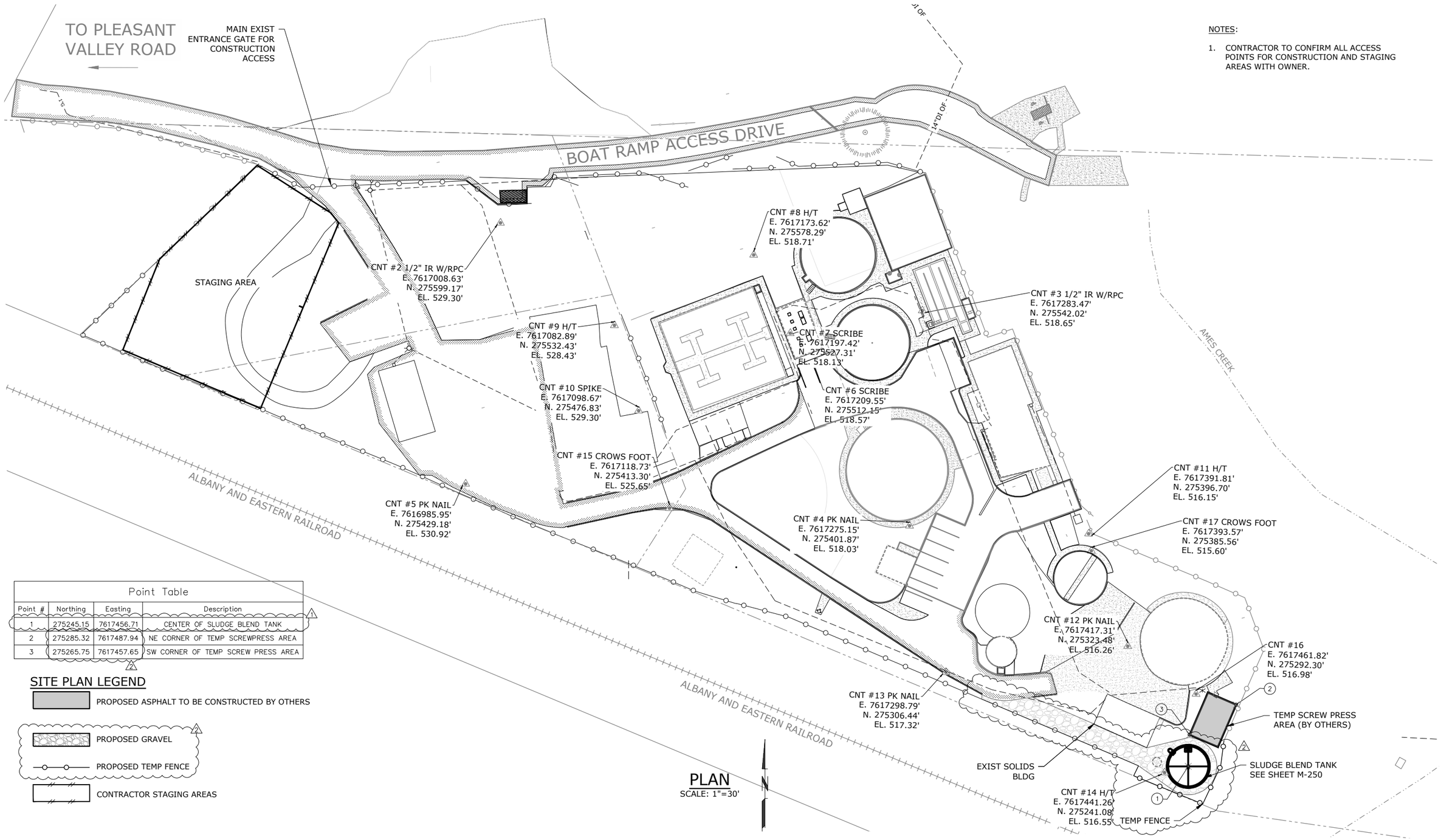
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SLUDGE BLEND TANK DESIGN BUILD

SITE DEMOLITION & TREE REMOVAL PLAN

PROJECT NO.: 936-50-21-09 | SCALE: AS SHOWN | DATE: JANUARY 2023

SHEET
C-005
XX of XX

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NOTES:

1. CONTRACTOR TO CONFIRM ALL ACCESS POINTS FOR CONSTRUCTION AND STAGING AREAS WITH OWNER.

Point Table			
Point #	Northing	Easting	Description
1	275245.15	7617456.71	CENTER OF SLUDGE BLEND TANK
2	275285.32	7617487.94	NE CORNER OF TEMP SCREWPRESS AREA
3	275265.75	7617457.65	SW CORNER OF TEMP SCREW PRESS AREA

SITE PLAN LEGEND

- PROPOSED ASPHALT TO BE CONSTRUCTED BY OTHERS
- PROPOSED GRAVEL
- PROPOSED TEMP FENCE
- CONTRACTOR STAGING AREAS

PLAN

SCALE: 1"=30'

NO.	DATE	BY	REVISION
1	01/09/2023	BVB	ADDENDUM 3
2	01/18/2023	BVB	ADDENDUM 4

NOTICE
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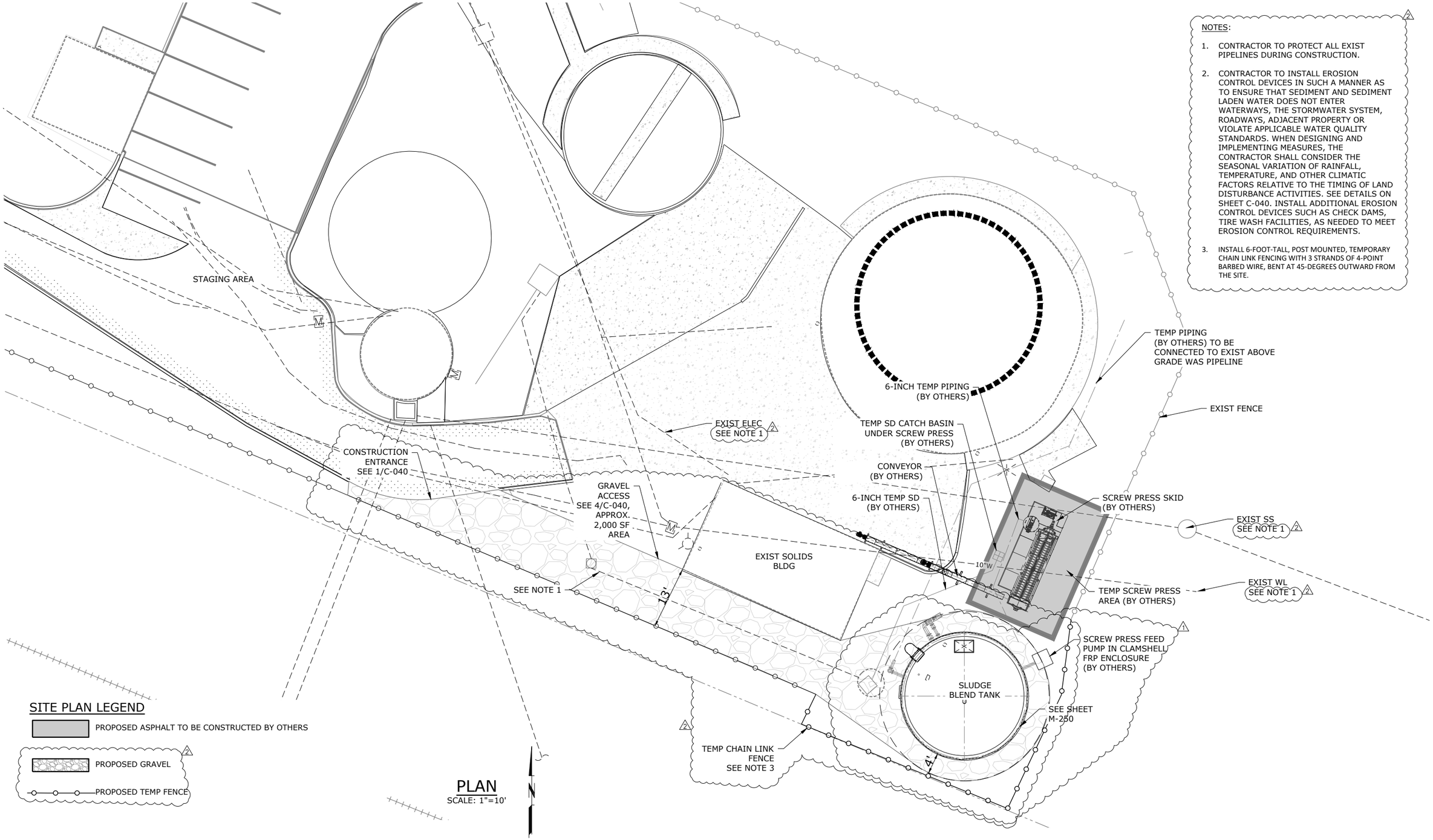
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SLUDGE BLEND TANK
DESIGN BUILD

OVERALL SITE PLAN, STRUCTURE COORDINATES, STAGING AND ACCESS, SURVEY CONTROL POINTS

PROJECT NO.: 936-50-21-09 | SCALE: AS SHOWN | DATE: JANUARY 2023

SHEET
C-010
XX of XX

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NOTES:

1. CONTRACTOR TO PROTECT ALL EXIST PIPELINES DURING CONSTRUCTION.
2. CONTRACTOR TO INSTALL EROSION CONTROL DEVICES IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT LADEN WATER DOES NOT ENTER WATERWAYS, THE STORMWATER SYSTEM, ROADWAYS, ADJACENT PROPERTY OR VIOLATE APPLICABLE WATER QUALITY STANDARDS. WHEN DESIGNING AND IMPLEMENTING MEASURES, THE CONTRACTOR SHALL CONSIDER THE SEASONAL VARIATION OF RAINFALL, TEMPERATURE, AND OTHER CLIMATIC FACTORS RELATIVE TO THE TIMING OF LAND DISTURBANCE ACTIVITIES. SEE DETAILS ON SHEET C-040. INSTALL ADDITIONAL EROSION CONTROL DEVICES SUCH AS CHECK DAMS, TIRE WASH FACILITIES, AS NEEDED TO MEET EROSION CONTROL REQUIREMENTS.
3. INSTALL 6-FOOT-TALL, POST MOUNTED, TEMPORARY CHAIN LINK FENCING WITH 3 STRANDS OF 4-POINT BARBED WIRE, BENT AT 45-DEGREES OUTWARD FROM THE SITE.

NO.	DATE	BY	REVISION
1	01/09/2023	BVB	ADDENDUM 3
2	01/18/2023	BVB	ADDENDUM 4

NOTICE
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BVB DRAWN
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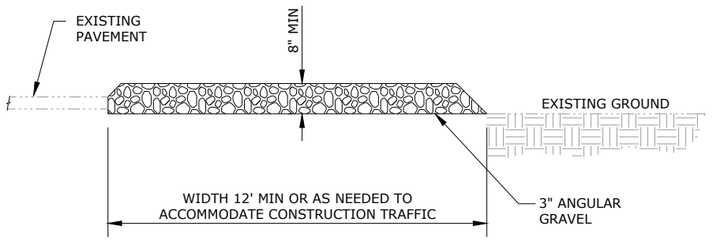
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SLUDGE BLEND TANK
DESIGN BUILD

SOLIDS AREA DETAIL PLAN

PROJECT NO.: 936-50-21-09 | SCALE: AS SHOWN | DATE: JANUARY 2023

SHEET
C-020
3 of XX

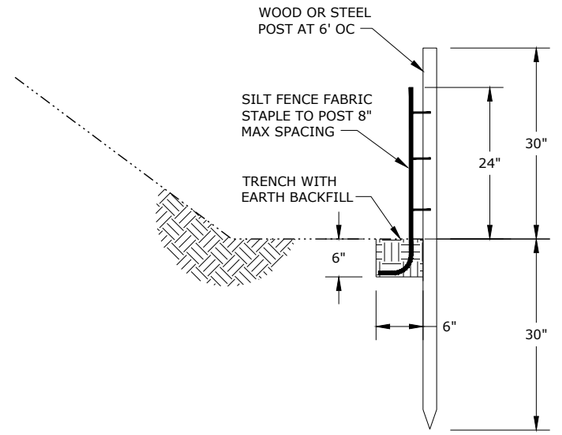
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STABILIZED CONSTRUCTION ENTRANCE

SCALE: NTS

1
-



SILT FENCE

SCALE: NTS

2
-

CURB INLET

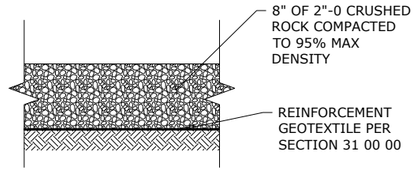
NOTES:
1. REMOVE SEDIMENT FROM BEHIND BIOBAGS WHEN IT REACHES 2 INCHES IN DEPTH.
2. INSTALL INLET INSERT SEE 5 -

DRAIN INLET

INLET PROTECTION

SCALE: NTS

3
-



GRAVEL SECTION

SCALE: NTS

4
-

5
-

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NO.	DATE	BY	REVISION
1	01/18/2023	BVB	ADDENDUM 4

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BVB DESIGNED
BVB DRAWN
WJM CHECKED

REGISTERED PROFESSIONAL ENGINEER
85993PE
OREGON
JULY 14, 2017
BROOKE VICTORIA BARRY
EXPIRES : 12/31/2023

WEST YOST
Water. Engineered.

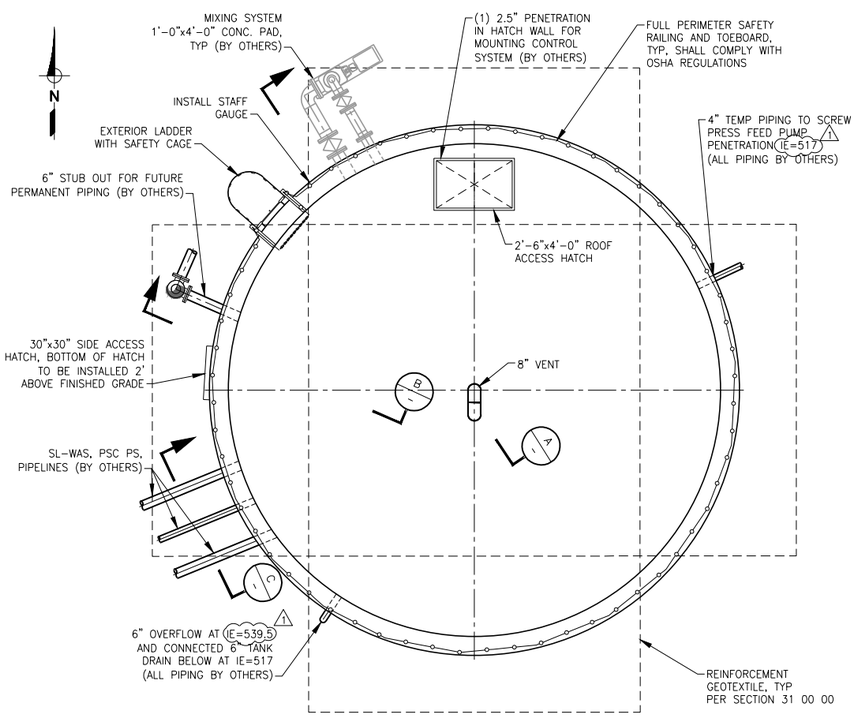
Sweet Home
Oregon at its best!

MAHLER WATER
RECLAMATION FACILITY
SLUDGE BLEND TANK
DESIGN BUILD

EROSION CONTROL & CIVIL
DETAILS

PROJECT NO.: 936-50-21-09 | SCALE: AS SHOWN | DATE: JANUARY 2023

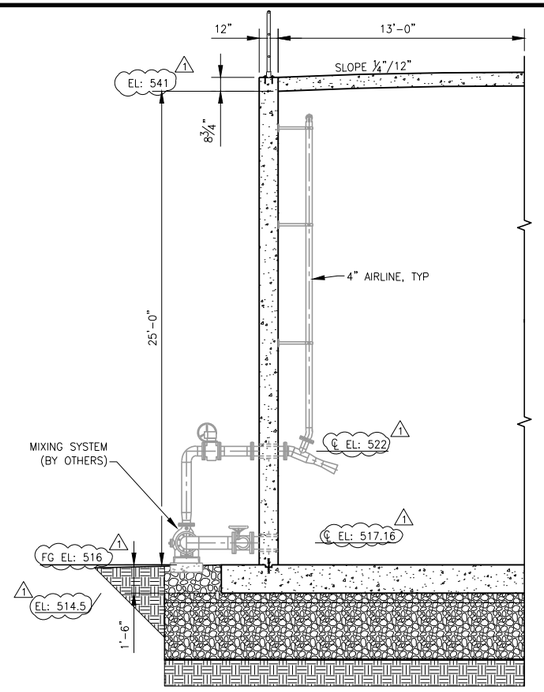
SHEET
C-040
XX of XX



SLUDGE BLEND TANK

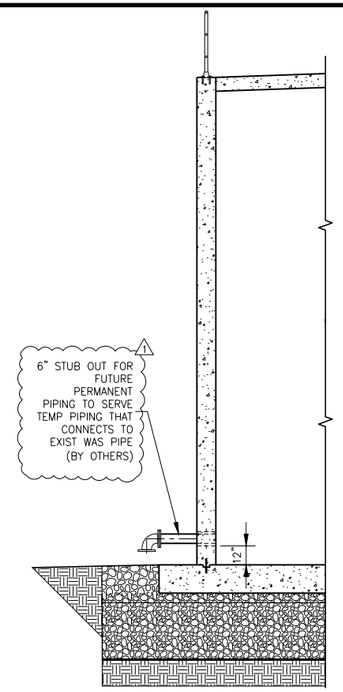
PLAN

SCALE: 1/4"=1'-0"



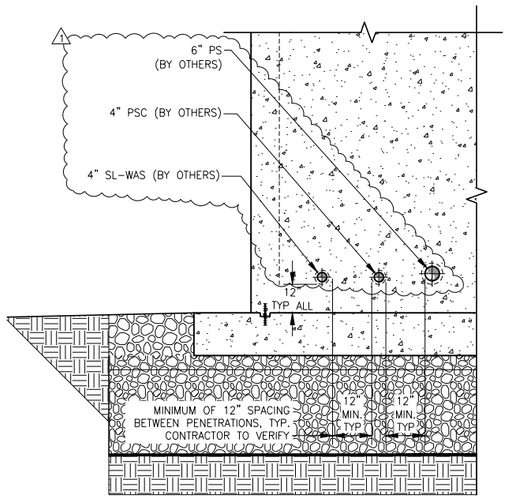
SECTION (A)

SCALE: 1/4"=1'-0"



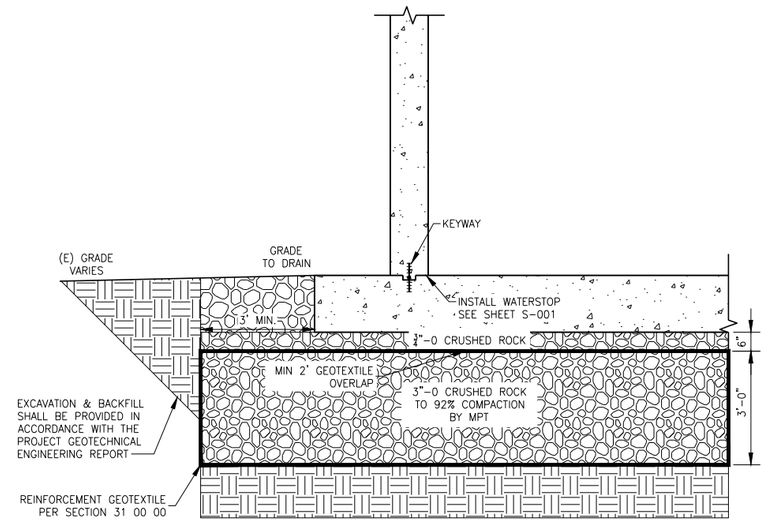
SECTION (B)

SCALE: 1/4"=1'-0"



SECTION (C)

SCALE: 3/8"=1'-0"



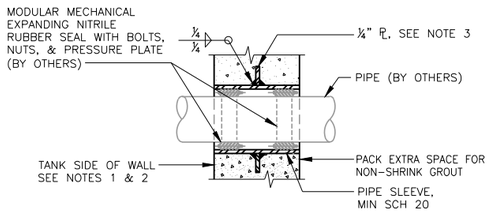
FOUNDATION SURFACE PREPARED TO THE SATISFACTION OF THE PROJECT GEOTECHNICAL ENGINEER.

CONTRACTOR SHALL CONFORM WITH GEOTECHNICAL REPORT

TYPICAL BURIED TANK SECTION

DETAIL (1)

NOT TO SCALE



TANK WALL PIPE PENETRATION (DOUBLE LINK SEAL)

DETAIL (2 TYP)

NOT TO SCALE

NOTES:
1. SLEEVE DIAMETER SHALL BE AS RECOMMENDED BY THE MECHANICAL SEAL MANUFACTURER.
2. SLEEVE NOT REQUIRED FOR PENETRATION IN EXISTING WALLS.
3. WEEP RINGS SHALL HAVE A MINIMUM DIAMETER EQUAL TO THE PIPE OR PIPE SLEEVE OUTSIDE DIAMETER PLUS 3-INCHES.
4. "TANK SIDE OF WALL" SHALL MEAN SIDE OF WALL NORMALLY EXPOSED TO LIQUID, EARTH, OR OUTSIDE ATMOSPHERE.
5. SEAL WITH MASTIC SEALANT WHERE WALL IS EXPOSED TO LIQUID, EARTH, OR EXPLOSION HAZARD AREA.

NO.	DATE	BY	REVISION
1	01/13/2023	BVB	ADDENDUM 3

NOTICE
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

EMR DESIGNED
SMB DRAWN
TRB CHECKED

PRELIMINARY ONLY
DO NOT USE FOR CONSTRUCTION
JAN 2023
West Yost

WEST YOST
Water. Engineered.

Sweet Home Oregon at its best!

MAHLER WATER RECLAMATION FACILITY
SLUDGE BLEND TANK
DESIGN BUILD

SLUDGE BLEND TANK AND MIXING SYSTEM
PLAN, SECTIONS AND DETAILS

PROJECT NO.: 936-50-21-09 | SCALE: AS SHOWN | DATE: JANUARY 2023

SHEET
M-250
XX of XX

P:\Clients\936 City Of Sweet Home\50-21-09 WWTP Phase 1 Final Design\CAD\Production\Sludge Blend Tank DB\93650-2109-M-250.dwg M-250 1/12/2023 9:19 AM ERODRIGUEZ 23.1s (LMS Tech)

SPECIAL INSPECTIONS:

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REFERENCED STANDARD
OSSC TABLE 1705.6, SOILS:			
1. VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY.		X	
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.		X	
3. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS.		X	
4. VERIFY USE OF PROPER MATERIALS, DENSITIES AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL.	X		
5. PRIOR TO PLACEMENT OF COMPACTED FILL, INSPECT SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.		X	
OSSC TABLE 1705.3, CONCRETE CONSTRUCTION:			
1. INSPECT REINFORCEMENT AND VERIFY PLACEMENT.		X	OSSC 1908.4
2. REINFORCING BAR WELDING: A. VERIFY WELDABILITY OF REINFORCING BARS OTHER THAN ASTM A706. B. INSPECT SINGLE PASS FILLET WELDS, MAXIMUM 5/16". C. INSPECT ALL OTHER WELDS.	 X	 X X	
3. INSPECT ANCHORS CAST IN CONCRETE.		X	
4. INSPECT ANCHORS POST INSTALLED IN HARDENED CONCRETE MEMBERS. A. ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS TO RESIST SUSTAINED TENSION LOADS. B. MECHANICAL ANCHORS AND ADHESIVE ANCHORS NOT DEFINED IN 4.A.	 X	 X	
5. VERIFY USE OF REQUIRED MIX DESIGN.		X	OSSC 1904.1, 1904.2 1908.2, 1908.3
6. PRIOR TO CONCRETE PLACEMENT, FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS AND DETERMINE THE TEMPERATURE OF THE CONCRETE. COLLECT A MINIMUM OF 6 TEST CYLINDERS FOR EACH POUR ON EACH DAY & EVERY 50 CY POURED.	X		OSSC 1908.10
7. INSPECT CONCRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICATION TECHNIQUES.	X		OSSC 1908.6, 1908.7 1908.8
8. VERIFY MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.		X	OSSC 1908.9
9. INSPECT PRESTRESSED CONCRETE FOR: A. APPLICATION OF PRESTRESSING FORCES. B. GROUTING OF BONDED PRESTRESSING TENDONS.	 X X		
10. INSPECT ERECTION OF PRECAST CONCRETE MEMBERS.		X	
11. VERIFY IN-SITU CONCRETE STRENGTH PRIOR TO STRESSING OF TENDONS IN POST-TENSIONED CONCRETE AND PRIOR TO REMOVAL OF SHORES AND FORMS FROM BEAMS AND STRUCTURAL SLABS.		X	
12. INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED.		X	

NOTE: SPECIAL INSPECTION SHALL BE PROVIDED FOR ALL STRUCTURAL ELEMENTS REQUIRING SPECIAL INSPECTION REGARDLESS OF WHETHER THE WORK IS PERFORMED ONSITE OR OFFSITE (SHOP).

CONTRACTOR RESPONSIBILITIES

CONTRACTOR RESPONSIBILITIES: THE CONTRACTOR IS RESPONSIBLE FOR CARRYING OUT THE REQUIREMENTS OF THESE DOCUMENTS THROUGH THE USE OF THEIR OWN EFFORTS OR THAT OF SUB-CONTRACTORS.

THE CONTRACTOR IS RESPONSIBLE FOR ALL CONSTRUCTION METHODS, TECHNIQUES, SEQUENCING AND SAFETY REQUIRED TO COMPLETE THE WORK. ALL INSTRUCTIONS CONTAINED IN THESE DOCUMENTS ARE INTERPRETED TO BE INSTRUCTIONS TO THE CONTRACTOR AND ARE THE RESPONSIBILITY OF THE CONTRACTOR TO FULFIL.

VERIFY EXISTING CONDITIONS PRIOR TO PROCEEDING WITH CONSTRUCTION. IMMEDIATELY BRING DISCREPANCIES TO THE ATTENTION OF THE ENGINEER OF RECORD (EOR).

MEASURE DIMENSIONS OF ANY EXISTING STRUCTURES ASSOCIATED WITH THE WORK AND COORDINATE WITH REQUIRED DIMENSIONS FOR NEW CONSTRUCTION. DRAWINGS SCALES ARE INDICATED FOR REFERENCE TO ASSIST WITH CLARIFYING THE WORK AND PROVIDING PROPORTIONS THAT RESEMBLE ACTUAL CONDITIONS. DO NOT MEASURE DRAWINGS FOR CONSTRUCTION. USE TEXT DIMENSIONS PROVIDED. REQUEST UNKNOWN DIMENSIONS FROM THE ENGINEER WITH SUFFICIENT LEAD TIME TO PREVENT CONSTRUCTION DELAYS. FIELD VERIFY DIMENSIONS.

ARRANGE FOR AND COORDINATE WORK BY TRADES AND SUPPLIERS. FACILITATE REQUIRED INSPECTIONS, SPECIAL INSPECTIONS AND TESTS SPECIFIED BY THE CONTRACT DOCUMENTS, BUILDING CODE AND PERMIT. WHERE COVERINGS OR WORK CONCEALS ITEMS OR AREAS TO BE INSPECTED PRIOR TO SATISFACTORY APPROVAL THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND REPLACEMENT OF COVERINGS OR WORK AS NECESSARY WITHOUT COST TO THE OWNER OR ENGINEER OF RECORD.

THE STRUCTURES SHALL BE FULLY BRACED FOR WIND AND SEISMIC LOADS DURING CONSTRUCTION. THE CONTRACTOR SHALL BRACE THE WORK UNTIL THE PERMANENT LATERAL FORCE RESISTING SYSTEM IS COMPLETED.

INSTALL ITEMS MANUFACTURED OR SUPPLIED BY OTHERS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

WHERE DETAILS OF CONSTRUCTION ARE NOT EXPLICITLY SHOWN, PROVIDE MATERIALS AND CONSTRUCTION OF THE SAME TYPE AND CHARACTER AS THAT OF SIMILAR CONDITIONS USED ON THE PROJECT. THE ACTUAL DETAILS USED SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO ORDERING MATERIALS OR BEGINNING CONSTRUCTION.

ANY CONFLICT OR DISCREPANCY SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER OF RECORD FOR CLARIFICATION AND RESOLUTION PRIOR TO ORDERING MATERIALS OR BEGINNING CONSTRUCTION.

STRUCTURAL MATERIAL NOTES

CONCRETE: ALL CONCRETE TANKS, BASINS, AND CONTAINMENT STRUCTURES ARE WATER-BEARING. WATER-BEARING CONCRETE STRUCTURES, INCLUDING REINFORCING, SHALL COMPLY WITH ACI 350, CODE REQUIREMENTS FOR ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES AS WELL AS ACI 318 AND ACI 301 CURRENT EDITIONS. ALL OTHER CONCRETE CONSTRUCTION, INCLUDING REINFORCING, SHALL COMPLY WITH ACI 350, ACI 318 AND ACI 301 CURRENT GOVERNING EDITIONS.

CONCRETE SHALL BE READY MIXED IN ACCORDANCE WITH ASTM C94.

CONCRETE STRENGTHS SHALL BE VERIFIED BY STANDARD 28-DAY CYLINDER TESTS PER ASTM C39, AND SHALL BE AS FOLLOWS:

f'c	MAX W/C	MIN CEMENT	SLUMP	USE
4500 PSI	0.48	590 LBS	4"+/-1"	WATER BEARING STRUCTURES

MIX DESIGNS FOR WATER BEARING STRUCTURES SHALL INCLUDE A CRYSTALLINE WATERPROOFING ADMIXTURE.

CEMENT SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR PORTLAND CEMENT AND CONFORM TO ASTM C150, TYPE II.
FLY ASH CONFORMING TO ASTM C618, TYPE F OR TYPE C. SHALL BE USED TO REPLACE AT LEAST 10% AND UP TO 50% OF THE CEMENT CONTENT, PROVIDED THAT THE MIX STRENGTH IS SUBSTANTIATED BY TEST DATA.
COARSE AGGREGATE SHALL CONFORM TO ASTM C33 WITH A MAXIMUM SIZE OF 3/4". FINE AGGREGATE SHALL BE CLEAN, DURABLE, NATURAL SAND CONFORMING TO ASTM C33.

A WATER-REDUCING ADMIXTURE CONFORMING TO ASTM C494, USED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, SHALL BE INCORPORATED IN CONCRETE DESIGN MIXES. A HIGH-RANGE WATER-REDUCING ADMIXTURE CONFORMING TO ASTM C494, TYPE F OR G, MAY BE USED IN CONCRETE MIXES, PROVIDING THAT THE SLUMP DOES NOT EXCEED 8".
SLUMP AT POINT OF TRUCK DISCHARGE SHALL NOT EXCEED THAT INDICATED ABOVE. SUPERPLASTICIZED CONCRETE SLUMP SHALL NOT EXCEED 7" ±1".

AN AIR ENTRAINING ADMIXTURE CONFORMING TO THE LATEST REVISION OF ASTM C260 SHALL BE ADDED TO CONCRETE TO PROVIDE 4% ±1.5% ENTRAINED AIR FOR SLABS, WALKS AND CURBS EXPOSED TO WEATHER.

LOCATION OF ALL CONSTRUCTION, CONTRACTION, AND EXPANSION JOINTS SHALL BE AS SHOWN ON THE DRAWINGS OR APPROVED BY THE ENGINEER. PLACE CONSTRUCTION JOINTS IN SLABS AND BEAMS AT THE SAME TIME AND LOCATION. CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED AND INTENTIONALLY ROUGHENED FOR BOND. PROVIDE WATER STOPS IN ALL CONSTRUCTION JOINTS IN WATER BEARING SLABS AND WALLS.

EMBEDDED ITEMS SHALL BE FIRMLY HELD INTO POSITION IN THE FORMWORK AND SHALL NOT BE "WET STABBED" INTO FRESHLY PLACED CONCRETE OR GROUT.

EXPANSION JOINTS SHALL HAVE EDGES ROUNDED TO 1/4" RADIUS, USE 1/2" CORK OR CANE-FIBER FORM BOARD, EXCAVATED TO 1/2" DEPTH AND FILLED WITH AN APPROVED POLY-SULFIDE CAULK.

DO NOT PLACE ANY CONCRETE WHOSE TEMPERATURE IS ABOVE 90°F.

DO NOT PLACE ANY CONCRETE THAT IS MORE THAN 90 MINUTES OLD, SINCE BATCH TIME.

UNLESS SELF-CONSOLIDATING CONCRETE IS APPROVED AS SUCH, ALL CONCRETE SHALL BE CONSOLIDATED DURING PLACEMENT. CONSOLIDATION SHALL BE BY INTERNAL VIBRATION, USING A GASOLINE-POWERED OR PLUG-IN VIBRATOR. INSERT VIBRATOR VERTICALLY INTO THE CONCRETE AT A SPACING NOT EXCEEDING 1.5 TIMES THE RADIUS OF INFLUENCE. DO NOT USE VIBRATOR TO MOVE CONCRETE. EXCEPTIONS TO THE ABOVE MAY BE MADE AS FOLLOWS:
A) SLABS ON GRADE LESS THAN 8" THICK, MAY BE CONSOLIDATED BY TAMPING WITH A COMMERCIAL TAMPER ONLY IF THE CONCRETE SLUMP IS 3" OR LESS.
B) CURBS 6" OR LESS IN WIDTH AND 12" OR LESS IN HEIGHT MAY BE CONSOLIDATED BY BATTERY-POWERED VIBRATOR OR BY MANUAL RODDING.

HYDRAULIC TESTING OF CONCRETE WATER-RETAINING STRUCTURES (INCLUDING CHEMICAL CONTAINMENT STRUCTURES), SHALL BE PER ACI 350.1-10, WITH A MAXIMUM LOSS OF 0.0125% / DAY AS THE QUANTITATIVE CRITERION. THE ENGINEER OF RECORD SHALL WITNESS ALL QUANTITATIVE AND QUALITATIVE TESTING AND APPROVE THE WATERTIGHTNESS OF THE TANK PRIOR TO BACKFILL

SLEEVES, OPENINGS, CONDUIT, AND OTHER EMBEDDED ITEMS NOT SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE APPROVED BY THE STRUCTURAL ENGINEER BEFORE POURING. NO SLEEVE, OPENING, OR INSERT MAY BE PLACED IN BEAMS, JOISTS, OR COLUMNS UNLESS APPROVED BY THE ENGINEER. CONDUITS EMBEDDED IN SLABS SHALL NOT BE LARGER IN OUTSIDE DIMENSION THAN ONE THIRD OF THE THICKNESS OF THE SLAB AND SHALL NOT BE SPACED CLOSER THAN THREE DIAMETERS ON CENTER.
PROVIDE 3/4" CHAMFERS ON ALL EXPOSED CONCRETE EDGES, UNLESS NOTED OTHERWISE. WHERE INDICATED OR REQUIRED, SLOPE CONCRETE SLABS TO DRAINS SHOWN ON PLUMBING AND/OR ARCHITECTURAL DRAWINGS.

ALL CONCRETE SHALL BE CURED IMMEDIATELY AFTER FINISHING OPERATIONS, FOR A PERIOD OF AT LEAST 7 CONSECUTIVE CALENDAR DAYS.

WEATHER RESISTANCE: ALL CONCRETE EXPOSED TO CHLORIDES SHALL CONTAIN A CALCIUM-NITRITE BASED CORROSION-INHIBITING ADMIXTURE DURING THE BATCHING PROCESS. THE DOSAGE FOR CONCRETE EXPOSED TO AIRBORNE CHLORIDES SHALL BE MINIMUM TWO GALLONS PER CUBIC YARD. THE WATER CONTAINED IN THE CORROSION-INHIBITING ADMIXTURE SHALL BE USED IN THE CALCULATION OF THE WATER-TO-CEMENTITIOUS RATIO OF THE CONCRETE. PROVIDE RHEOCRETE CNI BY MASTER BUILDERS OR APPROVED EQUIVALENT.

SHORING AND RESHORING: SHORING AND RESHORING SHALL CONFORM TO ACI 347-01. SHORING AND SUPPORTING FORMWORK SHALL NOT BE REMOVED FROM HORIZONTAL MEMBERS BEFORE CONCRETE STRENGTH IS AT LEAST 70 PERCENT OF DESIGN STRENGTH, AS DETERMINED BY FIELD CURE CYLINDERS. IN ADDITION, SHORING SHALL NOT BE REMOVED SOONER THAN RECOMMENDED BY ACI 347-01 , SECTION 3.7.2.3. FORMWORK SHALL NOT BE REMOVED IN LESS THAN TEN (10) DAYS.

REINFORCING STEEL: ALL REINFORCING BARS SHALL BE GRADE 60 DEFORMED BARS CONFORMING TO ASTM A706 OR A615.
REINFORCING STEEL TO BE WELDED OR FIELD BENT SHALL CONFORM TO ASTM A706.
WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185, UNLESS OTHERWISE NOTED.
REINFORCING STEEL SHALL BE SECURELY TIED IN PLACE WITH #16 ANNEALED IRON WIRE.

ALL DETAILING AND ACCESSORIES SHALL CONFORM TO ACI DETAILING MANUAL SP-66. PROVIDE CHAIRS, SPACERS, BOLSTERS, AND ITEMS IN CONTACT WITH FORMS WITH HOT-DIP GALVANIZED LEGS OR PLASTIC LEGS. ACCURATELY POSITION, SUPPORT, AND SECURE REINFORCEMENT AGAINST DISPLACEMENT BY FORMWORK CONSTRUCTION OR CONCRETE PLACEMENT OPERATIONS. "WET-STICKING" OF REINFORCING IS PROHIBITED.

REQUIRED CONCRETE COVER FOR REINFORCING STEEL (UNLESS NOTED OTHERWISE):

WATER RETAINING STRUCTURES:
- CONCRETE PLACED AGAINST EARTH 3"
- OTHER FORMED OR FINISHED SURFACES 2"

OTHER CONCRETE
- FOOTINGS 3" BOTTOM, 2" TOP & SIDES
- SLABS 3/4" MINIMUM
- COLUMNS 1½" TO TIES, 2" TO PRINCIPLE REINFORCEMENT
- BEAMS 1½" TO STIRRUPS, 2" TO PRINCIPLE REINFORCEMENT
- WALLS 1½" TO DRY CONDITIONS, 2" TO EARTH, WATER OR WEATHER

LAP SPLICE CONTINUOUS VERTICAL OR HORIZONTAL BARS IN CONCRETE MEMBERS IN ACCORDANCE WITH ACI 318-19, FOR CLASS "B" TENSION LAP SPLICES OR ACI 350 WHICHEVER IS GREATER. DO NOT SPLICE CONTINUOUS TOP BARS IN BEAMS AT ENDS OF CLEAR SPANS. DO NOT SPLICE CONTINUOUS BOTTOM BARS IN BEAMS IN CLEAR SPANS BETWEEN SUPPORTS. AT CYLINDRICAL WALLS, HOOP REINFORCEMENT SPLICES SHALL BE STAGGERED BY NOT LESS THAN ONE LAP LENGTH OR 3 FEET, AND SHALL NOT COINCIDE IN VERTICAL ARRAYS MORE FREQUENTLY THAN EVERY THIRD BAR.
SHOW ALL SPLICES ON SHOP DRAWINGS. SPLICE LOCATIONS AND METHODS SUBJECT TO APPROVAL OF ENGINEER OF RECORD.

AT SLAB AND WALL OPENINGS PROVIDE A MINIMUM OF (2) #5 BARS ALL FOUR SIDES AND DIAGONALLY; EXTEND THESE BARS A LAP DISTANCE OR A MINIMUM OF 27" PAST THE OPENING OR HOOK BARS IF DISCONTINUOUS.

DOWEL ALL WALLS AND COLUMNS TO FOOTINGS WITH HOOKED BAR SIZE AND SPACING TO MATCH VERTICAL REINFORCING UNLESS OTHERWISE SHOWN.

BARS SHALL BE FREE OF LOOSE SCALE, DIRT, GREASE OR ANY OTHER SUBSTANCES THAT IMPAIR THE BOND BETWEEN CONCRETE AND REINFORCING BARS.

CONCRETE ACCESSORIES:
WATERSTOPS SHALL BE INSTALLED IN ALL CONSTRUCTION JOINTS AND SHALL BE SPLICED IN ACCORDANCE WITH THE WATERSTOP MANUFACTURER'S RECOMMENDATIONS. PROVIDE GREENSTREAK #703 OR APPROVED EQUAL.

HEADED SHEAR STUDS SHALL BE NELSON HEADED ANCHORS WITH FLUARO ENDS OR APPROVED EQUAL. DEFORMED BAR ANCHORS (DBA) SHALL BE NELSON, TYPE D2L, OR APPROVED. STUDS AND DBA SHALL BE AUTOMATICALLY END WELDED WITH THE MANUFACTURER'S STANDARD EQUIPMENT IN ACCORDANCE WITH THEIR RECOMMENDATIONS. HAND WELDING NOT PERMITTED.

PERMANENTLY EXPOSED EMBEDDED PLATES AND ANGLES SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION, OR STAINLESS STEEL. ACCURATELY POSITION, SUPPORT, AND SECURE EMBEDDED ITEMS AGAINST DISPLACEMENT BY FORMWORK CONSTRUCTION OR CONCRETE PLACEMENT OPERATIONS. SECURELY ATTACH EMBEDDED ITEMS TO FORMWORK PRIOR TO START OF CONCRETE PLACEMENT. "WET-STICKING" OF EMBEDDED ITEMS IS PROHIBITED. NO LOADS OR WELDS SHALL BE PLACED ON EMBEDDED PLATES OR ANGLES FOR A MINIMUM OF 7 DAYS AFTER CASTING.

WHERE NEW CONCRETE IS PLACED AGAINST EXISTING CONCRETE, THE EXISTING CONCRETE SURFACE SHOULD BE CLEANED AND ROUGHENED TO A MINIMUM ¼" AMPLITUDE.

MECHANICAL ANCHORS: MECHANICAL ANCHORS SHALL HAVE A CURRENT ICC-ES EVALUATION REPORT INDICATING CONFORMANCE WITH CURRENT APPLICABLE ICC-ES ACCEPTANCE CRITERIA AC193. MECHANICAL ANCHORS SHALL BE SCREW TYPE OR AS NOTED ON THE DRAWINGS. PROVIDE SPECIAL INSPECTION AS MANDATED BY THE APPLICABLE BUILDING CODE AND BUILDING OFFICIAL HAVING JURISDICTION.

SCREW STYLE ANCHORS SHALL BE ONE PIECE 316 STAINLESS STEEL SCREW ANCHOR WITH FINISHED HEX HEAD WITH INTEGRAL WASHER, DOUBLE LEAD THREAD, CHAMFERED TIP, RATCHET TEETH ON UNDERSIDE OF HEAD. PROVIDE ANCHORS HEAD STAMPED WITH LENGTH. TYPE AND SIZE AS INDICATED ON DRAWINGS. ACCEPTABLE ANCHORS IN 'CRACKED' AND 'UN-CRACKED' CONCRETE ARE SIMPSON TITEN HD (ICC-ES ESR-2713), HILTI KWIK HUS-EZ (ICC-ES ESR-3027) OR POWERS WEDGE BOLT+ (ICC-ES ESR-2526).

IDENTIFY POSITION OF REINFORCING STEEL AND OTHER EMBEDDED ITEMS PRIOR TO DRILLING HOLES FOR ANCHORS. EXERCISE CARE IN CORING OR DRILLING TO AVOID DAMAGING EXISTING REINFORCING OR EMBEDDED ITEMS. NOTIFY THE ENGINEER IF REINFORCING STEEL OR OTHER EMBEDDED ITEMS ARE ENCOUNTERED DURING DRILLING.

ADHESIVE ANCHORS: ADHESIVE ANCHORS SHALL HAVE A CURRENT ICC-ES EVALUATION REPORT INDICATING CONFORMANCE WITH CURRENT APPLICABLE ICC-ES ACCEPTANCE CRITERIA (AC308 FOR INSTALLATION IN CONCRETE OR AC58 FOR INSTALLATION IN MASONRY). ADHESIVE SHALL BE INSTALLED IN DRY HOLES AND HAVE PERFORMANCE DATA FOR INSTALLATIONS IN WATER-SATURATED HOLES. CONTRACTOR SHALL NOTIFY THE ENGINEER-OF-RECORD PRIOR TO INSTALLING ADHESIVE ANCHORS IN WATER-SATURATED (DAMP) HOLES. ADHESIVE SHALL BE FULLY-CURED AT 70°F WITHIN 24 HOURS FROM THE TIME OF INSTALLATION. U.N.O. CONCRETE SHALL BE A MINIMUM OF 21 DAYS OLD AT THE TIME OF INSTALLATION PER ACI 318-14 CHAPTER 17.

