

**PROJECT MANUAL  
For  
RAIL PARK DRIVE IMPROVEMENTS  
KALISPELL, MT**

**THE ABOVE HEREBY CERTIFY THAT THIS PROJECT MANUAL  
WAS PREPARED BY THEM OR UNDER THEIR DIRECT  
SUPERVISION, AND THAT THEY ARE DULY  
REGISTERED PROFESSIONAL ENGINEER(S) UNDER THE  
LAWS OF THE STATE OF MONTANA**

**DECEMBER 2023**

**Project No. 2325-01621**



**RAIL PARK DRIVE IMPROVEMENTS  
KALISPELL, MT  
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The Montana Public Works Standard Specifications, Seventh Edition, April 2021 (MPWSS) and the City of Kalispell Standard Modifications to MPWSS, Dated JULY 5, 2022 (City of Kalispell Standards for Design and Construction), are included by reference in this Project Manual and shall be used except as amended or supplemented herein. Any section listed as “Included Herein” shall replace the corresponding section in MPWSS and City of Kalispell Standards for Design and Construction.

Reference documents applicable to the Project can be found at the following locations, respectively:

MPWSS: <https://montanacontractorsmtassoc.wliinc24.com/ecommerce/ecomlistpage.aspx>

City of Kalispell Standards for Design and Construction:

<https://www.kalispell.com/DocumentCenter/View/466/Standards-for-Design-and-Construction-PDF?bidId=>

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**DIVISION 0:**  
BIDDING  
REQUIREMENTS,  
CONTRACT FORMS &  
CONDITIONS



**SECTION 00100  
INVITATION TO BID**

Separate sealed bids for the construction of Rail Park Improvements will be received by the Flathead County Economic Development Authority (FCEDA), 44 2nd Ave W, Kalispell, MT 59901 until 11:00 AM, local time on Friday, February 02, 2024, and then publicly opened and read aloud.

The project consists of:

Sidewalk and boulevard construction along both sides of the existing Rail Park Drive complete with ADA ramps, landscaping, and trees.

Digital copies of the Bidding Documents are available at FCEDA, 44 2nd Ave W, Kalispell, MT 59901 for a fee of \$5.00 and on the FCEDA website at <https://www.flatheadcountyeda.com/rfps.html>.

The contract documents consisting of Drawings and Project Manual may be examined or obtained at the office of KLJ Engineering 1830 3<sup>rd</sup> Ave E #201, Kalispell, MT 59901 in accordance with Article 2.01 of Instructions to Bidders in MPWSS. Please contact Gary Johnson, KLJ, (406) 300-7101 with any questions. Cost of drawing and Project Manual is \$10.00 per set, which is not refundable.

There will be a Pre-Bid Conference at the office of the FCEDA, 44 2nd Ave W, Kalispell, at 11 AM, local time on Thursday, January 18, 2024. Interested Contractors are encouraged to attend.

Contractors and any of Contractor's subcontractors bidding or doing work on this project will be required to be registered with the Montana Department of Labor and Industry (DLI). Forms for registration are available from the Department of Labor and Industry, P.O. Box 8011, 1805 Prospect, Helena, MT 59604-8011. Information on registration can be obtained by calling (406) 444-7734. All laborers and mechanics employed by Contractor or Subcontractors in performance of the construction work shall be paid State of Montana Prevailing Wage Rates for Heavy or Highway Construction. Contractor must ensure that employees and applicants for employment are not discriminated against because of their race, color, religion, sex or national origin.

Each bid or proposal must be accompanied by a Certified Check, Cashier's Check, or Bid Bond payable to the City of Kalispell in an amount not less than ten percent (10%) of the total amount of the bid. Successful Bidder(s) shall furnish an approved Performance Bond and a Labor and Materials Payment Bond, each in the amount of one hundred percent (100%) of the contract amount. Insurance as required shall be provided by the successful Bidder(s) and a certificate(s) of that insurance shall be provided.

This project is funded in whole from Flathead County Economic Development Authority.

Bids may only be withdrawn as provided in Section 16.02 of the Instructions to Bidders after the scheduled time for the public opening of bids.

The right is reserved to reject any or all proposals received, to waive informalities, to postpone the award of the contract for a period of not to exceed sixty (60) days, and to accept the lowest responsive and responsible bid which is in the best interest of Owner.

The Flathead County Economic Development Authority is an Equal Opportunity Employer.

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Laura Russel  
Financial Director

Advertisement Dates:

Daily Interlake:     1/7/24  
                              1/14/24

**END OF SECTION**

**SECTION 00410  
BID FORM**

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

**ARTICLE 1—OWNER AND BIDDER**

- 1.01 This Bid is submitted to: The Flathead County Economic Development Authority, 44 2nd Ave W, Kalispell, MT 59901.
- 1.02 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.

**ARTICLE 2—ATTACHMENTS TO THIS BID**

- 2.01 The following documents are submitted with and made a condition of this Bid:
  - A. Required Bid security;
  - B. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;
  - C. Contractor’s license number as evidence of Bidder’s State Contractor’s License or a covenant by Bidder to obtain said license within the time for acceptance of Bids;

**ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES**

3.01 *Unit Price Bids*

- A. Bidder will perform the following Work at the indicated unit prices:

Item No.	Description	Unit	Estimated Quantity	Bid Unit Price	Bid Amount
101	Mobilization	LS	1	\$	\$
102	Taxes, Bonds, & Insurance	LS	1	\$	\$
103	General Requirements	LS	1	\$	\$
201	Erosion Control	LS	1	\$	\$
202	Misc Demo	LS	1	\$	\$
501	4" Concrete Sidewalk	SY	2254	\$	\$
502	6" Concrete Sidewalk	SY	340	\$	\$
503	Reinforced Concrete Sidewalk	SY	72	\$	\$
504	Asphalt Concrete	SY	95	\$	\$
505	Reinforced Portland Cement	SY	153	\$	\$
506	ADA Ramp	EA	3	\$	\$
507	Detectable Warning Device	EA	3	\$	\$
601	Striping – White Epoxy	GAL	5	\$	\$
602	Posts – Tubular Steel – Square 2"x2" – Perforated (14 ga)	LF	72	\$	\$

603	Signs – Aluminum Reflective Sheet IV	SF	50	\$	\$
701	Soil Amendment and Fine Grading	CY	441	\$	\$
702	Grading Back of Walk	CY	150	\$	\$
703	Non-Irrigated Seed Mix	SF	37053	\$	\$
704	Trees	LS	1	\$	\$
<b>Total of All Unit Price Bid Items</b>					\$

B. Bidder acknowledges that:

1. each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor’s overhead and profit for each separately identified item, and
2. estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Work will be based on actual quantities, determined as provided in the Contract Documents.