ACCEPTABLE FAST CURE ADHESIVE IN 'CRACKED' AND 'UN-CRACKED' CONCRETE ARE SIMPSON AT-XP (IAPMO UES ER-263), HILTI HIT-HY 200 (ICC-ES ESR-3187) OR POWERS AC100+ GOLD (ICC-ES ESR-2582); IN SOLID-GROUTED MASONRY ARE SIMPSON AT-XP (IAPMO UES ER-281) OR HILTI HIT-HY 270 (ICC-ES ESR-4143. DESIGN OF THESE ADHESIVES IS BASED ON CONCRETE TEMPERATURE RANGE 'A' OR '1'.

ACCEPTABLE SLOW CURE ADHESIVE IN 'CRACKED' AND 'UNCRACKED' CONCRETE ARE SIMPSON SET-XP (ICC-ES ESR-2508), HILTI HIT-RE 500-SD (ICC-ES ESR-2322) OR POWERS PE1000+ (ICC-ES ESR-2583); IN SOLID-GROUTED MASONRY ARE SIMPSON SET-XP (IAPMO UES ER-265). DESIGN OF THESE ADHESIVES IS BASED ON CONCRETE TEMPERATURE RANGE 'A' OR '1'.

THREADED STUDS SHALL CONFORM TO ASTM A36, UNLESS NOTED OTHERWISE. PERMANENTLY EXPOSED THREADED STUDS AND THREADED STUDS USED IN WATER BEARING STRUCTURES SHALL BE 316 STAINLESS STEEL. NUTS AND WASHERS SHALL CONFORM TO SAME SPECIFICATION AS THE SUPPLIED ANCHOR RODS.

INSTALLATION SHALL BE IN CONFORMANCE WITH MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS (MPI). INSTALLATION SHALL ALSO INCLUDE BRUSHING AND CLEANING OF DRILLED HOLES WITH COMPRESSED AIR AS REQUIRED BY THE APPLICABLE EVALUATION REPORT. INSTALLERS SHALL BE TRAINED BY THE MANUFACTURER'S REPRESENTATIVE. EMBEDMENT SHALL BE AS INDICATED ON THE STRUCTURAL DRAWINGS.

IDENTIFY POSITION OF REINFORCING STEEL AND OTHER EMBEDDED ITEMS PRIOR TO DRILLING HOLES FOR ANCHORS. EXERCISE CARE IN CORING OR DRILLING TO AVOID DAMAGING EXISTING REINFORCING OR EMBEDDED ITEMS. NOTIFY THE ENGINEER IF REINFORCING STEEL OR OTHER EMBEDDED ITEMS ARE ENCOUNTERED DURING DRILLING.

REINFORCED CONCRETE RESERVOIR

REINFORCED CONCRETE RESERVOIR CONTRACTOR SHALL PROVIDE DESIGN AND CONSTRUCTION OF REINFORCED CONCRETE RESERVOIR WITH CONSIDERATION OF THE STRUCTURAL MATERIALS NOTED HEREIN. REINFORCED CONCRETE RESERVOIR DRAWINGS AND CALCULATIONS SHALL BEAR THE SEAL AND SIGNATURE OF A STRUCTURAL ENGINEER REGISTERED IN THE STATE OF OREGON.
DRAWINGS AND CALCULATIONS SHALL BE SUITABLE FOR OBTAINING A BUILDING PERMIT.
BAKER SLLO, LLC., LYNDEN, WA, (360)354-4940 OR APPROVED EQUAL

EXPERIENCE: THE CONTRACTOR RESPONSIBLE FOR DESIGN AND CONSTRUCTION OF THE REINFORCED CONCRETE RESERVOIR SHALL PROVIDE A STATEMENT OF QUALIFICATIONS SHOWING EXPERIENCE OF HAVING DESIGNED AND BUILT A MINIMUM OF TEN SIMILAR REINFORCED CONCRETE RESERVOIRS IN THE LAST FIVE YEAR.

WARRANTY: THE CONTRACTOR RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION OF THE REINFORCED CONCRETE RESERVOIR SHALL GUARANTEE ALL MATERIALS AND WORKMANSHIP FOR A PERIOD OF FIVE YEAR AFTER COMPLETION, ACCEPTANCE, TESTING AND FILLING OF THE RESERVOIR.

PLACEMENT OF REINFORCING STEEL: COMPLY WITH ACI 318-LATEST EDITION. LAPS AND SPLICES SHALL BE STAGGERED AND ALL REINFORCING STEEL BE ACCURATELY PLACED. ALL REINFORCING STEEL SHALL BE FIRMLY SECURED TO PREVENT MOVEMENT DURING THE PLACING OF THE CONCRETE.

PLACEMENT OF CONCRETE: PLACE CONCRETE WITHIN 90 MINUTES OF BATCHING. BEFORE EACH POUR THE PREVIOUSLY PLACED CONCRETE SHALL BE THOROUGHLY CLEANED TO REMOVE ALL LOOSE SCALE, OIL AND ANY FOREIGN MATERIAL THAT MAY PREVENT A GOOD BOND WITH THE EXISTING CONCRETE. CONCRETE SHALL NOT BE ALLOWED TO FREE FALL MORE THAN 5 FEET DURING PLACEMENT. DEPOSIT CONCRETE IN HORIZONTAL LAYERS NOT TO EXCEED 18 INCHES IN DEPTH AND PLACE AS CLOSE AS POSSIBLE TO FINAL POSITION TO AVOID SEGREGATION. VIBRATE ALL CONCRETE DURING PLACEMENT WITH HIGH FREQUENCY INTERNAL VIBRATORS AS IT IS PLACED TO THOROUGHLY WORK THE CONCRETE AROUND REINFORCEMENT AND EMBEDDED ITEMS WITHOUT SEPARATION OF AGGREGATE.

FORM REMOVAL: ALLOW WALL FORMS TO REMAIN IN PLACE AT LEAST 16 HOURS AFTER CONCRETE HAS BEEN PLACED UNLESS LOW TEMPERATURES OR POOR WEATHER CONDITIONS REQUIRE MORE CURE TIME. ALLOW ROOF FORMS TO REMAIN IN PLACE FOR A MINIMUM OF 7 DAYS UNLESS LOW TEMPERATURES OR POOR WEATHER CONDITIONS REQUIRE MORE CURE TIME.

CONCRETE FINISHES: BASE SLAB AND ROOF SHALL BE A "WOOD FLOAT" FINISH TO PREVENT SLIPPERY SURFACES. UNDERSIDE OF ROOF SHALL BE ROUGH FORM FINISH. WALLS SHALL BE STEEL FORM FINISH WITH MINIMUM REFINEMENT. ROCK POCKETS, HONEYCOMBS, FORM TIE HOLES AND ANY VOIDS OVER 1/2 INCH DEEP SHALL BE REPAIRED. CONTACT ENGINEER OF RECORD PRIOR TO REPAIRS.

CLEAN AND PRESSURE WASH THE INTERIOR OF THE RESERVOIR AFTER CONSTRUCTION.

TOLERANCES:
BASE SLAB POSITION IN PLAN: +1/2 INCH
BASE SLAB DEPARTURE FROM LEVEL: +1/2 INCH AND -1/2 INCH
WALL DEPARTURE FROM PLUMB OR BATTER: 0.3% X HEIGHT < 1 INCH
VARIATION IN THICKNESS OF SLABS AND WALLS: +1/2 INCH AND -1/4 INCH
DEPARTURE IN LOCATION OF OPENINGS: +1/4 INCH AND -1/4 INCH
ABRUPT IRREGULARITIES (USING A 5' LONG STRAIGHT EDGE): +1/2" & -1/4"

TESTING: FILL THE RESERVOIR TO CHECK FOR WATER TIGHTNESS AFTER A MINIMUM OF 28 DAYS HAS PASSED SINCE THE LAST CONCRETE POUR. CHECK THE WATER LEVEL AFTER 3 CONSECUTIVE 24 HOUR PERIODS. ALLOWING FOR EVAPORATION, THE WATER LEVEL SHALL NOT DROP MORE THAN 1 TENTH OF ONE PERCENT IN ANY 24 HOUR PERIOD.

CRACKING: CRACKS WIDER THAN 0.005 INCHES THAT FORM WITHIN THE WARRANTY PERIOD SHALL BE CLEANED, REPAIRED AND INJECTED BY AN APPROVED EPOXY SEALING SYSTEM OR ADDITIONAL CONCRETE SHALL BE PLACED TO MAINTAIN WATER TIGHTNESS.

WEEPING AND EFFLORESCENCE: ACTIVE LEAKAGE OR EXCESSIVE EFFLORESCENCE THAT OCCURS WITHIN THE WARRANTY PERIOD SHALL BE CLEANED, REPAIRED AND INJECTED WITH AN APPROVED EPOXY SEALING SYSTEM OR ADDITIONAL CONCRETE SHALL BE PLACED TO MAINTAIN WATER TIGHTNESS. EXCESSIVE EFFLORESCENCE IS DEFINED AS EFFLORESCENCE PROJECTING MORE THAN 1/2 INCH FROM THE FINISH CONCRETE SURFACE OR ANY EFFLORESCENCE IN A CONTINUOUS LINE EXCEEDING 10 FEET IN LENGTH.

GENERAL STRUCTURAL NOTES

COORDINATION: CONSULT MECHANICAL DRAWINGS FOR SLEEVES, DEPRESSIONS, PENETRATIONS AND OTHER DETAILS REQUIRED FOR THE REINFORCED CONCRETE RESERVOIR.

CONTRACTOR SHALL LOCATE ALL CONCEALED UTILITIES PRIOR TO EXCAVATION OR SELECTIVE DEMOLITION WORKS. THE ENGINEER OR RECORD SHALL BE NOTIFIED OF POTENTIAL CONFLICTS BETWEEN FOUNDATIONS AND BURIED UTILITIES.

CODE REQUIREMENTS: THE STRUCTURES ARE DESIGNED IN ACCORDANCE WITH THE 2019 OREGON STRUCTURAL SPECIALTY CODE (OSSC) AND REFERENCE DOCUMENTS (ADM, ACI, AISC, AISI, ANSI, APA, ASCE/SEI, ASTM, AWC, AWPA, AWS, ICC, SDI, SJI, TMS, UL, WCLIB, ETC). FOLLOW ALL APPLICABLE PROVISIONS FOR ALL PHASES OF CONSTRUCTION.

TEMPORARY CONDITIONS: THE STRUCTURAL INTEGRITY OF THE COMPLETED STRUCTURE DEPENDS ON INTERACTION OF VARIOUS CONNECTED COMPONENTS. PROVIDE ADEQUATE BRACING, SHORING, AND OTHER TEMPORARY SUPPORTS AS REQUIRED TO SAFELY COMPLETE THE WORK. THE STRUCTURE SHOWN ON THE DRAWINGS HAS BEEN DESIGNED FOR STABILITY UNDER FINAL CONFIGURATION ONLY.

WALLS WHICH TIE TO UPPER SLABS SHALL NOT BE BACKFILLED UNTIL THE UPPER SLABS REACH FULL STRENGTH, UNLESS ADEQUATE BRACING IS PROVIDED AT THE TOP OF THE WALL.

EXISTING CONDITIONS: ALL EXISTING CONDITIONS, DIMENSIONS AND ELEVATIONS SHALL BE FIELD VERIFIED. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OR RECORD OF ANY SIGNIFICANT DISCREPANCIES FROM CONDITIONS SHOWN ON THE DRAWINGS.

EXISTING STRUCTURE: INFORMATION FOR EXISTING STRUCTURES WAS TAKEN FROM RECORD DRAWINGS PROVIDED BY THE CITY OF SWEET HOME. WORK SHOWN ON THESE PLANS ASSUMES THAT THE ORIGINAL CONSTRUCTION WAS PERFORMED IN ACCORDANCE WITH THE ORIGINAL DRAWINGS INCLUDING, BUT NOT LIMITED TO, DIMENSIONS, ELEVATIONS, MEMBER SIZES, MATERIALS, DETAILS, ETC. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE CONDITIONS RELATING TO THE EXISTING STRUCTURES AND TO NOTIFY THE ENGINEER OR RECORD IMMEDIATELY OF ANY DISCREPANCIES OR CONFLICTS.

EXERCISE EXTREME CARE AND CAUTION WHEN EXCAVATING AND FILLING ADJACENT TO EXISTING STRUCTURES. UNDER NO CIRCUMSTANCES SHALL THE STRUCTURAL INTEGRITY OF THE EXISTING STRUCTURES BE IMPAIRED IN ANY WAY BY CONSTRUCTION OPERATIONS AND PROCEDURES. DO NOT EXCAVATE OR DISTURB SOIL ADJACENT TO OR BENEATH EXISTING FOOTINGS.

DESIGN CRITERIA: THE FOLLOWING LOADS AND PARAMETERS WERE USED TO DETERMINE WIND AND SEISMIC LOADS.

VERTICAL LOADS:
DEAD LOADS:
- CONCRETE SLABS: 150 PCF DL

GROUND SNOW LOAD: 25 PSF SL

FLOOR LIVE LOADS:
- PROCESS 125 PSF LL, 2000 LB CONCENTRATED

LATERAL LOADS:
SEISMIC: RISK CATEGORY 3, SITE CLASS B, S_S=0.63, S_1=0.34, F_a=1.00, F_v=1.00, S_{MS}=0.63g, S_{M1}=0.34g, S_{DS}=0.42g, S_{D1}=0.23g, MCE_R=0.29g, F_{PGA}=1.00, SEISMIC DESIGN CATEGORY=D.

WIND: BASIC WIND SPEED: V=104 MPH, V_{asd}=85 MPH, EXPOSURE B

Exhibit B

Geotechnical Data Report

City of Sweet Home
Mahler Water Reclamation Facility Improvements

Geotechnical Data Report

Final Submittal

Prepared for

December 2022

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Acronyms and Abbreviations

ASTM	American Society for Testing and Materials
bgs	below ground surface
bpf	blows per foot
GDR	Geotechnical Data Report
$I_{S(50)}$	point load index
LBVS	Little Butte Volcanic Series
MJA	McMillen Jacobs Associates
N-value	standard penetration test blows to advance final foot
OAR	Oregon Administrative Rules
PGA	peak ground acceleration
RQD	Rock Quality Designation
SPT	Standard Penetration Test
USGS	United States Geological Survey
West Yost	West Yost Associates, Inc.
WRF	Wastewater Reclamation Facility

Distribution

To: Preston Van Meter, P.E.
West Yost Associates, Inc.

From: Wolfe Lang, P.E., G.E.
McMillen Jacobs Associates

Prepared By: Jeff Quinn, P.E.
McMillen Jacobs Associates

Reviewed By: Wolfe Lang, P.E., G.E.
McMillen Jacobs Associates

Revision Log

Revision No.	Date	Revision Description
Final Submittal	July 22, 2022	Final Submittal to West Yost
Final Submittal Rev. 1	December 16, 2022	Final Submittal Incorporating Site Revisions

1.0 Introduction

1.1 General

McMillen Jacobs Associates (MJA) has been retained by West Yost Associates, Inc. (West Yost) to provide geotechnical engineering services for the City of Sweet Home Mahler Water Reclamation Facility Improvements project. The project owner is the City of Sweet Home. The Project site location is shown in the Vicinity Map, Figure 1. This Geotechnical Data Report (GDR) presents the results of our field explorations and laboratory testing, as well as a discussion on the site geology.

1.2 Project Description

The City of Sweet Home Mahler Water Reclamation Facility (WRF) is located at 1357 Pleasant Valley Road, in Sweet Home, Oregon. The WRF has been in service since 1947 with two major upgrades completed in 1974 and 1994 (Brown & Caldwell, 2016). Our project understanding is based on our communication with West Yost and the 90 percent submittal plans entitled *Mahler Water Reclamation Facility Improvements Project – Phase 1*, dated June 2022, prepared by West Yost. The proposed WRF improvements are shown in Figure 2.

The proposed WRF improvements include the following:

- *Main Electrical and Blower (MEB) Building*: The 22- by 67.5-foot MEB Building will be located within the north-central part of the WRF site. The interior of the building will be supported on a 6-inch-thick slab on grade foundation, while the perimeter of the structure will be supported on a 1.5-foot-wide continuous spread footing. A new generator, which will be installed on the north side of the MEB Building, will be supported on 12- by 28-foot, 12-inch-thick reinforced concrete slab on grade with thickened edges. Site grades will be raised up to approximately 6 feet in this area to facilitate construction of the MEB Building, with approximately 4 to 6 feet of fill placed below the building footprint. The approximately 6-foot-tall fill slope on the east side of the MEB Building will descend at 2H:1V (horizontal:vertical).
- *Influent Pump Station (IPS)*: The new, 40- by 56-foot IPS will be constructed just north of the existing IPS, within the southeast corner of the WRF site. The approximate southern half of the IPS structure, which supports above-grade piping, will be supported on a 12-inch-thick reinforced concrete slab on grade with thickened edges. The approximate northern half of the IPS structure, which houses five submerged pumps, will be supported on a 28-inch-thick reinforced concrete slab with a base elevation of approximately 491.2 feet (e.g., about 26.2 feet below grade).
- *Sludge Blend Tank*: The new, 28-foot diameter sludge blend tank will be constructed in the southeast corner of the WRF site just east of the solids building. The sludge blend tank will be approximately 25 feet tall and will be supported on a 1.5-foot-thick, reinforced concrete mat foundation with a base elevation of approximately 515.3 feet (e.g., about 1.5 feet below grade).
- *Digested Sludge Holding Tank*: The new, 36-foot diameter sludge blend tank will be constructed in the southeast corner of the WRF site just north of the sludge blend tank. The sludge blend tank

will be approximately 26 feet tall and will be supported on a 1.5-foot-thick, reinforced concrete mat foundation with a base elevation corresponding to approximately 1.5 feet below grade.

- *Solids Building Expansion*: The existing solids building will be enlarged from its existing 22- by 37-foot plan dimensions to approximately 32- by 57-foot plan dimensions and will be supported on a shallow foundation system consisting of perimeter footings and an interior slab-on-grade.
- *40*-foot Diameter Digestor: The new digestor will be constructed within the footprint of the existing, approximately 55-foot diameter digestor (DG1) in the southeast corner of the WRF site. We understand that the existing foundation will be used to support the new digestor structure.
- *Temporary Generator*: A temporary electrical generator, supported on an 18-inch-thick reinforced concrete slab, will be installed on the south side of existing Secondary Clarifier SC60.
- *Existing Bathroom Relocation*: The existing bathroom, currently along the northern fence line and east of the existing entrance gate, will be moved to the north side of the boat ramp access road.
- *Retaining Walls*: To support new fills placed for site grading, as well as proposed cuts, there are six retaining walls (designated Wall 1 through Wall 6) proposed as part of the improvements. The retaining walls will be cast-in-place, reinforced concrete cantilevered walls ranging in height from 2.5 to 6.75 feet.
- *Existing Structures/Facilities to Remain In Use*: Secondary Clarifier Nos. 1 through 3; RAS/WAS Pump Station; Aeration Basin; Chlorine Contact Chamber; Administration and Operations Building; Solids Building; Sand Filters; Lime Silo; and the electrical building on the south side of existing SC60.
- *Proposed Piping Improvements*: 12-inch storm drain;10-inch storm drain; 8-inch to 36-inch sanitary sewer; 12-inch IPS forcemain to headworks (HDPE pipe); 24-inch RS IPS to Headworks (HDPE pipe); 6-inch PS forcemain; 12-inch RDPS; 6-inch SL-WAS; 6-inch SL-D forcemain; 4-inch PSC; and 10-inch DIP waterline relocation.
- *Demolition of the Following Existing Structures*: Backwash Storage; Waste Backwash Storage; the approximately 25- by 50-foot storage building on the west side of the WRF site; and several buildings clustered together in the central portion of the WRF site including the carport, an approximately 40- by 40-foot CMU building, an approximately 25- by 50-foot Quonset Hut storage building, and an approximately 15- by 35-foot shed.
- *Primary Clarifier*: The new primary clarifier will consist of an approximately 65- by 85-foot reinforced concrete tank structure. The base depth of the new primary clarifier will be approximately 9.5 to 22.5 feet below existing site grades and will be supported on an 18-inch-thick, reinforced concrete mat foundation system. The primary clarifier will be expanded to the north (designated Primary Clarifier 4) at a future date.
- *Secondary Clarifier 90 (SC90)*: SC90 will consist of an approximately 95-foot diameter, 17-foot-tall reinforced concrete tank structure. SC90 will be a primarily below-grade structure, with the tank walls being about 2 feet above finish grade. The base depth of the SC90 will be approximately 15 feet below existing site grades and will be supported on a reinforced concrete mat foundation.
- *Building A (O&M and Controls)*: This 40- by 120-foot building, oriented northeast-southwest, will be constructed at the west end of the WRF site and will be an at-grade structure supported on

an interior slab-on-grade. The perimeter of the structure and interior load-bearing walls will be supported on shallow spread footings.

- *Building A (Headworks and Dewatering)*: This 40- by 120-foot building, oriented southeast-northwest, will abut the southeast corner of the O&M and Controls building to form the leg of the L-shaped Building A. This will be an at-grade structure supported on an interior slab-on-grade. The perimeter of the structure and interior load-bearing walls will be supported on shallow spread footings.
- *SC90 WAS and RAS Pump Stations*: Each of these two pump stations will be an approximately 10-foot diameter reinforced concrete vault structure with a base depth of approximately 16.5 feet below existing site grades and will be supported on a reinforced concrete mat foundation.
- *Existing Secondary Clarifier SC60 RAS/WAS Pump Station*: This pump station will be an approximately 10- by 20-foot reinforced concrete vault structure with a base depth of approximately 12.5 feet below existing site grades and will be supported on a reinforced concrete mat foundation.
- *Aeration Basin No. 3*: Aeration Basin No. 3 will consist of an approximately 40- by 75-foot reinforced concrete structure. The base depth of Aeration Basin No. 3 will be approximately 13 to 18 feet below existing site grades and will be supported on a reinforced concrete mat foundation. Aeration Basin No. 3 will be expanded to the north (designated Aeration Basin No. 4) at a future time and will likely be founded at the same depth as Aeration Basin No. 3.
- *Tertiary Filters*: The tertiary filters will be housed in an approximately 25- by 35-foot reinforced concrete tank structure. The base depth of Aeration Basin No. 3 will be approximately 18 feet below existing site grades and will be supported on a reinforced concrete mat foundation.
- *Tertiary Building, UV Disinfection, and UW Storage*: These facilities will be located adjacent to one another within an approximate 35- by 40-foot area. The UW Storage and UV Storage facilities will be constructed within the existing chlorine contact chamber. The portion of the Tertiary Building housing the utility water pumps will likely be approximately 7 feet below existing site grades.
- *Outfall*: The outfall pipe leads from the UV disinfection chamber to the South Santiam River. This will be part of a future project phase.
- *Other Improvements*: The approximate western half of the WRF site, an area north of the boat ramp access drive, and a narrow area along the south site boundary will be surfaced with gravel. New asphalt pavements along the entrance road from Pleasant Valley Road and within most of the WRF site; new concrete curbs and sidewalks; two new entrance gates; and a new chain-link fence.

1.3 Purpose and Scope of Work

The primary purpose of this GDR is to compile sufficient geologic and geotechnical data at the project site to support the design and construction of the proposed improvements. This GDR presents a summary of geologic and geotechnical data collected from field explorations and testing, laboratory testing, a review of published geological sources, and other historical geotechnical information related to the project. Information contained in this GDR will be used to characterize subsurface conditions at the site and to develop recommendations for design and construction of the Project.

2.0 Site Conditions

2.1 Site Description

The existing WRF site is located on the south bank of the South Santiam River near its confluence with Ames Creek. The site is bordered by the Albany and Eastern railroad tracks to the south, a boat ramp access road and the South Santiam River beyond, private property to the west, and Ames Creek to the east. In general, the site slopes gently from the west to the east (i.e., towards Ames Creek) and gently from the south to the north towards the South Santiam River. The eastern two-thirds of the site, where most of the WRF is located, is situated on a relatively level terrace that generally sits 5 to 7 feet lower than the western one-third of the site and approximately 10 feet above Ames Creek to the east.

A paved access road runs along the north side of the site, from the Pleasant Valley Road WRF entrance at the west end of the site to the boat ramp and recreation use area at the north-northeast end of the site that provides public access to the South Santiam River. The paved WRF road, heading south from the access road from the main entrance gate, provides access to the main areas within the WRF. Bedrock is exposed along the South Santiam River and Ames Creek approximately 100 feet to the north-northeast of the site. Exposed bedrock on the riverbank slopes steeply into the river.

2.2 Regional Geology

The project site is located in the foothills of the Western Cascades, a north-south trending physiographic region that stretches from northern California to British Columbia, tucked between the Willamette Valley to the west and the younger High Cascades to the east. The Western Cascades in Oregon were formed by a series of volcanic events from approximately 35 to 17 million years ago. The region is marked by densely forested hills dissected by the region's many rivers (Madin, 1990; Schlicker and Deacon, 1967; Wilson, 1998; Popowski, 1996).

The Paleogene structural basement of this region of the Western Cascades is composed of non-marine volcaniclastic sedimentary rocks, tuff, basaltic andesite, andesite, and dacite of the Late Eocene to Oligocene Fisher Formation. The Fisher Formation is overlain by basalt lavas, ash-flow tuff, tuff, and non-marine sedimentary rocks of the Little Butte Volcanic Series. A subducting plate below the Eocene shoreline resulted in a volcanic chain that produced the volcanic activity responsible for the Fisher Formation and the Little Butte Volcanic Series. As the angle of the subducting plate shifted, the volcanic activity gradually shifted east of the region. The bedrock in the project area is composed of tholeiitic basalt from the Little Butte Volcanic Series.

Over the span of geologic time, quaternary sedimentary deposits of alluvium, colluvium, landslide deposits, and terrace deposits have accumulated on the volcanic rock surfaces and in the valleys formed by the rivers. The sediments that directly overlie the bedrock in the project area have been defined as alluvium. Regionally, the alluvium consists of unconsolidated gravel, sand, silt, and clay deposited in modern stream channels, adjoining flood plains, overbanks, and low bedrock terraces.

Across the project area, fill materials are present near the ground surface. These materials were generally placed to re-grade the site prior to development.

3.0 Site Investigations

3.1 General

The subsurface exploration was completed in four phases, between 2018 and 2022, and consisted of five boreholes (designated B-1 through B-5) and 36 probe-holes (designated P-01 through P-36).

The site investigations were performed under the direction of a geologist or geotechnical engineer from MJA, who examined and logged the soil and rock conditions encountered in the borings. The soils were classified in the field in accordance with the Visual-Manual Procedure (ASTM D 2488). Sample depths, stratigraphy, groundwater occurrence and soil engineering characteristics were also recorded. The stratigraphic contacts indicated on the logs represent the approximate boundaries between soil and rock; actual transitions may be more gradual. The boring logs are presented in Appendix A. The soil and rock samples were transported to the MJA Portland office for further examination. The rock core samples were transported, stored, cataloged, and disposed of in accordance with the Standard Practices for Preserving and Transporting Rock Core Samples (ASTM D 5079). The rock core photos are included in Appendix B

3.2 Exploratory Borings

Phase one was completed between April 30 and May 2, 2018, and included the advancement of five boreholes (B-1 through B-5) and fifteen probe-holes (P-01 through P-15). The Phase one borings were completed by Western States Soil Conservation (WSSC) of Hubbard, Oregon using a truck-mounted CME-75 drill rig. The boreholes were advanced to depths ranging from 5.8 to 23 feet bgs using mud-rotary drilling techniques within soil materials, and HQ-triple-tube wireline coring in rock materials in accordance with ASTM D 2113. The probe-holes were advanced using hollow-stem auger drilling techniques and extended to depths ranging from 2.5 to 15 feet bgs at which point drilling refusal was encountered at the top of the bedrock surface.

Phase two was completed on October 29, 2019 and consisted of the advancement of 12 probe-holes (designated P-16 through P-27). The phase two probe-holes were completed by McCallum Rock Drilling of Salem, Oregon using a track-mounted Furakawa 900 drill rig. The probe-holes were advanced to depths ranging from 11 to 26 feet bgs using air percussion drilling methods.

Phase three was completed on June 20, 2022 and consisted of eight probe-holes (designated P-28 through P-35) advanced by PLI Systems of Hillsboro, Oregon using a truck-mounted Mobile B-75 drill rig. The probe-holes were advanced using hollow-stem auger drilling techniques and extended to depths ranging from 3.7 to 19 feet bgs.

Phase four was completed on November 22, 2022 and consisted of one probe-hole (designated P-36) advanced by WSSC using a truck-mounted CME-75 drill rig. P-36 was advanced using hollow-stem auger drilling techniques and extended to 11.5 feet bgs.

In borings B-2 through B-5 and probe-holes P-28 through P-36, disturbed soil samples were collected in conjunction with a SPT at selected intervals using a standard 2-inch diameter split-barrel sampler, and automatic safety hammer system. In each test, the sampler was advanced 18 inches by dropping the 140-

pound hammer a distance of 30 inches for each strike in accordance with ASTM D 1586. The number of hammer blows for each six inches of penetration was recorded. The standard penetration resistance (N-value) of the soil is calculated as the sum of the number of blows required for the final 12 inches of sampler penetration. The SPT N-values of greater than 50 blows per six inches of penetration is referred to as refusal. The N-value is an indication of the relative density of granular soils and the relative consistency of cohesive soils. Uncorrected N-values are presented on the boring logs. In addition to the SPT sampling, relatively undisturbed samples were obtained in selected borings by pushing a 3-inch inside diameter thin wall sampler (Shelby Tube) in accordance with ASTM D 1587.

In the probe-holes in which SPT sampling was not performed, soil samples were taken from borehole cuttings. These sampling locations are shown in boring logs.

3.3 Piezometers

Two-inch diameter piezometers were installed in two boreholes to allow for long-term, stabilized groundwater level measurements. Piezometers were installed in the following boreholes:

- Boring B-3, screened between 9 and 12 feet bgs.
- Boring B-5, screened between 5.5 and 8.5 feet bgs.

3.4 Borehole Backfill and Abandonment

Piezometer construction and borehole backfilling and abandonment was performed in accordance with the requirements of the Oregon Department of Water Resources (OAR 690-240, Construction, Maintenance, Alteration, Conversion, and Abandonment of Monitoring Wells, Geotechnical Holes, and Other Holes in Oregon).

4.0 Laboratory Testing

Field samples obtained from exploratory borings were delivered to the MJA Portland office for further examination and storage. Each of the samples was re-examined and compared to the field boring log description to confirm the field classifications and maintain consistency. Representative samples were then selected for laboratory testing. Testing was performed on soil and rock samples from boreholes B-1, B-3, and B-5. The laboratory test results are provided in Appendix B. The laboratory testing included the following index and strength property tests, performed in accordance with relevant ASTM standards:

- Moisture content analyses (ASTM D 2216).
- Atterberg limits tests (ASTM D 4318).
- Point load tests of rock core (ASTM D 5731).
- Unconfined compressive strength of intact rock core (ASTM D 7012).

Point load testing was performed by MJA. All other laboratory testing was performed by Northwest Testing, Inc. of Wilsonville, Oregon. Laboratory test results are presented in Appendix B. A summary of the laboratory test results is provided in Table 4-1 on the following page. Comprehensive laboratory test results are presented in Appendix C.

Table 4-1. Laboratory Test Results Summary

Sample Location or ID				Soil Description			Moisture %	Atterberg Limits			Strength Testing		
											Point Load Strength Index, PLI	PLI Test Type	UCS[1]
Boring	Sample, No.	Top Depth (feet)	Bottom Depth (feet)	Geologic Unit	USCS Soil Type	Soil or Rock Description		Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Corrected Point Load Strength Index, $I_{s(50)}$ (PSI)	Diametral or Axial	PSI
B-1	R-1	5.2	6.3	LBVS Basalt		BASALT							25,302
B-3	S-2	5	6.5	FILL	CH	SANDY FAT CLAY	44.8	51	28	23			
B-5	S-1	2.5	4	FILL	SM	SILTY SAND with Gravel	26.3	44	28	16			
B-5	R-1	11.7	12.4	LBVS Basalt		BASALT							29,919
B-5	R-2	18.0	19.0	LBVS Basalt		BASALT							6,932
B-5	R-2	16.8	17.2	LBVS Basalt		BASALT					513	Diametral	12,563[2]
B-5	R-2	16.3	16.8	LBVS Basalt		BASALT					304	Diametral	7,437[2]
B-5	R-2	16.8	17.0	LBVS Basalt		BASALT					653	Diametral	13,717[2]
B-5	R-2	17.2	18.0	LBVS Basalt		BASALT					268	Diametral	5,098[2]
B-5	R-2	17.6	18.0	LBVS Basalt		BASALT					569	Diametral	13,951[2]
B-5	R-3	22.5	23.0	LBVS Basalt		BASALT					579	Diametral	13,315[2]
B-5	R-1	9.0	9.5	LBVS Basalt		BASALT					407	Diametral	9,778[2]
B-5	R-2	12.4	12.8	LBVS Basalt		BASALT					714	Diametral	17,138[2]
B-5	R-2	15.8	16.7	LBVS Basalt		BASALT					383	Diametral	9,185[2]
B-5	R-2	16.3	16.7	LBVS Basalt		BASALT					690	Diametral	14,493[2]

[1] UCS = Unconfined compressive strength.
[2] UCS results from point load strength index testing are based on a correlation factor of 24.5, which was calculated by plotting the relationship between UCS and point load strength index test results.

5.0 Subsurface Conditions

The materials encountered in the explorations were grouped into three geotechnical units: Pavement, Fill, Boulders, and Basalt (Little Butte Volcanic Series – Tholeiitic Basalt). These units have been defined by their geologic origin, stratigraphic position, engineering properties, and their distribution in the subsurface. Variations in subsurface conditions may exist between the locations of the borings. Contacts between the units may be more gradational than shown in the boring logs in Appendix A. The SPT N-values, shown on the boring logs and discussed below, are reported as counted in the field (uncorrected). Photos of rock core samples are provided in Appendix C. Cross sections of subsurface conditions are shown in Figures 3A through 3F. The following sections describe each geotechnical unit in greater detail.

5.1.1 Pavement

Asphalt concrete (AC) pavement was encountered in 12 borings (P-01, P-03, P-04, P-16, P-17, P-19, P-23, P-25, P-29, P-31, P-32, P-34, and P-36). The AC pavement ranged from about 4 to 6 inches in thickness and was typically underlain by about 4 inches of crushed rock base. Portland Cement Concrete (PCC) pavement was encountered in two borings (B-1 and P-27). In B-1, the PCC pavement was about 18 inches thick and underlain by about 12 inches of crushed rock base. In P-27, the PCC pavement section was about 6 inches thick.

5.1.2 Fill

Undocumented fill materials were present in all the explorations and were likely placed for site grading and development. We observed highly variable fill depths across the site, extending from the existing ground surface to depths ranging from 2 to 16.5 feet bgs. Additionally, the fill depths often varied considerably over short distances. The fill was underlain by bedrock, and generally consisted of silt with variable amounts of organics, lean to fat clay with variable amounts of sand and gravel, sand and gravel with variable amounts of silt and clay, and organic soil with variable amounts of sand. Undocumented fill refers to materials placed without (available) records of subgrade conditions or evaluation of compaction. Standard Penetration Tests (SPTs) conducted within the fill yielded N-values ranged from 0 to 45 blows per foot (bpf). The higher N-values were generally recorded at the fill-bedrock contact.

5.1.3 Boulders

Based on drilling action and slow advancement rates, we believe that large cobbles or boulders were encountered between 7.5 to 9 feet bgs in boring P-36, located in the southeast corner of the WRF site.

5.1.4 Basalt - Little Butte Volcanic Series Tholeiitic Basalt

The Little River Butte Volcanic Series (LRBV) in the project area consists of tholeiitic basalt and is bedrock in this area. The basalt was encountered beneath the fill in all the explorations. The contact between fill and LBVS was generally selected based on auger refusal, drilling resistance, drill cuttings, and/or SPT refusal (more than 50 blow counts for 6 inches or less of penetration). The depth to the LRBV ranged from 2.0 feet to 16.5 feet bgs.

The strength of the basalt rock generally varies from strong to very strong (R4 to R5). Rock strength descriptors are presented in Table 5-1. The basalt is slightly weathered to fresh, moderately to highly fractured (i.e., joint spacing from 3 feet to 2 inches), and gray. The joints were generally sub-horizontal or high angle, smooth to rough, planar, curved, and irregular in shape. The occasional joint had a less than 0.1-inch-thick light blue green coating. Core recovery ranged from 80 to 100 percent. The Rock Quality Designation of the cored rock (RQD) ranged from 42 to 86 percent, with an average value of 67 percent.

Table 5-1. Definition of Rock Strength Descriptions

Grade[1]	Approximate Uniaxial Compressive Strength (psi)	Qualitative Description
R0	35 – 150	Extremely Weak
R1	150 – 700	Very Weak
R2	700 – 3,600	Weak
R3	3,600 – 7,200	Medium Strong
R4	7,200 – 14,500	Strong
R5	14,500 – 36,000	Very Strong
R6	>36,000	Extremely Strong

[1] Rock strength grades from Brown (1981).

Three unconfined compressive strength tests were completed on selected rock core samples. The unconfined compressive strength of the rock cores ranged from 6,932 psi to 25,919 psi with an average value of 19,384 psi. The results of point load tests indicate the Point Load Index ($I_{S(50)}$) of the basalt ranged between approximately 268 psi and 714 psi, with an average value of 508 psi. Depth to rock at each exploration is summarized in Table 5-2. The depth to bedrock is also included on the geologic cross sections shown in Figures 3A through 3F.

Table 5-2. Depth of Fill / Depth to Rock Summary

Exploration ID	Associated Structure(s)	Ground Surface Elevation (feet)	Depth to Rock (feet)	Rock Surface Elevation (feet)
B-1	--	516.5	2.5	514.0
B-2	SC90 WAS Pump Station	518.3	16.5	501.8
B-3	Primary Clarifier	529.9	11	518.9
B-4	Building A – O&M & Controls	538.6	4.5	534.1
B-5	MEB Building	528.8	8.5	520.3
P-01	--	517.3	11	506.3
P-02	--	526.1	11.5	514.6
P-03	Primary Clarifier	530.4	16	514.4
P-04	Building A – Headworks & Dewatering	530.8	7.5	523.3
P-05	Building A – Headworks & Dewatering	533.1	3.5	529.6
P-06	Building A – O&M & Controls	536.2	3.5	532.7
P-07	--	538.0	2.5	535.5
P-08	Building A – O&M & Controls	535.3	7.5	527.8
P-09	--	530.5	4	526.5
P-10	--	530.1	5.5	524.6
P-11	MEB Building	529.8	5.5	524.3
P-12	MEB Building	526.4	5	521.4
P-13	Future Aeration Basin No. 4	523.6	8.5	515.1
P-14	Aeration Basin No. 3	521.7	5.5	516.2
P-15	--	519.1	2.5	516.6
P-16	IPS	517.1	12.0	505.1
P-17	--	516.5	6.0	510.5
P-18	SC90, SC60 RAS/WAS Pump Station	518.5	9.0	509.5
P-19	--	518.0	6.0	512.0
P-20	SC90 RAS Pump Station	525.4	8.0	517.4
P-21	Primary Clarifier, Aeration Basin No. 3	521.8	6.0	515.8
P-22	Aeration Basin No. 3	518.5	7.0	511.5
P-23	Primary Clarifier	530.4	15.0	515.4
P-24	MEB Building	529.7	3.0	526.7
P-25	Future Outfall	506.4	2.0	504.4
P-26	Future Outfall	507.2	3.0	504.2
P-27	--	516.6	10.0	506.6
P-28	IPS	516.5	11.0	505.5
P-29	IPS	517.3	12.5	504.8
P-30	SC90	519.8	11.0	508.8
P-31	SC90	520.8	10.0	510.8
P-32	Primary Clarifier, Future Primary Clarifier No. 4	530.4	10.0	520.4
P-33	Future Outfall	529.6	3.5	526.1
P-34	Tertiary Filters	516.9	15.0	501.9
P-35	-	517.5	6.0	511.5
P-36	Sludge Blend Tank, Digested Sludge Holding Tank, Solids Building	516.8	10.8	506.0

5.2 Groundwater

Two-inch diameter, PVC groundwater observation wells were installed in borings B-3 and B-5. Initial groundwater levels recorded on May 2, 2018, with subsequent levels recorded on October 29, 2019, and on June 20, 2022. We also observed groundwater in nine other exploration locations, as summarized in Table 5-3. Groundwater levels are noted on the boring logs in Appendix A.

Groundwater levels may vary with precipitation, the time of year, and/or other factors. Generally, groundwater highs occur near the end of the wet season in late spring and groundwater lows occur near the end of the dry season in the early fall.

Table 5-3. Groundwater Level Measurements

Boring ID	Piezometer	Borehole Elevation (feet)	Depth to Groundwater (feet)			Groundwater Elevation (feet)		
			May 2, 2018	Oct 29, 2019	June 20, 2022	May 2, 2018	Oct 29, 2019	June 20, 2022
B-2	No	518.3	2.5	-	-	515.8	-	-
B-3	Yes	529.9	2.9	3.6	8.2	527.0	526.3	521.7
B-4	No	538.6	2.0	-	-	536.6	-	-
B-5	Yes	528.8	5.0	7.0	6.8	523.8	521.8	522.0
P-03	No	530.4	8.5	-	-	521.9	-	-
P-09	No	530.5	3.0	-	-	527.5	-	-
P-13	No	523.6	6.0	-	-	517.6	-	-
P-15	No	519.1	2.5	-	-	516.6	-	-
P-29	No	517.3	-	-	10.5	-	-	506.8
P-31	No	520.8	-	-	9.2	-	-	511.6
P-32	No	530.4	-	-	9.7	-	-	520.7

6.0 Limitations

This Geotechnical Data Report has been prepared for the City of Sweet Home Mahler Water Reclamation Facility Improvements Project located in Sweet Home, Oregon. This report contains a compilation of information from field explorations, laboratory test data, and published literature. The professional judgments and characterizations presented herein are based on this information. McMillen Jacobs Associates is not responsible for errors and omissions that may appear in the field exploration and laboratory test results performed by others.

It shall be noted that the geotechnical data were obtained at specific exploration locations at specific times. It must be acknowledged that variations in soil/rock conditions exist between exploration locations, and this report does not necessarily reflect the variations between explorations. The nature and extent of variation may not become evident until exposed during construction. No analyses, interpretations between exploration locations, conclusions, or design recommendations are contained in this report. This report should be made available to prospective contractors for use as factual data only, and not as a warranty of subsurface conditions.

The scope of our geotechnical services has not included an environmental evaluation regarding the presence or absence of hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below the site, or for evaluation of disposal of contaminated soils or groundwater, should they be encountered.

This report has been completed within the limitations of the agreement between the Owners and West Yost Associates, Inc. and the West Yost Associates, Inc.-approved scope of work, schedule, and budget with McMillen Jacobs Associates. The services rendered have been performed in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the same area. McMillen Jacobs Associates is not responsible for the use of this report in connection with anything other than the project at the project location.

MCMILLEN JACOBS ASSOCIATES



Wolfe Lang, P.E., G.E.
Principal Geotechnical Engineer

Jeff Quinn, P.E.
Senior Project Engineer

7.0 References

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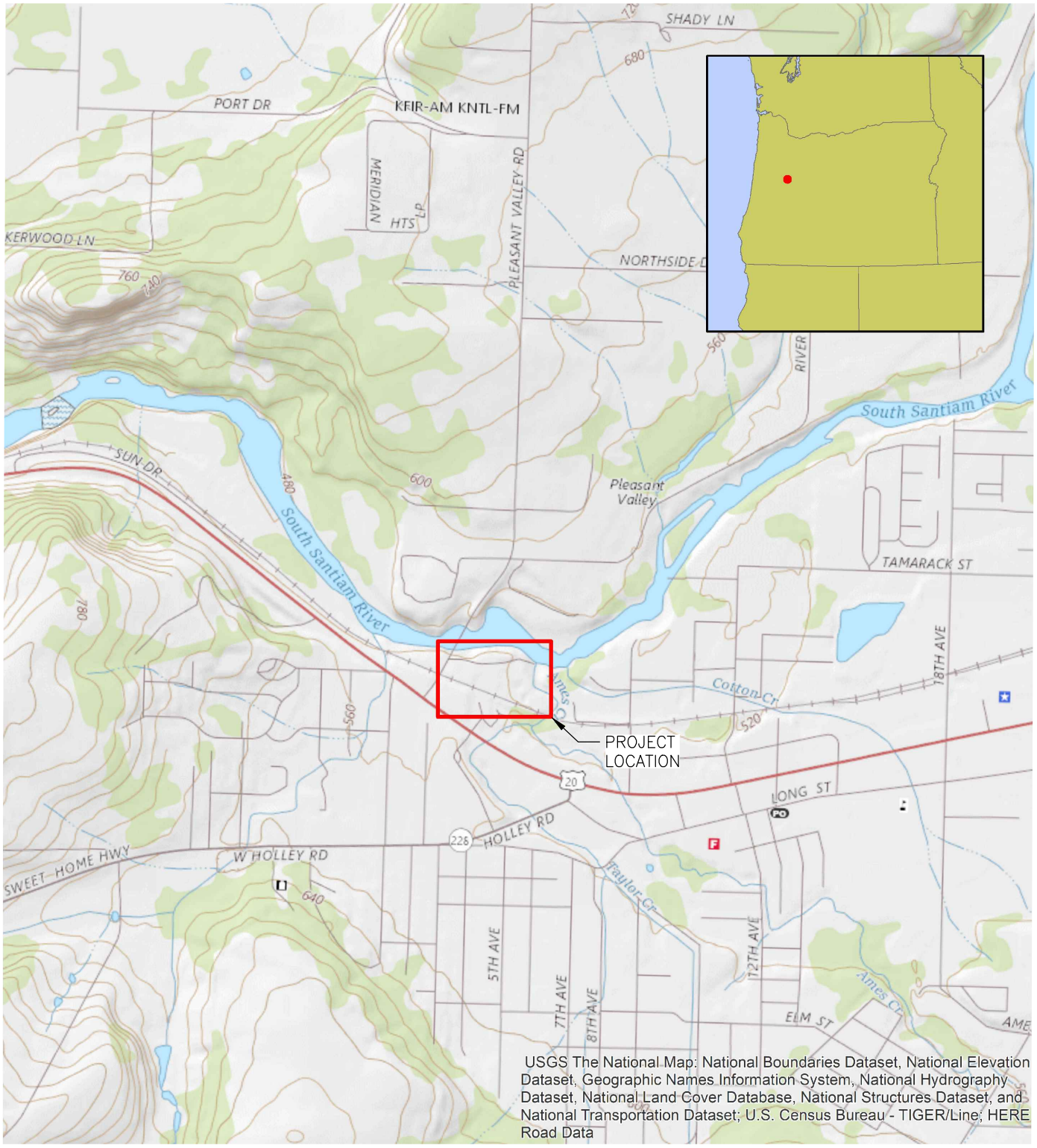
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Figures



PROJECT VICINITY MAP

SCALE: NTS

N

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CITY OF SWEET HOME

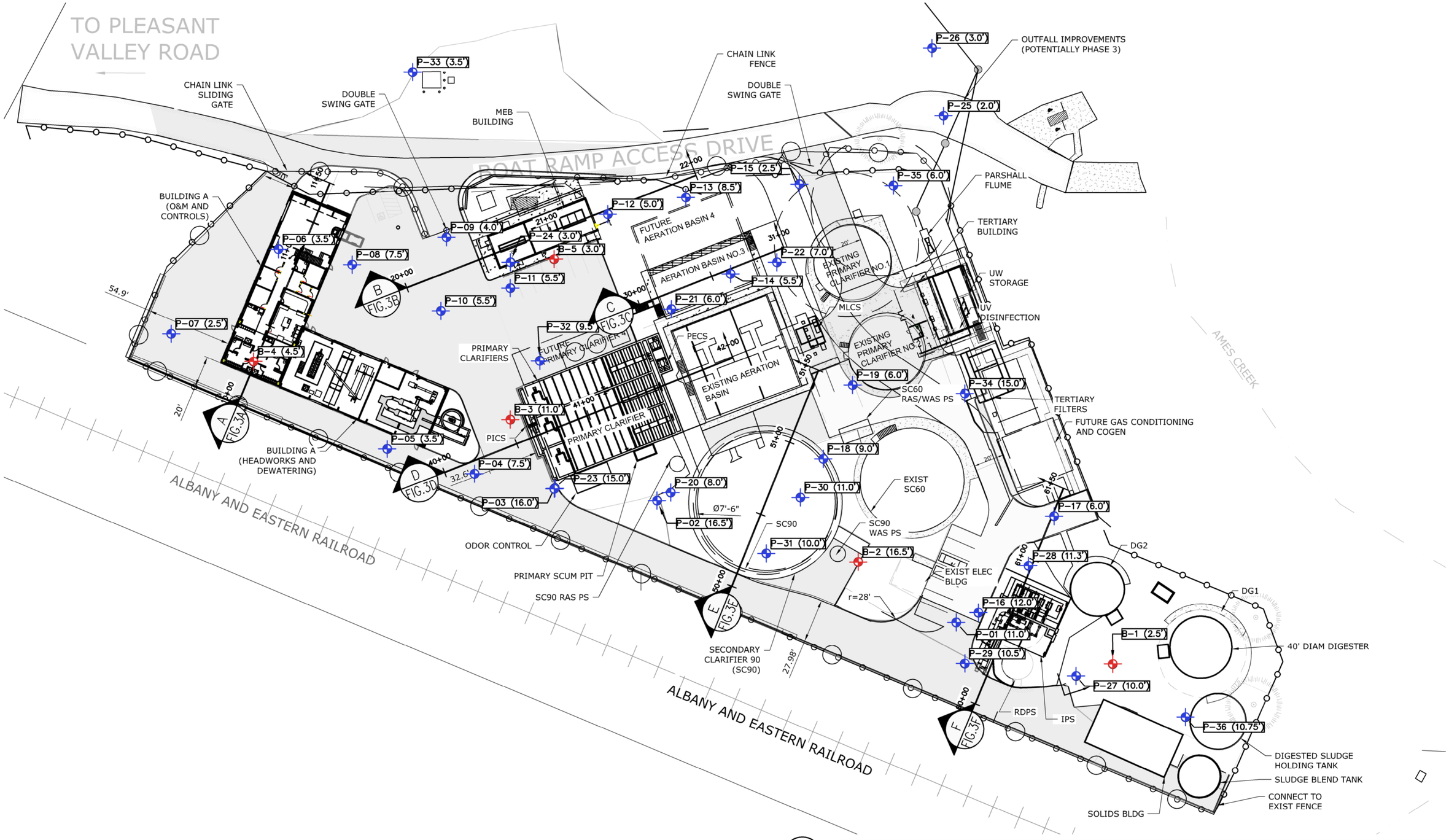
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL DATA REPORT
PROJECT VICINITY MAP

FIG.1

DEC 2022

Path: C:\Users\cburke\Box\Jobs\636 7.0 Sweet Home WWTP Final Design Review\900 Design Technology\970_Xrefs\Fig.1 – Vicinity map.dwg Plot date: Jul 21, 2022, CAD User: cburke



LEGEND:

B–1 (XX.X') BOREHOLE LOCATION (DEPTH TO ROCK IN FT)

P–01 (XX.X') PROBE–HOLE LOCATION (DEPTH TO ROCK IN FT)

EXPLORATION PLAN

SCALE: 1"=60'

0' 60' 120'

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CITY OF SWEET HOME

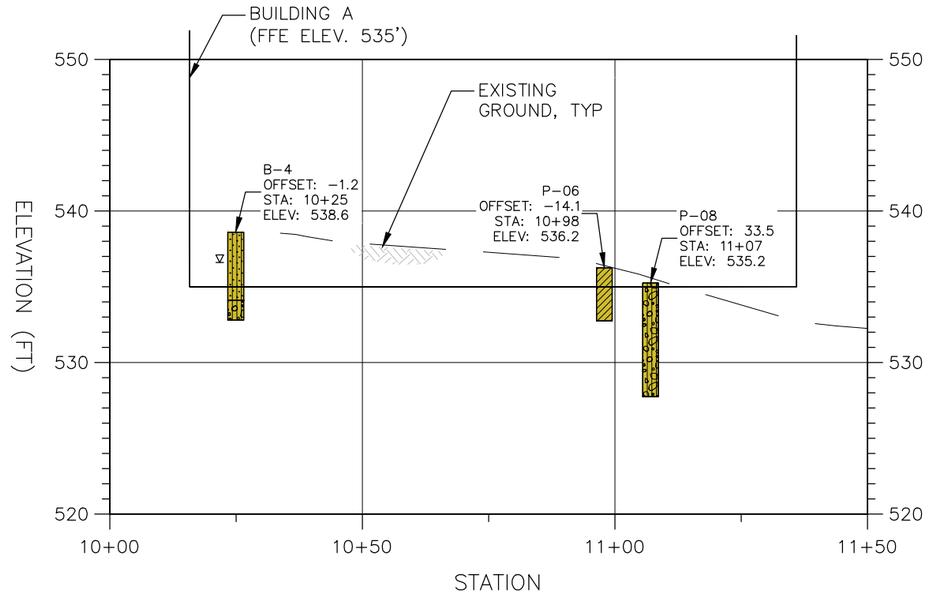
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GEOTECHNICAL DATA REPORT
EXPLORATION PLAN

FIG.2

DEC 2022

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GEOLOGIC PROFILE STA 10+00 TO 11+50

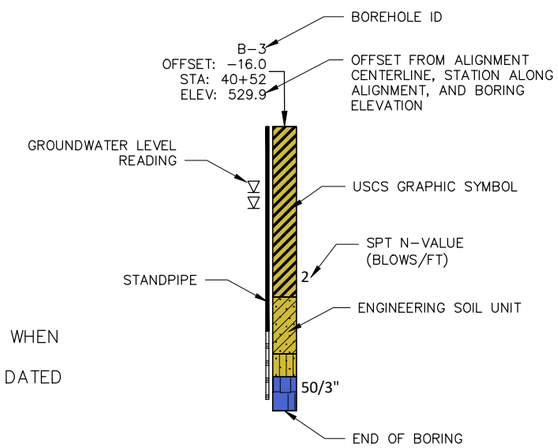
SCALE: 1"=30' HORIZ
1"=10' VERT

0' 30' 60'

0' 10' 20'

A
FIG.2

BORING/PROBE-HOLE LEGEND:



STRATIGRAPHIC LEGEND:

- WELL-GRADED GRAVEL (GW)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- SILT (ML)
- LEAN CLAY (CL)
- LOW PLASTICTIY ORGANIC CLAY (OL)
- FAT CLAY (CH)
- BASALT
- FILL
- BASALT

NOTES:

1. BOREHOLE LOCATIONS ARE APPROXIMATE.
2. BOREHOLE LOCATIONS ARE PROJECTED PERPENDICULAR TO ALIGNMENT.
3. OFFSETS ARE NEGATIVE LEFT OF ALIGNMENT AND POSITIVE RIGHT OF ALIGNMENT WHEN TRAVELING IN THE DIRECTION OF INCREASING STATION.
4. ALIGNMENT IS BASED ON 90% DRAWINGS PROVIDED BY WEST YOST ASSOCIATES, DATED JUNE 2022.

McMILLEN JACOBS ASSOCIATES

CITY OF SWEET HOME

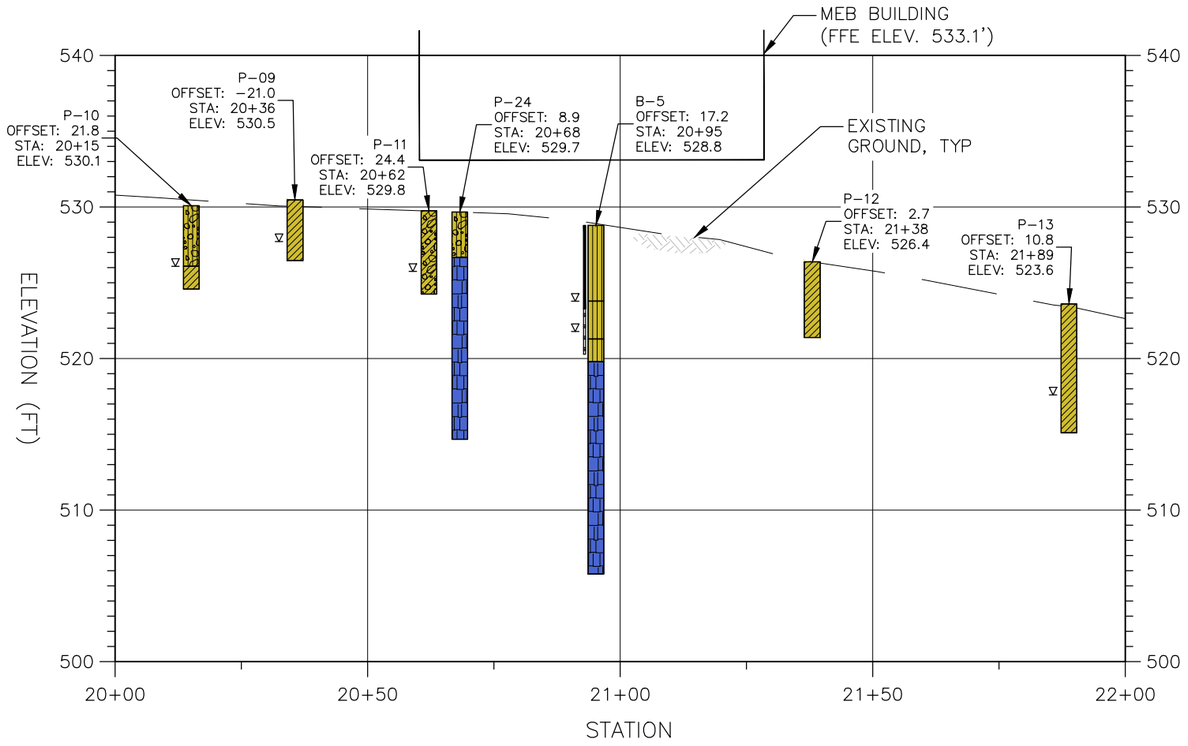
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL DATA REPORT
GEOLOGIC PROFILE
BUILDING A

FIG.3A

DEC 2022

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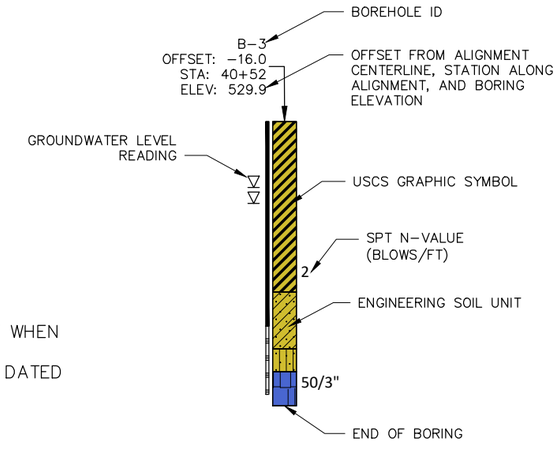
SCALE: 1"=30' HORIZ
1"=10' VERT

0' 30' 60'

0' 10' 20'

A
FIG.2

BORING/PROBE-HOLE LEGEND:



STRATIGRAPHIC LEGEND:

- WELL-GRADED GRAVEL (GW)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- SILT (ML)
- LEAN CLAY (CL)
- LOW PLASTICTIY ORGANIC CLAY (OL)
- FAT CLAY (CH)
- BASALT
- FILL
- BASALT

NOTES:

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McMILLEN JACOBS ASSOCIATES

CITY OF SWEET HOME

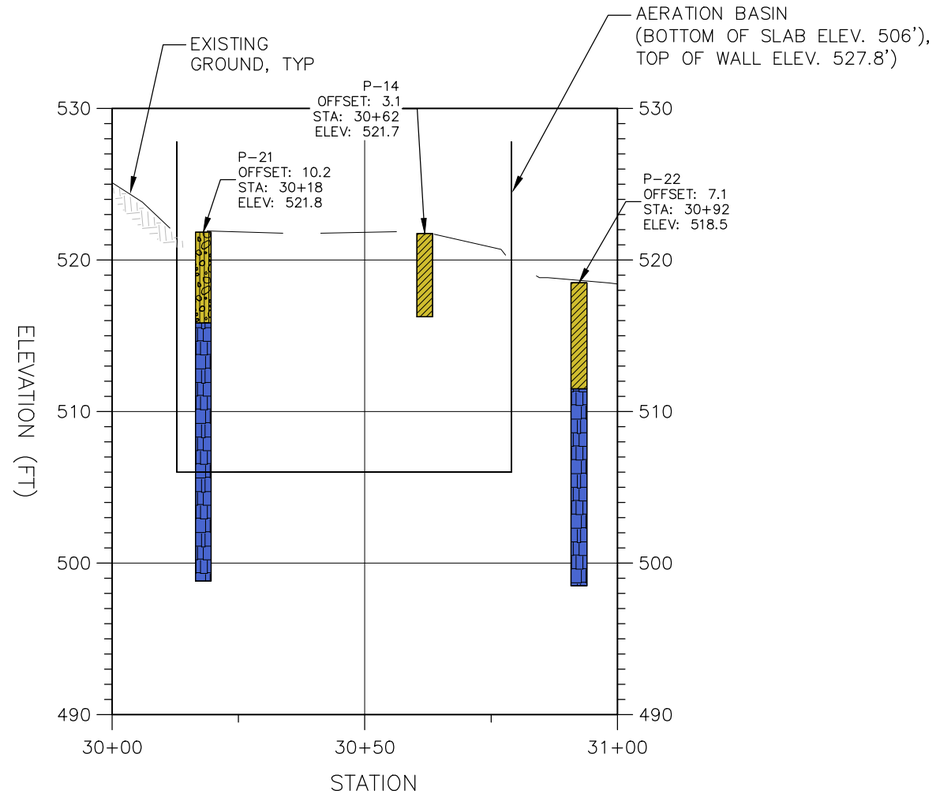
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL DATA REPORT
GEOLOGIC PROFILE
MEB BUILDING

FIG.3B

DEC 2022

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GEOLOGIC PROFILE STA 30+00 TO 31+00

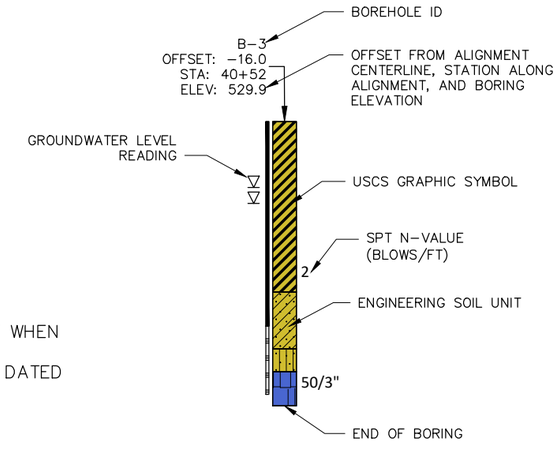
SCALE: 1"=30' HORIZ
1"=10' VERT

0' 30' 60'

0' 10' 20'

A
FIG.2

BORING/PROBE-HOLE LEGEND:



STRATIGRAPHIC LEGEND:

- WELL-GRADED GRAVEL (GW)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- SILT (ML)
- LEAN CLAY (CL)
- LOW PLASTICTIY ORGANIC CLAY (OL)
- FAT CLAY (CH)
- BASALT
- FILL
- BASALT

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CITY OF SWEET HOME

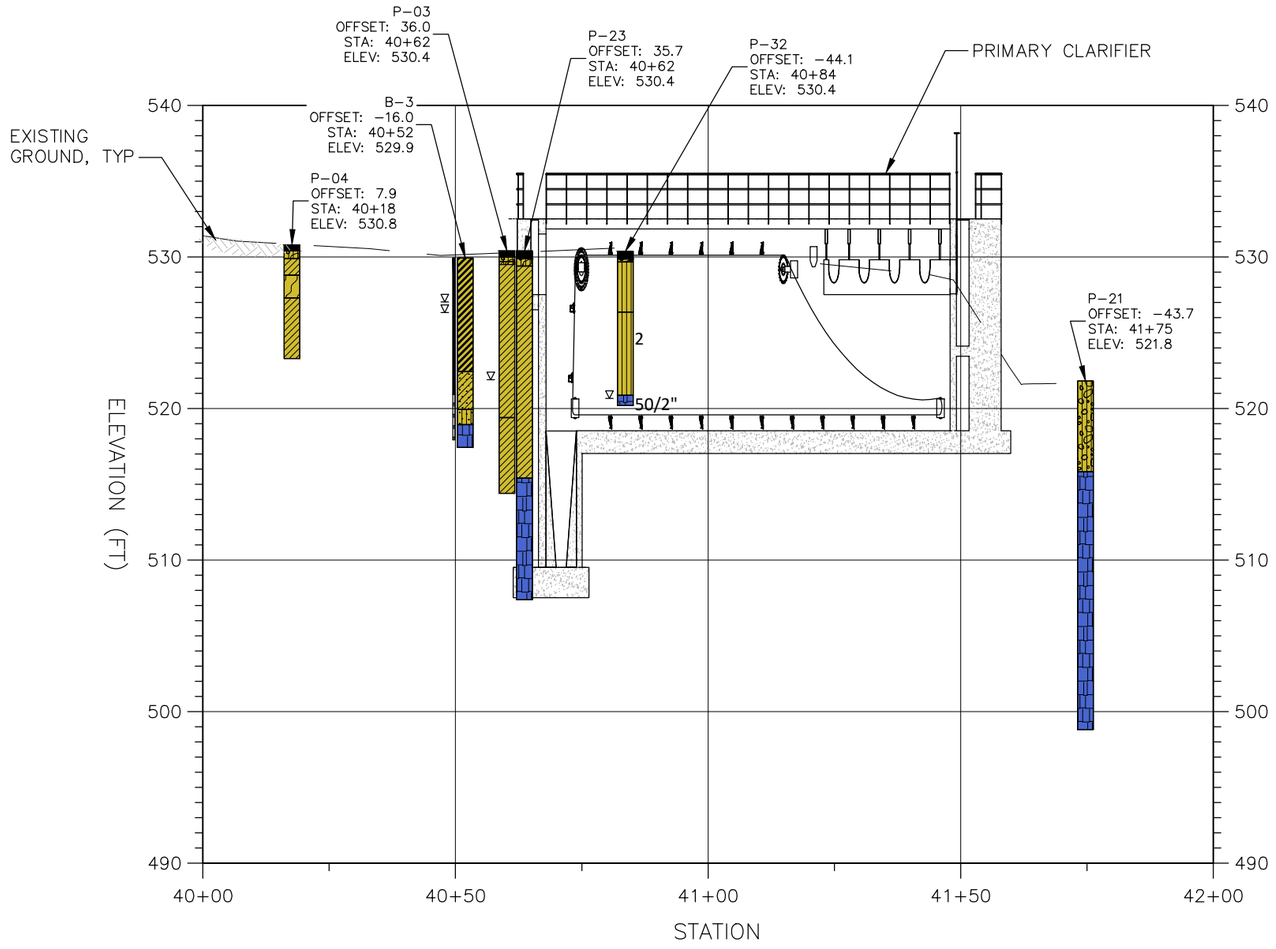
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GEOTECHNICAL DATA REPORT
GEOLOGIC PROFILE
AERATION BASIN NO. 3

FIG.3C

DEC 2022

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GEOLOGIC PROFILE STA 40+00 TO 42+00

SCALE: 1"=30' HORIZ
1"=10' VERT

0' 30' 60'

0' 10' 20'

A
FIG.2

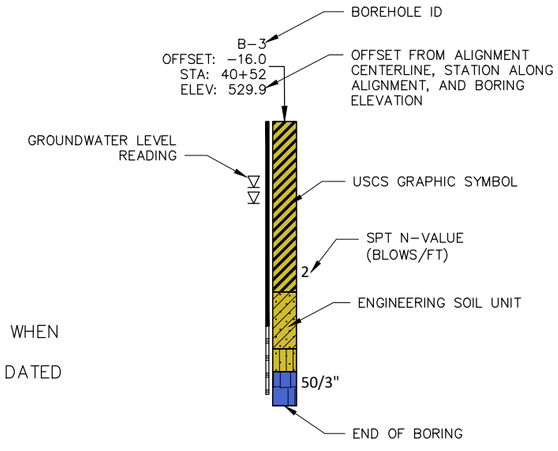
STRATIGRAPHIC LEGEND:

- WELL-GRADED GRAVEL (GW)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- SILT (ML)
- LEAN CLAY (CL)
- LOW PLASTICTIY ORGANIC CLAY (OL)
- FAT CLAY (CH)
- BASALT
- FILL
- BASALT

NOTES:

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BORING/PROBE-HOLE LEGEND:



McMILLEN JACOBS ASSOCIATES

CITY OF SWEET HOME

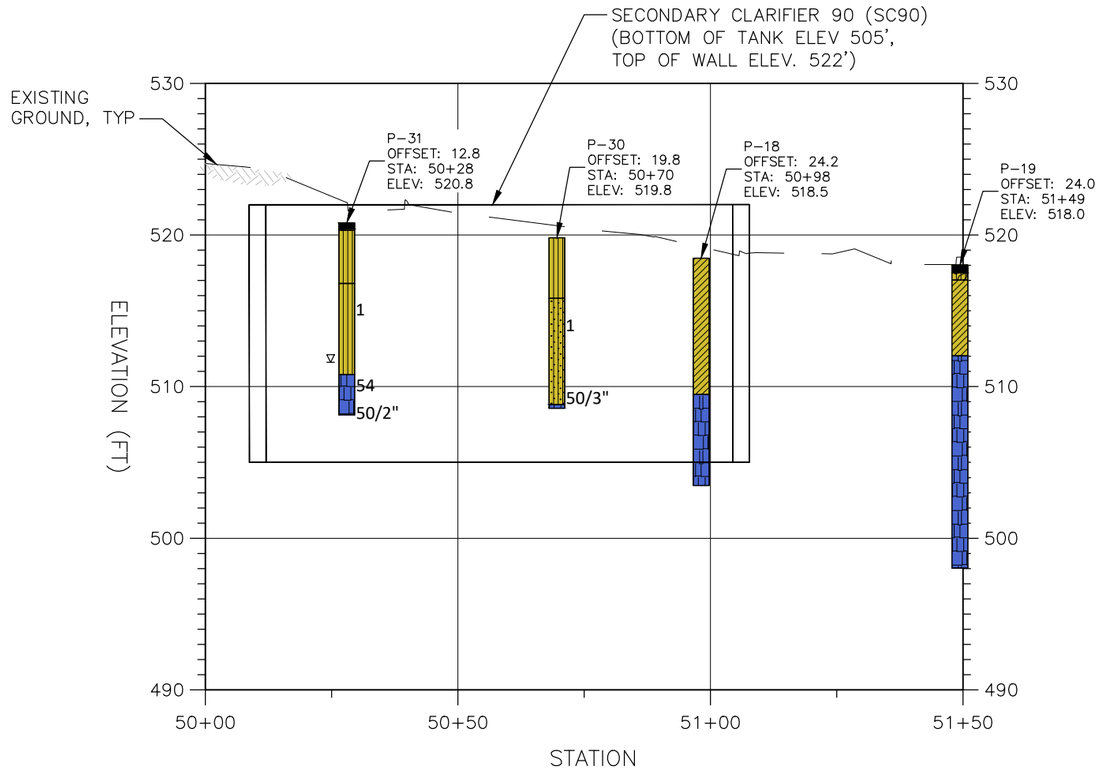
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL DATA REPORT
GEOLOGIC PROFILE
PRIMARY CLARIFIER

FIG.3D

DEC 2022

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GEOLOGIC PROFILE STA 50+00 TO 51+50

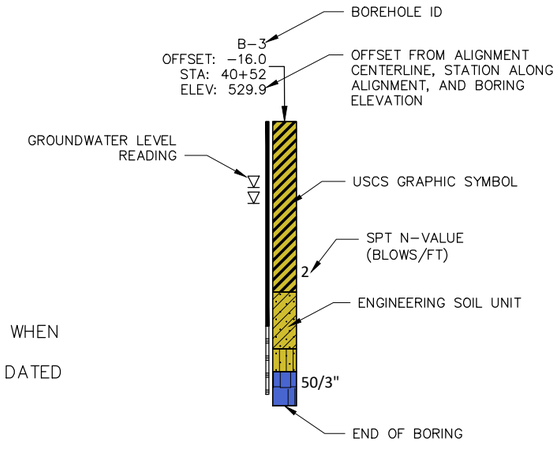
SCALE: 1"=30' HORIZ
1"=10' VERT

0' 30' 60'

0' 10' 20'

A
FIG.2

BORING/PROBE-HOLE LEGEND:



STRATIGRAPHIC LEGEND:

- WELL-GRADED GRAVEL (GW)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- SILT (ML)
- LEAN CLAY (CL)
- LOW PLASTICTIY ORGANIC CLAY (OL)
- FAT CLAY (CH)
- BASALT
- FILL
- BASALT

NOTES:

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CITY OF SWEET HOME

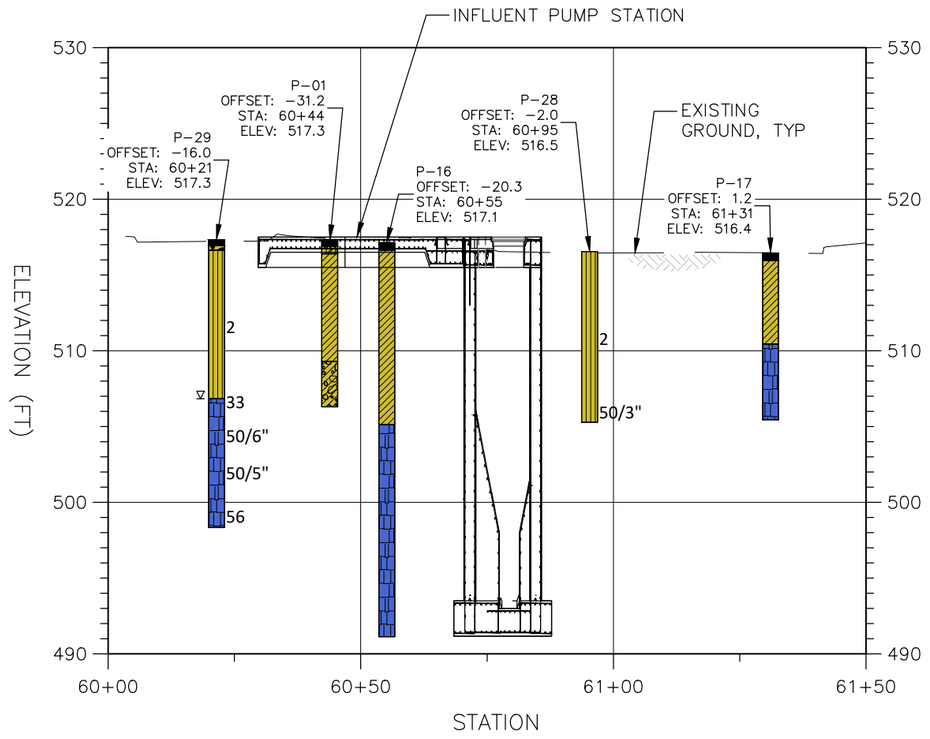
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL DATA REPORT
GEOLOGIC PROFILE
SECONDARY CLARIFIER 90 (SC90)

FIG.3E

DEC 2022

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GEOLOGIC PROFILE STA 60+00 TO 61+50

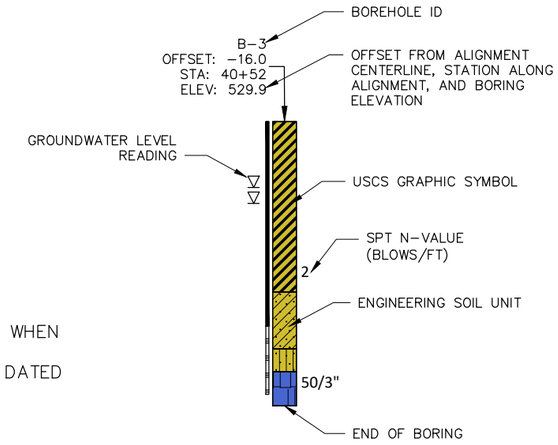
SCALE: 1"=30' HORIZ
1"=10' VERT

0' 30' 60'

0' 10' 20'

A
FIG.2

BORING/PROBE-HOLE LEGEND:



STRATIGRAPHIC LEGEND:

- WELL-GRADED GRAVEL (GW)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- SILT (ML)
- LEAN CLAY (CL)
- LOW PLASTICTIY ORGANIC CLAY (OL)
- FAT CLAY (CH)
- BASALT
- FILL
- BASALT

NOTES:

1. BOREHOLE LOCATIONS ARE APPROXIMATE.
2. BOREHOLE LOCATIONS ARE PROJECTED PERPENDICULAR TO ALIGNMENT.
3. OFFSETS ARE NEGATIVE LEFT OF ALIGNMENT AND POSITIVE RIGHT OF ALIGNMENT WHEN TRAVELING IN THE DIRECTION OF INCREASING STATION.
4. ALIGNMENT IS BASED ON 90% DRAWINGS PROVIDED BY WEST YOST ASSOCIATES, DATED JUNE 2022.

McMILLEN JACOBS ASSOCIATES

CITY OF SWEET HOME

MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL DATA REPORT
GEOLOGIC PROFILE
INFLUENT PUMP STATION

FIG.3F

DEC 2022

Path: C:\Users\cburke\Box\Jobs\63670 Sweet Home WWTP Final Design Review\900 Design Technology\970_Xrefs\PROFILES.dwg Plot date: Jul 21, 2022, CAD User: cburke

Appendix A

Boring Logs

McMILLEN JACOBS ASSOCIATES

Key to Log of Borings and Descriptive Terms for Soils
Project: 5834.0 Sweet Home WWTP Schematic Design
Sweet Home, OR

Soil Legend

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS Based on ASTM D2488 & D2487)					
MAJOR DIVISIONS			GROUP/SYMBOL		TYPICAL DESCRIPTION
COARSE-GRAINED SOILS (50% or more retained on No. 200 sieve)	GRAVELS (more than 50% retained on No. 4 sieve)	CLEAN GRAVELS (less than 5% fines)	GW		WELL-GRADED GRAVEL
			GP		POORLY GRADED GRAVEL
		GRAVELS (with 5 to 12% fines)	GW-GM		WELL-GRADED GRAVEL WITH SILT
			GW-GC		WELL-GRADED GRAVEL WITH CLAY
			GP-GM		POORLY GRADED GRAVEL WITH SILT
			GP-GC		POORLY GRADED GRAVEL WITH CLAY
		GRAVELS WITH FINES (more than 12% fines)	GM		SILTY GRAVEL
			GC		CLAYEY GRAVEL
	SANDS (less than 50% retained on No. 4 sieve)	CLEAN SANDS (less than 5% fines)	SW		WELL-GRADED SAND
			SP		POORLY GRADED SAND
		SANDS (with 5 to 12% fines)	SW-SM		WELL-GRADED SAND WITH SILT
			SW-SC		WELL-GRADED SAND WITH CLAY
			SP-SM		POORLY GRADED SAND WITH SILT
			SP-SC		POORLY GRADED SAND WITH CLAY
		SANDS WITH FINES (more than 12% fines)	SM		SILTY SAND
			SC		CLAYEY SAND
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)	SILTS & CLAYS (liquid limit less than 50)	INORGANIC	ML		SILT
			CL		LEAN CLAY
		ORGANIC	OL		LOW PLASTICITY ORGANIC CLAY
	SILTS & CLAYS (liquid limit greater than 50)	INORGANIC	MH		ELASTIC SILT
			CH		FAT CLAY
		ORGANIC	OH		HIGH PLASTICITY ORGANIC CLAY
	SILT/CLAY (liquid limit between 12 and 25)	INORGANIC	CL-ML		CLAYEY SILT / SILTY CLAY
HIGHLY ORGANIC SOILS	PRIMARILY ORGANIC MATTER		PT		PEAT

Notes:

1. Dual symbols (symbols separated by a hyphen, e.g. SP-SM, slightly silty fine SAND) are used for soils between 5% and 12% fines or when liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart.

Moisture Content

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch.
Moist	Damp but no visible water.
Wet	Visible free water, usually from below water table.

Gradation

Gradation	Description
Well-Graded	Approximately equal amounts of all grain sizes
Poorly Graded	Predominately one size (uniformly graded) or a wide range of sizes with a missing intermediate size (gap-graded)

Grain Size

Term	Grain Size	Example
Boulder	Greater than 12" (30cm)	Basketball or Larger
Cobble	3" - 12" (75mm - 30cm)	Fist to Basketball
Gravel Coarse	¾" - 3" (20mm - 75mm)	Thumb to Fist Sized
Gravel Fine	No. 4 Sieve - ¾" (5mm - 20mm)	Pea to Thumb Sized
Sand Coarse	No. 10 Sieve - No. 4 Sieve (2mm - 5mm)	Rock Salt to Pea Sized
Sand Medium	No. 40 Sieve - No. 10 Sieve (0.4mm - 2mm)	Sugar to Rock Salt
Sand Fine	No. 200 sieve - No. 40 sieve (0.08mm - 0.4mm)	Flour to Sugar
Fines	Passing No. 200 Sieve (0.08mm)	Grains Not Visible

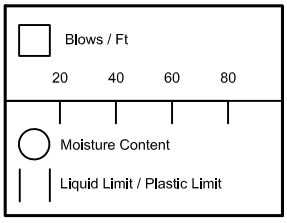
Relative Consistency

Fine - Grained Soils	
Relative Density	N, SPT Blows/Foot
Very Soft	< 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	> 30

Criteria for Describing Plasticity

Description	Criteria
Nonplastic	A ⅛" (3mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

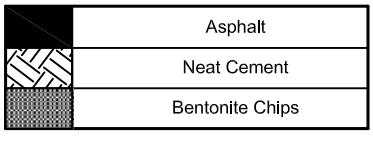
Test Symbols



Relative Density

Coarse - Grained Soils	
Relative Density	N, SPT Blows/Foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

Backfill Symbols



High/Low Water Level Screened Well Interval



McMILLEN JACOBS ASSOCIATES

Key to Boring Logs - Rock

Rock Strength

Description	Recognition	Uniaxial Compressive Strength (psf)
Extremely Weak Rock	Indented by thumbnail	30 to 150
Very Weak Rock	Peeled by pocket knife	150 to 700
Weak Rock	Peeled with difficulty by pocket knife	700 to 3,600
Moderately Strong Rock	Indented 5 mm with sharp end of pick	3,600 to 7,200
Strong Rock	One hammer blow to fracture	7,200 to 14,500
Very Strong Rock	Many hammer blows to fracture	14,500 to 36,000
Extremely Strong Rock	Only chipped by hammer blows	> 36,000

Core Recovery Calculation (%)

$$\frac{\Sigma \text{ Length of recovered core}}{\text{Total Length of core run}} \times 100$$

RQD Calculation (%)

$$\frac{\Sigma \text{ Length of core pieces} > 4 \text{ in.}}{\text{Total Length of core run}} \times 100$$

Rock Weathering

Residual Soil	Entirely decomposed to secondary minerals; material can be easily broken by hand
Completely Weathered	Almost entirely decomposed to secondary minerals; material can be granulated by hand
Highly Weathered	More than half of the rock is decomposed
Moderately Weathered	Rock is discolored and noticeably weakened, but less than half is decomposed
Slightly Weathered	Rock is slightly discolored, but not noticeably lower in strength than fresh rock
Fresh	Rock shows no discoloration, loss of strength, or other effect of weathering or alteration

Discontinuity Type

J	Joint
FJ	Joint along foliation
S	Shear
F	Fault
HJ	Healed joint
MB	Mechanical break
B	Joint along bedding

Rock Fracture Spacing

Extremely Close Spacing	Fractures spaced less than 1 inch apart
Very Close Spacing	Fractures spaced 1 to 2.5 inches apart
Close Spacing	Fractures spaced 2.5 to 8 inches apart
Moderate Spacing	Fractures spaced 8 inches to 2 feet apart
Wide Spacing	Fractures spaced 2 to 6.5 feet apart
Very Wide Spacing	Fractures spaced 6.5 to 20 feet apart
Extremely Wide Spacing	Fractures spaced greater than 20 feet apart

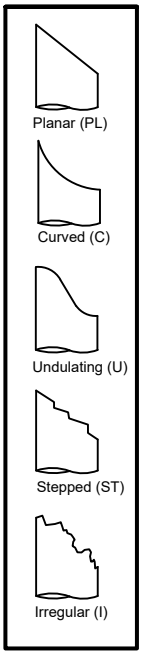
Sample Symbols

	HQ3 Rock Coring

Lithology Graphics

Basalt  Core Loss/ No Recovery 

Fracture Shape



Surface Roughness

Slickensided	Surface has smooth, glassy finish with visual evidence of striations
Smooth	Surface appears smooth and feels so to the touch
Slightly Rough	Asperities on discontinuity surfaces are distinguishable and can be felt
Rough	Ridges and side-angle steps are evident, surface feels very abrasive
Very Rough	Near vertical steps and ridges occur on discontinuity surface

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring B-1

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **Mud Rotary and HQ Wireline/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **13.5 ft**	
Hole Diameter: **4.00 in**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **516.5 ft**	
Location: **Survey**	Coordinates: **7617396.39 E, 275319.73 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Concrete - 18" thick (Pavement)		
							GM	Dense, moist, gray Silty Gravel (GM); Fine to coarse angular gravel, low plasticity silt (Base Aggregate)		At 2.5 feet very slow, very rough drilling. At 3.5 feet switch to rock coring.
512 / 5		100	RUN 1					BASALT, very strong (R5), slightly weathered to fresh, moderately to highly fractured, planar, stepped, smooth to rough joints with very narrow apertures (Little Butte Volcanic Series - Tholeiitic Basalt) *Run 1: 3.5-8.5 feet.* *RQD = 59%*		From 5.20 feet to 6.30 feet, UCS = 25,300 psi.
507 / 10		80	RUN 2					*Run 2: 8.5 -13.5 feet:* *RQD = 42%* *Planar and irregular, smooth to slightly rough joints.*		
502 / 15										Borehole completed at 13.5ft. below ground surface (bgs).
497 / 20										
492 / 25										
487 / 30										

McMILLEN JACOBS ASSOCIATES

Boring B-1

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring B-2

Date(s) Drilled: **05/01/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **Mud Rotary/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **16.5 ft**	
Hole Diameter: **4.00 in**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **518.2 ft**	
Location: **Survey**	Coordinates: **7617232.28 E, 275385.44 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
514							OL/OH	Organic Soil (OL/OH); Mulch (Fill)		
5/2/2018 1▼		47	S1	7-5-11 (N=16)			CL	Very stiff, moist, brown to gray brown, Sandy LEAN CLAY with Gravel (CL); Medium plasticity, medium to low toughness, fine to coarse sand, fine angular gravel (Fill)		
5		27	S2	2-4-4 (N=8)			SM	Loose, moist to wet, brown, Silty SAND with Gravel (SM); Fine to coarse sand, fine angular gravel, medium plasticity, slow dilatancy (Fill)		
		53	S3	2-3-1 (N=4)				Very loose, wet, brown, Silty SAND (SM); Fine to medium sand, low plasticity fines, rapid dilatancy (Fill)		
509										
10		73	S4	2-0-0 (N=WOR)			SM	*At 10.0 grades to orange-brown, occurrence of trace, fine, angular gravel, and slow dilatancy.*		
		33	S5	0-0-1 (N=1)						
504										
15		100	S5	17-18-27 (N=45)			GC	Very dense, moist, gray and olive-brown, CLAYEY GRAVEL with Sand (GC); Fine to coarse angular gravel, fine to coarse sand, medium plasticity fines (Fill)		Borehole completed at 16.5ft. below ground surface (bgs).
499										
20										
494										
25										
489										
30										

McMILLEN JACOBS ASSOCIATES

Boring B-2

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring B-3

Date(s) Drilled: **05/02/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **Mud Rotary/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **12.5 ft**	
Hole Diameter: **4.00 in**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **529.9 ft**	
Location: **Survey**	Coordinates: **7617007.93 E, 275477.18 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
525 / 5		53	S1	3-2-1 (N=3)			CH	Soft, moist, gray with trace orange mottles, Sandy FAT CLAY (CH); High plasticity, medium toughness, fine sand, occasional organics (Fill)		
		60	S2	0-1-1 (N=2)				*At 5.0 feet grades to scattered woody organics.*		
		100	S3	1-1-1 (N=2)			SC	Very loose, moist to wet, gray, CLAYEY SAND (SC); Fine to medium sand, medium plasticity and medium toughness fines, occasional 1-inch sandy lenses of slow dilatancy (Fill)		
520 / 10		87	S4	0-16-49 (N=65)			SM	Medium dense, wet, red-brown, SILTY SAND (SM); Fine to medium sand, low plasticity fines, slow dilatancy (Fill)		
		0	S5	50/0" (Refusal)				Dark gray basalt chips in cuttings (Little Butte Volcanic Series - Tholeiitic Basalt)		At 11.0 feet very rough , very slow drilling.
515 / 15										Borehole completed at 12.5ft. below ground surface (bgs).
510 / 20										
505 / 25										
500 / 30										