**ARTICLE 4—TIME OF COMPLETION**

- 4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 4.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

**ARTICLE 5—BIDDER’S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA**

5.01 *Bid Acceptance Period*

- A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

- A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

- A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

**ARTICLE 6—BIDDER’S REPRESENTATIONS AND CERTIFICATIONS**

6.01 *Bidder’s Representations*

- A. In submitting this Bid, Bidder represents the following:
  1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.



2. Bidder has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.
6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.
7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
8. 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.
9. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

#### 6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

1. 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 collusive agreement or rules of any group, association, organization, or corporation.

2. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.
3. Bidder has not solicited or induced any individual or entity to refrain from bidding.
4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 8.02.A:
  - a. 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.
  - b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.
  - c. 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.
  - d. 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.

BIDDER hereby submits this Bid as set forth above:

Bidder:

\_\_\_\_\_  
*(typed or printed name of organization)*

By:

\_\_\_\_\_  
*(individual's signature)*

Name:

\_\_\_\_\_  
*(typed or printed)*

Title:

\_\_\_\_\_  
*(typed or printed)*

Date:

\_\_\_\_\_  
*(typed or printed)*

*If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.*

Attest:

\_\_\_\_\_  
*(individual's signature)*

Name:

\_\_\_\_\_  
*(typed or printed)*

Title:

\_\_\_\_\_  
*(typed or printed)*

Date:

\_\_\_\_\_  
*(typed or printed)*

Address for giving notices:

\_\_\_\_\_  
\_\_\_\_\_

Bidder's Contact:

Name:

\_\_\_\_\_  
*(typed or printed)*

Title:

\_\_\_\_\_  
*(typed or printed)*

Phone:

\_\_\_\_\_

Email:

\_\_\_\_\_

Address:

\_\_\_\_\_  
\_\_\_\_\_

Bidder's Contractor License No.: (if applicable) \_\_\_\_\_

**SECTION 00520  
AGREEMENT FORM**

This Agreement is by and between \_\_\_\_\_, (“Owner”) and \_\_\_\_\_, (“Contractor”).

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

Owner and Contractor agree as follows:

**ARTICLE 1 – WORK**

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Construction of sidewalk, ADA ramps, boulevard, landscaping, & trees along both side of Rail Park Drive.

**ARTICLE 2 – THE PROJECT**

2.01 The Project for which the Work under the Contract Documents is a part, is generally described as follows:

Rail Park Improvements

**ARTICLE 3 – ENGINEER**

3.01 The Owner has retained KLJ Engineering, Inc (“Engineer”) to act as Owner’s representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by Engineer.

**ARTICLE 4 – CONTRACT TIMES**

4.01 *Time of the Essence*

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.03 *Contract Times: Days*

A. The Work will be substantially completed within 120 days after the date when the Contract Times commence to run as provided in Paragraph 4.01 of the General Conditions and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions within 30 days after the date when the Contract Times commence to run.

#### 4.04 *Liquidated Damages*

- A. Owner and Contractor recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving in a legal 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 Contractor agree that as liquidated damages for delay (but not as a penalty):
1. *Substantial Completion*: Contractor shall pay Owner \$850.00 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion, until the Work is substantially complete.
  2. *Completion of Remaining Work*: After Substantial Completion, if Contractor 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, Contractor shall pay Owner \$850.00 for each day that expires after such time until the Work is completed and ready for final payment.
- B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

#### 4.06 *Special Damages*

- A. Contractor shall reimburse Owner (1) for any fines or penalties imposed on Owner as a direct result of the Contractor's failure to attain Substantial Completion according to the Contract Times, and (2) for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 (as duly adjusted pursuant to the Contract) until the Work is substantially complete.
- B. After Contractor achieves Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times, Contractor shall reimburse Owner for the actual costs reasonably incurred by Owner for engineering, construction observation, inspection, and administrative services needed after the time specified in Paragraph 4.02 for Work to be completed and ready for final payment (as duly adjusted pursuant to the Contract), until the Work is completed and ready for final payment.
- C. The special damages imposed in the paragraph are supplemental to any liquidated damages for delayed completion established in the Agreement.

## ARTICLE 5 – CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to the adjustment under the Contract:

- A. For all Work, at the prices stated in Contractor’s Bid, attached hereto as an exhibit.

## ARTICLE 6 – PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

- A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

- A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the 25<sup>th</sup> day of each month if approved Contractor's Application for Payment is received by the 5<sup>th</sup> day of each month during performance of the Work as provided in Paragraph 6.02.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 the value of the Work completed (with balance being retainage).
  - b. **95** percent of cost of stored materials and equipment not incorporated in the Work (with the balance being retainage).

- B. Upon Substantial Completion of the entire construction to be provided under the construction Contract Documents, Owner shall pay an amount sufficient to increase total payments to Contractor to 95 percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less 100 percent of the Engineer’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.

6.03 *Final Payment*

- A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

6.04 *Consent of Surety*

- A. Owner will not make final payment or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.

6.05 *Interest*

- A. All amounts not paid when due will bear interest at the rate of 10 percent per annum.

**ARTICLE 7 – CONTRACT DOCUMENTS**

7.01 *Contents*

- A. The Contract Documents consist of the following:
  - 1. This Agreement.
  - 2. Bonds:
    - a. Performance bond (together with power of attorney).
    - b. Payment bond (together with power of attorney).
  - 3. General Conditions.
  - 4. Supplementary Conditions.
  - 5. Specifications as listed in the table of contents of the Project Manual.
  - 6. Drawings (not attached but incorporated by reference) consisting of [ ] sheets with each sheet bearing the following general title: Rail Park Drive Improvements.
  - 7. Drawings listed on the attached sheet index.
  - 8. Addenda (Numbers [##] to [##], inclusive).
  - 9. Exhibits to this Agreement (enumerated as follows):
    - a. [List exhibits (Contractor Bid, NOA, etc.)]
  - 10. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
    - a. Notice to Proceed.
    - b. Work Change Directives.
    - c. Change Orders.
    - d. Field Orders.
    - e. Warranty Bond, if any.

- B. The Contract 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 Contract.

## **ARTICLE 8 – REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS**

### **8.01 Contractor's Representations**

- A. In order to induce Owner to enter into this Agreement, Contractor makes the following representations:
  - 1. Contractor has examined and carefully studied the Contract Documents including Addenda.
  - 2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
  - 3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.
  - 4. Contractor has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
  - 5. Contractor has carefully studied the reports and drawings of Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.
  - 6. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.
  - 7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, with the Contract Times, and in accordance with the other terms and conditions of the Contract.



8. Contractor 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.
9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.
10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
11. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

#### 8.02 *Contractor's Certifications*

- A. Contractor 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 8.02:
  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 the 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.

#### 8.03 *Standard General Conditions*

- A. Owner stipulates that the General Conditions that are made a part of this Contract are EJCDC® C-700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee, and if Owner is the party that has furnished said General Conditions, the Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

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

OWNER:

CONTRACTOR:

\_\_\_\_\_  
*(typed or printed name of organization)*

\_\_\_\_\_  
*(typed or printed name of organization)*

By: \_\_\_\_\_  
*(Signature)*

By: \_\_\_\_\_  
*(Signature)*

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Name: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Attest: \_\_\_\_\_

Attest: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Address for giving notices:

Address for giving notices:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Phone: \_\_\_\_\_

Phone: \_\_\_\_\_

Owner's Designated Representative:

Contractor's Designated Representative:

Name: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone: \_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Email: \_\_\_\_\_

License No.: \_\_\_\_\_

State: \_\_\_\_\_

**END OF SECTION**

# SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

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# SUPPLEMENTARY CONDITIONS OF THE CONSTRUCTION CONTRACT

These Supplementary Conditions amend or supplement EJCDC® C-700, Standard General Conditions of the Construction Contract (2018). The General Conditions remain in full force and effect except as amended.

The terms used in these Supplementary Conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary Conditions is the same as the address system used in the General Conditions, with the prefix "SC" added—for example, "Paragraph SC-4.05."

## ARTICLE 1—DEFINITIONS AND TERMINOLOGY

SC-1.01.A.8 – Add the following at the end of the Paragraph:

The Change Order form to be used on this Project is EJCDC C-941 (2018). Owner approval is required before Change Orders are effective.

SC-1.01.A.30 – Add the following at the end of the Paragraph:

For the purposes of Rural Development, this term is synonymous with the term "applicant" as defined in 7 CFR 1780.7 (a) (1), (2) and (3) and is an entity receiving financial assistance from the federal programs.

SC-1.01.A.50 – Add the following at the end of the Paragraph:

The Work Change Directive form to be used on this Project is EJCDC C-940 (2018). Owner approval is required before a Work Change Directive is issued.

## ARTICLE 2—PRELIMINARY MATTERS

### 2.01 *Delivery of Bonds and Evidence of Insurance*

SC-2.01 Delete Paragraphs 2.01.B. and C. in their entirety and insert the following in their place:

- B. *Evidence of Contractor's Insurance:* When Contractor delivers the signed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner copies of the policies (including all endorsements, and identification of applicable self-insured retentions and deductibles) of insurance required to be provided by Contractor in this Contract. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- C. *Evidence of Owner's Insurance:* After receipt from Contractor of the signed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor copies of the policies of insurance to be provided by Owner in this Contract (if any). Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

### 2.02 *Copies of Documents*

SC-2.02 Amend the first sentence of Paragraph 2.02.A to read as follows:

Owner shall furnish to Contractor five printed copies of the Contract Documents (including one fully signed counterpart of the Agreement), and one in electronic portable document format (PDF).

### ARTICLE 3—CONTRACT DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

SC-3.01 Delete Paragraph 3.01.C in its entirety.

### ARTICLE 4—COMMENCEMENT AND PROGRESS OF THE WORK

SC-4.01.A – Delete the last sentence of paragraph.

4.05 *Delays in Contractor's Progress*

SC-4.05 Amend Paragraph 4.05.C by adding the following subparagraphs:

5. *Weather-Related Delays*

- a. If "abnormal weather conditions" as set forth in Paragraph 4.05.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. Extreme or unusual weather that is typical for a given region, elevation, or season should not be considered abnormal weather conditions. Requests for time extensions due to abnormal weather conditions will be submitted to the Engineer within five days of the end of the abnormal weather condition event. It is the responsibility of the Contractor to provide the information listed in SC 4.05.C.5.b.
- b. Adverse weather occurrences will not constitute justification for an extension of contract time unless the total time lost due to weather occurrences exceeds ten 10-percent of the contract time stipulated in the Agreement. The contract time will be adjusted for each adverse weather day after the 10-percent is reached. Contractor must submit to Engineer a written summary of work that was scheduled for each requested weather day with 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.