McMILLEN JACOBS ASSOCIATES

Boring B-3

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring B-4

Date(s) Drilled: **05/01/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **Mud Rotary/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **5.8 ft**	
Hole Diameter: **4.00 in**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **538.6 ft**	
Location: **Survey**	Coordinates: **7616842.35 E, 275514.57 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
534 5/2/2018 1		20	S1	7-10-7 (N=17)			SM	Medium dense, moist to wet, dark gray, SILTY SAND with Gravel (SM); Fine to medium sand, fine angular gravel, low plasticity fines, slow dilatancy, scattered organics (Fill)		
5		120	S2	28-50/3" (Refusal)			GM	Very dense, moist, gray and orange, SILTY GRAVEL with Sand (GM); Fine to coarse gravel, fine to coarse sand, medium plasticity fines (Fill)		At 4.5 feet very slow, very rough drilling.
529 10										Borehole completed at 5.8ft. below ground surface (bgs).
524 15										
519 20										
514 25										
509 30										

McMILLEN JACOBS ASSOCIATES

Boring B-4

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring B-5

Date(s) Drilled: **05/02/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **Mud Rotary and HQ Wireline/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **23.0 ft**	
Hole Diameter: **4.00 in**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **528.8 ft**	
Location: **Survey**	Coordinates: **7617036.16 E, 275580.52 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
524								Stiff, moist, gray, Sandy SILT (ML); Low plasticity, medium toughness, fine sand, trace coarse sand, occasional organics (Fill)		
5		53	S1	1-5-6 (N=11)			ML			
10/29/2015		53	S2	1-1-1 (N=2)			ML	Soft, moist to wet, green to red-brown, Sandy SILT (ML); Low plasticity, low toughness, fine to medium sand, occasional organics (Fill)		
		73	S3	1-4-11 (N=15)			ML	Stiff, wet, gray and red-brown, Sandy SILT (ML); Low plasticity, medium toughness fines, fine sand, trace medium and coarse sand, occasional organics (Fill)		
519								Run 1: 9.0 - 13.0 feet, RQD = 75%; BASALT, very strong (R5), slightly weathered to fresh, moderately to highly fractured, planar and curved, smooth to rough, high angle and sub-horizontal narrow joints (Little Butte Volcanic Series - Tholeiitic Basalt)		At 8.5 feet, more difficulty drilling, driller remarks likely weathered rock.
10		100	RUN 1							At 9.0 feet, switch to rock coring. RQD = 75%. From 11.7 feet to 12.4 feet UCS = 29,919 psi.
514								*Run 2: 13.0-18.0 feet, RQD = 86%, addition of irregular joints and < 0.1" thick light blue green staining/coating of occasional joints.*		At 13.0 feet RQD = 86%.
15		100	RUN 2							
509								*Run 3: 18.0-23.0 feet, RQD = 74%, grade to medium strong based on testing*		At 18.0 feet RQD = 74%. From 18.0 feet to 19.0 feet UCS = 6,932 psi.
20		100	RUN 3							
504										Borehole completed at 23ft. below ground surface (bgs).
25										
499										
30										

McMILLEN JACOBS ASSOCIATES

Boring B-5

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-01

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **11.0 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **517.3 ft**	
Location: **Survey**	Coordinates: **7617295.47 E, 275346.48 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt (Pavement)		
							GM	Dense, gray, Silty GRAVEL (GM); (Base Aggregate)		
								Very soft to soft, moist, brown, LEAN CLAY with Sand (CL); Low plasticity, medium toughness, fine sand, trace medium sand, occasional organics (Fill)		
513 / 5			S1				CL			
										At 9.0 feet driller remarks that the material stiffens.
										At 10.0 feet, driller remarks that the material feels like rock but the auger is able to continue to spin. Auger refusal at 11 feet.
508 / 10							GC	Very loose to loose, moist to wet, gray brown, CLAYEY GRAVEL with Sand (GC); Fine to coarse angular basalt gravel, fine to coarse sand, low plasticity fines (Fill)		
										Borehole completed at 11ft. below ground surface (bgs).
503 / 15										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
498 / 20										
493 / 25										
488 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-01

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-02

Date(s) Drilled: **05/01/2018 - 01/05/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **11.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **526.1 ft**	
Location: **Survey**	Coordinates: **7617102.54 E, 275424.97 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (□ BLOWS/FT 20 40 60 80; ○ MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
522 / 5							CL	Soft to very soft, moist, brown to light brown, Sandy LEAN CLAY with Gravel (CL); Low plasticity, fine angular gravel, occasional organics (Fill)		At 2.5 feet very slow, very rough drilling.
517 / 10										Auger refusal at 11.5 feet.
512 / 15										Borehole completed at 11.5ft. below ground surface (bgs). Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
507 / 20										
502 / 25										
497 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-02

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-03

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **16.0 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **530.4 ft**	
Location: **Survey**	Coordinates: **7617036.27 E, 275432.54 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
526 / 5							GM	Asphalt (Pavement) Base rock (Fill)		
							CL	Very soft to soft, moist, dark gray-brown, LEAN CLAY with Sand (CL); Fine sand (Fill)		
521 / 10 ▼ 4/30/2018							CL	Very soft to soft, moist to wet, gray, Sandy LEAN CLAY (CL); Medium plasticity, fine to medium sand (Fill) *At 13.0 feet, grades to brown, moist to wet, decrease in sand content.*		
516 / 15										Auger refusal at 16 feet.
										Borehole completed at 16ft. below ground surface (bgs).
511 / 20										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
506 / 25										
501 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-03

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-04

Date(s) Drilled: **04/30/2018 - 04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **7.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **530.8 ft**	
Location: **Survey**	Coordinates: **7616984.89 E, 275442.28 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt - 5" thick (Pavement)		
							GM	Dense, moist, gray Silty GRAVEL (GM); Fine to coarse angular gravel, low plasticity silt, 5 inches thick (Base Aggregate)		
							CL			
			S1				OL/ OH	Very soft to soft, moist, dark gray-brown, LEAN CLAY (CL); (Fill)		At 2.5 feet driller remarks that material becomes stiffer, woody material began smoking so driller added water to hole, very slow drilling. Organic chemical odor in the wood fiber of Sample 1.
								Hard, moist, brown, Organic Soil with Sand (OL/OH); Frequent hard wood in clay (Fill)		
526 5							CL	Very soft to soft, moist, green-brown with brown-orange mottles, LEAN CLAY (CL); Low plasticity, fine sand, trace medium sand (Fill)		
			S2							Auger refusal at 7.5 feet.
521 10										Borehole completed at 7.5ft. below ground surface (bgs).
516 15										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
511 20										
506 25										
501 30										

McMILLEN JACOBS ASSOCIATES

Boring P-04

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-05

Date(s) Drilled: **05/01/2018 - 05/01/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **3.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **533.1 ft**	
Location: **Survey**	Coordinates: **7616928.58 E, 275458.29 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
							CL	Very soft to soft, moist, brown to light brown, LEAN CLAY with Sand (CL); Low plasticity, medium toughness, fine sand, trace coarse angular gravel, occasional organics (Fill)		Auger refusal at 3.5 feet.
529 / 5										Borehole completed at 3.5ft. below ground surface (bgs).
524 / 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
519 / 15										
514 / 20										
509 / 25										
504 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-05

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-06

Date(s) Drilled: **04/30/2018 - 04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **3.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **536.2 ft**	
Location: **Survey**	Coordinates: **7616858.52 E, 275586.88 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
			S1				CL	Stiff, moist to wet, brown, LEAN CLAY (CL); Low plasticity, medium toughness, trace fine to medium sand, fine gravel, occasional woody organics (Fill)		Auger refusal at 3.5 feet.
532 / 5										Borehole completed at 3.5ft. below ground surface (bgs).
527 / 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
522 / 15										
517 / 20										
512 / 25										
507 / 30										

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-07

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **2.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **538.0 ft**	
Location: **Survey**	Coordinates: **7616789.32 E, 275532.46 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
							GM	Very loose to loose, moist, dark brown, SILTY GRAVEL with Sand (GM); Angular fine to coarse gravel with cobbles, low plasticity fines (Fill)		Auger refusal at 2.5 feet.
533 5										Borehole completed at 2.5ft. below ground surface (bgs).
528 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
523 15										
518 20										
513 25										
508 30										

McMILLEN JACOBS ASSOCIATES

Boring P-07

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-08

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **7.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **535.2 ft**	
Location: **Survey**	Coordinates: **7616905.96 E, 275577.01 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
531 / 5			S1				GM	Very loose to loose, moist, dark brown, SILTY GRAVEL with Sand (GM); Fine to coarse angular to subangular gravel, fine to coarse sand, low plasticity fines, occasional woody organics (Fill)		Slight petroleum odor while drilling. Auger refusal at 7.5 feet.
526 / 10										Borehole completed at 7.5ft. below ground surface (bgs). Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
521 / 15										
516 / 20										
511 / 25										
506 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-08

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-09

Date(s) Drilled: **05/01/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **4.0 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **530.5 ft**	
Location: **Survey**	Coordinates: **7616966.80 E, 275594.59 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (□ BLOWS/FT 20 40 60 80; ○ MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
526 5/2/2018 ▼			S1				CL	Moist, gray-brown, Sandy LEAN CLAY with Gravel (CL); Low plasticity, fine to coarse sand, fine angular gravel, scattered organics (Fill)		Slight petroleum odor. Auger refusal at 4 feet.
5										Borehole completed at 4ft. below ground surface (bgs). Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
521 10										
516 15										
511 20										
506 25										
501 30										

McMILLEN JACOBS ASSOCIATES

Boring P-09

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-10

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **5.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **530.1 ft**	
Location: **Survey**	Coordinates: **7616963.18 E, 275547.22 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
526 0							GM	Very loose to loose, moist, brown, SILTY GRAVEL with Sand (GM); Fine to coarse gravel, fine and coarse sand, low plasticity. (Fill)		
5/1/2018 1							CL	Very soft to soft, wet, gray-brown, LEAN CLAY with Sand (CL); Low plasticity, fine sand, trace angular fine angular gravel. (Fill)		Auger refusal at 5.5 feet.
521 5										Borehole completed at 5.5ft. below ground surface (bgs).
516 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
511 15										
506 20										
501 25										
30										

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Boring P-10

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-11

Date(s) Drilled: **04/30/2018 - 04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **5.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **529.8 ft**	
Location: **Survey**	Coordinates: **7617007.94 E, 275561.88 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
525 5			S1				GC	Very loose to loose, moist to wet, brown to gray brown, Clayey GRAVEL with Sand (GC); Fine to coarse gravel, fine to coarse sand (Fill)		Auger refusal at 5.5 feet.
520 10										Borehole completed at 5.5ft. below ground surface (bgs). Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
515 15										
510 20										
505 25										
500 30										

5/1/2018 1

McMILLEN JACOBS ASSOCIATES

Boring P-11

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-12

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **5.0 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **526.4 ft**	
Location: **Survey**	Coordinates: **7617070.84 E, 275609.56 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
522 / 5			S1				CL	Very soft to soft, moist, brown, Gravelly LEAN CLAY with Sand (CL); Low plasticity, fine to coarse angular gravel, fine to coarse sand (Fill)		Auger refusal at 5 feet.
										Borehole completed at 5ft. below ground surface (bgs).
517 / 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
512 / 15										
507 / 20										
502 / 25										
497 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-12

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-13

Date(s) Drilled: **04/30/2018 - 04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **8.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **523.6 ft**	
Location: **Survey**	Coordinates: **7617121.16 E, 275620.34 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
519 / 0							CL	Very soft to soft, moist to wet, dark brown to gray brown, Sandy LEAN CLAY with Gravel (CL); Low plasticity, fine to coarse sand, fine angular gravel (Fill)		Loose gravelly material begins caving at the ground surface.
5/6/2018 1										Auger refusal at 8.5 feet.
514 / 5										Borehole completed at 8.5ft. below ground surface (bgs).
509 / 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
504 / 15										
499 / 20										
494 / 25										
30										

McMILLEN JACOBS ASSOCIATES

Boring P-13

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-14

Date(s) Drilled: **05/01/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **5.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **521.7 ft**	
Location: **Survey**	Coordinates: **7617149.97 E, 275571.01 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
517 / 5			S1				CL	Very soft to soft, wet, gray-brown, Sandy LEAN CLAY with Gravel (CL); Low plasticity, fine to coarse sand, fine angular gravel (Fill)		Observed groundwater at approximately 4.0 feet water present, difficult to measure due to gravel.
512 / 10										Auger refusal at 5.5 feet.
507 / 15										Borehole completed at 5.5ft. below ground surface (bgs).
502 / 20										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
497 / 25										
492 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-14

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-15

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **2.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **519.1 ft**	
Location: **Survey**	Coordinates: **7617194.34 E, 275628.88 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
519 0							GC	Very loose to loose, moist to wet, brown, CLAYEY GRAVEL with Sand (GC); Fine angular gravel, fine to coarse sand (Fill)		Auger refusal at 2.5 feet.
4/30/2018 ▽ 515 5										Borehole completed at 2.5ft. below ground surface (bgs).
510 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
505 15										
500 20										
495 25										
490 30										

McMILLEN JACOBS ASSOCIATES

Boring P-15

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-16

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **26.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **517.1 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617309.79 E, 275352.81 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt (Pavement)		
								Soft, moist, brown, CLAY (CL) (Fill)		
513										
5							CL			
508										
10										
								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
503										
15										
498										
20										
493										
25										Borehole completed at 26ft. below ground surface (bgs).
488										
30										

McMILLEN JACOBS ASSOCIATES

Boring P-16

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-17

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **11.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **516.4 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617358.56 E, 275414.92 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt (Pavement)		
								Soft, moist, brown, CLAY (CL) (Fill)		
							CL			
512 / 5										
								Basalt, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
507 / 10										
										Borehole completed at 11ft. below ground surface (bgs).
502 / 15										
497 / 20										
492 / 25										
487 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-17

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-18

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **15.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **518.5 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617209.77 E, 275451.86 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
514 / 5							CL	Soft, moist, brown, CLAY (CL) (Fill)		
509 / 10								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
504 / 15										Borehole completed at 15ft. below ground surface (bgs).
499 / 20										
494 / 25										
489 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-18

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-19

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **20.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **518.0 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617228.61 E, 275499.48 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt (Pavement)		
							GM	Medium dense, gray, silty GRAVEL (GM) (Fill)		
								Soft, moist, brown, CLAY (CL) (Fill)		
514							CL			
5										
								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
509										
10										
504										
15										
499										
20										Borehole completed at 20ft. below ground surface (bgs).
494										
25										
489										
30										

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-20

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **20.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **525.4 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617111.38 E, 275430.15 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
521 / 5							CL	Soft, moist, brown, CLAY (CL) (Fill)		
516 / 10								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
511 / 15										
506 / 20										Borehole completed at 20ft. below ground surface (bgs).
501 / 25										
496 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-20

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-21

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **23.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **521.8 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617111.78 E, 275548.31 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
517 / 5							GM	Loose, gray, silty GRAVEL (GM) (Fill)		
512 / 10								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
507 / 15										
502 / 20										
497 / 25										Borehole completed at 23ft. below ground surface (bgs).
492 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-21

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-22

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **20.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **518.5 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617179.82 E, 275578.51 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
514 / 5							CL	Soft, moist, brown, slightly sandy CLAY (CL) (Fill)		
509 / 10								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
504 / 15										
499 / 20										Borehole completed at 20ft. below ground surface (bgs).
494 / 25										
489 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-22

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-23

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **23.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **530.4 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617036.68 E, 275432.95 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
526 / 0								Asphalt (Pavement)		
							GM	Medium dense, gray, slightly silty GRAVEL (GM) (Fill)		
								Soft, moist, brown, CLAY (CL) (Fill)		
526 / 5										
							CL			
521 / 10										
516 / 15								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
511 / 20										There was no return of rock chips until 22 feet bgs. Driller commented that the hole was being plugged by dirt and preventing return of rock fragments.
506 / 25										Borehole completed at 23ft. below ground surface (bgs).
501 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-23

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-24

Date(s) Drilled: **10/30/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **15.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **529.7 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617008.03 E, 275578.53 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
525 / 0							GM	Loose, gray, silty GRAVEL (GM) (Fill)		
525 / 5								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		Driller commented that it got wet around 5 feet bgs.
520 / 10										
515 / 15										Borehole completed at 15ft. below ground surface (bgs).
510 / 20										
505 / 25										
500 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-24

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-25

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **15.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **506.4 ft**	
Location: **Pleasant Valley Boat Ramp**	Coordinates: **7617287.27 E, 275672.91 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt (Pavement)		
							GM	Medium dense, gray, silty GRAVEL (GM) (Fill)		
502								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
5										
497										
10										
492										
15										Borehole completed at 15ft. below ground surface (bgs).
487										
20										
482										
25										
477										
30										

McMILLEN JACOBS ASSOCIATES

Boring P-25

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-26

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **23.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **507.2 ft**	
Location: **Pleasant Valley Boat Ramp**	Coordinates: **7617279.85 E, 275716.52 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
503 / 5							GM	Medium dense, gray, silty GRAVEL (GM) (Fill)		
								BASALT, fractured, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		Driller comments that between 5 and 12 feet bgs seemed like highly fractured rock.
498 / 10										
								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
493 / 15										
488 / 20										
483 / 25										Borehole completed at 23ft. below ground surface (bgs).
478 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-26

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-27

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **26.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **516.6 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617372.72 E, 275312.04 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Concrete (Pavement)		
								Soft, moist, brown, slightly sandy CLAY (CL) (Fill)		
512 / 5							CL			
507 / 10								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
502 / 15										
497 / 20										
492 / 25										Borehole completed at 26ft. below ground surface (bgs).
487 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-27

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-28

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 11.2 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 516.5 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617342.00 E, 275383.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
512 / 5		67	SPT-1	1-1-1 (N=2)			ML	Soft, moist, brown, SILT (ML); low plasticity, trace fine gravel, trace fine sand, trace wood fibers. (Fill)		
		100	G-1					*Becomes gray mottled at 5.5 feet.*		
507 / 10		64	SPT-2	1-7-50/3" (Refusal)				*10 - 11 feet: sample consists of approx. 50% wood fibers by volume.* *Auger refusal at 11.25 feet on basalt bedrock.*		Borehole completed at 11.25ft. below ground surface (bgs).
502 / 15										
497 / 20										
492 / 25										
487 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-28

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-29

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 19.0 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 517.3 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617301.00 E, 275320.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt - 5" thick (Pavement) Base Aggregate - 3" thick (Fill) Soft, moist, brown, SILT (ML); low plasticity, trace fine gravel, trace fine sand, trace wood fibers. (Fill)		
513		100	G-1							
5		20	SPT-1	1-0-2 (N=2)			ML			
		100	G-2							
508										
10		33	SPT-2	0-7-26 (N=33)				*Becomes wet at 10 feet.*		Auger grinding below 10 - 15 feet.
		100	G-3					BASALT; very weak, dark brown, highly weathered to decomposed (Little Butte Volcanic Series - Tholeiitic Basalt)		
		70	SPT-3	50/12" (Refusal)						
503										
15		98	SPT-4	26-50/5" (Refusal)				*Penetration rate decreases significantly at 15 feet; stronger rock inferred below this depth.*		Smooth, slow drilling below 15 feet.
		87	SPT-5	12-23-33 (N=56)				*Becomes dark blue-gray at 18 feet.*		
498										Borehole completed at 19ft. below ground surface (bgs).
20										
493										
25										
488										
30										

McMILLEN JACOBS ASSOCIATES

Boring P-29

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-30

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 11.2 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 519.8 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617195.00 E, 275427.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
		100	G-1				ML	Moist, light brown, SILT with gravel (ML); low plasticity, fine to coarse angular gravel. (Fill)		
515 / 5		100	SPT-1	1-0-1 (N=1)			SM	Very soft, wet, light brown, Silty SAND (SM); fine to medium sand, low plasticity fines. (Fill)		
510 / 10		40	SPT-2	8-11-50/3" (Refusal)				*Basalt inferred below 11 feet.* *Auger refusal at 11.25 feet on basalt bedrock.*		Borehole completed at 11.25ft. below ground surface (bgs).
505 / 15										
500 / 20										
495 / 25										
490 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-30

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-31

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 12.7 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 520.8 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617173.00 E, 275391.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt - 5" thick (Pavement)		
								Base Aggregate - 1" thick (Fill)		
							ML	Moist, light brown, SILT with gravel (ML); low plasticity, fine to coarse angular gravel. (Fill)		
516 / 5		33	SPT-1	0-0-1 (N=1)			ML	Very soft, moist to wet, Sandy SILT (ML); fine to medium sand, low plasticity fines. (Fill)		
511 / 10		40	SPT-2	30-38-16 (N=54)				*Basalt inferred below 10 feet.*		Rod chatter begins at 9 feet and increases significantly below 10 feet.
		147	SPT-3	50/2" (Refusal)				*Auger refusal at 12.67 feet on basalt bedrock.*		Borehole completed at 12.67ft. below ground surface (bgs).
506 / 15										
501 / 20										
496 / 25										
491 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-31

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-32

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 10.2 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 530.4 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617027.00 E, 275515.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt - 6" thick (Pavement)		
								Base Aggregate - 2" thick (Fill)		
		100	G-1				ML	Moist, dark brown, SILT with gravel (ML); low plasticity, fine to coarse gravel. (Fill)		
526										
5		100	SPT-1	0-1-1 (N=2)			ML	Soft, moist, gray, SILT (ML); low plasticity, trace fine sand. (Fill) *Becomes gray at 4.5 feet.*		
521										Rod chatter below 9.5 feet bgs.
10		47	SPT-2	50/2" (Refusal)				*Auger refusal at 10.17 feet on basalt bedrock.*		Borehole completed at 10.17ft. below ground surface (bgs).
516										
15										
511										
20										
506										
25										
501										
30										

McMILLEN JACOBS ASSOCIATES

Boring P-32

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-33

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 3.7 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 529.6 ft	
Location: See Figure 2 Site Plan	Coordinates: 7616945.00 E, 275701.00 N	Elevation Source: Site Survey	

ELEV. (FT) / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
525 / 5		100	G-1				GM	Moist, brown, Silty GRAVEL (GM); fine to coarse gravel, non-plastic fines. (Fill)		Strong rod chatter from ground surface to 3.5 feet bgs.
		0	SPT-1	50/2" (Refusal)				*Basalt inferred below 3.5 feet.*		Auger bit grinding at 3.5 feet.
520 / 10								*Auger refusal at 3.67 feet on basalt bedrock.*		Borehole completed at 3.67ft. below ground surface (bgs).
515 / 15										
510 / 20										
505 / 25										
500 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-33

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-34

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 15.0 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 516.9 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617301.00 E, 275494.00 N	Elevation Source: Site Survey	

ELEV. (FT) / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt - 5" thick (Pavement)		
							GM	Base Aggregate - 2" thick (Fill)		
								Moist, brown, Silty GRAVEL (GM); fine to coarse gravel, low plasticity fines. (Fill)		
		100	G-1					Soft to very soft, moist, brown, SILT (ML); low plasticity, trace fine sand. (Fill)		
512 / 5		40	SPT-1	1-1-3 (N=4)			ML			
507 / 10		33	SPT-2	1-0-1 (N=1)				*Becomes very soft, grades to Silt with sand at 10 feet.*		
502 / 15		100	SPT-3	50/2" (Refusal)				*Auger refusal at 15 feet on basalt bedrock.*		Borehole completed at 15ft. below ground surface (bgs).
497 / 20										
492 / 25										
487 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-34

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-35

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 7.1 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 517.5 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617255.00 E, 275628.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
513 / 5							GM	Moist, dark gray and brown, Silty GRAVEL (GM); fine to coarse gravel. (Fill)		Rod chatter from ground surface to 5 feet bgs.
							ML	Soft, moist, brown, SILT (ML); low plasticity, trace fine sand. (Fill)		
		60	SPT-1	0-1-2 (N=3)						Rod chatter and difficulty anvancing auger below 6 feet.
		0	SPT-2	50/1" (Refusal)				*Basalt inferred below 6 feet.*		
508 / 10								*Auger refusal at 7.08 feet on basalt bedrock.*		Borehole completed at 7.08ft. below ground surface (bgs).
503 / 15										
498 / 20										
493 / 25										
488 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-35

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-36

Date(s) Drilled: 11/22/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: J. Quinn	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: Western States Soil Conservation, Inc.	Total Depth of Borehole: 11.6 ft	
Hole Diameter: 8.00 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 516.77 ft	
Location: SE Corner of WWTP Site	Coordinates: 7617443.00 E, 275286.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Concrete - 6" thick (Pavement)		
								Base Aggregate - 6" thick (Fill)		
								Stiff, moist, brown with orange mottling, LEAN CLAY (CL); low to medium plasticity, trace coarse rounded gravel, trace fine sand. (Fill)		
		55	SPT-1	2-8-7 (N=15)						
-5 5								*Becomes medium stiff at 5 feet bgs.*		
		50	SPT-2	2-3-4 (N=7)			CL			
		60	SPT-3	50/5" (Refusal)				*Boulders/cobbles likely from 7.5 to 9.0 feet bgs.*		Slow, difficult drilling from 7.5 to 9 feet bgs.
								Becomes stiff at 9.0 feet bgs.		Drillers cracked auger transfer rod at approximately 8.5 feet bgs. Abandoned original boring at 8.5 feet bgs due to being off vertical alignment and moved about 4 feet west to re-drill boring.
-10 10		100	SPT-4	3-3-9 (N=12)				*Becomes gray with rootlets at 10 feet bgs.*		
								Basalt inferred below 10.75 feet bgs.		Difficult, slow drilling below 10.75 feet bgs. 30 minutes to advance from 10.75 to 11.5 feet bgs.
		800	SPT-5	50/0" (Refusal)						Borehole completed at 11.6ft. below ground surface (bgs).

McMILLEN JACOBS ASSOCIATES

Boring P-36

Appendix B

Rock Core Photos



BOREHOLE B-01, 3.5 TO 13.5 FEET



BOREHOLE B-05, 9.0 TO 16.3 FEET

McMILLEN JACOBS ASSOCIATES	**SWEET HOME WWTP SCHEMATIC DESIGN GEOTECHNICAL DATA REPORT**	**JULY 2022**
	CORE PHOTOGRAPHS	**FIGURE C - 1**



BOREHOLE B-05, 16.3 TO 23 FEET

Appendix C

Laboratory Test Results

Northwest Testing, Inc.
A Division of Northwest Geotech, Inc.
9120 SW Pioneer Court, Suite B, Wilsonville, Oregon 97070 | ph: 503.682.1880 fax: 503.682.2753 | www.nwgeotech.com

TECHNICAL REPORT

Report To:	Mr. Farid Sariosseiri McMillen Jacobs Associates 1500 SW First Avenue, Suite 750 Portland, Oregon 97201	**Date:** **Lab No:**	5/14/18 18-108
Project:	Laboratory Testing – Sweet Home WWTP 5834.0	**Project No.:**	2286.1.1

Report of: Atterberg limits, moisture content, and compressive strength of rock

Sample Identification

NTI completed Atterberg limits, moisture content, and compressive strength of rock testing on samples delivered to our laboratory on May 9, 2018 by a McMillen Jacobs Associates representative. Testing was performed in accordance with the standards indicated. Our laboratory test results are summarized on the following tables and attached pages.

Laboratory Test Results

Atterberg Limits (ASTM D 4318)			
Sample ID	**Liquid Limit**	**Plastic Limit**	**Plasticity Index**
B-3 S-2 @ 5 – 6.5 ft.	51	28	23
B-5 S-1 @ 2.5 – 4 ft.	44	28	16

Moisture Content of Soil (ASTM D 2216)	
Sample ID	**Moisture Content (Percent)**
B-3 S-2 @ 5 – 6.5 ft.	44.8
B-5 S-1 @ 2.5 – 4 ft.	26.3

Copies: Addressee

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A Division of Northwest Geotech, Inc.
9120 SW Pioneer Court, Suite B, Wilsonville, Oregon 97070 | ph: 503.682.1880 fax: 503.682.2753 | www.nwgeotech.com

TECHNICAL REPORT

Report To:	Mr. Farid Sariosseiri McMillen Jacobs Associates 1500 SW First Avenue, Suite 750 Portland, Oregon 97201	**Date:** **Lab No:**	5/14/18 18-108
Project:	Laboratory Testing – Sweet Home WWTP 5834.0	**Project No.:**	2286.1.1

Laboratory Testing

Compressive Strength of Intact Rock Core Specimens (ASTM D 7012 Method C)				
Sample ID	**Diameter (inches)**	**Height (inches)**	**Rate of Loading (lbs/s)**	**Uniaxial Compressive Strength (psi)**
B-1 R-1 @ 5.2 – 6.3 ft.	2.41	4.88	100	25,302



Photo1: As received sample



Photo 2: Test sample before testing



Photo 3: Test sample after testing

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Report To:	Mr. Farid Sariosseiri McMillen Jacobs Associates 1500 SW First Avenue, Suite 750 Portland, Oregon 97201	**Date:** **Lab No:**	5/14/18 18-108
Project:	Laboratory Testing – Sweet Home WWTP 5834.0	**Project No.:**	2286.1.1

Laboratory Testing

Compressive Strength of Intact Rock Core Specimens (ASTM D 7012 Method C)				
Sample ID	**Diameter (inches)**	**Height (inches)**	**Rate of Loading (lbs/s)**	**Uniaxial Compressive Strength (psi)**
B-5 R-1 @ 11.7 – 12.4 ft.	2.41	4.85	100	25,919



Photo1: As received sample

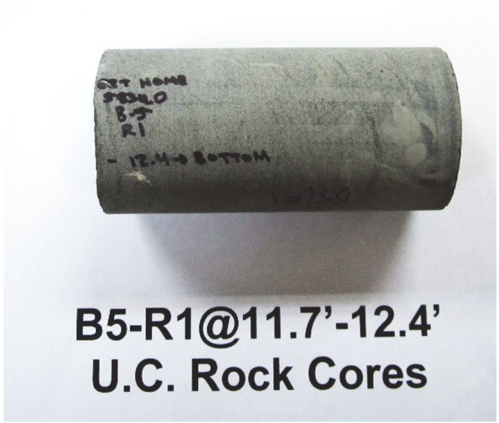


Photo 2: Test sample before testing



Photo 3: Test sample after testing

Laboratory Testing

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TECHNICAL REPORT

Report To:	Mr. Farid Sariosseiri McMillen Jacobs Associates 1500 SW First Avenue, Suite 750 Portland, Oregon 97201	**Date:** **Lab No:**	5/14/18 18-108
Project:	Laboratory Testing – Sweet Home WWTP 5834.0	**Project No.:**	2286.1.1

Compressive Strength of Intact Rock Core Specimens (ASTM D 7012 Method C)				
Sample ID	**Diameter (inches)**	**Height (inches)**	**Rate of Loading (lbs/s)**	**Uniaxial Compressive Strength (psi)**
B-5 R-2 @ 18 – 19 ft.	2.41	4.86	100	6932

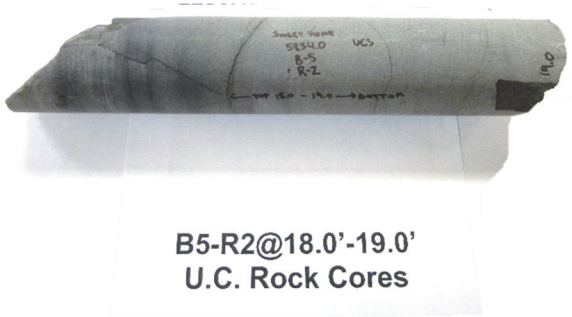


Photo1: As received sample

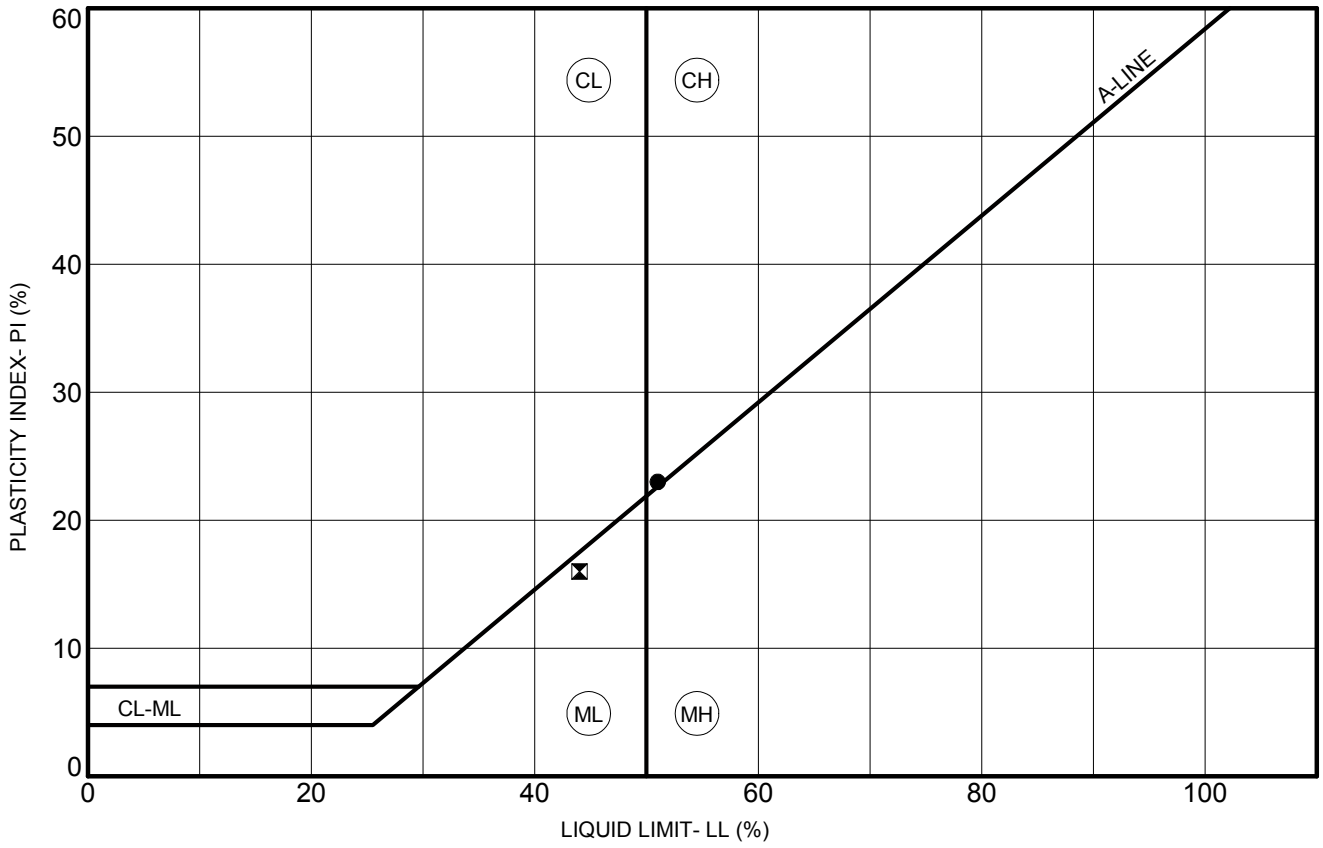


Photo 2: Test sample before testing



Photo 3: Test sample after testing

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	Sample ID	Depth (ft)	Moisture Content %	LL	PL	PI	% Pass #200	Classification
●	**B-03**	**5.0**	**(44.8)**	**51**	**28**	**23**		**CH**
⧓	**B-05**	**2.5**	**(26.3)**	**44**	**28**	**16**		**ML**

McMILLEN JACOBS ASSOCIATES

1500 SW 1ST AVE STE 750
PORTLAND, OR 97201
TELEPHONE: 503.384.2906

ATTERBERG LIMITS

Project: Waste Water Treatment Plant - Schematic Design
Number: 5834.0
Sample Location: Sweet Home
Testing Agency: Northwest Testing, Inc.

JA_ATTERBERG_PORTLAND OFFICE ADDRESS_5834.0 SWEET HOME.GPJ_JACOBS DATA TEMPLATE_GENERAL SOIL PROJECTS.GDT 6/11/18 REV-

Point Load Strength Index Test Results ASTM D-5731

PROJECT:	Sweet Home WWTP	**LAB SAMPLE NO.:**	
PROJECT NO.:	5834.0	**SAMPLE NO.:**	5834.0 - B-5
PROJECT LOCATION:	Sweet Home, OR	**SAMPLE DESCRIP:**	Basalt
SAMPLED BY:	Julia Irizarry	**DATE REPORTED:**	5/11/2018
DATE SAMPLED:	5/2/2018	**REPORTED BY:**	Devin Roth

Sample No.	Test Number	Test Type*	Rock Type	Width, W	Depth or Diameter, D	Failure Load, P	De^2	Point Load Strength Index, $I_{s(50)}$	Uniaxial Compressive Strength, UCS
				(in)	(in)	(lbs)	(in^2)	(psi)	(psi)
1	1	d	Basalt	5.31	2.36	5959	10313	513	12563
2	2	d	Basalt	5.91	2.36	3828	11459	304	7437
2B	3	d	Basalt	3.23	2.36	5158	6264	653	13717
3	4	d	Basalt	10.04	2.36	5104	19481	268	5098
3B	5	d	Basalt	5.59	2.36	6882	10848	569	13951
5	6	d	Basalt	6.69	2.36	8044	12987	579	13315
6	7	d	Basalt	5.12	2.36	4598	9931	407	9778
7	8	d	Basalt	4.13	2.36	6830	8021	714	17138
8	9	d	Basalt	11.42	2.36	8044	22154	383	9185
9	10	d	Basalt	5.20	2.36	7882	10084	690	14493
							Min	**268**	**5098**
							Max	**714**	**17138**
							Avg	**508**	**11667**

Size Corrected Point Load Index, $Is_{(50)}$

$I_{s(50)}$ = **508 psi** or **73,159 psf** or **3.5 MPa**

Mean Uniaxial Compressive Strength, σ_c

σ_c = **11,667 psi** or **1,680,111 psf** or **80 MPa**

*Test Type

d = diametral
a = axial
b = block
l= lump

Exhibit C

Sample AIS Forms

SAMPLE AIS CERTIFICATION LETTERS

The following information is provided as a sample letter of **step** certification for AIS compliance. Documentation must be provided on company letterhead.

<<Date>>

<<Company Name>>
<<Address>>
<<City State Zip>>

SUBJECT:

I, (company representative), certify that the (melting, bending, coating, galvanizing, cutting, etc.) process for (manufacturing or fabricating) the following products and/or materials shipped or provided for the subject project is in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. Xxxx
2. Xxxx
3. Xxxx

Such process took place at the following location:

_____

If any of the above compliance statements change while providing material to this project, we will immediately notify the prime contractor and the engineer.

Sincerely,
<<Company Name>>

Name - *Signed by company representative*

Title

The following information is provided as a sample letter of certification for AIS compliance. Documentation must be provided on company letterhead.

<<Date>>

<<Company Name>>
<<Address>>
<<City State Zip>>

SUBJECT:

I, (company representative), certify that the following products and/or materials shipped/provided to the subject project are in full compliance with the American Iron and Steel requirement as mandated in EPA's State Revolving Fund Programs.

Item, Products and/or Materials:

1. Xxxx
2. Xxxx
3. Xxxx

Such process took place at the following location:

_____

If any of the above compliance statements change while providing material to this project, we will immediately notify the prime contractor and the engineer.

Sincerely,
<<Company Name>>

Name - *Signed by company representative*

Title

Exhibit D

Geotechnical Engineering Report

City of Sweet Home
Mahler Water Reclamation Facility Improvements

Geotechnical Engineering Report

Final Submittal

McMILLEN JACOBS ASSOCIATES

Prepared for

WEST YOST
Water. Engineered.

December 2022

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Appendices

Appendix A Boring Logs
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Acronyms and Abbreviations

ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
bgs	below ground surface
bpf	blows per foot
CDF	controlled density fill
CLSM	controlled low strength material
CSZ	Cascadia Subduction Zone
g	standard acceleration due to gravity
GDR	Geotechnical Data Report
GER	Geotechnical Engineering Report
H	height of buried wall
H_w	submerged portion of buried wall
IBC	International Building Code
$I_{S(50)}$	point load index
LBVS	Little Butte Volcanic Series
M	earthquake magnitude
MCE	maximum credible earthquake
MJA	McMillen Jacobs Associates
NHSMP	National Seismic Hazard Mapping Project
No.	number
N-value	standard penetration test blows to advance final foot
OAR	Oregon Administrative Rules
ODOT	Oregon Department of Transportation
OSHA	Occupational Safety and Health Administration
OSSC	Oregon Structure Specialty Code
PGA	peak ground acceleration
pci	pounds per cubic inch
psi	pounds per square inch
RMR	Rock Mass Rating
RQD	Rock Quality Designation
SEI	Structural Engineering Institute
SPT	Standard Penetration Test
USGS	United States Geological Survey
West Yost	West Yost Associates, Inc.
WRF	Wastewater Reclamation Facility

Distribution

To: Preston Van Meter, P.E.
West Yost Associates, Inc.

From: Wolfe Lang, P.E., G.E.
McMillen Jacobs Associates

Prepared By: Jeff Quinn, P.E.
McMillen Jacobs Associates

Reviewed By: Wolfe Lang, P.E., G.E.
McMillen Jacobs Associates

Revision Log

Revision No.	Date	Revision Description
Final Submittal	July 22, 2022	Final Submittal to West Yost
Final Submittal, Rev. No. 1	December XX, 2022	Final Submittal Incorporating Site Revisions

1.0 Introduction

1.1 General

McMillen Jacobs Associates (MJA) has been retained by West Yost Associates, Inc. (West Yost) to provide geotechnical engineering services for the City of Sweet Home Mahler Water Reclamation Facility Improvements project. The project owner is the City of Sweet Home. The Project site location is shown in the Vicinity Map, Figure 1. This Geotechnical Engineering Report (GER) presents the results of our field explorations, laboratory testing, geotechnical analyses, and design and construction recommendations. Detailed discussions of site explorations, site geology, and laboratory testing is summarized in a Geotechnical Data Report (GDR) prepared by MJA, dated July 2022.

1.2 Project Description

The City of Sweet Home Mahler Water Reclamation Facility (WRF) is located at 1357 Pleasant Valley Road, in Sweet Home, Oregon. The WRF has been in service since 1947 with two major upgrades completed in 1974 and 1994 (Brown & Caldwell, 2016). Our project understanding is based on our communication with West Yost and the 90 percent submittal plans entitled *Mahler Water Reclamation Facility Improvements Project – Phase 1*, dated June 2022, prepared by West Yost. The proposed WRF improvements are shown in Figure 2. We were not provided with structural loading information for the above WRF improvements. We understand the WRF is to remain operational during construction of the proposed improvements.

The proposed WRF improvements include the following:

- *Main Electrical and Blower (MEB) Building*: The 22- by 67.5-foot MEB Building will be located within the north-central part of the WRF site. The interior of the building will be supported on a 6-inch-thick slab on grade foundation, while the perimeter of the structure will be supported on a 1.5-foot-wide continuous spread footing. A new generator, which will be installed on the north side of the MEB Building, will be supported on 12- by 28-foot, 12-inch-thick reinforced concrete slab on grade with thickened edges. Site grades will be raised up to approximately 6 feet in this area to facilitate construction of the MEB Building, with approximately 4 to 6 feet of fill placed below the building footprint. The approximately 6-foot-tall fill slope on the east side of the MEB Building will descend at 2H:1V (horizontal:vertical).
- *Influent Pump Station (IPS)*: The new, 40- by 56-foot IPS will be constructed just north of the existing IPS, within the southeast corner of the WRF site. The approximate southern half of the IPS structure, which supports above-grade piping, will be supported on a 12-inch-thick reinforced concrete slab on grade with thickened edges. The approximate northern half of the IPS structure, which houses five submerged pumps, will be supported on a 28-inch-thick reinforced concrete slab with a base elevation of approximately 491.2 feet (e.g., about 26.2 feet below grade).
- *Sludge Blend Tank*: The new, 28-foot diameter sludge blend tank will be constructed in the southeast corner of the WRF site just east of the solids building. The sludge blend tank will be

approximately 25 feet tall and will be supported on a 1.5-foot-thick, reinforced concrete mat foundation with a base elevation of approximately 515.3 feet (e.g., about 1.5 feet below grade).