### ARTICLE 5—SITE, SUBSURFACE AND PHYSICAL CONDITIONS, HAZARDOUS ENVIRONMENTAL CONDITIONS

5.03 *Subsurface and Physical Conditions*

SC-5.03 Add the following new paragraphs immediately after Paragraph 5.03.D:

- E. The following table lists the reports of explorations and tests of subsurface conditions at or adjacent to the Site that contain Technical Data, and specifically identifies the Technical Data in the report upon which Contractor may rely:

Report Title	Date of Report	Technical Data
None		

- F. The following table lists the drawings 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, and specifically identifies the Technical Data upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
None		

- G. ~~Contractor may examine copies of reports and drawings identified in SC 5.03.E and SC 5.03.F that were not included with the Bidding Documents at [location] during regular business hours, or may request copies from Engineer.~~

5.06 *Hazardous Environmental Conditions*

SC-5.06 Add the following new paragraphs immediately after Paragraph 5.06.A.3:

4. The following table lists the reports known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and the Technical Data (if any) upon which Contractor may rely:

Report Title	Date of Report	Technical Data
3 <sup>rd</sup> Party Work Plan	March 2023	

5. The following table lists the drawings known to Owner relating to Hazardous Environmental Conditions at or adjacent to the Site, and Technical Data (if any) contained in such Drawings upon which Contractor may rely:

Drawings Title	Date of Drawings	Technical Data
None		

**ARTICLE 6—BONDS AND INSURANCE**

6.01 *Performance, Payment, and Other Bonds*

SC-6.01 Add the following paragraphs immediately after Paragraph 6.01.A:

1. *Required Performance Bond Form:* The performance bond that Contractor furnishes will be in the form of EJCDC® C-610, Performance Bond (2010, 2013, or 2018 edition).
2. *Required Payment Bond Form:* The payment bond that Contractor furnishes will be in the form of EJCDC® C-615, Payment Bond (2010, 2013, or 2018 edition).

SC-6.01 Add the following paragraphs immediately after Paragraph 6.01.B:

1. ~~The correction period specified as one year after the date of Substantial Completion in Paragraph 15.08.A of the General Conditions is hereby revised to be ## years after Substantial Completion.~~

6.02 Insurance—General Provisions

SC-6.02 Add the following paragraph immediately after Paragraph 6.02.H.2 of the General Conditions:

3. For all Subcontractors, Suppliers, or categories of Subcontractor or Supplier, Contractor shall require the following specified insurance, with policy limits as stated: **\$1.5 million per occurrence/\$3 million per aggregate limit for those insurances appropriate for their participation in the project.**

6.03 *Contractor’s Insurance*

SC-6.03 Supplement Paragraph 6.03 with the following provisions after Paragraph 6.03.C:

- 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 (in addition to Owner and Engineer) the following: None.
- E. *Workers’ Compensation and Employer’s Liability:* Contractor shall purchase and maintain workers’ compensation and employer’s liability insurance, including, as applicable, United States Longshoreman and Harbor Workers’ Compensation Act, Jones Act, stop-gap employer’s liability coverage for monopolistic states, and foreign voluntary workers’ compensation (from available sources, notwithstanding the jurisdictional requirement of Paragraph 6.02.B of the General Conditions).

<b>Workers’ Compensation and Related Policies</b>	<b>Policy limits of not less than:</b>
<b>Workers’ Compensation</b>	
State	Statutory
Applicable Federal (e.g., Longshoreman’s)	Statutory
Foreign voluntary workers’ compensation (employer’s responsibility coverage), if applicable	Statutory
<b>Jones Act (if applicable)</b>	
Bodily injury by accident—each accident	\$1,500,000.00

<b>Workers' Compensation and Related Policies</b>	<b>Policy limits of not less than:</b>
Bodily injury by disease—aggregate	\$3,000,000.00
<b>Employer's Liability</b>	
Each accident	\$1,500,000.00
Each employee	\$1,500,000.00
Policy limit	\$3,000,000.00
<b>Stop-gap Liability Coverage</b>	
For work performed in monopolistic states, stop-gap liability coverage must be endorsed to either the worker's compensation or commercial general liability policy with a minimum limit of:	\$3,000,000.00

- F. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against claims for:
1. damages because of bodily injury, sickness or disease, or death of any person other than Contractor'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:* Contractor'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. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary 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 7.18.
  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 Contractor 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—Excluded Content:* The commercial general liability insurance policy, including its coverages, endorsements, and incorporated provisions, must not include any of the following:
1. Any modification of the standard definition of “insured contract” (except to delete the railroad protective liability exclusion if Contractor is required to indemnify a railroad or others with respect to Work within 50 feet of railroad property).
  2. Any exclusion for water intrusion or water damage.
  3. Any provisions resulting in the erosion of insurance limits by defense costs other than those already incorporated in ISO form CG 00 01.
  4. Any exclusion of coverage relating to earth subsidence or movement.
  5. Any exclusion for the insured’s vicarious liability, strict liability, or statutory liability (other than worker’s compensation).
  6. Any limitation or exclusion based on the nature of Contractor’s work.
  7. Any professional liability exclusion broader in effect than the most recent edition of ISO form CG 22 79.
- I. *Commercial General Liability—Minimum Policy Limits*

<b>Commercial General Liability</b>	<b>Policy limits of not less than:</b>
General Aggregate	\$3,000,000.00
Products—Completed Operations Aggregate	\$3,000,000.00
Personal and Advertising Injury	\$1,500,000.00
Bodily Injury and Property Damage—Each Occurrence	\$1,500,000.00

- J. *Automobile Liability:* Contractor 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.

<b>Automobile Liability</b>	<b>Policy limits of not less than:</b>
<b>Bodily Injury</b>	
Each Person	\$1,500,000.00
Each Accident	\$3,000,000.00
<b>Property Damage</b>	
Each Accident	\$1,500,000.00
<b>[or]</b>	
<b>Combined Single Limit</b>	
Combined Single Limit (Bodily Injury and Property Damage)	\$3,000,000.00

- K. *Umbrella or Excess Liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer’s liability, commercial general liability, and automobile liability insurance described in the Paragraphs above. The coverage afforded must be at least as broad as that of each and every one of the underlying policies.

<b>Excess or Umbrella Liability</b>	<b>Policy limits of not less than:</b>
Each Occurrence	\$1,500,000.00
General Aggregate	\$3,000,000.00

- L. *Using Umbrella or Excess Liability Insurance to Meet CGL and Other Policy Limit Requirements:* Contractor may meet the policy limits specified for employer’s liability, commercial general liability, and automobile liability through the primary policies alone, or through combinations of the primary insurance policy’s policy limits and partial attribution of the policy limits of an umbrella or excess liability policy that is at least as broad in coverage as that of the underlying policy, as specified herein. If such umbrella or excess liability policy was required under this Contract, at a specified minimum policy limit, such umbrella or excess policy must retain a minimum limit of \$1,500,000.00 after accounting for partial attribution of its limits to underlying policies, as allowed above.

- M. *Contractor’s Pollution Liability Insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage, including cleanup costs, as a result of pollution conditions arising from Contractor’s operations and completed operations. This insurance must be maintained for no less than three years after final completion.

<b>Contractor’s Pollution Liability</b>	<b>Policy limits of not less than:</b>
Each Occurrence/Claim	\$1,500,000.00
General Aggregate	\$3,000,000.00

- N. *Contractor’s Professional Liability Insurance:* If Contractor will provide or furnish professional services under this *Contract*, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance must cover negligent acts, errors, or omissions in the performance of professional design or related services by the insured or others for whom the insured is legally liable. The insurance must be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. The retroactive date on the policy must pre-date the commencement of furnishing services on the Project.

<b>Contractor’s Professional Liability</b>	<b>Policy limits of not less than:</b>
Each Claim	\$1,500,000.00
Annual Aggregate	\$3,000,000.00

- O. *Railroad Protective Liability Insurance*: Prior to commencing any Work within 50 feet of railroad-owned and controlled property, Contractor 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.

**[Insert additional specific requirements, commonly set by the railroad, here.]**

<b>Railroad Protective Liability Insurance</b>	<b>Policy limits of not less than:</b>
Each Claim	\$2,000,000.00
Aggregate	\$6,000,000.00

- P. *Unmanned Aerial Vehicle Liability Insurance*: If Contractor uses unmanned aerial vehicles (UAV—commonly referred to as drones) at the Site or in support of any aspect of the Work, Contractor shall obtain UAV liability insurance in the amounts stated; name Owner, Engineer, and all individuals and entities identified in the Supplementary Conditions as additional insureds; and provide a certificate to Owner confirming Contractor’s compliance with this requirement. Such insurance will provide coverage for property damage, bodily injury or death, and invasion of privacy.

<b>Unmanned Aerial Vehicle Liability Insurance</b>	<b>Policy limits of not less than:</b>
Each Claim	\$1,500,000.00
General Aggregate	\$3,000,000.00

6.04 *Builder’s Risk and Other Property Insurance*

SC-6.04 Delete Paragraph 6.04.A and insert the following in its place:

- A. Owner 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 Supplementary Conditions or required by Laws and Regulations). The specific requirements applicable to the builder’s risk insurance are set forth in the Supplementary Conditions.

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provisions:

- F. *Builder’s Risk Requirements*: The builder’s risk insurance must:
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 Contractor.
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 no greater than 25% of the aggregate limit of coverage.
  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 no greater than 25% of the aggregate limit of coverage.
  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, Contractor, Subcontractors (of every tier), and any other individuals or entities required by this Contract to be insured under such builder's risk policy. For purposes of Paragraphs 6.04, 6.05, and 6.06 of the General Conditions, and this and all other corresponding Supplementary Conditions, the parties required to be insured will be referred to collectively as "insureds." In addition to Owner, Contractor, and Subcontractors of every tier, include as insureds the following:

- a. None.
- 11. include, in addition to the Contract Price amount, the value of the following equipment and materials to be installed by the Contractor but furnished by the Owner or third parties:
  - a. None.
- 12. 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 no greater than 25% of the aggregate limit of coverage.
- ~~13. In addition to the coverage sublimits stated above, the following coverages are also subject to sublimits, as follows:~~
  - ~~a. **[Here list a specific coverage, or cause of loss, that has been determined to be likely to be subject to a sublimit. If not applicable, then delete Paragraph SC-6.04.F.13 in its entirety.]** If this coverage is subject to a sublimit, such sublimit will be a minimum of \$[amount].~~

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provision:

- G. *Coverage for Completion Delays:* The builder's risk policy will include, for the benefit of Owner, loss of revenue and soft cost coverage for losses arising from delays in completion that result from covered physical losses or damage. Such coverage will include, without limitation, fixed expenses and debt service for a minimum of 12 months with a maximum deductible of 30 days, compensation for loss of net revenues, rental costs, and attorneys' fees and engineering or other consultants' fees, if not otherwise covered.

SC-6.04 Supplement Paragraph 6.04 of the General Conditions with the following provisions:

- H. *Builder's Risk and Other Property Insurance Deductibles:* The purchaser of any required builder's risk, installation floater, or other property insurance will be responsible for costs not covered because of the application of a policy deductible.
  - 1. The builder's risk policy (or if applicable the installation floater) will be subject to a deductible amount of no more than \$2,500 for direct physical loss in any one occurrence.

SC-6.04 Delete Paragraph 6.04.A of the General Conditions and substitute the following in its place:

A. *Installation Floater*

- 1. Contractor shall provide and maintain installation floater insurance on a broad form or "all risk" policy providing coverage for materials, supplies, machinery, fixtures, and equipment that will be incorporated into the Work ("Covered Property"). Coverage under the Contractor's installation floater will include loss from covered "all risk" causes (perils) to Covered Property:
  - a. of the Contractor, and Covered Property of others that is in Contractor's care, custody, and control;
  - b. while in transit to the Site, including while at temporary storage sites;
  - c. while at the Site awaiting and during installation, erection, and testing;

- d. continuing at least until the installation or erection of the Covered Property is completed, and the Work into which it is incorporated is accepted by Owner.
2. The installation floater coverage cannot be contingent on an external cause or risk, or limited to property for which the Contractor is legally liable.
3. The installation floater coverage will be in an amount sufficient to protect Contractor's interest in the Covered Property. The Contractor will be solely responsible for any deductible carried under this coverage.
4. This policy will include a waiver of subrogation applicable to Owner, Contractor, Engineer, all Subcontractors, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them.