- *Digested Sludge Holding Tank*: The new, 36-foot diameter sludge blend tank will be constructed in the southeast corner of the WRF site just north of the sludge blend tank. The sludge blend tank will be approximately 26 feet tall and will be supported on a 1.5-foot-thick, reinforced concrete mat foundation with a base elevation corresponding to approximately 1.5 feet below grade.
- *Solids Building Expansion*: The existing solids building will be enlarged from its existing 22- by 37-foot plan dimensions to approximately 32- by 57-foot plan dimensions and will be supported on a shallow foundation system consisting of perimeter footings and an interior slab-on-grade.
- *40*-foot Diameter Digestor: The new digestor will be constructed within the footprint of the existing, approximately 55-foot diameter digestor (DG1) in the southeast corner of the WRF site. We understand that the existing foundation will be used to support the new digestor structure.
- *Temporary Generator*: A temporary electrical generator, supported on an 18-inch-thick reinforced concrete slab, will be installed on the south side of existing Secondary Clarifier SC60.
- *Existing Bathroom Relocation*: The existing bathroom, currently along the northern fence line and east of the existing entrance gate, will be moved to the north side of the boat ramp access road.
- *Retaining Walls*: To support new fills placed for site grading, as well as proposed cuts, there are six retaining walls (designated Wall 1 through Wall 6) proposed as part of the improvements. The retaining walls will be cast-in-place, reinforced concrete cantilevered walls ranging in height from 2.5 to 6.75 feet.
- *Existing Structures/Facilities to Remain In Use*: Secondary Clarifier Nos. 1 through 3; RAS/WAS Pump Station; Aeration Basin; Chlorine Contact Chamber; Administration and Operations Building; Sand Filters; Lime Silo; and the electrical building on the south side of existing SC60.
- *Proposed Piping Improvements*: 12-inch storm drain;10-inch storm drain; 8-inch to 36-inch sanitary sewer; 12-inch IPS forcemain to headworks (HDPE pipe); 24-inch RS IPS to Headworks (HDPE pipe); 6-inch PS forcemain; 12-inch RDPS; 6-inch SL-WAS; 6-inch SL-D forcemain; 4-inch PSC; and 10-inch DIP waterline relocation.
- *Demolition of the Following Existing Structures*: Backwash Storage; Waste Backwash Storage; the approximately 25- by 50-foot storage building on the west side of the WRF site; and several buildings clustered together in the central portion of the WRF site including the carport, an approximately 40- by 40-foot CMU building, an approximately 25- by 50-foot Quonset Hut storage building, and an approximately 15- by 35-foot shed.
- *Primary Clarifier*: The new primary clarifier will consist of an approximately 65- by 85-foot reinforced concrete tank structure. The base depth of the new primary clarifier will be approximately 9.5 to 22.5 feet below existing site grades and will be supported on an 18-inch-thick, reinforced concrete mat foundation system. The primary clarifier will be expanded to the north (designated Primary Clarifier 4) at a future date.
- *Secondary Clarifier 90 (SC90)*: SC90 will consist of an approximately 95-foot diameter, 17-foot-tall reinforced concrete tank structure. SC90 will be a primarily below-grade structure, with the tank walls being about 2 feet above finish grade. The base depth of the SC90 will be

approximately 15 feet below existing site grades and will be supported on a reinforced concrete mat foundation.

- *Building A (O&M and Controls)*: This 40- by 120-foot building, oriented northeast-southwest, will be constructed at the west end of the WRF site and will be an at-grade structure supported on an interior slab-on-grade. The perimeter of the structure and interior load-bearing walls will be supported on shallow spread footings.
- *Building A (Headworks and Dewatering)*: This 40- by 120-foot building, oriented southeast-northwest, will abut the southeast corner of the O&M and Controls building to form the leg of the L-shaped Building A. This will be an at-grade structure supported on an interior slab-on-grade. The perimeter of the structure and interior load-bearing walls will be supported on shallow spread footings.
- *SC90 WAS and RAS Pump Stations*: Each of these two pump stations will be an approximately 10-foot diameter reinforced concrete vault structure with a base depth of approximately 16.5 feet below existing site grades and will be supported on a reinforced concrete mat foundation.
- *Existing Secondary Clarifier SC60 RAS/WAS Pump Station*: This pump station will be an approximately 10- by 20-foot reinforced concrete vault structure with a base depth of approximately 12.5 feet below existing site grades and will be supported on a reinforced concrete mat foundation.
- *Aeration Basin No. 3*: Aeration Basin No. 3 will consist of an approximately 40- by 75-foot reinforced concrete structure. The base depth of Aeration Basin No. 3 will be approximately 13 to 18 feet below existing site grades and will be supported on a reinforced concrete mat foundation. Aeration Basin No. 3 will be expanded to the north (designated Aeration Basin No. 4) at a future time and will likely be founded at the same depth as Aeration Basin No. 3.
- *Tertiary Filters*: The tertiary filters will be housed in an approximately 25- by 35-foot reinforced concrete tank structure. The base depth of Aeration Basin No. 3 will be approximately 18 feet below existing site grades and will be supported on a reinforced concrete mat foundation.
- *Tertiary Building, UV Disinfection, and UW Storage*: These facilities will be located adjacent to one another within an approximate 35- by 40-foot area. The UW Storage and UV Storage facilities will be constructed within the existing chlorine contact chamber. The portion of the Tertiary Building housing the utility water pumps will likely be approximately 7 feet below existing site grades.
- *Outfall*: The outfall pipe leads from the UV disinfection chamber to the South Santiam River. This will be part of a future project phase.
- *Other Improvements*: The approximate western half of the WRF site, an area north of the boat ramp access drive, and a narrow area along the south site boundary will be surfaced with gravel. In addition, new asphalt pavements along the entrance road from Pleasant Valley Road and within most of the WRF site; new concrete curbs and sidewalks; two new entrance gates; and a new chain-link fence.

1.3 Purpose and Scope of Work

The purpose of this investigation was to characterize the subsurface conditions at the site and develop geotechnical design recommendations for the proposed project. Specifically, our scope of work included the following:

- Assess soil seismic profile (site classification) and parameters in accordance with the 2019 Oregon Structure Specialty Code (OSSC) to support structural design. If the site is potentially liquefiable, the soil seismic profile will be only for the facilities with seismic periods less than 0.5 second.
- Evaluate the liquefaction potential and liquefaction-induced effects, such as seismic-induced settlements, lateral spreading, and potential reduction in soil bearing capacity.
- Evaluate static and seismic soil bearing capacity, subgrade modulus, and total and differential settlements for the proposed foundations and facilities.
- Provide recommendations and design criteria for shallow foundation systems.
- Provide static and seismic lateral earth pressure recommendations for the embedded walls of the proposed structures.
- Provide lateral load resistance recommendations, including passive earth pressure and coefficient of friction.
- Provide recommendations for shoring and dewatering of deep excavations.
- Provide recommendations for site preparation, grading, drainage, and wet-weather earthwork procedures.
- Provide engineered fill recommendations and compaction criteria for the foundations.

2.0 Field and Laboratory Investigation

2.1 Subsurface Exploration

Initial exploratory borings were completed by Western States Soil Conservation (WSSC) of Hubbard, Oregon using a truck-mounted CME-75 drill rig. The explorations were completed between April 30 and May 2, 2018. This exploration program included advancing five boreholes, designated B-1 through B-5, and fifteen probe-holes, designated P-01 through P-15. The boreholes were advanced using mud-rotary drilling and HQ rock coring techniques to depths ranging from 5.8 to 23 feet bgs. The probe-holes were advanced using hollow-stem auger drilling techniques and extended to between 2.5 and 15 feet bgs (top of bedrock).

Additional air-track probe holes were advanced on October 29, 2019 by McCallum Rock Drilling of Salem, Oregon using a Furakawa 900 track-mounted drill rig. This exploration program included advancing 12 air-track probe holes (designated P-16 through P-27) to depths ranging from 11 to 26 feet bgs.

On June 20, 2022, eight additional probe-holes (designated P-28 through P-35) were advanced by PLI Systems of Hillsboro, Oregon using a truck-mounted Mobile B59 drill rig. The probe-holes were advanced using hollow-stem auger drilling techniques and extended to between 3.7 and 19 feet bgs.

On November 22, 2022, one additional probe-hole (designated P-36) was advanced by WSSC using a truck-mounted CME-75 drill rig. P-36 was advanced using hollow-stem auger drilling techniques and extended to 11.5 feet bgs.

Details of the exploration and sampling intervals are provided in the project GDR (McMillen Jacobs, 2022). The exploration locations are shown in Figure 2 and the exploration logs are provided in Appendix A.

2.2 Piezometers

Two-inch diameter piezometers were installed in two boreholes to allow for long-term, stabilized groundwater level measurements. Piezometers were installed in the following boreholes:

- Boring B-3, screened between 9 and 12 feet bgs.
- Boring B-5, screened between 5.5 and 8.5 feet bgs.

2.3 Laboratory Testing

Field samples obtained from exploratory borings were delivered to the MJA Portland office for further examination and storage. Each of the samples was re-examined and compared to the field boring log description to confirm the field classifications and maintain consistency. Representative samples were then selected for laboratory testing. Testing was performed on soil and rock samples from boreholes B-1,

B-3, and B-5. The laboratory test results are provided in Appendix B. The laboratory testing included the following index and strength property tests, performed in accordance with relevant ASTM standards:

- Moisture content analyses (ASTM D 2216).
- Atterberg limits tests (ASTM D 4318).
- Point load tests of rock core (ASTM D 5731).
- Unconfined compressive strength of intact rock core (ASTM D 7012).

Point load testing was performed by MJA. All other laboratory testing was performed by Northwest Testing, Inc. of Wilsonville, Oregon. Laboratory test results are presented in Appendix B.

3.0 Site Conditions

3.1 Site Description

The site is currently occupied by the existing WRF, located on the south bank of the South Santiam River near its confluence with Ames Creek. The site is fenced around its perimeter and is bordered by the Albany and Eastern railroad tracks to the south, a boat ramp access road to the north (and the South Santiam River beyond), a private property to the west, and Ames Creek to the east. In general, the site slopes gently from the west to the east (i.e., towards Ames Creek) and gently from the south to the north (i.e., towards the South Santiam River). The eastern two-thirds of the site (in which the existing aeration basin and the clarifiers are located) is situated on a relatively level terrace that generally sits 5 to 7 feet lower than the western one-third of the site and approximately 10 feet above Ames Creek to the east.

A paved access road runs along the north side of the site, from the Pleasant Valley Road WRF entrance at the west end of the site to the boat ramp and recreation use area at the north-northeast end of the site. The paved WRF road, heading south from the access road from the main entrance gate, provides access to the main areas within the WRF. Bedrock is exposed along the South Santiam River and Ames Creek approximately 100 feet to the north-northeast of the site. Exposed bedrock on the riverbank slopes steeply into the river.

3.2 Geological Setting

The project is located in the foothills of the Western Cascades, a north-south trending physiographic region that stretches from northern California to British Columbia, tucked between the Willamette Valley to the west and the younger High Cascades to the east. The Western Cascades in Oregon were formed by a series of volcanic events from approximately 35 to 17 million years ago. The region is marked by densely forested hills dissected by the region's many rivers (Madin, 1990; Schlicker and Deacon, 1967; Wilson, 1998; Popowski, 1996). A detail description of the geological setting of the site is described in the project GDR (McMillen Jacobs, 2019).

3.3 Subsurface Conditions

The materials encountered in the explorations were grouped into three geotechnical units: Pavement, Fill, and Basalt (Little Butte Volcanic Series – Tholeiitic Basalt). These units have been defined by their geologic origin, stratigraphic position, engineering properties, and their distribution in the subsurface. Variations in subsurface conditions may exist between the locations of the borings. Contacts between the units may be more gradational than shown in the boring logs in Appendix A. The SPT N-values, shown on the boring logs and discussed below, are reported as counted in the field (uncorrected). Photos of rock core samples are provided in Appendix C. Cross sections of subsurface conditions are shown in Figures 3A through 3F. The following sections describe each geotechnical unit in greater detail.

3.3.1 Pavement

Asphalt concrete (AC) was encountered in 12 borings, as described in the boring logs in Appendix A. The AC pavement ranged from about 4 to 6 inches in thickness and was typically underlain by about 4 inches of crushed rock base. Portland Cement Concrete (PCC) pavement was encountered in three borings (B-1,

P-27, and P-36). In B-1, the PCC pavement was about 18 inches thick and underlain by about 12 inches of crushed rock base. In P-27 and P-36, the PCC pavement section was about 6 inches thick.

3.3.2 Fill

Undocumented fill materials were present in all the explorations and were likely placed for site grading and development. We observed highly variable fill depths across the site, extending from the existing ground surface to depths ranging from 2 to 16.5 feet bgs. Additionally, the fill depths often varied considerably over short distances. The fill was underlain by bedrock, and generally consisted of silt with variable amounts of organics, lean to fat clay with variable amounts of sand and gravel, sand and gravel with variable amounts of silt and clay, and organic soil with variable amounts of sand. Undocumented fill refers to materials placed without (available) records of subgrade conditions or evaluation of compaction. Standard Penetration Tests (SPTs) conducted within the fill yielded N-values ranged from 0 to 45 blows per foot (bpf). The higher N-values were generally recorded at the fill-bedrock contact.

3.3.3 Boulders

Based on drilling action and slow advancement rates, we believe that large cobbles or boulders were encountered between 7.5 to 9 feet bgs in boring P-36, located in the southeast corner of the WRF site.

3.3.4 Basalt - Little Butte Volcanic Series Tholeiitic Basalt

The Little River Butte Volcanic Series (LRBV) in the project area consists of tholeiitic basalt and is bedrock in this area. The basalt was encountered beneath the fill in all the explorations. The depth to the LRBV ranged from 2.0 feet to 16.5 feet bgs.

The unconfined compressive strength of the basalt varied between approximately 7,000 psi and 26,000 psi with an average value of approximately 19,000 psi. The results of point load tests indicate that the Point Load Index ($I_{S(50)}$) of the basalt ranged between approximately 270 psi and 715 psi, with an average value of 510 psi. We suspect the lower value of unconfined compressive strengths may correspond to failure along the weak planes. Definition of rock strength and depth to bedrock at each exploration are provided in Table 3-1 and Table 3-2, respectively. The basalt characteristics are discussed in more details in Section 3.4. The depth to bedrock is also included on the geologic cross sections shown in Figures 3A through 3F.

Table 3-1. Definition of Rock Strength Descriptions

Grade[1]	Approximate Uniaxial Compressive Strength (psi)	Qualitative Description
R0	35 – 150	Extremely Weak
R1	150 – 700	Very Weak
R2	700 – 3,600	Weak
R3	3,600 – 7,200	Medium Strong
R4	7,200 – 14,500	Strong
R5	14,500 – 36,000	Very Strong
R6	>36,000	Extremely Strong

[1] Rock strength grades from Brown (1981).

Table 3-2. Depth of Fill / Depth to Rock Summary

Exploration ID	Associated Structure(s)	Ground Surface Elevation (feet)	Depth to Rock (feet)	Rock Surface Elevation (feet)
B-1	--	516.5	2.5	514.0
B-2	SC90 WAS Pump Station	518.3	16.5	501.8
B-3	Primary Clarifier	529.9	11	518.9
B-4	Building A – O&M & Controls	538.6	4.5	534.1
B-5	MEB Building	528.8	8.5	520.3
P-01	--	517.3	11	506.3
P-02	--	526.1	11.5	514.6
P-03	Primary Clarifier	530.4	16	514.4
P-04	Building A – Headworks & Dewatering	530.8	7.5	523.3
P-05	Building A – Headworks & Dewatering	533.1	3.5	529.6
P-06	Building A – O&M & Controls	536.2	3.5	532.7
P-07	--	538.0	2.5	535.5
P-08	Building A – O&M & Controls	535.3	7.5	527.8
P-09	--	530.5	4	526.5
P-10	--	530.1	5.5	524.6
P-11	MEB Building	529.8	5.5	524.3
P-12	MEB Building	526.4	5	521.4
P-13	Future Aeration Basin No. 4	523.6	8.5	515.1
P-14	Aeration Basin No. 3	521.7	5.5	516.2
P-15	--	519.1	2.5	516.6
P-16	IPS	517.1	12.0	505.1
P-17	--	516.5	6.0	510.5
P-18	SC90, SC60 RAS/WAS Pump Station	518.5	9.0	509.5
P-19	--	518.0	6.0	512.0
P-20	SC90 RAS Pump Station	525.4	8.0	517.4
P-21	Primary Clarifier, Aeration Basin No. 3	521.8	6.0	515.8
P-22	Aeration Basin No. 3	518.5	7.0	511.5
P-23	Primary Clarifier	530.4	15.0	515.4
P-24	MEB Building	529.7	3.0	526.7
P-25	Future Outfall	506.4	2.0	504.4
P-26	Future Outfall	507.2	3.0	504.2
P-27	--	516.6	10.0	506.6
P-28	IPS	516.5	11.0	505.5
P-29	IPS	517.3	12.5	504.8
P-30	SC90	519.8	11.0	508.8
P-31	SC90	520.8	10.0	510.8
P-32	Primary Clarifier, Future Primary Clarifier No. 4	530.4	10.0	520.4
P-33	Future Outfall	529.6	3.5	526.1
P-34	Tertiary Filters	516.9	15.0	501.9
P-35	-	517.5	6.0	511.5
P-36	Sludge Blend Tank	516.8	10.8	506.0

3.4 Rock Mass Classification

Two rock mass classification systems, Rock Quality Designation (RQD) and Rock Mass Rating (RMR), were used to evaluate and characterize rock mass conditions for providing recommendations regarding ground behavior, excavation methods, and design of the embedded walls. These classifications were originally developed for tunneling but are useful in estimating rock excavatability.

3.4.1 Rock Quality Designation (RQD)

RQD values are a modified core recovery in which only core lengths equal to or longer than 4 inches are measured in an individual core run (Bieniawaski, 1989). RQD values are presented on the boring logs in Appendix A. The RQD ranged from 42 to 86 percent, indicating "poor" to "good" rock quality, with an average RQD of 67 percent, indicating a "fair" condition of the rock.

3.4.2 Rock Mass Rating (RMR) System

The RMR (Bieniawaski, 1989) is a rating system that considers six numerical rock mass inputs including: strength of intact rock, RQD, discontinuity spacing, condition of discontinuities, orientation of discontinuities relative to excavation, and groundwater conditions. An RMR range of 60 to 70 was estimated for the encountered conditions, indicating a "good" rock condition. RMR calculation sheets summarizing input and results are included in Appendix D.

3.5 Groundwater

Groundwater observation wells were installed in borings B-3 and B-5. Initial groundwater levels recorded on May 2, 2018, with subsequent levels recorded on October 29, 2019, and June 20, 2022. We also observed groundwater in nine other exploration locations, as summarized in Table 3-3. Groundwater levels are noted on the boring logs in Appendix A.

Groundwater levels may vary with precipitation, the time of year, and/or other factors. Generally, groundwater highs occur near the end of the wet season in late spring and groundwater lows occur near the end of the dry season in the early fall.

Table 3-3. Groundwater Level Measurements

Boring ID	Piezometer	Borehole Elevation (feet)	Depth to Groundwater (feet)			Groundwater Elevation (feet)		
			May 2, 2018	Oct 29, 2019	June 20, 2022	May 2, 2018	Oct 29, 2019	June 20, 2022
B-2	No	518.3	2.5	-	-	515.8	-	-
B-3	Yes	529.9	2.9	3.6	8.2	527.0	526.3	521.7
B-4	No	538.6	2.0	-	-	536.6	-	-
B-5	Yes	528.8	5.0	7.0	6.8	523.8	521.8	522.0
P-03	No	530.4	8.5	-	-	521.9	-	-
P-09	No	530.5	3.0	-	-	527.5	-	-
P-13	No	523.6	6.0	-	-	517.6	-	-
P-15	No	519.1	2.5	-	-	516.6	-	-
P-29	No	517.3	-	-	10.5	-	-	506.8
P-31	No	520.8	-	-	9.2	-	-	511.6
P-32	No	530.4	-	-	9.7	-	-	520.7

4.0 Seismic and Geologic Hazard Evaluation

4.1 General

The seismic hazards evaluation was performed in general accordance with the 2019 Oregon Structure Specialty Code (OSSC, 2019) and ASCE's Minimum Design Loads for Buildings and Other Structures, 2016 Edition (ASCE/SEI 7-16). The OSSC requires evaluating the seismic hazards for the Maximum Credible Earthquake (MCE) having a 2% probability of exceedance in a 50-year period (2,475-year return period).

4.2 Regional Seismicity

The Pacific Northwest is a seismically active region that has three principal seismic sources: (1) the Cascadia Subduction Zone (CSZ) megathrust, which represents the interface between the subducting Juan de Fuca plate and the overriding North American plate; (2) faults located within the Juan de Fuca plate (referred to as CSZ intraplate or intraslab sources); and (3) crustal faults principally in the North American plate (Wong and Silva, 1998).

4.3 Site Classifications

The project site was assigned a seismic site class following code-based procedures in ASCE/SEI 7-16, Chapter 20 (2016). Site class is used to categorize common subsurface conditions into broad classes to which ground motion attenuation and amplification effects are assigned. Site class accounts for the conditions encountered in the upper 100 feet of the subsurface profile. Shallow bedrock was encountered during the subsurface investigation and most of the structures are anticipated to be supported on the bedrock. Therefore, a Site Class B is appropriate for design purposes.

4.4 Seismic Design Parameters

The 2019 OSSC requires that spectral response accelerations be developed based on the ASCE 7-16. We developed spectral response accelerations using the online ASCE 7 Hazard Tool, which references ground motion procedures in accordance with ASCE 7-16 and is based on the USGS 2014 National Seismic Hazard Mapping Project (NSHMP) developed for the Maximum Considered Earthquake (MCE) (Peterson et. al., 2014). The MCE consists of ground motions (accelerations) with a 2-percent probability of exceedance in 50 years (return period of 2,475 years). The recommended spectral acceleration parameters for use in structural design are provided in Table 4-1. For pipeline design we recommend using a Peak Ground Velocity (PGV) of 10 inches per second.

Table 4-1. 2019 OSSC MCE Spectral Acceleration Parameters for Site Class B

Parameter	0.2 Second	1 Second
Mapped MCE_R (Rock site)	S_S = 0.63 g	S_1 = 0.34 g
Site Coefficients	F_a = 0.9	F_v = 0.8
Site-Adjusted MCE_R	S_{MS} = 0.57 g	S_{M1} = 0.27 g
Design MCE_R	S_{DS} = 0.38 g	S_{D1} = 0.18 g
Mapped MCE_G PGA (Rock Site)	0.29 g	
Site Coefficient F_{PGA}	0.9	
Site-adjusted MCE_G PGA	0.26 g	

4.5 Liquefaction

4.5.1 Overview

Liquefaction is a phenomenon affecting saturated, granular soils in which cyclic, rapid shearing from an earthquake results in a drastic loss of shear strength and a transformation from a granular solid mass to a viscous, heavy fluid mass. The results of soil liquefaction include loss of shear strength, loss of soil materials through sand boils, flotation of buried chambers/pipes, and post liquefaction settlement.

4.5.2 Liquefaction Hazard

The Project site is underlain by competent basalt bedrock, encountered at shallow depths, overlain by variable amounts of fill. However, there are localized areas of the site that are underlain by fill extending to depths up to about 16.5 feet bgs, as indicated in Table 3-2. Our liquefaction analyses indicated that the loose/soft fill materials below the groundwater table are potentially liquefiable. Since the fill materials are not laterally continuous, widespread soil liquefaction is not considered to be a hazard at the site.

Anticipated foundation conditions for the proposed structures are summarized in Table 6-1. The excavations required to facilitate construction of the below-grade structures will effectively remove the potentially liquefiable soils and these structures will be founded on basalt bedrock. Therefore, the risk of liquefaction is negligible for the below-grade structures. For the at-grade structures (i.e., Building A and the MEB Building), the total anticipated liquefaction-induced settlement is on the order of 1 inch with differential settlement on the order of ½ inch and occurring across the slab-on-grade foundation and across the long axis of these buildings. For the IPS, the approximate southern half of which will be supported on a slab-on-grade foundation, we anticipate the total liquefaction-induced settlement will be on the order of 1 inch, with differential settlement on the order of ½ inch and occurring across the slab-on-grade foundation.

We evaluated liquefaction susceptibility using SPT-based methods presented by Boulanger and Idriss (2014), as well as Idriss and Boulanger (2008). Our analyses considered the aggregate seismic event (or MCE), a design-level event that considers the cumulative effect from all seismic sources in the region for

the indicated probability of exceedance (i.e., 2 percent in 50 years). The spectral acceleration parameters for the MCE are summarized in Table 4-1. Estimating the ground surface PGA was accomplished using aggregated probabilistic data for design-level earthquakes available at the USGS Unified Hazard Tool website. The resulting aggregate seismic event used in our liquefaction susceptibility and settlement analyses had an earthquake magnitude of 8.3 and peak ground acceleration (PGA) of 0.29 g. Groundwater was modeled as the seasonal high level at each boring/probe location, based on groundwater measurements and observations discussed in Section 3.5.

4.6 Other Seismic Hazards

Due to the shallow bedrock and overall gently-sloping site, we conclude that other seismic hazards are negligible. These seismic hazards include seismically-induced landslides, liquefaction (apart from the localized areas discussed above), lateral spreading, ground motion amplification, and surface rupture. The nearest Class A fault mapped by the USGS is the Owl Creek Fault, located approximately 25 miles west of the site. Therefore, fault rupture is not considered a hazard to the project.

5.0 Conclusions and Key Geotechnical Considerations

Based on the results of our field explorations and analyses, the site can be developed as described in Section 1.2 of this report, provided the recommendations presented in this report are incorporated into the design and development. We conclude the primary geotechnical considerations are the presence of highly variable and weak undocumented fill materials and the associated excessive settlement of the at-grade structures due to static and seismic loading. Other important considerations for the Project include the presence of shallow groundwater and shallow strong to very strong basalt bedrock.

5.1 Settlement Potential of At-Grade Structures

Due to the presence of highly variable undocumented fill materials across the site, we conclude there is a risk for uneven subgrade response from structural loads for at-grade structures. Adverse effects resulting from uneven subgrade response of the soils could take the form of excessive total and differential static settlement and/or bearing capacity failure. In addition, there is the potential for localized liquefaction-induced settlement within the undocumented fill materials below the at-grade structures. Therefore, we do not recommend the proposed at-grade structures (discussed in Section 1.2) be supported by shallow spread footing, slab-on-grade, or mat foundations without subgrade improvement in the form of the over-excavation of a minimum of 3 feet of undocumented fill. For the critical structures, such as the IPS and MEB Building, complete over-excavation of the undocumented fill and replacement with compacted structural fill are recommended to mitigate potential static and liquefaction-induced settlements. For the Sludge Blend Tank and the Digested Sludge Holding Tank, we recommend that the undocumented fill materials be over-excavated to 5 feet bgs and replaced with a crushed rock mat section.

Foundation recommendations for mitigating excessive settlement for the at-grade structures are presented in Section 6.2 and in Section 6.3 for the Sludge Blend Tank and the Digested Sludge Holding Tank.

5.1.1 Liquefaction-Induced Settlement

Potentially liquefiable soil is present in isolated areas (i.e., where undocumented fill materials are present) below the proposed at-grade structures. As discussed in Section 4.5, the results of our liquefaction-induced settlement analyses indicated up to 1 inch of total vertical settlement, and about ½ inch of differential settlement for the portion of the IPS supported on a slab-on-grade foundation, as well as for the MEB Building and Building A.

5.1.2 Static Settlement

Building A: Below the Building A footprint, the undocumented fill extends to depths ranging from 2.5 to 7.5 feet and are generally less than 4.5 feet. We estimated that about ½ to 1½ inch settlement may develop within the building footprint with the differential settlement of about 1 inch across the building. For Building A, we recommend to over-excavate of a minimum of 3 feet of undocumented fill and replace with compacted structural fill. This will reduce the total static settlement to less than 1 inch and differential settlement to less than ½ inch.

IPS Structure: The portion of the IPS that will be supported on a slab-on-grade foundation is underlain by 8 to 12 feet of soft, predominately fine-grained fill materials which may develop up to about 2 inches of

static settlement. The adjacent portion of the IPS will be founded at a depth of about 26 feet on hard basalt bedrock and is not expected to develop any settlement. Therefore, there is the potential for up to 2 inches of differential settlement between the at-grade and below-grade portions of the IPS, which could affect structural performance as well as excessive movement of the pipes and their connections. We recommend complete over-excavation of the undocumented fill materials below the at-grade portion of the IPS to mitigate the potential for static differential settlement.

MEB Building: About 4 to 6 feet of fill will be placed below the MEB Building footprint to achieve the desired finish grade. The fill placement will induce stress increases (up to approximately 800 psf) on the soft, compressible fill materials that extend up to about 8.5 feet below existing site grades below the MEB Building footprint. We anticipate consolidation settlement on the order of 3 inches may occur due to the fill placement, with differential settlement of up to 1½ inches across the building. To mitigate the potential for total and differential static settlement, we recommend complete over-excavation of the undocumented fill materials below the MEB Building prior to mass grading operations.

Sludge Blend Tank and Digested Sludge Holding Tank: The 28-foot diameter Sludge Blend Tank and the 36-foot diameter and the Digested Sludge Holding Tank are underlain by undocumented fill materials extending to about 10.75 feet bgs, based on boring P-36. The proposed bottom-of-slab depths for both tanks is approximately 1.5 feet bgs (i.e., at-grade structures). If founded on existing conditions, settlements of the tanks will likely range from about 2 to 2.5 inches, and differential settlement ranging from 1 to 1.25 inch. To reduce respective total and differential settlements to less than 1 inch and ½ inch, we recommend the undocumented fill materials be over-excavated to 5 feet bgs and replaced with a reinforced crushed rock section as discussed in Section 6.3.

5.2 Shallow Groundwater

Due to the presence of shallow groundwater at the subject site, we anticipate temporary excavations will likely require dewatering, depending on the time of year construction takes place. Recommendations for groundwater control during construction are presented in Section 7.4.

5.3 Basalt Bedrock

The explorations encountered strong to very strong (R4 to R5) basalt bedrock at depths ranging from 2.0 to 16.5 feet across the site. We understand that excavations for the proposed improvements are anticipated to be up to 24 feet bgs (e.g., for the primary clarifier). Therefore, rock excavation will be required. Due to its strong to very strong nature, we anticipate that the basalt bedrock will not be rippable by typical construction equipment and will require drilling and blasting. Recommendations for rock excavation are presented in Section 7.0.

6.0 Design Recommendations

6.1 Foundation Recommendations for Below-Grade Structures

Based on the 90 percent submittal plans for the project, the below-grade structures will be supported on reinforced mat foundations. Spread footing foundations may also be used for foundation support of the below-grade structures. Recommendations for these types of foundations are presented in the following sections. Table 6-1 presents a summary of the anticipated foundation conditions for the proposed below-grade structures.

Table 6-1. Anticipated Foundation Conditions for Below-Grade Structures

Structure[1]	Bottom Depth (feet bgs)	Relevant Boring(s)	Depth to Rock[5] (feet)	Anticipated Foundation Conditions	Anticipated Rock Excavation (feet)[6]
IPS[2]	1.5	P-01, P-16, P-28, P-29	11 to 12.5	Fill	0
	26.2			Bedrock	14 to 15
Primary Clarifier[3]	9.5 to 22.5	B-3, P-03, P-21, P-23, P-32	6 to 16	Bedrock	Up to 15
Aeration Basin No. 3	13 to 18	P-14, P-21	5.5 to 6	Bedrock	7 to 12
SC90	15 (Assumed)	P-18, P-30, P-31	9 to 11	Bedrock	4 to 6
SC90 RAS PS	16.5	P-20	8	Bedrock	8.5
SC90 WAS PS	16.5	B-2	Unknown	Bedrock	0
SC60 RAS/WAS PS	12.5	P-18	9	Bedrock	4
Tertiary Filters	18	P-34	15	Bedrock	3
Tertiary Building[4]	7	n/a	n/a	Fill or bedrock	n/a

Notes:
1. Bottom depths for structures based on 90 percent submittal plans and from West Yost via email on July 19, 2022.
2. The approximate southern half of the IPS will be supported on a slab-on-grade and the approximate northern half of the IPS will be founded below grade at about 26.2 feet bgs.
3. The deepest excavation is on the west side of the primary clarifier where depth to rock ranges from about 11 to 16 feet, whereas the shallowest excavation is on the east side where the depth to rock is about is about 6 feet.
4. Due to access and existing utility and access conflicts, explorations were not able to be completed near this facility.
5. Based on results of geotechnical investigation, fill depth at the site is highly variable and therefore, depth to rock may vary significantly over short distances.
6. Only to foundation bottom elevation; likely additional excavation required below for piping, leveling course, etc.

6.1.1 Subgrade Preparation

Satisfactory subgrade support for spread footings or mat foundations associated with the proposed below-grade structures can be obtained on basalt bedrock or on imported structural fill that is properly placed and compacted on the bedrock. Based on our understanding of planned foundation depths for below grade we anticipate that bedrock will likely be encountered in all below grade structure excavations. The geotechnical engineer or his representative should be contacted to observe subgrade conditions prior to placement of forms, reinforcement steel, or structural fill.

If fill materials are present below the proposed bottom-of-foundation elevation, remaining existing fill materials should be over-excavated and replaced with imported structural fill back to required elevation.

All granular pads for footings should be constructed a minimum of 6 inches wider on each side of the footing for every vertical foot of over-excavation.

Bedrock surfaces that will support spread and continuous footings should be cut as level and as smooth as practical. Placement of foundation concrete on extremely rough bedrock surfaces is not recommended, particularly for strip or continuous footings. For spread and continuous footings, we recommend a minimum of 2 inches, and not more than 12 inches, of heavily compacted, imported structural fill be placed as a leveling course where relatively smooth and level bedrock surfaces cannot be achieved during excavation. For mat foundations, we recommend a minimum 6-inch-thick layer of imported structural fill be placed as a leveling course where relatively smooth and level bedrock surfaces cannot be achieved during excavation.

6.1.2 Minimum Footing Width & Embedment

Minimum spread footing widths should be in conformance with the current OSSC. As a guideline, we recommend individual spread footings have a minimum width of 24 inches, and continuous wall footings have a minimum width of 18 inches. All footings should be founded at least 18 inches below the lowest permanent adjacent grade to develop lateral capacity and for frost protection.

6.1.3 Bearing Pressure & Settlement

Spread footings associated with below-grade structures founded as recommended in Section 6.1.1 should be proportioned for a maximum allowable bearing pressure of 5,000 pounds per square foot (psf). This bearing pressure is a net bearing pressure, applies to the total of dead and long-term live loads, and may be increased by one-third when considering seismic or wind loads.

For spread footings associated with below-grade structures founded as recommended in Section 6.1, we estimate total static settlements to be 1 inch or less, with differential settlements between adjacent columns and/or bearing walls on the order of 0.5 inch or less.

6.1.4 Design Parameters for Mat Foundations and Floor Slabs

For the imported structural fill (including leveling course) thickness of 12-inch or less overlying the bedrock surface, we recommend a maximum modulus of vertical subgrade reaction of 300 pounds per cubic inch (pci) be used for design of mat foundations and floor slabs. For structural fill thickness more than 12 inches, such as in the over-excavation and backfill to foundation level areas, we recommend the modulus of vertical subgrade reaction to be reduced to 250 pci. The subgrade modulus values represent anticipated values, which would be obtained in a standard in situ plate test with a 1-foot square plate. Use of this subgrade modulus for floor slab design should include appropriate modifications based on dimensions as necessary.

For design of the mat foundations supporting the Sludge Blend Tank and the Digested Sludge Holding Tank, a modulus of vertical subgrade reaction of 250 pci may be used, an allowable bearing capacity of 2,000 psf may be used, if applicable. These values assume that these two tanks will be supported on improved subgrade consisting of a crushed rock mat section as discussed in Section 6.3.

6.2 Foundation Recommendations for At-Grade Structures

Shallow foundation support for the at-grade structures can be derived from shallow spread footings or mat foundations. Recommendations for these types of foundations are presented in the following sections and a summary of the proposed at-grade structures is provided in Table 6-2.

Table 6-2. Anticipated Foundation Conditions for At-Grade Structures

Structure[1]	Bottom Depth (feet bgs)	Relevant Boring(s)	Depth to Rock (feet)	Anticipated Foundation Conditions	Anticipated Rock Excavation (feet)[4]
IPS[2]	1.5	P-01, P-16, P-28, P-29	11 to 12.5	Fill	0
	26.2			Bedrock	14 to 15
MEB Building[3]	1.5	B-5, P-12, P-24	3 to 8.5	Fill	0
Sludge Blend Tank	1.5	P-36	10.8	Fill	0
Digested Sludge Holding Tank	1.5	P-36	10.8	Fill	0
Building A (O&M and Controls)	1.5 (e.g., at-grade)	B-4, P-06, P-08	3.5 to 7.5	Fill	0
Building A (Headworks & Dewatering)	1.5 (e.g., at-grade)	P-04, P-05	3.5 to 7.5	Fill	0

Notes:
1. Bottom depths for structures based on 90 percent submittal plans provided by West Yost.
2. The approximate southern half of the IPS will be supported on a slab-on-grade and the approximate northern half of the IPS will be founded below grade at about 26.2 feet bgs.
3. The MEB building will be an at-grade structure and built on approximately 5 feet of new fill.
4. Only to foundation bottom elevation; likely additional excavation required below for piping, leveling course, etc.

6.2.1 Subgrade Preparation

Satisfactory subgrade support for spread footings or mat and slab-on-grade foundations associated with the proposed at-grade structures can be obtained by over-excavating a minimum of 3 feet of the undocumented fill materials and replacing it with properly placed and compacted structural fill. For the on-grade portion of the IPS and MEB Building, complete over-excavation of the undocumented fill and replacement with compacted structural fill are recommended. All granular pads for footings should be constructed a minimum of 6 inches wider on each side of the footing for every vertical foot of over-excavation. The geotechnical engineer or his representative should be contacted to observe subgrade conditions prior to placement of forms, reinforcement steel, or structural fill.

For any at-grade structure excavation that reaches bedrock, see Section 6.1.1 for subgrade preparation for bedrock surfaces.

6.2.2 Minimum Footing Width & Embedment

Minimum spread footing widths should be in conformance with the current OSSC. As a guideline, we recommend individual spread footings have a minimum width of 24 inches, and continuous wall footings have a minimum width of 18 inches. All footings should be founded at least 18 inches below the lowest permanent adjacent grade to develop lateral capacity and for frost protection.

6.2.3 Bearing Pressure & Settlement

Spread footings associated with at-grade structures founded as recommended in Section 6.2 should be proportioned for a maximum allowable bearing pressure of 2,000 pounds per square foot (psf). This bearing pressure is a net bearing pressure, applies to the total of dead and long-term live loads, and may be increased by one-third when considering seismic or wind loads.

For spread footings associated with at-grade structures founded as recommended in Section 6.2.1, we estimate total static settlements to be 1 inch or less, with differential settlements between adjacent columns and/or bearing walls on the order of 0.5 inch or less.

6.2.4 Design Parameters for Mat Foundations and Floor Slabs

For the recommended minimum 36-inch-thick layer of imported structural fill (including leveling course) overlying the undocumented fill materials, we recommend a maximum modulus of vertical subgrade reaction of 175 pounds per cubic inch (pci) be used for design of mat foundations and floor slabs. The subgrade modulus values represent anticipated values, which would be obtained in a standard in situ plate test with a 1-foot square plate. Use of this subgrade modulus for floor slab design should include appropriate modifications based on dimensions as necessary.

6.3 Foundation Recommendations for Sludge Blend Tank and Digested Sludge Holding Tank

We recommend the upper 5 feet of undocumented fill materials be removed (i.e., over-excavation of 3.5 feet) to construct a crushed rock mat section to support the Sludge Blend Tank and Digested Sludge Holding Tank. The crushed rock mat section is shown in Figure 8. Subgrade areas should be cleanly cut to firm undisturbed soil. Additional over-excavation may be required locally, especially if organic materials, construction debris, or other unsuitable materials are encountered.

Once the upper 5 feet of undocumented fill materials have been removed, the exposed subgrade surface should be rolled with a self-propelled, smooth-drum compaction equipment to recompact the subgrade to at least 92 percent of ASTM D1557. The over-excavation and subgrade compaction should be observed by a representative of the geotechnical engineer.

After the over-excavation and subgrade is approved, a strong geotextile, such as Mirafi RS580i that provides both separation/filtration and reinforcement, should be installed directly on the prepared subgrade. The overlap of the geotextile should be at least 2 feet.

After the placement of the geotextile, construction of the crushed rock mat section should follow immediately to protect the prepared subgrade. The reinforcement geotextile should consist of two layers of Mirafi RS580i (or its equivalent). The overlap of the geogrid should be at least 2 feet. The first layer of geogrid should be placed directly on the prepared subgrade, and the second layer should be at 3 feet above the first layer.

Fill materials used in the crushed rock mat section should be clean, 1½-inch minus Dense Graded Aggregates structural fill (see Section 7.6.2 for additional recommendations) and should be compacted to 92 percent of ASTM D1557. The 1½-inch minus structural fill should be placed in maximum lifts of 12 inches of loose material and should be placed such that construction equipment does not operate directly on the geotextile and rock spread such that the geotextile is not damaged or pulled apart at joints. Each lift of subgrade stabilization material should be tested by an experienced geotechnical engineering representative prior to placement of subsequent lifts.

6.4 Retaining Walls

There are six retaining walls, Wall 1 through Wall 6, proposed as part of the WRF improvements. The retaining walls will be cast-in-place, reinforced concrete cantilevered walls ranging in height from 2.5 to 6.75 feet and with footing widths ranging from 3 feet to 6 feet. The retaining walls will retain backfill heights ranging from 2 feet to 6.25 feet. We understand the retaining walls are being designed by West Yost.

The following sections and information in this report should be referenced, regarding to the design and construction of the retaining walls:

- Lateral earth pressure recommendations provided in Table 6-3;
- Retaining wall footing design and subgrade preparation should be in general accordance with Sections 6.2.1, 6.2.2, and 6.2.3 of this report;
- Lateral/sliding resistance recommendations are provided in Section 6.6; and
- Retaining wall backfill recommendations are provided in Section 7.6.3.

6.5 Uplift & Flotation Considerations

6.5.1 Below Grade Structures

Below-grade, water-tight structures should be designed to resist uplift forces during periods of high groundwater. Forces resisting uplift include self-weight of the structure and one of following two options for backfill soils. The selection depends on the geometry of the foundation behind the embedded walls:

1. When the foundation wall includes a perimeter lip (or heel) extending beyond the back face of the foundation wall, the self-weight of a soil wedge can be included. The wedge is defined by the area from the back face of the foundation wall to a plane projected upwards from the heel of the footing at an angle of 20 degrees outward from vertical. An average soil unit weight of 120 pcf

above the design groundwater level is recommended for this evaluation. A buoyant soil unit weight of 70 pcf should be used below the design groundwater level.

2. When the foundation wall *does not* include a heel, shear resistance should be evaluated using a friction coefficient of 0.4 between the structure wall and backfill in conjunction with the at-rest lateral earth pressure distribution provided in Figure 4.

A schematic showing these buoyancy resistance options is provided in Figure 5. For the evaluation of buoyancy, a design groundwater level at the ground surface is recommended. This is due, in part, to the potential for water to collect in the wall backfill and subgrade. Although water will likely dissipate into the formation, the dissipation rate may be slower than the collection rate, leading to temporary hydrostatic and uplift pressures below structure foundations.

However, this uplift resistance by either frictional or weight approach may not be sufficient due to the large footprints of some of the structures (e.g., the SC90, Aeration Basin No. 3, and Primary Clarifier structures), or structurally unfavorable for the base slab design. In this case, an underdrain system and/or pressure relief valves may need to be considered. If an underdrain system is to be considered during design, we recommend that the system consist of an 18-inch-thick layer of drain rock overlain by 6 inches of leveling course below the foundations and slabs, with 4-inch diameter perforated pipes located at the mid-height of the drainage layer. The pipes should be connected to a manhole with a pump system. The pump system can be turned on prior to maintenance for hydrostatic pressure relief and dewatering. The underdrain system can also be used as leak detection system under structures. A typical underdrain system is shown in Figure 6. More details about the underdrain system should be provided in the project plans and specifications if an underdrain system is to be utilized.

6.5.2 Pipeline Structures

Since the ground water level (modeled at the ground surface) is above the proposed pipeline structures, a check against buoyancy of the empty pipe was performed. We calculated a Factor of Safety (FOS) against flotation based on the most conservative buried pipe structure case (the 24-inch diameter RS IPS to Headworks HDPE pipeline with 3 feet of pipe cover). Our calculations showed a FOS greater than 3.5 for this buried pipe case. Therefore, we conclude that the potential flotation risk of buried pipeline structures is low.