**ARTICLE 7—CONTRACTOR’S RESPONSIBILITIES**

**7.03 Labor; Working Hours**

SC-7.03 Add the following new subparagraphs immediately after Paragraph 7.03.C:

1. Regular working hours will be Monday through Friday between 7:00 AM and 7:00 PM. No work on weekends except prior approval from Owner.
2. Owner's legal holidays are:
  - New Year’s Day – January 1
  - Memorial Day – Last Monday in May
  - Independence Day – July 4
  - Labor Day – First Monday in September
  - Thanksgiving Day – Fourth Thursday in November
  - Christmas Day – December 25

SC-7.03 Add the following new paragraph immediately after Paragraph 7.03.C:

- D. Contractor shall be responsible for the cost of any overtime pay or other expense incurred by the Owner for Engineer’s services (including those of the Resident Project Representative, if any), Owner’s representative, and construction observation services, occasioned by the performance of Work on Saturday, Sunday, any legal holiday, or as overtime on any regular work day. ~~If Contractor is responsible but does not pay, or if the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under Article 15.~~

Cost will be assessed against payment to Contractor, as a set off, in accordance with Article 15 of the General Conditions. The assessment amount will be based on Engineer’s rate specified below.

- Project Assistant I \$ 71.00
- Project Assistant II \$ 97.00
- Project Manager \$225.00
- CAD Tech I \$ 89.00

- CAD Tech II \$100.00
- CAD Tech III \$122.00
- Engineer \$172.00
- Sr Engineer \$229.00
- Engineer in Training I \$110.00
- Engineer in Training II \$125.00
- Surveyor Technician \$ 86.00
- Crew Chief \$104.00
- Sr Crew Chief \$125.00
- Professional Land Surveyor \$207.00

SC-7.03 Add the following new subparagraph immediately after Paragraph SC-7.03.D:

1. For purposes of administering the foregoing requirement, additional overtime costs are defined as cost incurred by Owner, due to Engineer providing services related to Work being completed outside of Normal Working Hours, on Saturday, Sunday or on Legal Holidays.

#### 7.10 Taxes

SC-7.10 Add a new paragraph immediately after Paragraph 7.10.A:

- A. Owner is exempt from payment of sales and compensating use taxes of the State of Montana and of cities and counties thereof on all materials to be incorporated into the Work.
  1. Owner will furnish the required certificates of tax exemption to Contractor for use in the purchase of supplies and materials to be incorporated into the Work.
  2. Owner's exemption does not apply to construction tools, machinery, equipment, or other property purchased by or leased by Contractor, or to supplies or materials not incorporated into the Work.

## ARTICLE 8—OTHER WORK AT THE SITE

## ARTICLE 9—OWNER'S RESPONSIBILITIES

### 9.13 Owner's Site Representative

SC-9.13 Add the following new paragraph immediately after Paragraph 9.12 of the General Conditions:

#### 9.13 Owner's Site Representative

*A. Owner will furnish an "Owner's Site Representative" to represent Owner at the Site and assist Owner in observing the progress and quality of the Work. The Owner's Site Representative is not Engineer's consultant, agent, or employee. Owner's Site Representative will be (To be Determined). The authority and responsibilities of Owner's Site Representative follow: (As defined in the General Conditions).*

## ARTICLE 10—ENGINEER'S STATUS DURING CONSTRUCTION

### 10.03 Resident Project Representative

SC-10.03 Add the following new paragraphs immediately after Paragraph 10.03.B:

- C. The Resident Project Representative (RPR) will be Engineer's representative at the Site. RPR's dealings in matters pertaining to the Work in general will be with Engineer and Contractor. RPR's dealings with Subcontractors will only be through or with the full knowledge or approval of Contractor. The RPR will:
1. *Conferences and Meetings:* Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences, and other Project-related meetings (but not including Contractor's safety meetings), and as appropriate prepare and circulate copies of minutes thereof.
  2. *Safety Compliance:* Comply with Site safety programs, as they apply to RPR, and if required to do so by such safety programs, receive safety training specifically related to RPR's own personal safety while at the Site.
  3. *Liaison*
    - a. Serve as Engineer's liaison with Contractor. Working principally through Contractor's authorized representative or designee, assist in providing information regarding the provisions and intent of the Contract Documents.
    - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's On-Site operations.
    - c. Assist in obtaining from Owner additional details or information, when required for Contractor's proper execution of the Work.
  4. *Review of Work; Defective Work*
    - a. Conduct On-Site observations of the Work to assist Engineer in determining, to the extent set forth in Paragraph 10.02, if the Work is in general proceeding in accordance with the Contract Documents.
    - b. Observe whether any Work in place appears to be defective.
    - c. Observe whether any Work in place should be uncovered for observation, or requires special testing, inspection or approval.
  5. *Inspections and Tests*
    - a. Observe Contractor-arranged inspections required by Laws and Regulations, including but not limited to those performed by public or other agencies having jurisdiction over the Work.
    - b. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Work.
  6. *Payment Requests:* Review Applications for Payment with Contractor.
  7. *Completion*
    - a. Participate in Engineer's visits regarding Substantial Completion.
    - b. Assist in the preparation of a punch list of items to be completed or corrected.



- c. Participate in Engineer's visit to the Site in the company of Owner and Contractor regarding completion of the Work and prepare a final punch list of items to be completed or corrected by Contractor.
  - d. Observe whether items on the final punch list have been completed or corrected.
- D. The RPR will not:
- 1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
  - 2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
  - 3. Undertake any of the responsibilities of Contractor, Subcontractors, or Suppliers.
  - 4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction.
  - 5. Advise on, issue directions regarding, or assume control over security or safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
  - 6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.
  - 7. Authorize Owner to occupy the Project in whole or in part.

## **ARTICLE 11—CHANGES TO THE CONTRACT**

## **ARTICLE 12—CLAIMS**

No suggested Supplementary Conditions in this Article.