Although the FOS against floatation is acceptable for the above, worst-case scenario, there are typically minimum depth of cover requirements to protect pipelines from traffic and structural surcharge loading. Therefore, construction live load and traffic load during the project life should be considered in the design.

6.6 Lateral Earth Pressures – Embedded Walls & Retaining Walls

Backfill material placed behind the below-grade structures, vaults, ancillary structures, as well as the proposed retaining walls should consist of free-draining crushed aggregate conforming to Section 00510.12 in the most recent OSSC. We recommend using a high groundwater level at the site ground surface in the calculation of lateral earth pressures for embedded walls. Table 6-3 summarizes our recommended lateral earth pressure values, expressed as the equivalent fluid pressures.

Table 6-3. Recommended Lateral Earth Pressures

Design Condition	Groundwater Condition	Static At-rest Pressure (psf)	Static Surcharge Pressure (psf)	Additional Seismic Pressure (psf)	Hydrostatic Pressure (psf)
At-Rest Earth Pressure	Above Groundwater	$50(H-H_W)$	0.4q	17H	--
	Below Groundwater	$50(H-H_W) + 28H_W$	0.4q	17H	$62H_W$
Active Earth Pressure	Above Groundwater	$29(H-H_W)$	0.22q	10H	--
	Below Groundwater	$29(H-H_W)+16H_W$	0.22q	10H	$62H_W$

General Notes:
1. H = total height of buried wall.
2. H_W = submerged portion of buried wall

Our recommended lateral earth pressures assume imported, free-draining crushed aggregate and finished backfill slopes flatter than 4H:1V (horizontal:vertical). The equivalent fluid earth pressures and seismic earth pressures increase with depth in a hydrostatic, triangular pressure distribution with the resultant force acting at approximately 0.3H above the base of the wall (where H is the total height of the wall). The pressure distribution of the surcharge loads is a constant value of lateral pressure resulting from the vertical, surface surcharge loads (q) with the resultant lateral surcharge force acting approximately at a height above the base of the wall equal to one-half the total wall height. Walls that extend below the anticipated high/perched groundwater level of 2.5 feet bgs should also include the hydrostatic groundwater loading. The distribution and resultant of the backfill, groundwater, and seismic earth pressure are shown on Figure 4.

6.7 Lateral Resistance – At-Grade and Below-Grade Structures

Lateral resistances for at-grade and below-grade structures can be provided by frictional resistance between the base of the foundation and the crushed rock/structural fill material, and through soil passive resistance around the embedded portion of the structure for below-grade structures. For base frictional resistance, an allowable friction factor of 0.60 for cast-in-place concrete foundations on the crushed rock/structural fill material may be used, and an allowable friction factor of 0.40 for pre-cast concrete foundations on the crushed rock/structural fill material may be used.

The design value for passive pressure should not exceed the value of 150D (in units of psf, where D is the depth of the embedment), due to the large amounts of movement necessary to mobilize full passive resistance. This value incorporates a factor of safety (FOS) of 3 from the ultimate value. Unless in paved areas, the upper 12 inches should not be used in calculating passive resistance because construction and post-construction activities often disturb this region.

6.8 Pipeline Structures

6.8.1 Pipeline Subgrade Support

The subgrade along the pipelines is anticipated to consist of basalt or fill materials (i.e., soft clayey soil, or very loose silty sand). Basalt will support the pipeline without any modifications. For areas where the trench subgrade consists of soft subgrade conditions, we recommend subgrade stabilization in general accordance with Section 7.6.6. The new pipeline construction will not result in a net increase in pressure at the base of the pipeline, and therefore pipe settlement under static conditions is expected to be negligible.

6.8.2 Pipe Zone Geotechnical Design Parameters

Flexible pipes derive their load carrying capacity from their interaction with the pipe zone backfill as the pipe deflects under load and pushes laterally against the soil. Load carrying capacity depends on the depth of the pipe, the surrounding soil conditions, the type and density of the backfill, and the thickness of compacted pipe zone backfill between the pipe and the native soil/rock in the trench wall. Based on the anticipated subsurface soil types and relative densities, we have developed the following geotechnical design parameters to be used for pipeline design.

Table 6-4. Pipeline Design Parameters

Property	Undocumented Fill Soils	Basalt Bedrock	Granular Backfill	CLSM
Moist Unit Weight, γ_m (pcf)	115	165	135	125
Saturated Unit Weight, γ_{sat} (pcf)	120	165	140	125
Friction Angle, ϕ (degrees)	30	45	38	34
Modulus of Soil Reaction, E' (psi)	700	>10,000	2400	3,000

The design parameters presented in Table 6-4 are appropriate for use in the Iowa Deflection formula (Spangler, 1941) and are consistent with American Water Works Association Manual M11 (2004).

6.8.3 Trench Width

Distance between the pipe springline and trench sidewall should be wide enough to allow for inspection, adequate backfill compaction, and field density testing. For granular backfill the minimum distance between the pipe springline and the trench sidewall should be as follows:

- Pipe diameter ≥ 36 inches: 18 inches
- Pipe diameter <36 inches and ≥ 24 inches: 12 inches
- Pipe diameter <24 inches: 9 inches

Where Controlled Low Strength Material (CLSM) is used as backfill, the trench width should extend a minimum 9 inches beyond the pipe springline for pipes with diameters greater than 36 inches. For pipes

with diameters smaller than 36 inches, the trench width should extend a minimum 6 inches beyond the pipe springline.

6.8.4 Pipeline Backfill Material

We recommend that the pipe bedding and pipe zone in the trench be constructed with imported, well-graded crushed rock, such as ¾- inch minus crushed aggregate conforming to Section 02630.10 in the most recent OSSC.

7.0 Construction Recommendations

Recommendations provided herein are for planning purposes. We assume that we will be provided an opportunity to complete our recommendations once the project details are finalized. All specifications referenced in this section referred to 2021 Oregon Standard Specifications for Construction (ODOT, 2021). We recommend completing the construction during dry season when the groundwater is at the lowest.

7.1 Site Preparation

All areas to be excavated, filled, or used as a subgrade should be stripped. Prior to stripping and excavation, utilities should be located and rerouted as necessary, and any abandoned pipes or utility conduits should be removed or stabilized in a manner that does not adversely affect performance of new facilities. Demolition of any existing buildings and foundations associated with former structures should include complete removal of all structural elements, including foundations and concrete slabs. Although we anticipate that a majority of the subgrade supporting the proposed improvements will consist of basalt bedrock, the following paragraphs are applicable to those areas in which subgrade conditions will consist of the existing, on-site undocumented fill materials (i.e., pavement/hardscaping areas, etc.).

Due to the moisture-sensitive nature of the existing on-site fill materials, all stripping and excavations should be performed using a smooth-edge excavator working from areas where material has yet to be removed. Stripping and excavation should remove surficial organic soil (sod and topsoil), trees/roots, asphalt pavement and base rock, and any loose/soft materials as determined by a qualified geotechnical engineering representative. Subgrade areas should be cleanly cut to firm, undisturbed soil. Should construction take place during wet weather, we recommend that a representative of the geotechnical engineer be present to observe the subgrade in order to evaluate whether additional preparation is indicated.

Placement of crushed rock should follow immediately after site grading in order to provide protection of the sensitive subgrade soil during construction activities. In temporary construction traffic areas, the placement of a 12-inch-thick granular working base is generally recommended. For heavily traveled construction traffic areas, thicker sections (i.e. 18 to 24 inches) and geotextile fabrics are recommended. Generally, four to six inches of crushed rock is sufficient in foot traffic areas.

7.2 Excavation

The site is underlain by fill, extending from the ground surface to depths ranging from 2.0 to 16.5 feet bgs. The fill is underlain by strong to very strong (R4 to R5) basalt. We anticipate that maximum excavation depths for the proposed improvements will be on the order of 20 feet bgs. Therefore, rock excavation will be required.

Rippability is the ease with which rock can be mechanically excavated, and it is influenced by numerous rock parameters, including unconfined compressive strength, degree of weathering, fracturing, abrasiveness, and spacing of discontinuities. Uniaxial compressive strength test results of the basalt bedrock ranged from 7,000 to 26,000 psi, with an average value of 19,000 psi. The results of Point Load

Index ($I_{S(50)}$) testing ranged from approximately 270 and 715 psi, with an average value of 510 psi, which correlate to uniaxial compressive strengths of approximately 5,100 to 17,150 psi. The results of strength tests, in conjunction with observed joint spacing and degree of weathering indicate the rock is not rippable by typical construction equipment. Therefore, rock excavation will likely require drilling and blasting.

The contractor should be responsible for selecting appropriate rock excavation techniques that prevent damage to existing facilities and minimizes over-break or over-cut beyond the excavation limits. Protruding rock of more than 4 inches above the specified subgrade elevation should not be allowed. Any large protrusions should be removed. In addition, the selection of excavation methods and procedures should consider the impact to the subgrade preparation.

7.3 Temporary Excavation Support

All excavations should be in accordance with applicable OSHA and state regulations. It is the contractor's responsibility to select the excavation methods, to monitor site excavations for safety, and to provide any shoring required to protect personnel and nearby, existing structures. A competent person, as defined by Oregon OSHA, is an individual that can identify existing and predictable excavation-related hazards and has the authority to take prompt corrective measures to eliminate such hazards. McMillen Jacobs' Project role does not include review or oversight of excavation safety. As summarized in Table 6-1, the base depths of the proposed below-grade structures are up to about 26 feet below existing site grades and may require excavation depths on the order of up to 30 feet.

Due to the depth of the proposed structures, depth to groundwater, and site restraints, temporary excavation support will likely be required for some excavations within the existing fill. For excavations extending into basalt bedrock, the rock can be cut at slopes as steep as vertical. For the undocumented fill materials, an OSHA soil type of "C" should be used; with a maximum allowable temporary cut slop of 1.5H:1V (horizontal:vertical) if fully dewatered.

Our opinions for the excavation support discussed above are for planning purposes only. The contractor should be responsible for the stability of temporary excavations and the actual means and methods to protect excavations and that temporary slopes comply with applicable local, state, and federal safety regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards. Lateral earth pressures for design of the temporary excavation support within fill are provided in Figure 7.

7.4 Groundwater Control

Groundwater measurements made during explorations indicate groundwater levels between 2.5 and 8.5 feet bgs across the site. Groundwater levels during construction may be higher than these, especially during the wet seasons. Excavations for structures are anticipated to extend to approximately 20 feet below the ground surface. Therefore, the excavations will encounter groundwater.

Soil within the excavations are primarily fine-grained with isolated zones of sandy soils. These materials are not anticipated to produce significant volumes of water. However, due to the size of the work area and

shallow groundwater, it is anticipated that dewatering systems including sump-pumps or well points may be required.

7.5 Blasting Plan

Based on the conditions encountered in the borings, the contractor may select to use drilling and blasting methods for excavation. The drilling and blasting must conform to the requirements in Section 00335 of the most recent OSSC. The Contractor must submit a blasting plan prepared by a person qualified and experienced in blasting work at least 14 days before beginning of drilling and blasting work. The blasting plan must provide details of drilling and blasting pattern, vibration, flyrock, noise reduction method, blast area security measures, and traffic control.

Drilling and blasting activities generate vibrations. Blast designs must be developed to limit vibrations to levels that do not adversely influence existing nearby structures. Blast designs involve interrelated parameters including round length, blast hole size, spacing, location, explosive strength, and the delay and firing sequence. Delays are used to detonate fractions of seconds after blast initiation to make sure each charge will fire into a cavity created by an earlier charge.

If blasting is used, nearby structures should be pre-surveyed for documenting the existing conditions. Seismographs that are specifically designed to monitor construction blasting should be used during construction to monitor blast vibrations to verify that actual vibration levels are within an acceptable range at critical structures. If a blast results in unacceptable vibrations, special modifications to the blasting procedures should be made, such as using different delay patterns, reduction in size of individual blasts, shorter and/or smaller diameter blast holes, closer spacing of blast holes, reduction of explosives, or a combination thereof as necessary to improve results.

7.6 Fill Materials & Compaction Criteria

We anticipate that various fill materials will be used for the construction of this project and that their specific locations and placement criteria will be described in the construction plans and specifications. The following sections describe general fill criteria that are subject to modification under specific design recommendations and the development of construction plans and specifications.

7.6.1 On-Site Soils – General Use

The on-site fill materials are not suitable for re-use as structural fill, though they may be separated and stockpiled for use in non-structural or appropriate landscape applications.

7.6.2 Imported Structural Fill – General Use

Imported structural fill should conform with the requirements of ODOT 1½-inch or ¾-inch minus Dense Graded Aggregates as defined in Section 02630-10.

Imported structural fill should be placed in maximum lifts of 8 inches of loose material. Unless otherwise noted, structural fill should be compacted to 92 percent of ASTM D1557 (i.e., Modified Proctor). Proper moisture conditioning and the use of vibratory equipment will facilitate compaction of these materials.

Each lift of imported structural fill should be tested by a qualified testing agency prior to placement of subsequent lifts. This fill condition should extend horizontally outward beyond the exterior perimeter of the building and footings a distance equal to the height of the fill or 3 feet, whichever is greater.

7.6.3 Embedded Wall & Retaining Wall Backfill

Embedded wall and retaining wall backfill (wall backfill) should consist of should consist of free-draining crushed aggregate conforming to Section 00510.12 in the most recent OSSC and be compacted to a minimum of 90 percent of the maximum dry density, as determined by ASTM D 1557. Wall backfill placed within 3 feet of the wall should be compacted in lifts less than 6-inches thick using hand-operated tamping equipment (e.g., jumping jack or vibratory plate compactors). If flat work (e.g., sidewalks or pavements) is placed atop the wall backfill, we recommend that the upper 2 feet of material be compacted to 95 percent of the maximum dry density, as determined by ASTM D 1557.

7.6.4 Bedding and Pipe Zone Backfill

We recommend that pipe bedding consist of imported structural fill as described above, such as ¾-inch minus crushed aggregate base material. We recommended a minimum 6 inches of bedding below the invert of the pipe. If weak subgrade conditions are encountered, subgrade stabilization may be necessary, as discussed in Section 7.6.6.

Above the pipe bedding zone, an imported structural fill as described above should be used for the pipe zone which typically extends at least 12 inches above the top of the pipe, or as determined by West Yost or the pipe manufacturer.

Bedding and pipe zone materials should be compacted to 90 percent of the maximum dry density, as determined by ASTM D 1557.

7.6.5 Trench Backfill

Trench backfill above the pipe zone should consist of imported structural fill as described above, with a maximum particle size of ¾ inch, and with less than 8 percent material passing the U.S. Standard No. 200 Sieve. As a guideline, trench backfill should be placed in 12- to 18-inch lifts. The earthwork contractor may elect to use alternative lift thicknesses based on their experience with specific equipment and fill material conditions during construction in order to achieve the required compaction. Trench backfill materials should be compacted to 95 percent of the maximum dry density, as determined by ASTM D1557.

7.6.6 Subgrade Stabilization

If groundwater is present at the base of utility excavations, trench base stabilization material should be placed. Trench base stabilization material should consist of a minimum of 12 inches of well-graded granular material (with a maximum particle size of 3 inches and less than 5 percent material passing the U.S. Standard No. 4 Sieve) underlain by a layer of non-woven geotextile placed directly over the subgrade. The material should be free of organic matter and other deleterious material, placed in one lift, and compacted until well keyed. Vibratory compaction equipment is not recommended due to risk of

additional disturbance to the subgrade. A reinforcement geotextile should be used below the aggregate as described in Section 7.7.2.

7.6.7 Controlled Low-Strength Material (CLSM)

CLSM is a self-compacting, cementitious material that is typically considered when backfilling localized areas. CLSM is sometimes referred to as "controlled density fill" or CDF. Due to its flowable characteristics, CLSM typically can be placed in restricted-access excavations where placing and compacting fill is difficult. If chosen for use at this site, we recommend the CLSM conform with Section 00442 in the most recent OSSC. The geotechnical engineer's representative should observe placement of the CLSM and obtain samples for compression testing in accordance with ASTM D4832. As a guideline, for each day's placement, two compressive strength specimens from the same CLSM sample should be tested. The results of the two individual compressive strength tests should be averaged to obtain the reported 28-day compressive strength. If CLSM is considered for use on this site, please contact the geotechnical engineer for site-specific and application-specific recommendations.

7.6.8 Pavement Materials – Asphalt & Base Course

Asphalt pavement and base course materials should conform to the requirements set forth in the most recent Oregon SSC guidelines. Base course material should consist of a well-graded, 1½-inch or ¾-inch-minus, crushed rock, having less than 5 percent material passing the No. 200 sieve. Base course material should be moisture conditioned to within 2 percent of optimum moisture content and compacted by mechanical means to a minimum of 95 percent of the material's maximum dry density, as determined in accordance with ASTM D 1557. Base coarse materials should be placed in layers that, when compacted, do not exceed about 8 inches. The asphalt pavement should be compacted to at least 92 percent of the material's theoretical maximum density as determined in accordance ASTM D 2041 (Rice Specific Gravity).

7.7 Geotextiles

7.7.1 Separation Geotextiles

In general, the widespread use of separation geotextiles is not anticipated for the project. However, they may be required in localized areas of trench seepage or for protection of subgrade, or in other areas identified during construction. They are not required for typical trench construction. If used, separation geotextiles should consist of a "needle-punched", non-woven separation fabric meeting the requirements for nonwoven drainage geotextiles, as shown in Table 02320-4 in OSSC Section 02320.

7.7.2 Reinforcement Geotextiles

A reinforcement geotextile system should be installed beneath subgrade stabilization backfill within the pipeline trenches. We recommend a single-layer system consisting of a strong geotextile, such as Mirafi RS380i, that provides both separation/filtration and reinforcement. The reinforcement/separation geotextile should be installed on the base of the trench and extend up to the top of the subgrade stabilization zone (below bedding) at a minimum. Reinforcement geotextiles should meet the requirements for Type 2, woven riprap geotextiles, as shown in Table 02320-2 in ODOT OSSC Section 02320 (ODOT, 2021).

For construction of the crushed rock mat section to support the Sludge Blend Tank and the Digested Sludge Holding Tank, we recommend using the Mirafi RS580i geotextile, which is very similar to the Mirafi RS380i discussed above, but has a higher tensile strength and modulus.

7.8 Wet Weather Construction

For planning purposes, the wet season should be considered to extend from late September to late June. It is our experience that dry weather working conditions should prevail between early July and the middle of September.

The soils encountered within the project area are highly moisture sensitive and will degrade after being traversed by construction equipment during periods of wet weather or wet conditions. Therefore, during or after wet weather, it will likely be necessary to import granular materials for structural fill or to protect exposed subgrade materials. Delays in site earthwork activities should be anticipated during periods of heavy rainfall. If earthwork is performed during extended periods of wet weather or in wet conditions, we recommend the following:

- Cover the base of trenches within soil with trench stabilization material.
- Excavations should be protected from surface water runoff by placing sandbags or by other means to promote runoff of precipitation away from work areas and to prevent ponding of water in excavations.
- Plastic covers, sloping, ditching, sumps, dewatering, and other measures should be employed in work areas as necessary to permit timely completion of work. Bales of straw and/or geotextile silt fences should be used to control surface soil movement and erosion.
- Excavations (specifically trench excavations) should be completed in small sections and backfilled at the end of each day to reduce exposure to wet conditions.
- Excavation or the removal of unsuitable soil should be followed promptly by placement and compaction of trench or foundation stabilization fill.
- The size and type of construction equipment used may have to be limited to minimize soil disturbance.

8.0 Closure

This report has been prepared for the exclusive use of the City of Sweet Home and West Yost Associates, Inc. in connection with the Sweet Home Wastewater Treatment Plant – Final Design project. The data presented in this report is based on the subsurface conditions encountered during our site explorations. The data presented herein is intended to support the design of the proposed improvements. McMillen Jacobs Associates is not responsible for the interpretation of the data contained in this report by anyone; as such interpretations are dependent on each person's subjectivity.

The geotechnical engineering evaluations and interpretations are completed within the limitations of McMillen Jacobs Associates approved scope of work, schedule and budget. The services rendered by McMillen Jacobs Associates have been performed in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the same area. The construction recommendations are considered preliminary and provided for planning purposes only. McMillen Jacobs Associates is not responsible for the use of this report in connection with anything other than the project at the location described above.

MCMILLEN JACOBS ASSOCIATES



Wolfe Lang, P.E., G.E.
Principal Geotechnical Engineer

Jeff Quinn, P.E.
Senior Project Engineer

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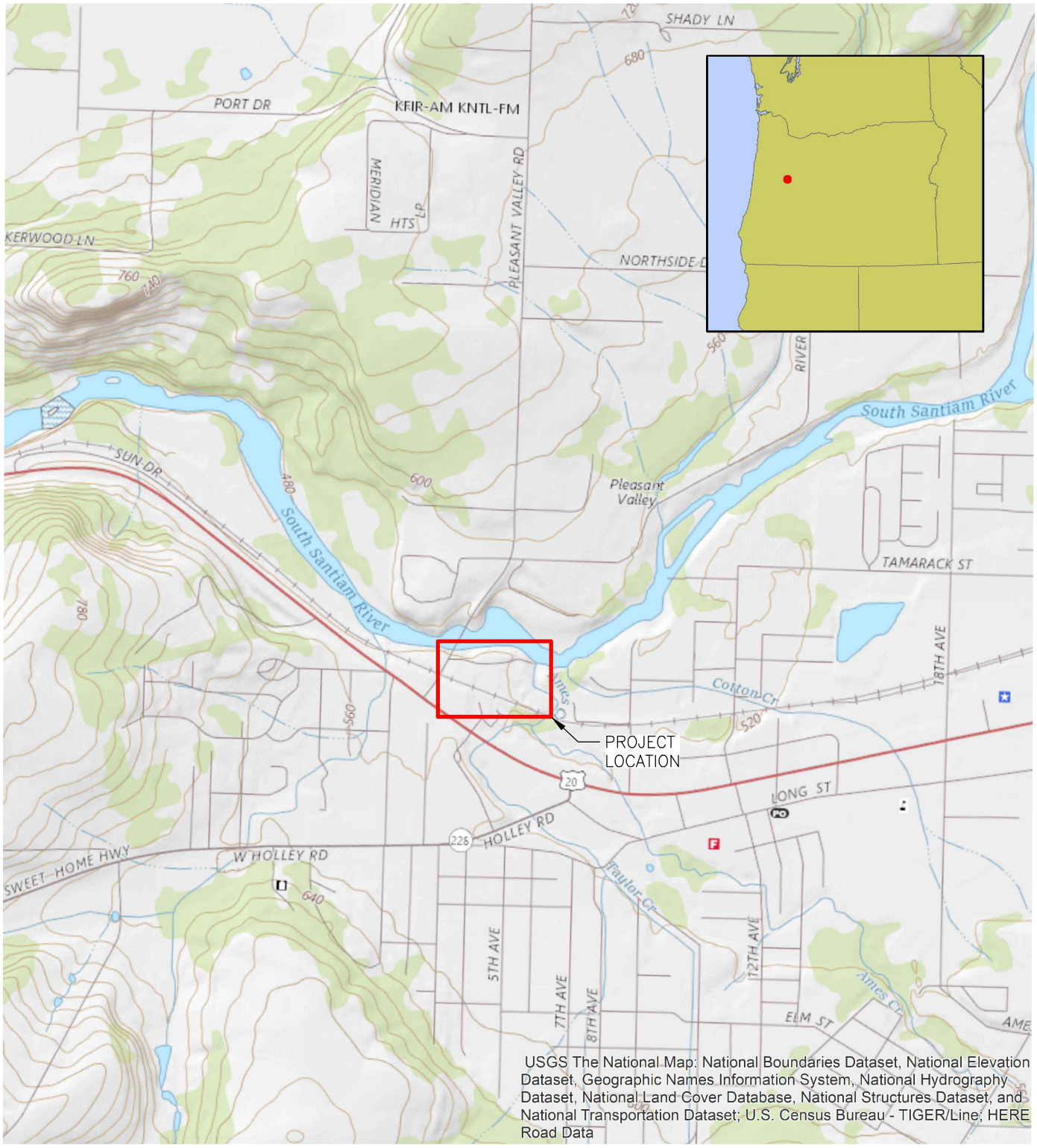
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Figures



PROJECT VICINITY MAP

SCALE: NTS

N

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CITY OF SWEET HOME

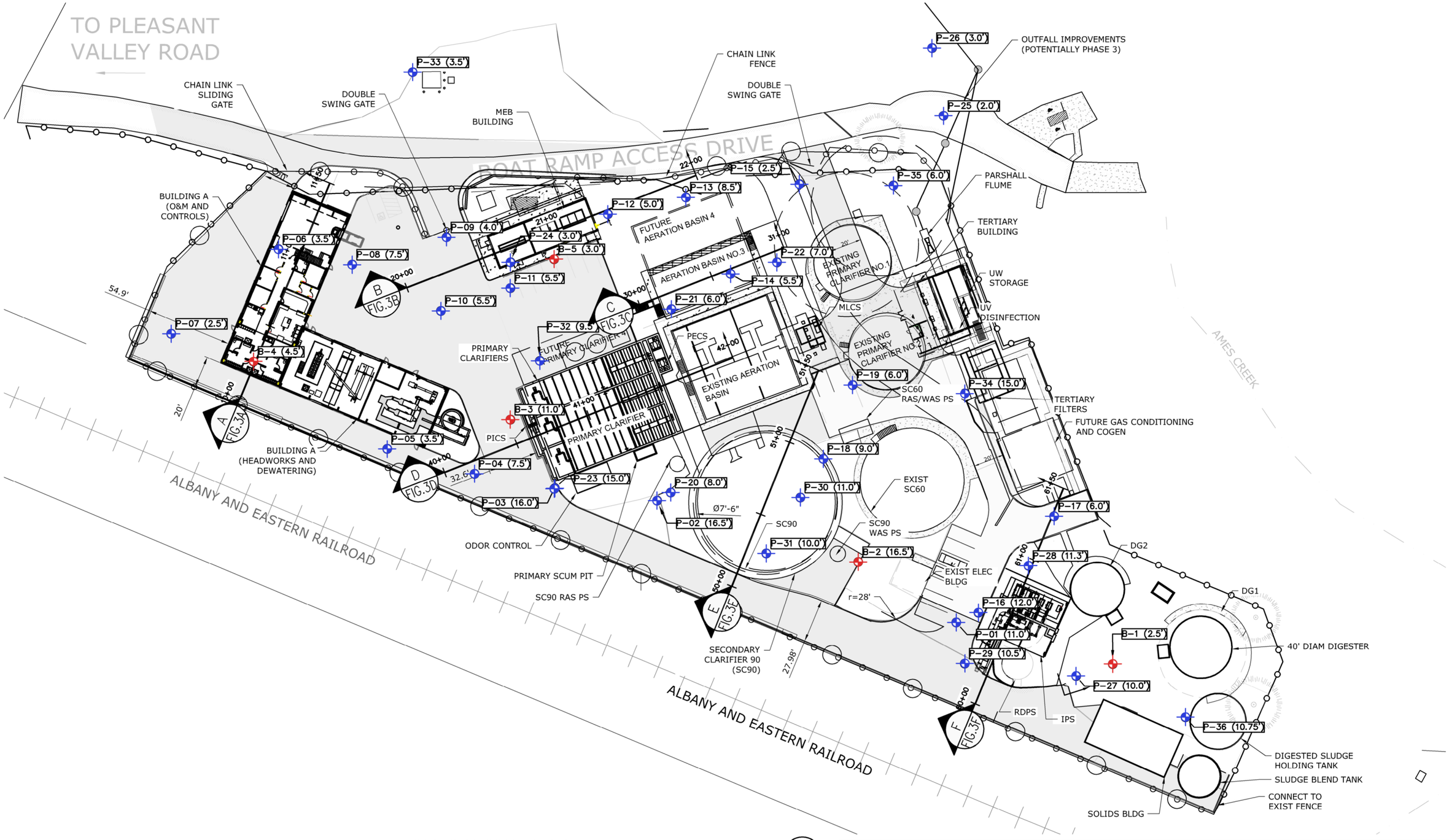
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL ENGINEERING REPORT
PROJECT VICINITY MAP

FIG.1

DEC 2022

Path: C:\Users\cburke\Box\Jobs\6367.0 Sweet Home WWTP Final Design Review\900 Design Technology\970_Xrefs\Fig.1 – Vicinity map.dwg Plot date: Jul 21, 2022, CAD User: cburke



LEGEND:

B–1 (XX.X') BOREHOLE LOCATION (DEPTH TO ROCK IN FT)

P–01 (XX.X') PROBE–HOLE LOCATION (DEPTH TO ROCK IN FT)

EXPLORATION PLAN

SCALE: 1"=60'

0' 60' 120'

A

N

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CITY OF SWEET HOME

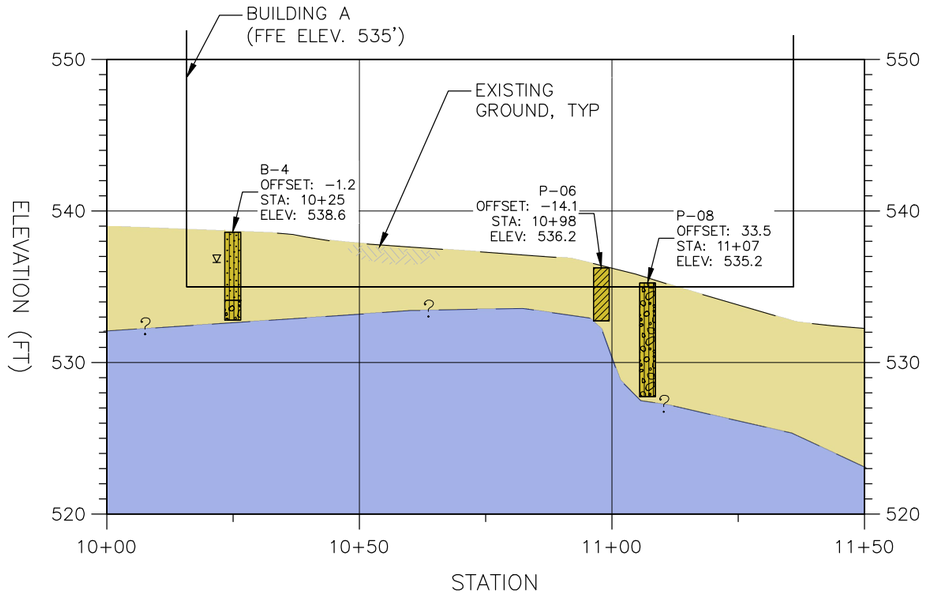
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL ENGINEERING REPORT
EXPLORATION PLAN

FIG.2

DEC 2022

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GEOLOGIC PROFILE STA 10+00 TO 11+50

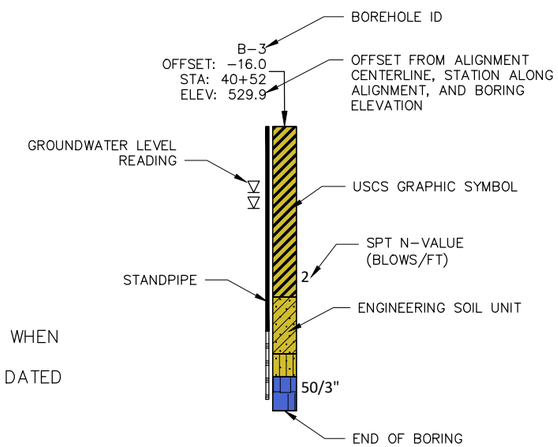
SCALE: 1"=30' HORIZ
1"=10' VERT

0' 30' 60'

0' 10' 20'

A
FIG.2

BORING/PROBE-HOLE LEGEND:



STRATIGRAPHIC LEGEND:

- WELL-GRADED GRAVEL (GW)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- SILT (ML)
- LEAN CLAY (CL)
- LOW PLASTICTIY ORGANIC CLAY (OL)
- FAT CLAY (CH)
- BASALT
- FILL
- BASALT

NOTES:

1. BOREHOLE LOCATIONS ARE APPROXIMATE.
2. BOREHOLE LOCATIONS ARE PROJECTED PERPENDICULAR TO ALIGNMENT.
3. OFFSETS ARE NEGATIVE LEFT OF ALIGNMENT AND POSITIVE RIGHT OF ALIGNMENT WHEN TRAVELING IN THE DIRECTION OF INCREASING STATION.
4. ALIGNMENT IS BASED ON 90% DRAWINGS PROVIDED BY WEST YOST ASSOCIATES, DATED JUNE 2022.

McMILLEN JACOBS ASSOCIATES

CITY OF SWEET HOME

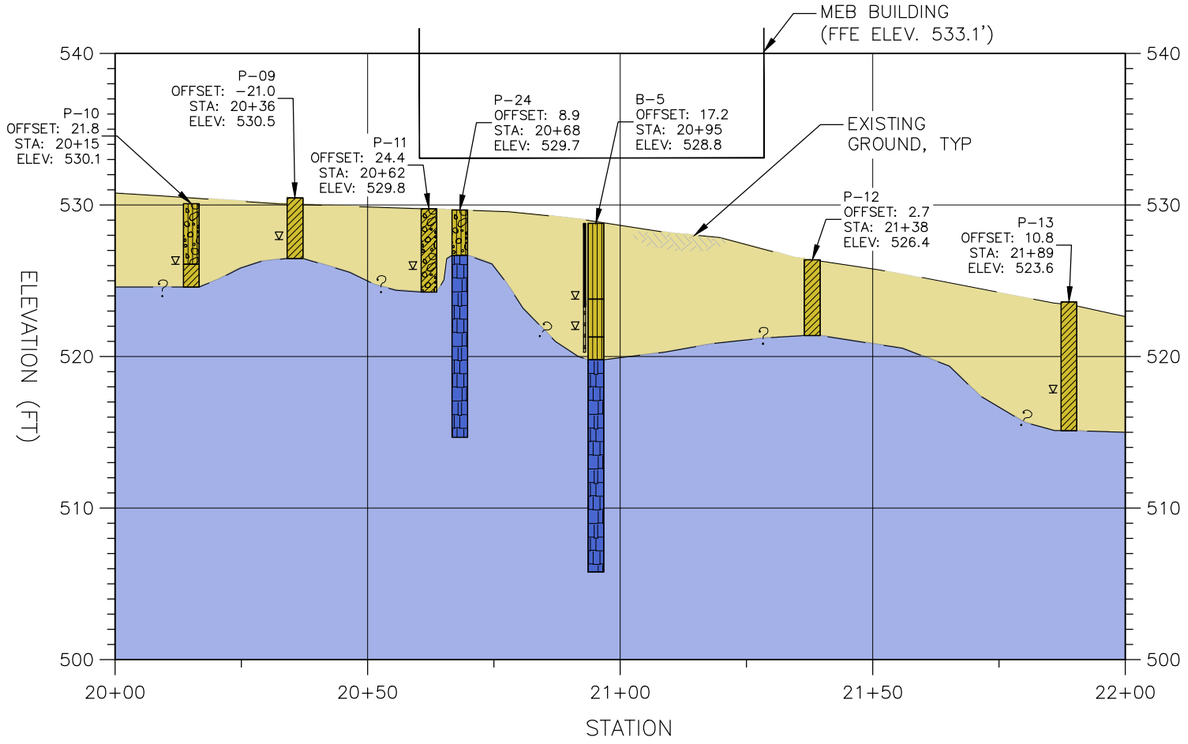
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL ENGINEERING REPORT
GEOLOGIC PROFILE
BUILDING A

FIG.3A

DEC 2022

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GEOLOGIC PROFILE STA 20+00 TO 22+00

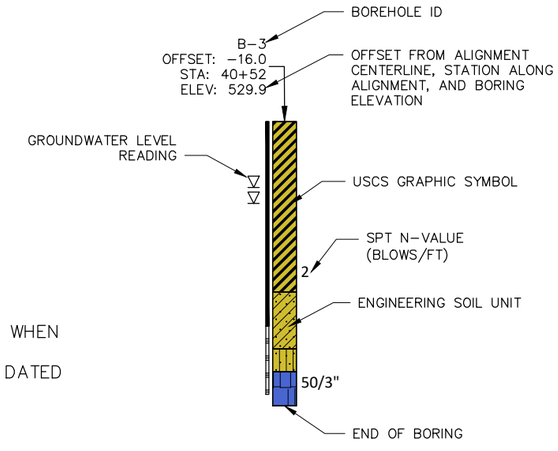
SCALE: 1"=30' HORIZ
1"=10' VERT

0' 30' 60'

0' 10' 20'

B
FIG.2

BORING/PROBE-HOLE LEGEND:



STRATIGRAPHIC LEGEND:

- WELL-GRADED GRAVEL (GW)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- SILT (ML)
- LEAN CLAY (CL)
- LOW PLASTICTIY ORGANIC CLAY (OL)
- FAT CLAY (CH)
- BASALT
- FILL
- BASALT

NOTES:

1. BOREHOLE LOCATIONS ARE APPROXIMATE.
2. BOREHOLE LOCATIONS ARE PROJECTED PERPENDICULAR TO ALIGNMENT.
3. OFFSETS ARE NEGATIVE LEFT OF ALIGNMENT AND POSITIVE RIGHT OF ALIGNMENT WHEN TRAVELING IN THE DIRECTION OF INCREASING STATION.
4. ALIGNMENT IS BASED ON 90% DRAWINGS PROVIDED BY WEST YOST ASSOCIATES, DATED JUNE 2022.

McMILLEN JACOBS ASSOCIATES

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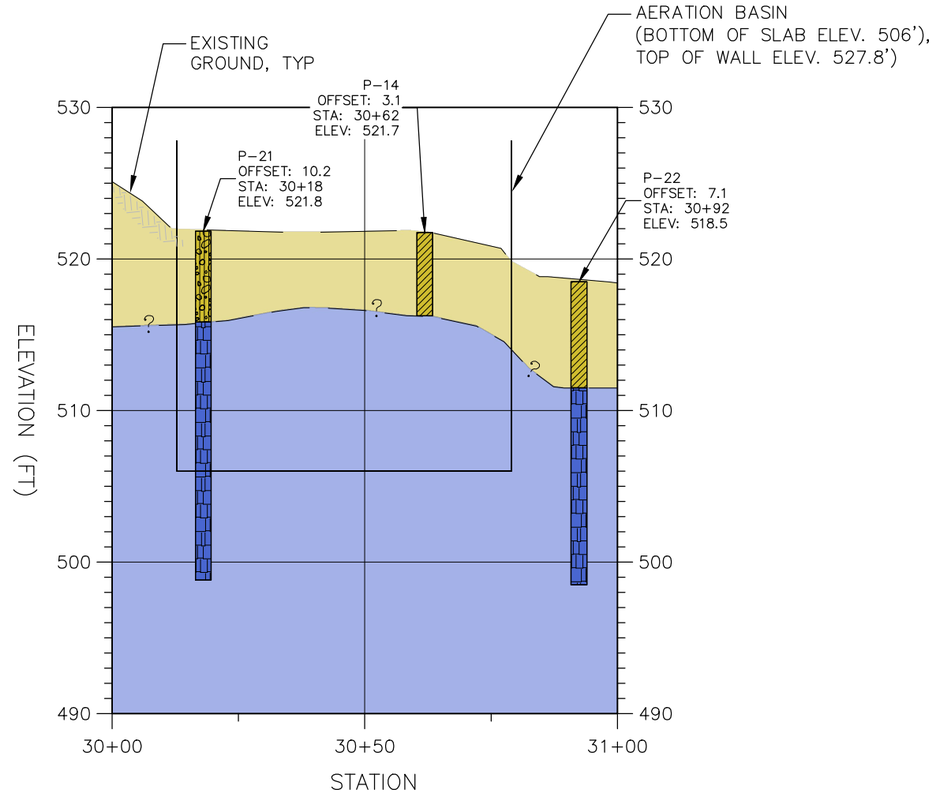
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL ENGINEERING REPORT
GEOLOGIC PROFILE
MEB BUILDING

FIG.3B

DEC 2022

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GEOLOGIC PROFILE STA 30+00 TO 31+00

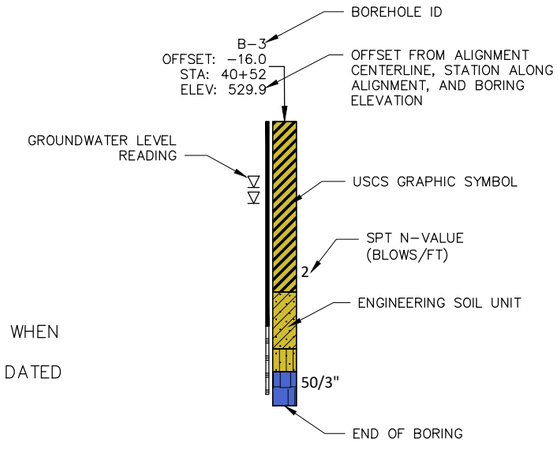
SCALE: 1"=30' HORIZ
1"=10' VERT

0' 30' 60'

0' 10' 20'

C
FIG.2

BORING/PROBE-HOLE LEGEND:



STRATIGRAPHIC LEGEND:

- WELL-GRADED GRAVEL (GW)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- SILT (ML)
- LEAN CLAY (CL)
- LOW PLASTICTIY ORGANIC CLAY (OL)
- FAT CLAY (CH)
- BASALT
- FILL
- BASALT

NOTES:

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2. BOREHOLE LOCATIONS ARE PROJECTED PERPENDICULAR TO ALIGNMENT.
3. OFFSETS ARE NEGATIVE LEFT OF ALIGNMENT AND POSITIVE RIGHT OF ALIGNMENT WHEN TRAVELING IN THE DIRECTION OF INCREASING STATION.
4. ALIGNMENT IS BASED ON 90% DRAWINGS PROVIDED BY WEST YOST ASSOCIATES, DATED JUNE 2022.