## **ARTICLE 13—COST OF WORK; ALLOWANCES, UNIT PRICE WORK**

### *13.01 Cost of the Work*

SC-13.01 Supplement Paragraph 13.01.C.2 by adding the following definition of small tools and hand tools:

- a. For purposes of this paragraph, "small tools and hand tools" means any tool or equipment whose current price if it were purchased new at retail would be less than \$500.

SC-13.02.C – Delete paragraph in its entirety and insert "Deleted".

### *13.03 Unit Price Work*

SC-13.03 Delete Paragraph 13.03.E in its entirety and insert the following in its place:

- E. Adjustments in Unit Price
  - 1. Contractor or Owner shall be entitled to an adjustment in the unit price with respect to an item of Unit Price Work if:

- a. the extended price of a particular item of Unit Price Work amounts to 10-percent or more of the Contract Price (based on estimated quantities at the time of Contract formation) and the variation in the quantity of that particular item of Unit Price Work actually furnished or performed by Contractor differs by more than 25-percent from the estimated quantity of such item indicated in the Agreement; and
  - b. Contractor's unit costs to perform the item of Unit Price Work have changed materially and significantly as a result of the quantity change.
2. The adjustment in unit price will account for and be coordinated with any related changes in quantities of other items of Work, and in Contractor's costs to perform such other Work, such that the resulting overall change in Contract Price is equitable to Owner and Contractor.
  3. Adjusted unit prices will apply to all units of that item.

#### **ARTICLE 14—TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK**

No suggested Supplementary Conditions in this Article.

#### **ARTICLE 15—PAYMENTS TO CONTRACTOR, SET OFFS; COMPLETIONS; CORRECTION PERIOD**

##### *15.01 Progress Payments*

SC-15.01.B.4 – Add the following language at the end of paragraph:

No payments will be made that would deplete the retainage, place in escrow any funds that are required for retainage or invest the retainage for the benefit of the Contractor.

SC-15.01.D.1 – Delete paragraph in its entirety and insert the following in its place:

The Application for Payment with Engineer's recommendations will be presented to the Owner and Agency for consideration. If both the Owner and Agency find the Application for Payment acceptable, the recommended amount less any reduction under the provisions of Paragraph 15.01.E will become due twenty (20) days after the Application for Payment is presented to the Owner, and the Owner will make payment to the Contractor.

SC-15.01 Add the following new Paragraph 15.01.F:

- F. For contracts in which the Contract Price is based on the Cost of Work, if Owner determines that progress payments made to date substantially exceed the actual progress of the Work (as measured by reference to the Schedule of Values), or present a potential conflict with the Guaranteed Maximum Price, then Owner may require that Contractor prepare and submit a plan for the remaining anticipated Applications for Payment that will bring payments and progress into closer alignment and take into account the Guaranteed Maximum Price (if any), through reductions in billings, increases in retainage, or other equitable measures. Owner will review the plan, discuss any necessary modifications, and implement the plan as modified for all remaining Applications for Payment.

SC-15.02.A – Amend paragraph by striking out the following text: "7 days after".

##### *15.03 Substantial Completion*

SC-15.03 Add the following new subparagraph to Paragraph 15.03.B:

1. If some or all of the Work has been determined not to be at a point of Substantial Completion and will require re-inspection or re-testing by Engineer, the cost of such re-inspection or re-testing, including the cost of time, travel and living expenses, will be paid by Contractor to Owner. If Contractor does not pay, or the parties are unable to agree as to the amount owed, then Owner may impose a reasonable set-off against payments due under this Article 15.

15.08 *Correction Period*

SC-15.08 ~~Add the following new Paragraph 15.08.G:~~

- ~~G. The correction period specified as one year after the date of Substantial Completion in Paragraph 15.08.A of the General Conditions is hereby revised to be the number of years set forth in SC-6.01.B.1; or if no such revision has been made in SC-6.01.B, then the correction period is hereby specified to be 2 years after Substantial Completion.~~

## **ARTICLE 16—SUSPENSION OF WORK AND TERMINATION**

No suggested Supplementary Conditions in this Article.

## **ARTICLE 17—FINAL RESOLUTIONS OF DISPUTES**

17.02 *Arbitration*

SC-17.02 Add the following new paragraph immediately after Paragraph 17.01.

17.02 *Arbitration*

- A. All matters subject to final resolution under this Article will be settled by arbitration administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules (subject to the conditions and limitations of this Paragraph SC-17.02). Any controversy or claim in the amount of \$100,000 or less will be settled in accordance with the American Arbitration Association's supplemental rules for Fixed Time and Cost Construction Arbitration. This agreement to arbitrate will be specifically enforceable under the prevailing law of any court having jurisdiction.
- B. The demand for arbitration will be filed in writing with the other party to the Contract and with the selected arbitration administrator, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the specific time required in Article 17, or if no specified time is applicable within a reasonable time after the matter in question has arisen, and in no event will any such demand be made after the date when institution of legal or equitable proceedings based on such matter in question would be barred by the applicable statute of limitations.
- C. The arbitrator(s) must be licensed engineers, contractors, attorneys, or construction managers. Hearings will take place pursuant to the standard procedures of the Construction Arbitration Rules that contemplate in-person hearings. The arbitrators will have no authority to award punitive or other damages not measured by the prevailing party's actual damages, except as may be required by statute or the Contract. Any award in an arbitration initiated under this clause will be limited to monetary damages and include no injunction or direction to any party other than the direction to pay a monetary amount.