McMILLEN JACOBS ASSOCIATES

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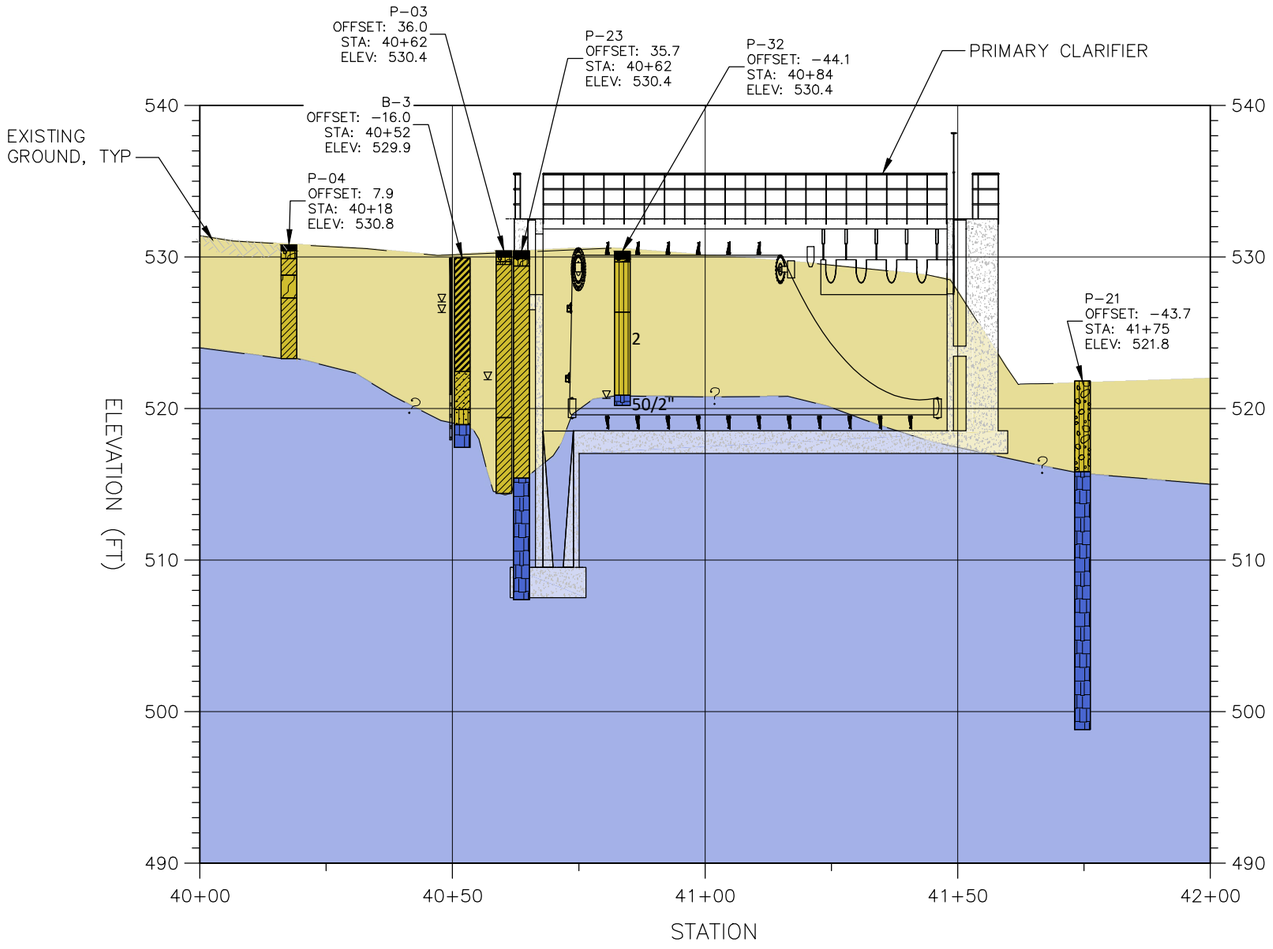
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL ENGINEERING REPORT
GEOLOGIC PROFILE
AERATION BASIN NO. 3

FIG.3C

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GEOLOGIC PROFILE STA 40+00 TO 42+00

SCALE: 1"=30' HORIZ
1"=10' VERT

0' 30' 60'
0' 10' 20'

D
FIG.2

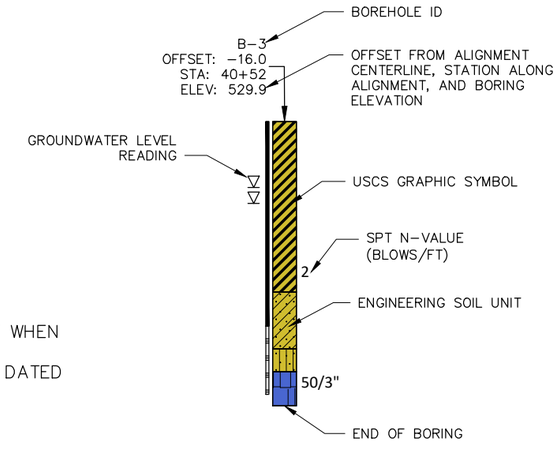
STRATIGRAPHIC LEGEND:

- WELL-GRADED GRAVEL (GW)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- SILT (ML)
- LEAN CLAY (CL)
- LOW PLASTICTIY ORGANIC CLAY (OL)
- FAT CLAY (CH)
- BASALT
- FILL
- BASALT

NOTES:

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3. OFFSETS ARE NEGATIVE LEFT OF ALIGNMENT AND POSITIVE RIGHT OF ALIGNMENT WHEN TRAVELING IN THE DIRECTION OF INCREASING STATION.
4. ALIGNMENT IS BASED ON 90% DRAWINGS PROVIDED BY WEST YOST ASSOCIATES, DATED JUNE 2022.

BORING/PROBE-HOLE LEGEND:



McMILLEN JACOBS ASSOCIATES

CITY OF SWEET HOME

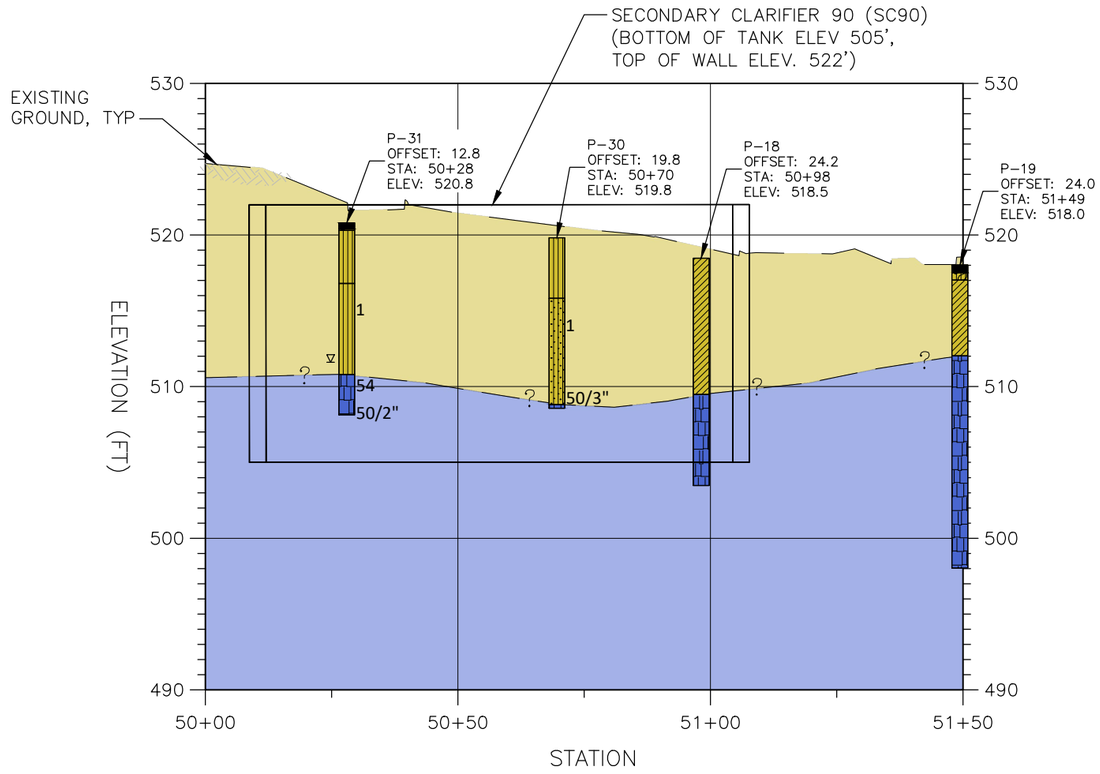
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GEOTECHNICAL ENGINEERING REPORT
GEOLOGIC PROFILE
PRIMARY CLARIFIER

FIG.3D

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GEOLOGIC PROFILE STA 50+00 TO 51+50

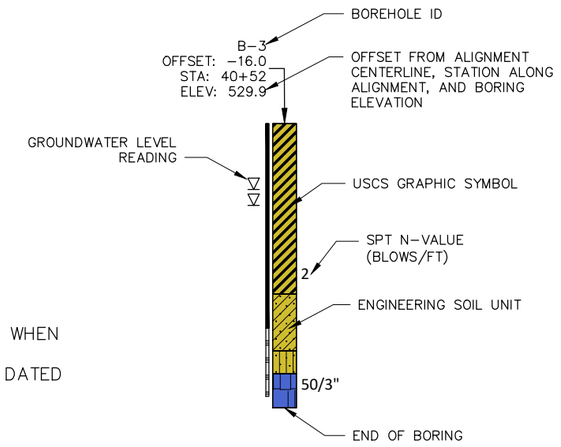
SCALE: 1"=30' HORIZ
1"=10' VERT

0' 30' 60'

0' 10' 20'

E
FIG.2

BORING/PROBE-HOLE LEGEND:



STRATIGRAPHIC LEGEND:

- WELL-GRADED GRAVEL (GW)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- SILT (ML)
- LEAN CLAY (CL)
- LOW PLASTICTIY ORGANIC CLAY (OL)
- FAT CLAY (CH)
- BASALT
- FILL
- BASALT

NOTES:

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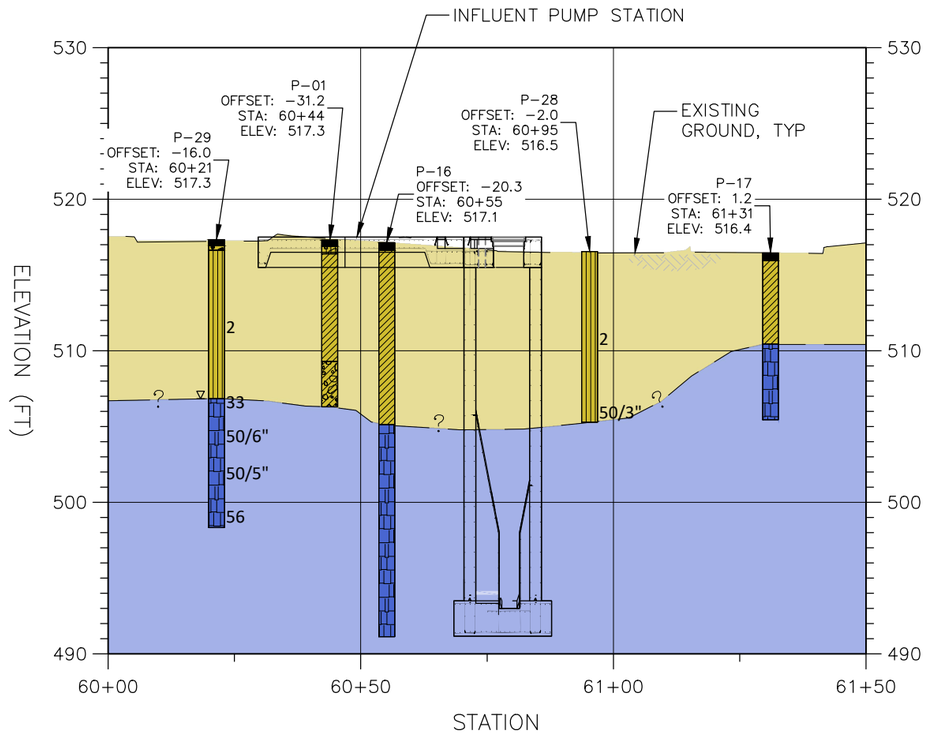
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL ENGINEERING REPORT
GEOLOGIC PROFILE
SECONDARY CLARIFIER 90 (SC90)

FIG.3E

DEC 2022

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GEOLOGIC PROFILE STA 60+00 TO 61+50

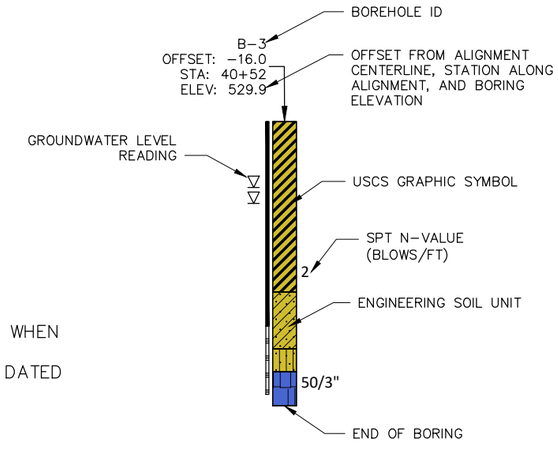
SCALE: 1"=30' HORIZ
1"=10' VERT

0' 30' 60'

0' 10' 20'

F
FIG.2

BORING/PROBE-HOLE LEGEND:



STRATIGRAPHIC LEGEND:

- WELL-GRADED GRAVEL (GW)
- SILTY GRAVEL (GM)
- CLAYEY GRAVEL (GC)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- SILT (ML)
- LEAN CLAY (CL)
- LOW PLASTICTIY ORGANIC CLAY (OL)
- FAT CLAY (CH)
- BASALT
- FILL
- BASALT

NOTES:

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CITY OF SWEET HOME

MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

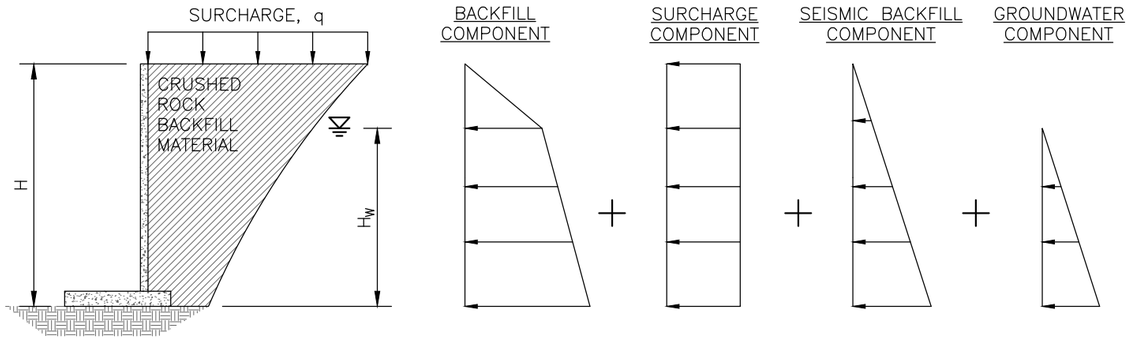
GEOTECHNICAL ENGINEERING REPORT
GEOLOGIC PROFILE
INFLUENT PUMP STATION

FIG.3F

DEC 2022

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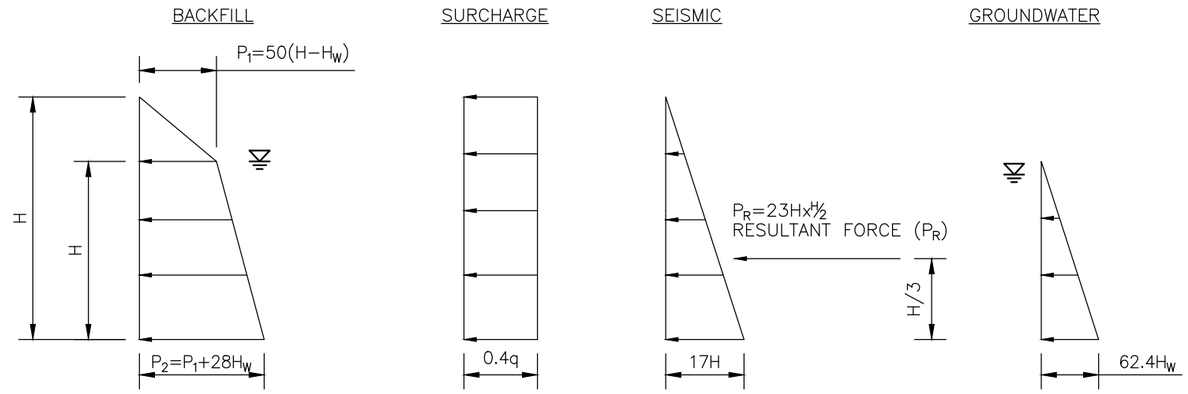
LATERAL EARTH PRESSURES ON EMBEDDED WALLS & STRUCTURES



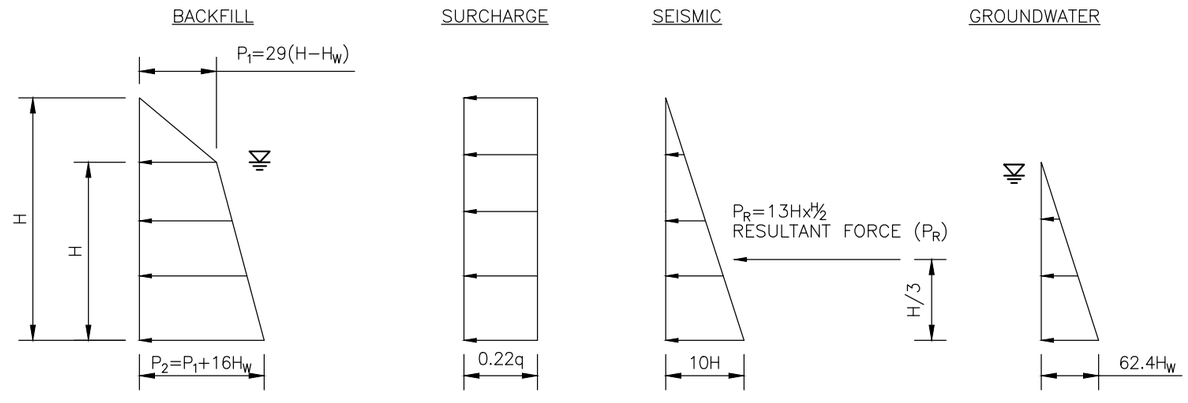
NOTES:

1. UNITS ARE POUNDS PER SQUARE FOOT (PSF).
2. BACKFILL PRESSURES BASED ON IMPORTED CRUSHED ROCK.
3. HEIGHT OF GROUNDWATER, H_W, SHOULD BE TAKEN AT GROUND SURFACE.

RESTRAINED (NON-YIELDING) EMBEDDED WALLS & STRUCTURES



NON-RESTRAINED (YIELDING) BASEMENT WALLS



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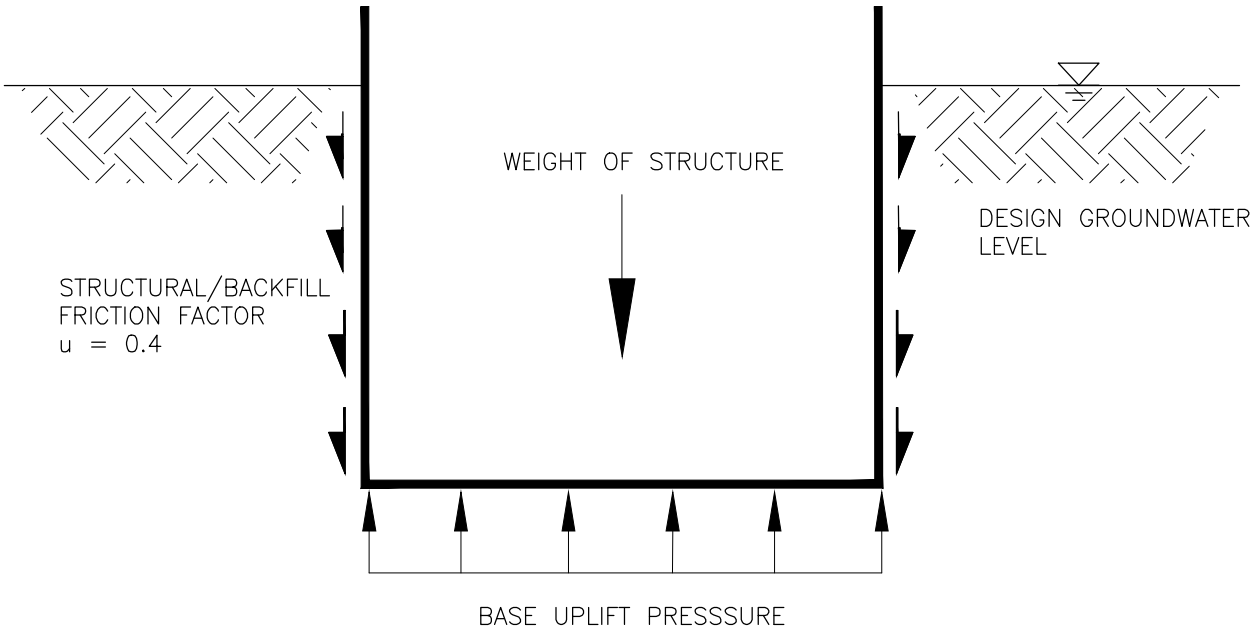
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL ENGINEERING REPORT
LATERAL EARTH PRESSURES FOR EMBEDDED WALLS

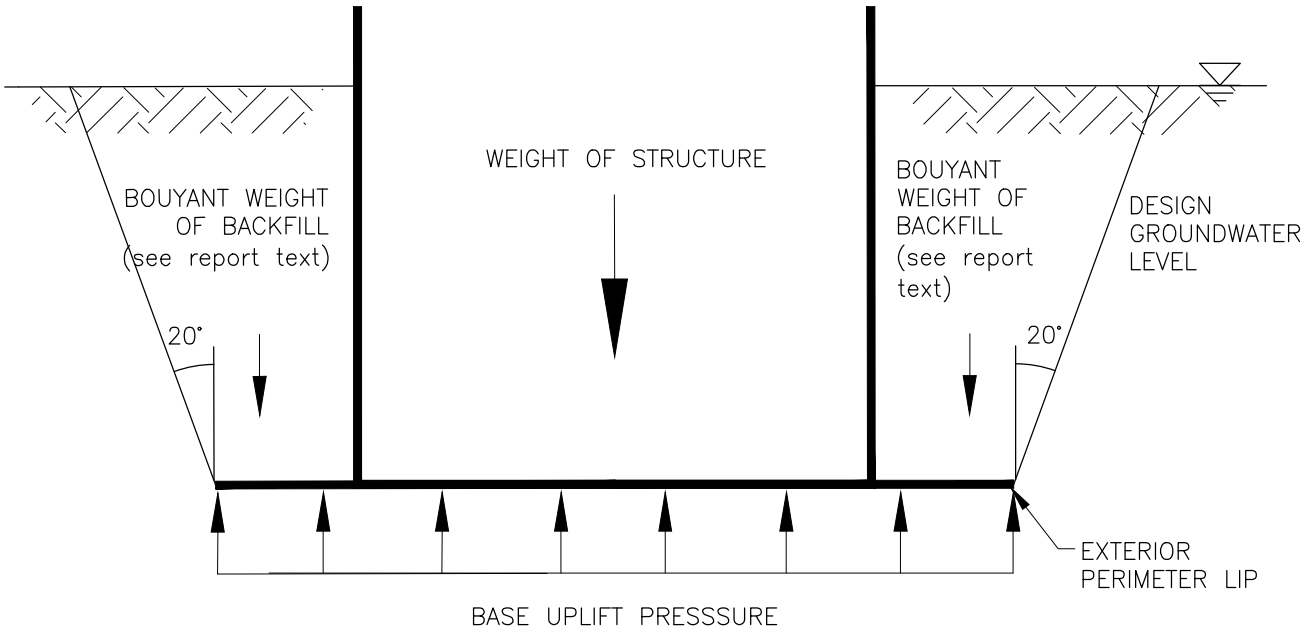
FIG.4

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STRUCTURE WITHOUT EXTERIOR PERIMETER LIP



STRUCTURE WITH EXTERIOR PERIMETER LIP

HYDROSTATIC UPLIFT PRESSURE AND RESISTANT FORCES

SCALE: NTS

McMILLEN JACOBS ASSOCIATES

CITY OF SWEET HOME

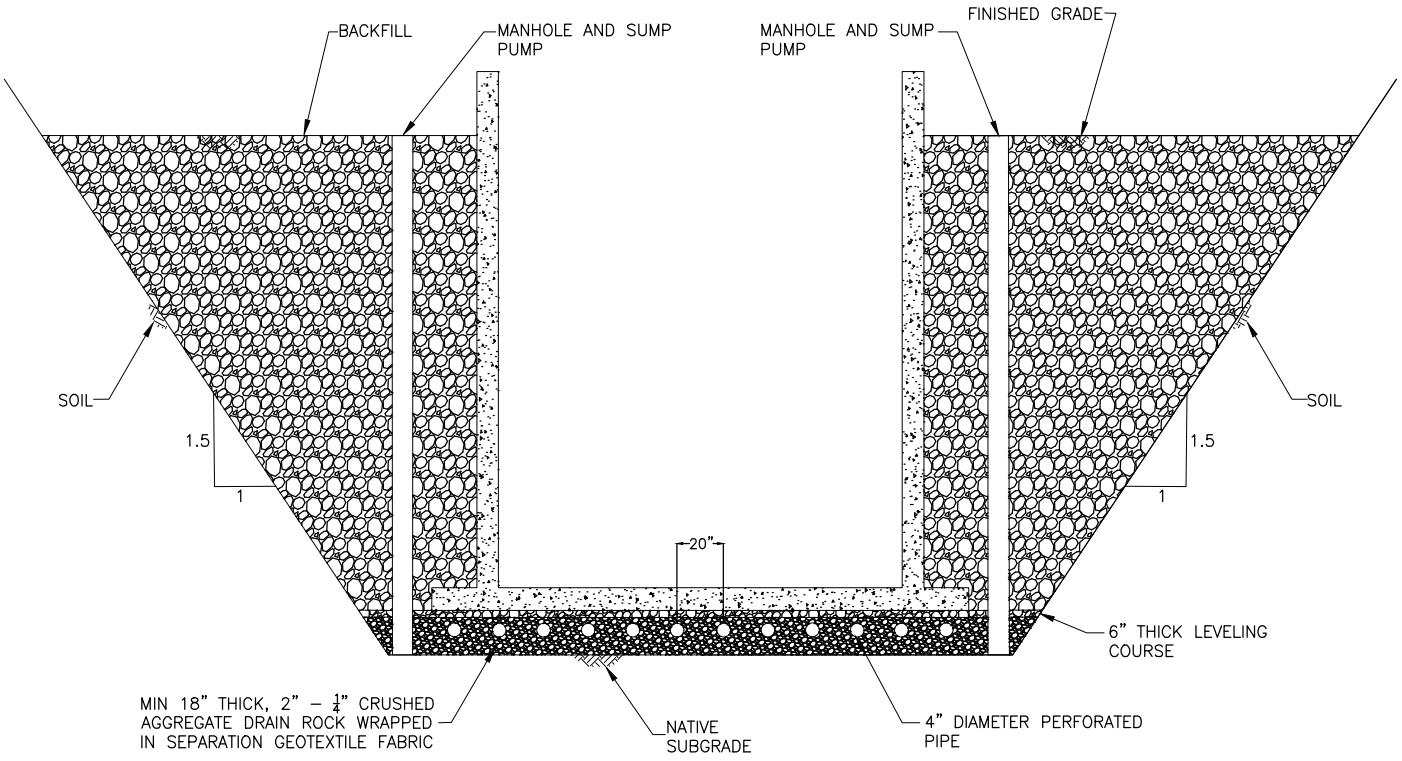
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL ENGINEERING REPORT
LATERAL EARTH PRESSURE DIAGRAM
HYDROSTATIC UPLIFT PRESSURE AND RESISTING FORCES

FIG.5

DEC 2022

Path: C:\Users\cburke\Box\Jobs\6367.0 Sweet Home WWTP Final Design Review\900 Design Technology\970_Xrefs\Fig.5 – Hydrostatic Uplift.dwg Plot date: Jul 22, 2022, CAD User: cburke



UNDERDRAIN SYSTEM
SCALE: NTS

McMILLEN JACOBS ASSOCIATES

CITY OF SWEET HOME

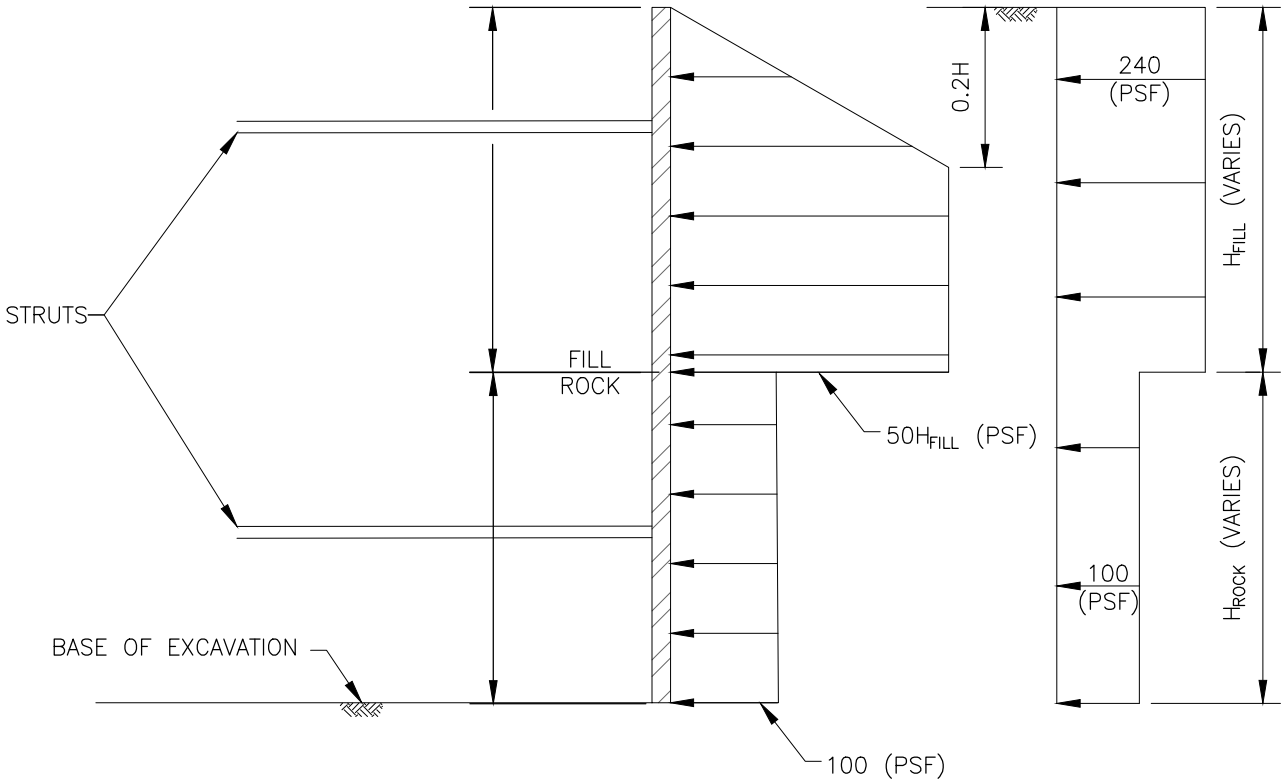
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL ENGINEERING REPORT
CONCEPTUAL UNDERDRAIN SYSTEM

FIG.6

DEC 2022

Path: C:\Users\cburke\Box\Jobs\6367.0 Sweet Home WWTP Final Design Review\900 Design Technology\970_Xrefs\Fig.6 – Conceptual Underdrain System.dwg Plot date: Jul 22, 2022, CAD User: cburke



APPARENT LATERAL EARTH PRESSURE DIAGRAM – TEMPORARY SHORING
SCALE: NTS

NOTES:

1. EARTH PRESSURE DIAGRAM ASSUMES BRACED EXCAVATION SUPPORT.
2. SURCHARGE LOAD MAY VARY BASED ON CONTRACTOR EQUIPMENT LOADS.
3. EARTH PRESSURE DIAGRAM ASSUMES LEVEL GROUND BEHIND SHORING.
4. EARTH PRESSURE DIAGRAM DOES NOT CONSIDER GROUNDWATER – GROUNDWATER PRESSURE SHOULD BE ADDED IF GROUNDWATER IS PRESENT.

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CITY OF SWEET HOME

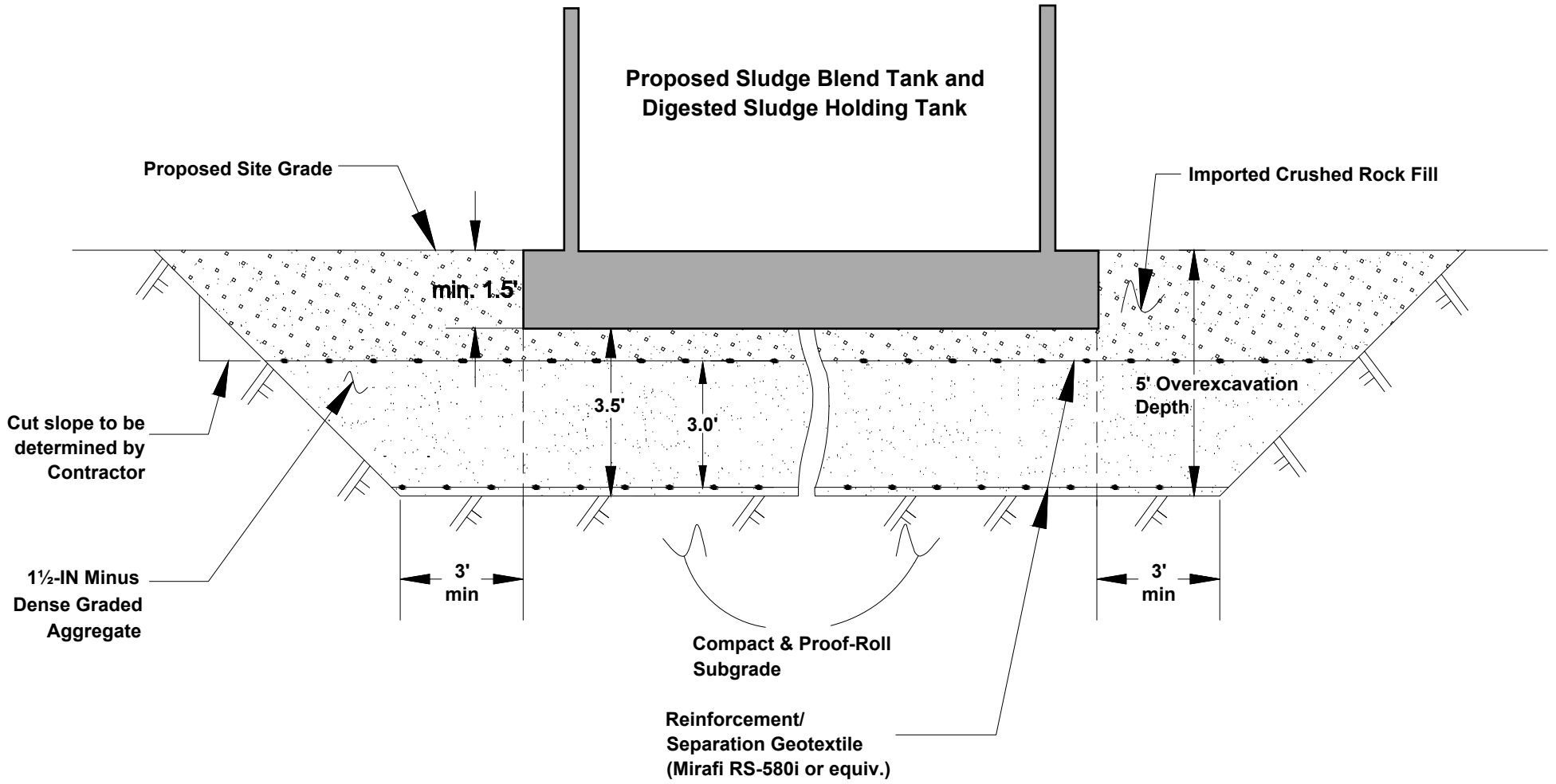
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL ENGINEERING REPORT
LATERAL EARTH PRESSURE DIAGRAM
TEMPORARY SHORING

FIG.7

DEC 2022

Path: C:\Users\cburke\Box\Jobs\6367.0 Sweet Home WWTP Final Design Review\900 Design Technology\970_Xrefs\Fig.7 – Temporary Shoring.dwg Plot date: Jul 22, 2022, CAD User: cburke



NOTES

1. Upon reaching bottom of 5-foot overexcavation, compact exposed subgrade surface with heavy roller compactor or excavator-mounted hoe pack.
2. Subgrade stabilization material should be placed in 12-inch loose lifts.

NOT TO SCALE

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CITY OF SWEET HOME
MAHLER WATER RECLAMATION FACILITY IMPROVEMENTS

GEOTECHNICAL ENGINEERING REPORT
CRUSHED ROCK MAT SECTION

FIG.8

DEC 2022

Appendix A

Boring Logs

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Key to Log of Borings and Descriptive Terms for Soils
Project: 5834.0 Sweet Home WWTP Schematic Design
Sweet Home, OR

Soil Legend

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS Based on ASTM D2488 & D2487)					
MAJOR DIVISIONS			GROUP/SYMBOL		TYPICAL DESCRIPTION
COARSE-GRAINED SOILS (50% or more retained on No. 200 sieve)	GRAVELS (more than 50% retained on No. 4 sieve)	CLEAN GRAVELS (less than 5% fines)	GW		WELL-GRADED GRAVEL
			GP		POORLY GRADED GRAVEL
		GRAVELS (with 5 to 12% fines)	GW-GM		WELL-GRADED GRAVEL WITH SILT
			GW-GC		WELL-GRADED GRAVEL WITH CLAY
			GP-GM		POORLY GRADED GRAVEL WITH SILT
			GP-GC		POORLY GRADED GRAVEL WITH CLAY
		GRAVELS WITH FINES (more than 12% fines)	GM		SILTY GRAVEL
			GC		CLAYEY GRAVEL
	SANDS (less than 50% retained on No. 4 sieve)	CLEAN SANDS (less than 5% fines)	SW		WELL-GRADED SAND
			SP		POORLY GRADED SAND
		SANDS (with 5 to 12% fines)	SW-SM		WELL-GRADED SAND WITH SILT
			SW-SC		WELL-GRADED SAND WITH CLAY
			SP-SM		POORLY GRADED SAND WITH SILT
			SP-SC		POORLY GRADED SAND WITH CLAY
		SANDS WITH FINES (more than 12% fines)	SM		SILTY SAND
			SC		CLAYEY SAND
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)	SILTS & CLAYS (liquid limit less than 50)	INORGANIC	ML		SILT
			CL		LEAN CLAY
		ORGANIC	OL		LOW PLASTICITY ORGANIC CLAY
	SILTS & CLAYS (liquid limit greater than 50)	INORGANIC	MH		ELASTIC SILT
			CH		FAT CLAY
		ORGANIC	OH		HIGH PLASTICITY ORGANIC CLAY
	SILT/CLAY (liquid limit between 12 and 25)	INORGANIC	CL-ML		CLAYEY SILT / SILTY CLAY
HIGHLY ORGANIC SOILS	PRIMARILY ORGANIC MATTER		PT		PEAT

Notes:

1. Dual symbols (symbols separated by a hyphen, e.g. SP-SM, slightly silty fine SAND) are used for soils between 5% and 12% fines or when liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart.

Moisture Content

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch.
Moist	Damp but no visible water.
Wet	Visible free water, usually from below water table.

Gradation

Gradation	Description
Well-Graded	Approximately equal amounts of all grain sizes
Poorly Graded	Predominately one size (uniformly graded) or a wide range of sizes with a missing intermediate size (gap-graded)

Grain Size

Term	Grain Size	Example
Boulder	Greater than 12" (30cm)	Basketball or Larger
Cobble	3" - 12" (75mm - 30cm)	Fist to Basketball
Gravel Coarse	¾" - 3" (20mm - 75mm)	Thumb to Fist Sized
Gravel Fine	No. 4 Sieve - ¾" (5mm - 20mm)	Pea to Thumb Sized
Sand Coarse	No. 10 Sieve - No. 4 Sieve (2mm - 5mm)	Rock Salt to Pea Sized
Sand Medium	No. 40 Sieve - No. 10 Sieve (0.4mm - 2mm)	Sugar to Rock Salt
Sand Fine	No. 200 sieve - No. 40 sieve (0.08mm - 0.4mm)	Flour to Sugar
Fines	Passing No. 200 Sieve (0.08mm)	Grains Not Visible

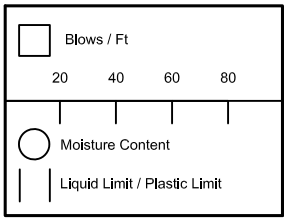
Relative Consistency

Fine - Grained Soils	
Relative Density	N, SPT Blows/Foot
Very Soft	< 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	> 30

Criteria for Describing Plasticity

Description	Criteria
Nonplastic	A ⅛" (3mm) thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

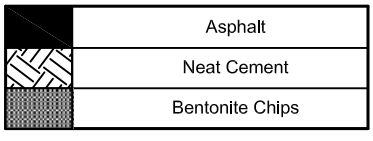
Test Symbols



Relative Density

Coarse - Grained Soils	
Relative Density	N, SPT Blows/Foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

Backfill Symbols



High/Low Water Level Screened Well Interval



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Key to Boring Logs - Rock

Rock Strength

Description	Recognition	Uniaxial Compressive Strength (psf)
Extremely Weak Rock	Indented by thumbnail	30 to 150
Very Weak Rock	Peeled by pocket knife	150 to 700
Weak Rock	Peeled with difficulty by pocket knife	700 to 3,600
Moderately Strong Rock	Indented 5 mm with sharp end of pick	3,600 to 7,200
Strong Rock	One hammer blow to fracture	7,200 to 14,500
Very Strong Rock	Many hammer blows to fracture	14,500 to 36,000
Extremely Strong Rock	Only chipped by hammer blows	> 36,000

Core Recovery Calculation (%)

$$\frac{\Sigma \text{ Length of recovered core}}{\text{Total Length of core run}} \times 100$$

RQD Calculation (%)

$$\frac{\Sigma \text{ Length of core pieces} > 4 \text{ in.}}{\text{Total Length of core run}} \times 100$$

Rock Weathering

Residual Soil	Entirely decomposed to secondary minerals; material can be easily broken by hand
Completely Weathered	Almost entirely decomposed to secondary minerals; material can be granulated by hand
Highly Weathered	More than half of the rock is decomposed
Moderately Weathered	Rock is discolored and noticeably weakened, but less than half is decomposed
Slightly Weathered	Rock is slightly discolored, but not noticeably lower in strength than fresh rock
Fresh	Rock shows no discoloration, loss of strength, or other effect of weathering or alteration

Discontinuity Type

J	Joint
FJ	Joint along foliation
S	Shear
F	Fault
HJ	Healed joint
MB	Mechanical break
B	Joint along bedding

Rock Fracture Spacing

Extremely Close Spacing	Fractures spaced less than 1 inch apart
Very Close Spacing	Fractures spaced 1 to 2.5 inches apart
Close Spacing	Fractures spaced 2.5 to 8 inches apart
Moderate Spacing	Fractures spaced 8 inches to 2 feet apart
Wide Spacing	Fractures spaced 2 to 6.5 feet apart
Very Wide Spacing	Fractures spaced 6.5 to 20 feet apart
Extremely Wide Spacing	Fractures spaced greater than 20 feet apart

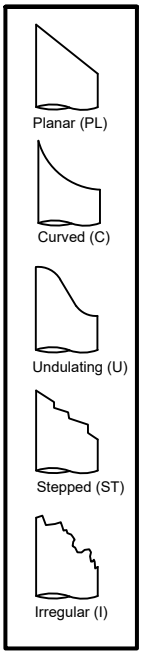
Sample Symbols

	HQ3 Rock Coring

Lithology Graphics

Basalt  Core Loss/ No Recovery 

Fracture Shape



Surface Roughness

Slickensided	Surface has smooth, glassy finish with visual evidence of striations
Smooth	Surface appears smooth and feels so to the touch
Slightly Rough	Asperities on discontinuity surfaces are distinguishable and can be felt
Rough	Ridges and side-angle steps are evident, surface feels very abrasive
Very Rough	Near vertical steps and ridges occur on discontinuity surface

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring B-1

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **Mud Rotary and HQ Wireline/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **13.5 ft**	
Hole Diameter: **4.00 in**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **516.5 ft**	
Location: **Survey**	Coordinates: **7617396.39 E, 275319.73 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Concrete - 18" thick (Pavement)		
							GM	Dense, moist, gray Silty Gravel (GM); Fine to coarse angular gravel, low plasticity silt (Base Aggregate)		At 2.5 feet very slow, very rough drilling. At 3.5 feet switch to rock coring.
512 / 5		100	RUN 1					BASALT, very strong (R5), slightly weathered to fresh, moderately to highly fractured, planar, stepped, smooth to rough joints with very narrow apertures (Little Butte Volcanic Series - Tholeiitic Basalt) *Run 1: 3.5-8.5 feet.* *RQD = 59%*		From 5.20 feet to 6.30 feet, UCS = 25,300 psi.
507 / 10		80	RUN 2					*Run 2: 8.5 -13.5 feet:* *RQD = 42%* *Planar and irregular, smooth to slightly rough joints.*		
502 / 15										Borehole completed at 13.5ft. below ground surface (bgs).
497 / 20										
492 / 25										
487 / 30										

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Boring B-1

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring B-2

Date(s) Drilled: **05/01/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **Mud Rotary/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **16.5 ft**	
Hole Diameter: **4.00 in**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **518.2 ft**	
Location: **Survey**	Coordinates: **7617232.28 E, 275385.44 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
514							OL/OH	Organic Soil (OL/OH); Mulch (Fill)		
5/2/2018 1▼		47	S1	7-5-11 (N=16)			CL	Very stiff, moist, brown to gray brown, Sandy LEAN CLAY with Gravel (CL); Medium plasticity, medium to low toughness, fine to coarse sand, fine angular gravel (Fill)		
5		27	S2	2-4-4 (N=8)			SM	Loose, moist to wet, brown, Silty SAND with Gravel (SM); Fine to coarse sand, fine angular gravel, medium plasticity, slow dilatancy (Fill)		
		53	S3	2-3-1 (N=4)				Very loose, wet, brown, Silty SAND (SM); Fine to medium sand, low plasticity fines, rapid dilatancy (Fill)		
509										
10		73	S4	2-0-0 (N=WOR)			SM	*At 10.0 grades to orange-brown, occurrence of trace, fine, angular gravel, and slow dilatancy.*		
		33	S5	0-0-1 (N=1)						
504										
15		100	S5	17-18-27 (N=45)			GC	Very dense, moist, gray and olive-brown, CLAYEY GRAVEL with Sand (GC); Fine to coarse angular gravel, fine to coarse sand, medium plasticity fines (Fill)		Borehole completed at 16.5ft. below ground surface (bgs).
499										
20										
494										
25										
489										
30										

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Boring B-2

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring B-3

Date(s) Drilled: **05/02/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **Mud Rotary/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **12.5 ft**	
Hole Diameter: **4.00 in**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **529.9 ft**	
Location: **Survey**	Coordinates: **7617007.93 E, 275477.18 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
525 / 5		53	S1	3-2-1 (N=3)			CH	Soft, moist, gray with trace orange mottles, Sandy FAT CLAY (CH); High plasticity, medium toughness, fine sand, occasional organics (Fill)		
		60	S2	0-1-1 (N=2)				*At 5.0 feet grades to scattered woody organics.*		
		100	S3	1-1-1 (N=2)			SC	Very loose, moist to wet, gray, CLAYEY SAND (SC); Fine to medium sand, medium plasticity and medium toughness fines, occasional 1-inch sandy lenses of slow dilatancy (Fill)		
520 / 10		87	S4	0-16-49 (N=65)			SM	Medium dense, wet, red-brown, SILTY SAND (SM); Fine to medium sand, low plasticity fines, slow dilatancy (Fill)		
		0	S5	50/0" (Refusal)				Dark gray basalt chips in cuttings (Little Butte Volcanic Series - Tholeiitic Basalt)		At 11.0 feet very rough , very slow drilling.
515 / 15										Borehole completed at 12.5ft. below ground surface (bgs).
510 / 20										
505 / 25										
500 / 30										

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Boring B-3

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring B-4

Date(s) Drilled: **05/01/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **Mud Rotary/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **5.8 ft**	
Hole Diameter: **4.00 in**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **538.6 ft**	
Location: **Survey**	Coordinates: **7616842.35 E, 275514.57 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
534 5/2/2018 1		20	S1	7-10-7 (N=17)			SM	Medium dense, moist to wet, dark gray, SILTY SAND with Gravel (SM); Fine to medium sand, fine angular gravel, low plasticity fines, slow dilatancy, scattered organics (Fill)		
5		120	S2	28-50/3" (Refusal)			GM	Very dense, moist, gray and orange, SILTY GRAVEL with Sand (GM); Fine to coarse gravel, fine to coarse sand, medium plasticity fines (Fill)		At 4.5 feet very slow, very rough drilling.
529 10										Borehole completed at 5.8ft. below ground surface (bgs).
524 15										
519 20										
514 25										
509 30										

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Boring B-4

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring B-5

Date(s) Drilled: **05/02/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **Mud Rotary and HQ Wireline/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **23.0 ft**	
Hole Diameter: **4.00 in**	Hammer Weight/Drop (lb/in.)/Type: **140 lb / 30 in / Automatic**	Ground Surface Elevation/Datum: **528.8 ft**	
Location: **Survey**	Coordinates: **7617036.16 E, 275580.52 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
524								Stiff, moist, gray, Sandy SILT (ML); Low plasticity, medium toughness, fine sand, trace coarse sand, occasional organics (Fill)		
5		53	S1	1-5-6 (N=11)			ML			
10/29/2015		53	S2	1-1-1 (N=2)			ML	Soft, moist to wet, green to red-brown, Sandy SILT (ML); Low plasticity, low toughness, fine to medium sand, occasional organics (Fill)		
		73	S3	1-4-11 (N=15)			ML	Stiff, wet, gray and red-brown, Sandy SILT (ML); Low plasticity, medium toughness fines, fine sand, trace medium and coarse sand, occasional organics (Fill)		
519								Run 1: 9.0 - 13.0 feet, RQD = 75%; BASALT, very strong (R5), slightly weathered to fresh, moderately to highly fractured, planar and curved, smooth to rough, high angle and sub-horizontal narrow joints (Little Butte Volcanic Series - Tholeiitic Basalt)		At 8.5 feet, more difficulty drilling, driller remarks likely weathered rock.
10		100	RUN 1							At 9.0 feet, switch to rock coring. RQD = 75%. From 11.7 feet to 12.4 feet UCS = 29,919 psi.
514								*Run 2: 13.0-18.0 feet, RQD = 86%, addition of irregular joints and < 0.1" thick light blue green staining/coating of occasional joints.*		At 13.0 feet RQD = 86%.
15		100	RUN 2							
509								*Run 3: 18.0-23.0 feet, RQD = 74%, grade to medium strong based on testing*		At 18.0 feet RQD = 74%. From 18.0 feet to 19.0 feet UCS = 6,932 psi.
20		100	RUN 3							
504										Borehole completed at 23ft. below ground surface (bgs).
25										
499										
30										

McMILLEN JACOBS ASSOCIATES

Boring B-5

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-01

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **11.0 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **517.3 ft**	
Location: **Survey**	Coordinates: **7617295.47 E, 275346.48 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt (Pavement)		
							GM	Dense, gray, Silty GRAVEL (GM); (Base Aggregate)		
								Very soft to soft, moist, brown, LEAN CLAY with Sand (CL); Low plasticity, medium toughness, fine sand, trace medium sand, occasional organics (Fill)		
513 / 5			S1				CL			
										At 9.0 feet driller remarks that the material stiffens.
										At 10.0 feet, driller remarks that the material feels like rock but the auger is able to continue to spin. Auger refusal at 11 feet.
508 / 10							GC	Very loose to loose, moist to wet, gray brown, CLAYEY GRAVEL with Sand (GC); Fine to coarse angular basalt gravel, fine to coarse sand, low plasticity fines (Fill)		
										Borehole completed at 11ft. below ground surface (bgs).
503 / 15										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
498 / 20										
493 / 25										
488 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-01

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-02

Date(s) Drilled: **05/01/2018 - 01/05/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **11.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **526.1 ft**	
Location: **Survey**	Coordinates: **7617102.54 E, 275424.97 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (□ BLOWS/FT 20 40 60 80; ○ MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
522 / 5							CL	Soft to very soft, moist, brown to light brown, Sandy LEAN CLAY with Gravel (CL); Low plasticity, fine angular gravel, occasional organics (Fill)		At 2.5 feet very slow, very rough drilling.
517 / 10										Auger refusal at 11.5 feet.
512 / 15										Borehole completed at 11.5ft. below ground surface (bgs). Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
507 / 20										
502 / 25										
497 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-02

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-03

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **16.0 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **530.4 ft**	
Location: **Survey**	Coordinates: **7617036.27 E, 275432.54 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
526 / 5							GM	Asphalt (Pavement) Base rock (Fill)		
							CL	Very soft to soft, moist, dark gray-brown, LEAN CLAY with Sand (CL); Fine sand (Fill)		
521 / 10 ▼ 4/30/2018							CL	Very soft to soft, moist to wet, gray, Sandy LEAN CLAY (CL); Medium plasticity, fine to medium sand (Fill) *At 13.0 feet, grades to brown, moist to wet, decrease in sand content.*		
516 / 15										Auger refusal at 16 feet.
										Borehole completed at 16ft. below ground surface (bgs).
511 / 20										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
506 / 25										
501 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-03

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-04

Date(s) Drilled: **04/30/2018 - 04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **7.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **530.8 ft**	
Location: **Survey**	Coordinates: **7616984.89 E, 275442.28 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt - 5" thick (Pavement)		
							GM	Dense, moist, gray Silty GRAVEL (GM); Fine to coarse angular gravel, low plasticity silt, 5 inches thick (Base Aggregate)		
							CL			
			S1				OL/ OH	Very soft to soft, moist, dark gray-brown, LEAN CLAY (CL); (Fill)		At 2.5 feet driller remarks that material becomes stiffer, woody material began smoking so driller added water to hole, very slow drilling. Organic chemical odor in the wood fiber of Sample 1.
								Hard, moist, brown, Organic Soil with Sand (OL/OH); Frequent hard wood in clay (Fill)		
526 5							CL	Very soft to soft, moist, green-brown with brown-orange mottles, LEAN CLAY (CL); Low plasticity, fine sand, trace medium sand (Fill)		
			S2							Auger refusal at 7.5 feet.
521 10										Borehole completed at 7.5ft. below ground surface (bgs).
516 15										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
511 20										
506 25										
501 30										

McMILLEN JACOBS ASSOCIATES

Boring P-04

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-05

Date(s) Drilled: **05/01/2018 - 05/01/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **3.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **533.1 ft**	
Location: **Survey**	Coordinates: **7616928.58 E, 275458.29 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
							CL	Very soft to soft, moist, brown to light brown, LEAN CLAY with Sand (CL); Low plasticity, medium toughness, fine sand, trace coarse angular gravel, occasional organics (Fill)		Auger refusal at 3.5 feet.
529 / 5										Borehole completed at 3.5ft. below ground surface (bgs).
524 / 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
519 / 15										
514 / 20										
509 / 25										
504 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-05

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-06

Date(s) Drilled: **04/30/2018 - 04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **3.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **536.2 ft**	
Location: **Survey**	Coordinates: **7616858.52 E, 275586.88 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
			S1				CL	Stiff, moist to wet, brown, LEAN CLAY (CL); Low plasticity, medium toughness, trace fine to medium sand, fine gravel, occasional woody organics (Fill)		Auger refusal at 3.5 feet.
532 / 5										Borehole completed at 3.5ft. below ground surface (bgs).
527 / 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
522 / 15										
517 / 20										
512 / 25										
507 / 30										

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-07

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **2.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **538.0 ft**	
Location: **Survey**	Coordinates: **7616789.32 E, 275532.46 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
							GM	Very loose to loose, moist, dark brown, SILTY GRAVEL with Sand (GM); Angular fine to coarse gravel with cobbles, low plasticity fines (Fill)		Auger refusal at 2.5 feet.
533 5										Borehole completed at 2.5ft. below ground surface (bgs).
528 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
523 15										
518 20										
513 25										
508 30										

McMILLEN JACOBS ASSOCIATES

Boring P-07

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-08

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **7.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **535.2 ft**	
Location: **Survey**	Coordinates: **7616905.96 E, 275577.01 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
531 / 5			S1				GM	Very loose to loose, moist, dark brown, SILTY GRAVEL with Sand (GM); Fine to coarse angular to subangular gravel, fine to coarse sand, low plasticity fines, occasional woody organics (Fill)		Slight petroleum odor while drilling. Auger refusal at 7.5 feet.
526 / 10										Borehole completed at 7.5ft. below ground surface (bgs). Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
521 / 15										
516 / 20										
511 / 25										
506 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-08

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-09

Date(s) Drilled: **05/01/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **4.0 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **530.5 ft**	
Location: **Survey**	Coordinates: **7616966.80 E, 275594.59 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (□ BLOWS/FT 20 40 60 80; ○ MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
526 5/2/2018 ▼			S1				CL	Moist, gray-brown, Sandy LEAN CLAY with Gravel (CL); Low plasticity, fine to coarse sand, fine angular gravel, scattered organics (Fill)		Slight petroleum odor. Auger refusal at 4 feet.
5										Borehole completed at 4ft. below ground surface (bgs). Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
521 10										
516 15										
511 20										
506 25										
501 30										

McMILLEN JACOBS ASSOCIATES

Boring P-09

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-10

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **5.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **530.1 ft**	
Location: **Survey**	Coordinates: **7616963.18 E, 275547.22 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
526 0							GM	Very loose to loose, moist, brown, SILTY GRAVEL with Sand (GM); Fine to coarse gravel, fine and coarse sand, low plasticity. (Fill)		
5/1/2018 1							CL	Very soft to soft, wet, gray-brown, LEAN CLAY with Sand (CL); Low plasticity, fine sand, trace angular fine angular gravel. (Fill)		Auger refusal at 5.5 feet.
521 5										Borehole completed at 5.5ft. below ground surface (bgs).
516 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
511 15										
506 20										
501 25										
30										

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Boring P-10

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-11

Date(s) Drilled: **04/30/2018 - 04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **5.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **529.8 ft**	
Location: **Survey**	Coordinates: **7617007.94 E, 275561.88 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
525 5			S1				GC	Very loose to loose, moist to wet, brown to gray brown, Clayey GRAVEL with Sand (GC); Fine to coarse gravel, fine to coarse sand (Fill)		Auger refusal at 5.5 feet.
520 10										Borehole completed at 5.5ft. below ground surface (bgs). Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
515 15										
510 20										
505 25										
500 30										

5/1/2018 1

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Boring P-11

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-12

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **5.0 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **526.4 ft**	
Location: **Survey**	Coordinates: **7617070.84 E, 275609.56 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
522 / 5			S1				CL	Very soft to soft, moist, brown, Gravelly LEAN CLAY with Sand (CL); Low plasticity, fine to coarse angular gravel, fine to coarse sand (Fill)		Auger refusal at 5 feet.
										Borehole completed at 5ft. below ground surface (bgs).
517 / 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
512 / 15										
507 / 20										
502 / 25										
497 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-12

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-13

Date(s) Drilled: **04/30/2018 - 04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **8.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **523.6 ft**	
Location: **Survey**	Coordinates: **7617121.16 E, 275620.34 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
519 / 0							CL	Very soft to soft, moist to wet, dark brown to gray brown, Sandy LEAN CLAY with Gravel (CL); Low plasticity, fine to coarse sand, fine angular gravel (Fill)		Loose gravelly material begins caving at the ground surface.
5/6/2018 1										Auger refusal at 8.5 feet.
514 / 5										Borehole completed at 8.5ft. below ground surface (bgs).
509 / 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
504 / 15										
499 / 20										
494 / 25										
30										

McMILLEN JACOBS ASSOCIATES

Boring P-13

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-14

Date(s) Drilled: **05/01/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **5.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **521.7 ft**	
Location: **Survey**	Coordinates: **7617149.97 E, 275571.01 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
517 / 5			S1				CL	Very soft to soft, wet, gray-brown, Sandy LEAN CLAY with Gravel (CL); Low plasticity, fine to coarse sand, fine angular gravel (Fill)		Observed groundwater at approximately 4.0 feet water present, difficult to measure due to gravel.
512 / 10										Auger refusal at 5.5 feet.
507 / 15										Borehole completed at 5.5ft. below ground surface (bgs).
502 / 20										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
497 / 25										
492 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-14

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-15

Date(s) Drilled: **04/30/2018**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **J. Irizarry**	Checked By: **K. Elliott**
Drilling Method/ Rig Type: **4-1/4" Hollow stem auger/CME 75**	Drilling Contractor: **Western States Soil Conservation, Inc.**	Total Depth of Borehole: **2.5 ft**	
Hole Diameter: **4.25 in**	Hammer Weight/Drop (lb/in.)/Type	Ground Surface Elevation/Datum: **519.1 ft**	
Location: **Survey**	Coordinates: **7617194.34 E, 275628.88 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
519 0							GC	Very loose to loose, moist to wet, brown, CLAYEY GRAVEL with Sand (GC); Fine angular gravel, fine to coarse sand (Fill)		Auger refusal at 2.5 feet.
4/30/2018 ▽ 515 5										Borehole completed at 2.5ft. below ground surface (bgs).
510 10										Grab samples obtained from auger cuttings during exploration. Reported relative density and apparent consistency based on reactions while drilling.
505 15										
500 20										
495 25										
490 30										

McMILLEN JACOBS ASSOCIATES

Boring P-15

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-16

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **26.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **517.1 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617309.79 E, 275352.81 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt (Pavement)		
								Soft, moist, brown, CLAY (CL) (Fill)		
513										
5							CL			
508										
10										
								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
503										
15										
498										
20										
493										
25										Borehole completed at 26ft. below ground surface (bgs).
488										
30										

McMILLEN JACOBS ASSOCIATES

Boring P-16

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-17

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **11.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **516.4 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617358.56 E, 275414.92 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt (Pavement)		
								Soft, moist, brown, CLAY (CL) (Fill)		
							CL			
512 / 5										
								Basalt, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
507 / 10										
										Borehole completed at 11ft. below ground surface (bgs).
502 / 15										
497 / 20										
492 / 25										
487 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-17

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-18

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **15.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **518.5 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617209.77 E, 275451.86 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
514 / 5							CL	Soft, moist, brown, CLAY (CL) (Fill)		
509 / 10								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
504 / 15										Borehole completed at 15ft. below ground surface (bgs).
499 / 20										
494 / 25										
489 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-18

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-19

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **20.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **518.0 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617228.61 E, 275499.48 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt (Pavement)		
							GM	Medium dense, gray, silty GRAVEL (GM) (Fill)		
								Soft, moist, brown, CLAY (CL) (Fill)		
514							CL			
5										
								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
509										
10										
504										
15										
499										
20										Borehole completed at 20ft. below ground surface (bgs).
494										
25										
489										
30										

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-20

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **20.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **525.4 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617111.38 E, 275430.15 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
521 / 5							CL	Soft, moist, brown, CLAY (CL) (Fill)		
516 / 10								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
511 / 15										
506 / 20										Borehole completed at 20ft. below ground surface (bgs).
501 / 25										
496 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-20

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-21

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **23.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **521.8 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617111.78 E, 275548.31 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
517 / 5							GM	Loose, gray, silty GRAVEL (GM) (Fill)		
512 / 10								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
507 / 15										
502 / 20										
497 / 25										Borehole completed at 23ft. below ground surface (bgs).
492 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-21

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-22

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **20.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **518.5 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617179.82 E, 275578.51 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
514 / 5							CL	Soft, moist, brown, slightly sandy CLAY (CL) (Fill)		
509 / 10								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
504 / 15										
499 / 20										Borehole completed at 20ft. below ground surface (bgs).
494 / 25										
489 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-22

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-23

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **23.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **530.4 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617036.68 E, 275432.95 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
526 / 0								Asphalt (Pavement)		
							GM	Medium dense, gray, slightly silty GRAVEL (GM) (Fill)		
								Soft, moist, brown, CLAY (CL) (Fill)		
526 / 5										
							CL			
521 / 10										
516 / 15								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
511 / 20										There was no return of rock chips until 22 feet bgs. Driller commented that the hole was being plugged by dirt and preventing return of rock fragments.
506 / 25										Borehole completed at 23ft. below ground surface (bgs).
501 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-23

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-24

Date(s) Drilled: **10/30/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **15.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **529.7 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617008.03 E, 275578.53 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
525 / 0							GM	Loose, gray, silty GRAVEL (GM) (Fill)		
525 / 5								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		Driller commented that it got wet around 5 feet bgs.
520 / 10										
515 / 15										Borehole completed at 15ft. below ground surface (bgs).
510 / 20										
505 / 25										
500 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-24

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-25

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **15.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **506.4 ft**	
Location: **Pleasant Valley Boat Ramp**	Coordinates: **7617287.27 E, 275672.91 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt (Pavement)		
							GM	Medium dense, gray, silty GRAVEL (GM) (Fill)		
502								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
5										
497										
10										
492										
15										Borehole completed at 15ft. below ground surface (bgs).
487										
20										
482										
25										
477										
30										

McMILLEN JACOBS ASSOCIATES

Boring P-25

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-26

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **23.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **507.2 ft**	
Location: **Pleasant Valley Boat Ramp**	Coordinates: **7617279.85 E, 275716.52 N**	Elevation Source: **Site Survey**	

ELEV. (FT) WATER LEVEL DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
503 / 5							GM	Medium dense, gray, silty GRAVEL (GM) (Fill)		
								BASALT, fractured, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		Driller comments that between 5 and 12 feet bgs seemed like highly fractured rock.
498 / 10										
								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
493 / 15										
488 / 20										
483 / 25										Borehole completed at 23ft. below ground surface (bgs).
478 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-26

Project: Sweet Home WWTP Schematic Design
Project Location: Sweet Home, OR
Project Number: 5834.0

Log of Boring P-27

Date(s) Drilled: **10/29/2019**	Geotechnical Consultant: **McMillen Jacobs Associates**	Logged By: **L. Ferguson**	Checked By: **J. Quinn**
Drilling Method/ Rig Type: **Air Track Probe/Furukawa HCR900**	Drilling Contractor: **McCallum Rock Drilling**	Total Depth of Borehole: **26.0 ft**	
Hole Diameter: **3.00 in**	Hammer Weight/Drop (lb/in.)/Type: **N/A**	Ground Surface Elevation/Datum: **516.6 ft**	
Location: **Sweet Home WWTP**	Coordinates: **7617372.72 E, 275312.04 N**	Elevation Source: **Site Survey**	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Concrete (Pavement)		
								Soft, moist, brown, slightly sandy CLAY (CL) (Fill)		
512 / 5							CL			
507 / 10								BASALT, hard, gray (Little Butte Volcanic Series - Tholeiitic Basalt)		
502 / 15										
497 / 20										
492 / 25										Borehole completed at 26ft. below ground surface (bgs).
487 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-27

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-28

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 11.2 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 516.5 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617342.00 E, 275383.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
512 / 5		67	SPT-1	1-1-1 (N=2)			ML	Soft, moist, brown, SILT (ML); low plasticity, trace fine gravel, trace fine sand, trace wood fibers. (Fill)		
		100	G-1					*Becomes gray mottled at 5.5 feet.*		
507 / 10		64	SPT-2	1-7-50/3" (Refusal)				*10 - 11 feet: sample consists of approx. 50% wood fibers by volume.* *Auger refusal at 11.25 feet on basalt bedrock.*		Borehole completed at 11.25ft. below ground surface (bgs).
502 / 15										
497 / 20										
492 / 25										
487 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-28

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-29

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 19.0 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 517.3 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617301.00 E, 275320.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt - 5" thick (Pavement) Base Aggregate - 3" thick (Fill) Soft, moist, brown, SILT (ML); low plasticity, trace fine gravel, trace fine sand, trace wood fibers. (Fill)		
513		100	G-1							
5		20	SPT-1	1-0-2 (N=2)			ML			
		100	G-2							
508										
10		33	SPT-2	0-7-26 (N=33)				*Becomes wet at 10 feet.*		Auger grinding below 10 - 15 feet.
		100	G-3					BASALT; very weak, dark brown, highly weathered to decomposed (Little Butte Volcanic Series - Tholeiitic Basalt)		
		70	SPT-3	50/12" (Refusal)						
503										
15		98	SPT-4	26-50/5" (Refusal)				*Penetration rate decreases significantly at 15 feet; stronger rock inferred below this depth.*		Smooth, slow drilling below 15 feet.
		87	SPT-5	12-23-33 (N=56)				*Becomes dark blue-gray at 18 feet.*		
498										Borehole completed at 19ft. below ground surface (bgs).
20										
493										
25										
488										
30										

McMILLEN JACOBS ASSOCIATES

Boring P-29

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-30

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 11.2 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 519.8 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617195.00 E, 275427.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
		100	G-1				ML	Moist, light brown, SILT with gravel (ML); low plasticity, fine to coarse angular gravel. (Fill)		
515 / 5		100	SPT-1	1-0-1 (N=1)			SM	Very soft, wet, light brown, Silty SAND (SM); fine to medium sand, low plasticity fines. (Fill)		
510 / 10		40	SPT-2	8-11-50/3" (Refusal)				*Basalt inferred below 11 feet.* *Auger refusal at 11.25 feet on basalt bedrock.*		Borehole completed at 11.25ft. below ground surface (bgs).
505 / 15										
500 / 20										
495 / 25										
490 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-30

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-31

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 12.7 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 520.8 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617173.00 E, 275391.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt - 5" thick (Pavement)		
								Base Aggregate - 1" thick (Fill)		
							ML	Moist, light brown, SILT with gravel (ML); low plasticity, fine to coarse angular gravel. (Fill)		
516 / 5		33	SPT-1	0-0-1 (N=1)			ML	Very soft, moist to wet, Sandy SILT (ML); fine to medium sand, low plasticity fines. (Fill)		
511 / 10		40	SPT-2	30-38-16 (N=54)				*Basalt inferred below 10 feet.*		Rod chatter begins at 9 feet and increases significantly below 10 feet.
		147	SPT-3	50/2" (Refusal)				*Auger refusal at 12.67 feet on basalt bedrock.*		Borehole completed at 12.67ft. below ground surface (bgs).
506 / 15										
501 / 20										
496 / 25										
491 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-31

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-32

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 10.2 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 530.4 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617027.00 E, 275515.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt - 6" thick (Pavement)		
								Base Aggregate - 2" thick (Fill)		
		100	G-1				ML	Moist, dark brown, SILT with gravel (ML); low plasticity, fine to coarse gravel. (Fill)		
526										
5		100	SPT-1	0-1-1 (N=2)			ML	Soft, moist, gray, SILT (ML); low plasticity, trace fine sand. (Fill) *Becomes gray at 4.5 feet.*		
521										Rod chatter below 9.5 feet bgs.
10		47	SPT-2	50/2" (Refusal)				*Auger refusal at 10.17 feet on basalt bedrock.*		Borehole completed at 10.17ft. below ground surface (bgs).
516										
15										
511										
20										
506										
25										
501										
30										

McMILLEN JACOBS ASSOCIATES

Boring P-32

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-33

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 3.7 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 529.6 ft	
Location: See Figure 2 Site Plan	Coordinates: 7616945.00 E, 275701.00 N	Elevation Source: Site Survey	

ELEV. (FT) / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
525 / 5		100	G-1				GM	Moist, brown, Silty GRAVEL (GM); fine to coarse gravel, non-plastic fines. (Fill)		Strong rod chatter from ground surface to 3.5 feet bgs.
		0	SPT-1	50/2" (Refusal)				*Basalt inferred below 3.5 feet.*		Auger bit grinding at 3.5 feet.
520 / 10								*Auger refusal at 3.67 feet on basalt bedrock.*		Borehole completed at 3.67ft. below ground surface (bgs).
515 / 15										
510 / 20										
505 / 25										
500 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-33

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-34

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 15.0 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 516.9 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617301.00 E, 275494.00 N	Elevation Source: Site Survey	

ELEV. (FT) / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Asphalt - 5" thick (Pavement)		
							GM	Base Aggregate - 2" thick (Fill)		
								Moist, brown, Silty GRAVEL (GM); fine to coarse gravel, low plasticity fines. (Fill)		
		100	G-1					Soft to very soft, moist, brown, SILT (ML); low plasticity, trace fine sand. (Fill)		
512 / 5		40	SPT-1	1-1-3 (N=4)			ML			
507 / 10		33	SPT-2	1-0-1 (N=1)				*Becomes very soft, grades to Silt with sand at 10 feet.*		
502 / 15		100	SPT-3	50/2" (Refusal)				*Auger refusal at 15 feet on basalt bedrock.*		Borehole completed at 15ft. below ground surface (bgs).
497 / 20										
492 / 25										
487 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-34

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-35

Date(s) Drilled: 06/20/2022 - 06/20/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: A. Judy	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: PLI Systems, Inc.	Total Depth of Borehole: 7.1 ft	
Hole Diameter: 8.25 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 517.5 ft	
Location: See Figure 2 Site Plan	Coordinates: 7617255.00 E, 275628.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
513 / 5							GM	Moist, dark gray and brown, Silty GRAVEL (GM); fine to coarse gravel. (Fill)		Rod chatter from ground surface to 5 feet bgs.
							ML	Soft, moist, brown, SILT (ML); low plasticity, trace fine sand. (Fill)		
		60	SPT-1	0-1-2 (N=3)						Rod chatter and difficulty anvancing auger below 6 feet.
		0	SPT-2	50/1" (Refusal)				*Basalt inferred below 6 feet.*		
508 / 10								*Auger refusal at 7.08 feet on basalt bedrock.*		Borehole completed at 7.08ft. below ground surface (bgs).
503 / 15										
498 / 20										
493 / 25										
488 / 30										

McMILLEN JACOBS ASSOCIATES

Boring P-35

Project: Sweet Home WWTP Final Design Review
Project Location:
Project Number: 6367.0

Log of Boring P-36

Date(s) Drilled: 11/22/2022	Geotechnical Consultant: McMillen Jacobs Associates	Logged By: J. Quinn	Checked By: J. Quinn
Drilling Method/ Rig Type: 8.25" Hollow Stem Auger/CME 75	Drilling Contractor: Western States Soil Conservation, Inc.	Total Depth of Borehole: 11.6 ft	
Hole Diameter: 8.00 in	Hammer Weight/Drop (lb/in.)/Type: 140 lb / 30 in / Automatic	Ground Surface Elevation/Datum: 516.77 ft	
Location: SE Corner of WWTP Site	Coordinates: 7617443.00 E, 275286.00 N	Elevation Source: Site Survey	

ELEV. (FT) / WATER LEVEL / DEPTH (FT)	SAMPLE TYPE	RECOVERY (%)	SAMPLE #	BLOW COUNTS	PENETRATION RESISTANCE BLOWS/FT (BLOWS/FT 20 40 60 80; MC; LL/PL)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	BACKFILL INFORMATION	REMARKS AND TESTS
								Concrete - 6" thick (Pavement)		
								Base Aggregate - 6" thick (Fill)		
								Stiff, moist, brown with orange mottling, LEAN CLAY (CL); low to medium plasticity, trace coarse rounded gravel, trace fine sand. (Fill)		
		55	SPT-1	2-8-7 (N=15)						
-5 5								*Becomes medium stiff at 5 feet bgs.*		
		50	SPT-2	2-3-4 (N=7)			CL			
		60	SPT-3	50/5" (Refusal)				*Boulders/cobbles likely from 7.5 to 9.0 feet bgs.*		Slow, difficult drilling from 7.5 to 9 feet bgs.
								Becomes stiff at 9.0 feet bgs.		Drillers cracked auger transfer rod at approximately 8.5 feet bgs. Abandoned original boring at 8.5 feet bgs due to being off vertical alignment and moved about 4 feet west to re-drill boring.
-10 10		100	SPT-4	3-3-9 (N=12)				*Becomes gray with rootlets at 10 feet bgs.*		
								Basalt inferred below 10.75 feet bgs.		Difficult, slow drilling below 10.75 feet bgs. 30 minutes to advance from 10.75 to 11.5 feet bgs.
		800	SPT-5	50/0" (Refusal)						Borehole completed at 11.6ft. below ground surface (bgs).

McMILLEN JACOBS ASSOCIATES

Boring P-36

Appendix B

Laboratory Test Results

Northwest Testing, Inc.
A Division of Northwest Geotech, Inc.
9120 SW Pioneer Court, Suite B, Wilsonville, Oregon 97070 | ph: 503.682.1880 fax: 503.682.2753 | www.nwgeotech.com

TECHNICAL REPORT

Report To:	Mr. Farid Sariosseiri McMillen Jacobs Associates 1500 SW First Avenue, Suite 750 Portland, Oregon 97201	**Date:** **Lab No:**	5/14/18 18-108
Project:	Laboratory Testing – Sweet Home WWTP 5834.0	**Project No.:**	2286.1.1

Report of: Atterberg limits, moisture content, and compressive strength of rock

Sample Identification

NTI completed Atterberg limits, moisture content, and compressive strength of rock testing on samples delivered to our laboratory on May 9, 2018 by a McMillen Jacobs Associates representative. Testing was performed in accordance with the standards indicated. Our laboratory test results are summarized on the following tables and attached pages.

Laboratory Test Results

Atterberg Limits (ASTM D 4318)			
Sample ID	**Liquid Limit**	**Plastic Limit**	**Plasticity Index**
B-3 S-2 @ 5 – 6.5 ft.	51	28	23
B-5 S-1 @ 2.5 – 4 ft.	44	28	16

Moisture Content of Soil (ASTM D 2216)	
Sample ID	**Moisture Content (Percent)**
B-3 S-2 @ 5 – 6.5 ft.	44.8
B-5 S-1 @ 2.5 – 4 ft.	26.3

Copies: Addressee

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Report To:	Mr. Farid Sariosseiri McMillen Jacobs Associates 1500 SW First Avenue, Suite 750 Portland, Oregon 97201	**Date:** **Lab No:**	5/14/18 18-108
Project:	Laboratory Testing – Sweet Home WWTP 5834.0	**Project No.:**	2286.1.1

Laboratory Testing

Compressive Strength of Intact Rock Core Specimens (ASTM D 7012 Method C)				
Sample ID	**Diameter (inches)**	**Height (inches)**	**Rate of Loading (lbs/s)**	**Uniaxial Compressive Strength (psi)**
B-1 R-1 @ 5.2 – 6.3 ft.	2.41	4.88	100	25,302



Photo1: As received sample



Photo 2: Test sample before testing



Photo 3: Test sample after testing

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Laboratory Testing

Compressive Strength of Intact Rock Core Specimens (ASTM D 7012 Method C)				
Sample ID	**Diameter (inches)**	**Height (inches)**	**Rate of Loading (lbs/s)**	**Uniaxial Compressive Strength (psi)**
B-5 R-1 @ 11.7 – 12.4 ft.	2.41	4.85	100	25,919



Photo1: As received sample

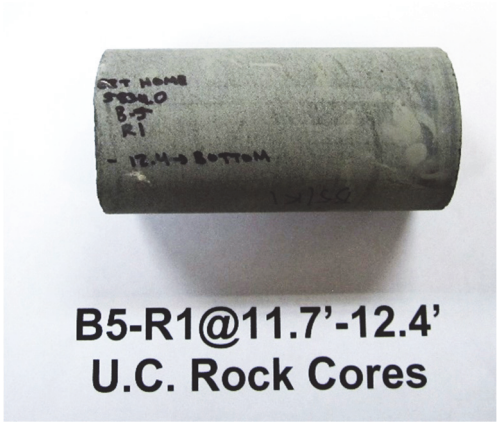


Photo 2: Test sample before testing



Photo 3: Test sample after testing

Laboratory Testing

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TECHNICAL REPORT

Report To:	Mr. Farid Sariosseiri McMillen Jacobs Associates 1500 SW First Avenue, Suite 750 Portland, Oregon 97201	**Date:** **Lab No:**	5/14/18 18-108
Project:	Laboratory Testing – Sweet Home WWTP 5834.0	**Project No.:**	2286.1.1

Compressive Strength of Intact Rock Core Specimens (ASTM D 7012 Method C)				
Sample ID	**Diameter (inches)**	**Height (inches)**	**Rate of Loading (lbs/s)**	**Uniaxial Compressive Strength (psi)**
B-5 R-2 @ 18 – 19 ft.	2.41	4.86	100	6932

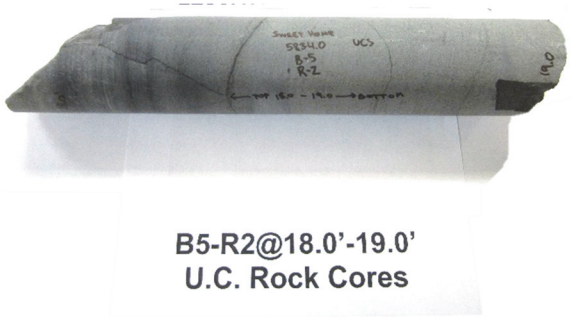


Photo1: As received sample

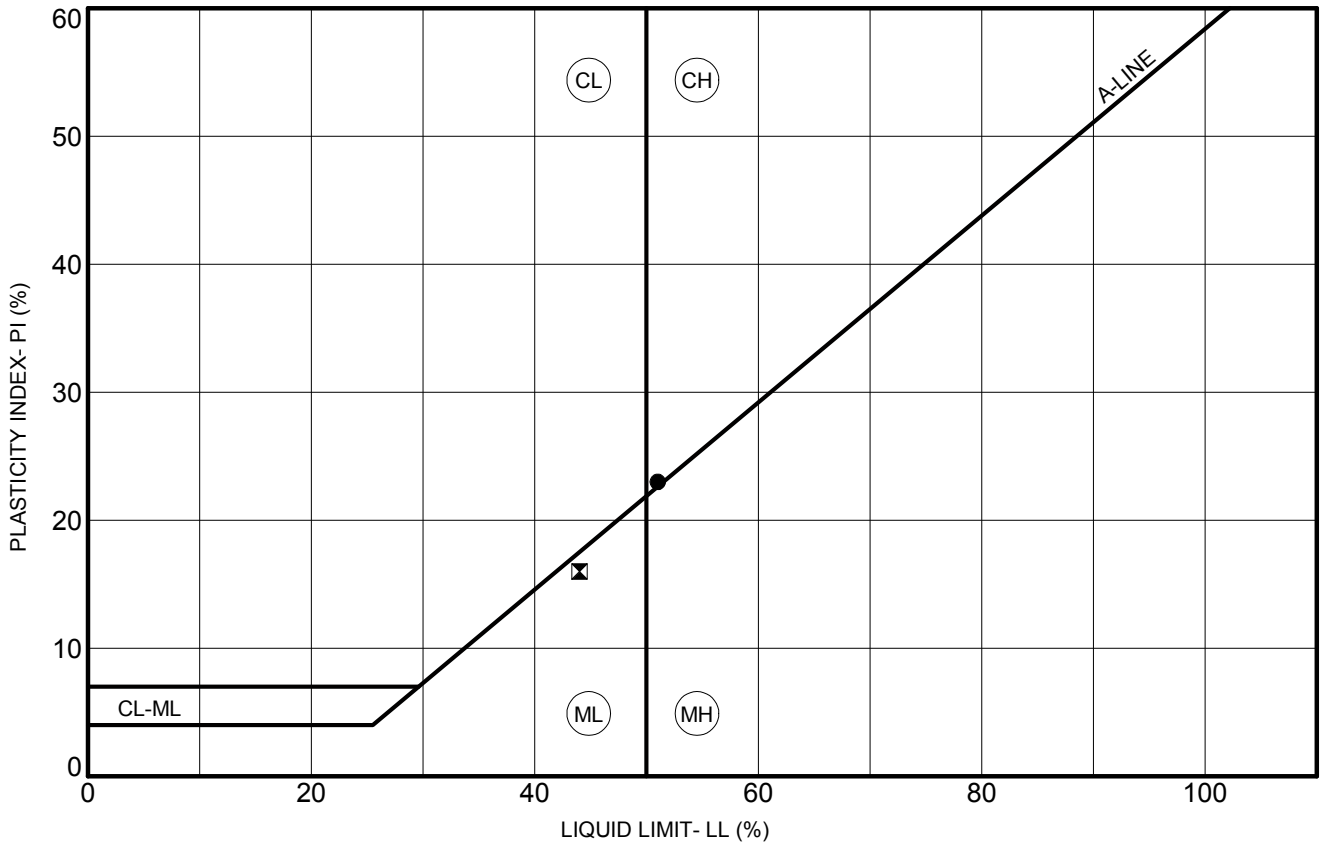


Photo 2: Test sample before testing



Photo 3: Test sample after testing

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	Sample ID	Depth (ft)	Moisture Content %	LL	PL	PI	% Pass #200	Classification
●	**B-03**	**5.0**	**(44.8)**	**51**	**28**	**23**		**CH**
⧓	**B-05**	**2.5**	**(26.3)**	**44**	**28**	**16**		**ML**

McMILLEN JACOBS ASSOCIATES

1500 SW 1ST AVE STE 750
PORTLAND, OR 97201
TELEPHONE: 503.384.2906

ATTERBERG LIMITS

Project: Waste Water Treatment Plant - Schematic Design
Number: 5834.0
Sample Location: Sweet Home
Testing Agency: Northwest Testing, Inc.

JA_ATTERBERG_PORTLAND OFFICE ADDRESS_5834.0 SWEET HOME.GPJ_JACOBS DATA TEMPLATE_GENERAL SOIL PROJECTS.GDT 6/11/18 REV-

Point Load Strength Index Test Results ASTM D-5731

PROJECT:	Sweet Home WWTP	**LAB SAMPLE NO.:**	
PROJECT NO.:	5834.0	**SAMPLE NO.:**	5834.0 - B-5
PROJECT LOCATION:	Sweet Home, OR	**SAMPLE DESCRIP:**	Basalt
SAMPLED BY:	Julia Irizarry	**DATE REPORTED:**	5/11/2018
DATE SAMPLED:	5/2/2018	**REPORTED BY:**	Devin Roth

Sample No.	Test Number	Test Type*	Rock Type	Width, W	Depth or Diameter, D	Failure Load, P	De^2	Point Load Strength Index, $I_{s(50)}$	Uniaxial Compressive Strength, UCS
				(in)	(in)	(lbs)	(in^2)	(psi)	(psi)
1	1	d	Basalt	5.31	2.36	5959	10313	513	12563
2	2	d	Basalt	5.91	2.36	3828	11459	304	7437
2B	3	d	Basalt	3.23	2.36	5158	6264	653	13717
3	4	d	Basalt	10.04	2.36	5104	19481	268	5098
3B	5	d	Basalt	5.59	2.36	6882	10848	569	13951
5	6	d	Basalt	6.69	2.36	8044	12987	579	13315
6	7	d	Basalt	5.12	2.36	4598	9931	407	9778
7	8	d	Basalt	4.13	2.36	6830	8021	714	17138
8	9	d	Basalt	11.42	2.36	8044	22154	383	9185
9	10	d	Basalt	5.20	2.36	7882	10084	690	14493
							Min	**268**	**5098**
							Max	**714**	**17138**
							Avg	**508**	**11667**

Size Corrected Point Load Index, $Is_{(50)}$

$I_{s(50)}$ = **508 psi** or **73,159 psf** or **3.5 MPa**

Mean Uniaxial Compressive Strength, σ_c

σ_c = **11,667 psi** or **1,680,111 psf** or **80 MPa**

*Test Type

d = diametral
a = axial
b = block
l= lump

Appendix C

Rock Core Photos



BOREHOLE B-01, 3.5 TO 13.5 FEET



BOREHOLE B-05, 9.0 TO 16.3 FEET

McMILLEN JACOBS ASSOCIATES	**SWEET HOME WWTP SCHEMATIC DESIGN GEOTECHNICAL DATA REPORT**	**JULY 2022**
	CORE PHOTOGRAPHS	**FIGURE C - 1**



BOREHOLE B-05, 16.3 TO 23 FEET

Appendix D

RMR Calculation

The Rock Mass Rating System

Geomechanics Classification of Rock Masses

After Z.T. Bieniawski, 1989

McMILLEN JACOBS ASSOCIATES

1500 SW First Avenue, Suite 750, Portland, OR

Project: **Sweet Home WWTP**
Date: **5/16/2018**
Location:
Boring: **B-1 &B-5**
Geologist/Engineer: **Farid Sariosseiri**
Rock Type: **Bedded Volcaniclastics**
Elevation, ft:

Rock Mass Property Input

Strength of Intact Rock, Mpa	**135**
Point Load ?	**N**
Uniaxial Compressive ?	**Y**
Bieniawski Rating	**12**
RQD, %	**67**
Bieniawski Rating	13
Discontinuity Spacing, mm	**150**
Bieniawski Rating	**7**

Conditions of Discontinuitites	**Rating**
1. Very rough surfaces, not continuous, no separation, and unweathered rock walls.	**30**
2. Slightly rough surfaces, separation < 1 mm, and slightly weathered walls.	**25**
3. Slightly rough surface, separation < 1 mm, and highly weathered walls.	**20**
4. Slickenslided surfaces -or- gouge (infilling), 1-5 mm thick -or- separation 1-5 mm and continuous.	**10**
5. Soft gouge > 5 mm -or- separation > 5 mm and continuous	**0**
Bieniawski Rating?	**25**

Groundwater Conditions	**Rating**
Conditions include:	
A. Inflow per 10 m of tunnel length (L/m),	
B. Ratio of joint water pressure to σ_1,	
C. General conditions.	
1. No inflow -or- 0 ratio -or- completely dry.	**15**
2. < 10 L/min -or- < 10 ratio -or- damp.	**10**
3. 10-25 L/min inflow -or- 0.1-0.2 ratio -or- wet.	**7**
4. 22-125 L/min inflow -or- 0.2-0.5 ratio -or- dripping.	**4**
5. > 125 L/min inflow -or- > 0.5 ratio -or- flowing.	**0**
Bieniawski Rating?	**15**

Orientation of Discontinuities	**Rating**		
	Tunnels	Foundations	Slopes
Very Favorable	**0**	**0**	**0**
Favorable	**-2**	**-2**	**-5**
Fair	**-5**	**-7**	**-25**
Unfavorable	**-10**	**-15**	**-50**
Very Unfavorable	**-12**	**-25**	**-60**
Bieniawski Rating?			**-5**

Overall RMR	**67**	
Class	**II**	**Good Rock**

GSI **62**

Exhibit E

Design-Builder's Warranty Guarantee

BAKER SILO LLC.
concrete water reservoirs & storage tanks

February 6, 2023

To: City of Sweet Home

Subject: Sludge Blend Tank Design-Build Reservoir Warranty

Dear Client:

We, the undersigned, do hereby warrant for a period of 5 years from the date of Final Completion of all work performed under the terms of the contract documents.

Final Completion date is xx, xx, xxxx

Baker Silo, LLC. will remedy at our expense any defects appearing during that period due to poor materials and/or workmanship, free of charge upon written notification.

If we can be of further assistance, please give me a call. Thank you for this opportunity.

Sincerely,

Norm Heerspink
Managing Member

P.O. Box 979 Lynden, WA 98264 | www.BAKERSILO.com | P. 360-354-4940 | F. 360-354-5657 | E. info@bakersilo.com