- D. The Arbitrators will have the authority to allocate the costs of the arbitration process among the parties but will only have the authority to allocate attorneys' fees if a specific Law or Regulation or this Contract permits them to do so.
- E. The award of the arbitrators must be accompanied by a reasoned written opinion and a concise breakdown of the award. The written opinion will cite the Contract provisions deemed applicable and relied on in making the award.
- F. The parties agree that failure or refusal of a party to pay its required share of the deposits for arbitrator compensation or administrative charges will constitute a waiver by that party to present evidence or cross-examine witness. In such event, the other party shall be required to present evidence and legal argument as the arbitrator(s) may require for the making of an award. Such waiver will not allow for a default judgment against the non-paying party in the absence of evidence presented as provided for above.
- G. No arbitration arising out of or relating to the Contract will include by consolidation, joinder, or in any other manner any other individual or entity (including Engineer, and Engineer's consultants and the officers, directors, partners, agents, employees or consultants of any of them) who is not a party to this Contract unless:
  - 1. the inclusion of such other individual or entity will allow complete relief to be afforded among those who are already parties to the arbitration;
  - 2. such other individual or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration, and which will arise in such proceedings;
  - 3. such other individual or entity is subject to arbitration under a contract with either Owner or Contractor, or consents to being joined in the arbitration; and
  - 4. the consolidation or joinder is in compliance with the arbitration administrator's procedural rules.
- H. The award will be final. Judgment may be entered upon it in any court having jurisdiction thereof, and it will not be subject to modification or appeal, subject to provisions of the Laws and Regulations relating to vacating or modifying an arbitral award.
- I. Except as may be required by Laws or Regulations, neither party nor an arbitrator may disclose the existence, content, or results of any arbitration hereunder without the prior written consent of both parties, with the exception of any disclosure required by Laws and Regulations or the Contract. To the extent any disclosure is allowed pursuant to the exception, the disclosure must be strictly and narrowly limited to maintain confidentiality to the extent possible.

### 17.03 Attorneys' Fees

SC-17.03 Add the following new paragraph immediately after Paragraph 17.02. [Note: If there is no Paragraph 17.02, because neither arbitration nor any other dispute resolution process has been specified here in the Supplementary Conditions, then revise this to state "Add the following new Paragraph immediately after Paragraph 17.01" and revise the numbering accordingly].

### 17.03 Attorneys' Fees

- A. For any matter subject to final resolution under this Article, the prevailing party shall be entitled to an award of its attorneys' fees incurred in the final resolution proceedings, in an equitable amount to be determined in the discretion of the court, arbitrator, arbitration panel, or other arbiter of the matter subject to final resolution, taking into account the parties' initial demand or defense positions in comparison with the final result.

**ARTICLE 18—MISCELLANEOUS**

**END OF SECTION**

**SECTION 00840**  
**WAGE RATES**

**Contractor shall use the Wages Rates listed below:**

This Section contains:

A. Montana Prevailing Wage Rates for Heavy Construction

**MONTANA  
PREVAILING WAGE RATES FOR HEAVY CONSTRUCTION SERVICES 2023**

**Effective: January 14, 2023**

*Greg Gianforte, Governor  
State of Montana*

*Laurie Esau, Commissioner  
Department of Labor & Industry*

To obtain copies of prevailing wage rate schedules, or for information relating to public works projects and payment of prevailing wage rates, visit ERD at [erd.dli.mt.gov/labor-standards](http://erd.dli.mt.gov/labor-standards) or contact:

Employment Standards Division  
Montana Department of Labor and Industry  
P. O. Box 8011  
Helena, MT 59601  
Phone 406-444-6543

**The department welcomes questions, comments, and suggestions from the public. In addition, we'll do our best to provide information in an accessible format, upon request, in compliance with the Americans with Disabilities Act.**

**MONTANA PREVAILING WAGE REQUIREMENTS**

The Commissioner of the Department of Labor and Industry, in accordance with Sections 18-2-401 and 18-2-402 of the Montana Code Annotated (MCA), has determined the standard prevailing rate of wages for the occupations listed in this publication.

The wages specified herein control the prevailing rate of wages for the purposes of Section 18-2-401, et seq., MCA. It is required each employer pay (as a minimum) the rate of wages, including fringe benefits, travel allowance, zone pay and per diem applicable to the district in which the work is being performed as provided in the attached wage determinations.

All Montana Prevailing Wage Rates are available on the internet at [erd.dli.mt.gov/labor-standards](http://erd.dli.mt.gov/labor-standards) or by contacting the department at (406) 444-6543.

In addition, this publication provides general information concerning compliance with Montana's Prevailing Wage Law and the payment of prevailing wages. For detailed compliance information relating to public works contracts and payment of prevailing wage rates, please consult the regulations on the internet at [erd.dli.mt.gov/labor-standards](http://erd.dli.mt.gov/labor-standards) or contact the department at (406) 444-6543.

Laurie Esau  
Commissioner  
Department of Labor and Industry  
State of Montana

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## **A. Date of January 14, 2023**

## **B. Definition of Heavy Construction**

The Administrative Rules of Montana (ARM), 24.17.501(4) – (4)(a), states “Heavy construction projects include, but are not limited to, those projects that are not properly classified as either ‘building construction’, or ‘highway construction.’”

*Heavy construction projects include, but are not limited to, antenna towers, bridges (major bridges designed for commercial navigation), breakwaters, caissons (other than building or highway), canals, channels, channel cut-offs, chemical complexes or facilities (other than buildings), cofferdams, coke ovens, dams, demolition (not incidental to construction), dikes, docks, drainage projects, dredging projects, electrification projects (outdoor), fish hatcheries, flood control projects, industrial incinerators (other than building), irrigation projects, jetties, kilns, land drainage (not incidental to other construction), land leveling (not incidental to other construction), land reclamation, levees, locks and waterways, oil refineries (other than buildings), pipe lines, ponds, pumping stations (prefabricated drop-in units – not buildings), railroad construction, reservoirs, revetments, sewage collection and disposal lines, sewers (sanitary, storm, etc.), shoreline maintenance, ski tows, storage tanks, swimming pools (outdoor), subways (other than buildings), tipples, tunnels, unsheltered piers and wharves, viaducts (other than highway), water mains, waterway construction, water supply lines (not incidental to building), water and sewage treatment plants (other than buildings) and wells.”*

## **C. Definition of Public Works Contract**

Section 18-2-401(11)(a), MCA defines “public works contract” as “...a contract for construction services let by the state, county, municipality, school district, or political subdivision or for nonconstruction services let by the state, county, municipality, or political subdivision in which the total cost of the contract is in excess of \$25,000...”.

## **D. Prevailing Wage Schedule**

This publication covers only Heavy Construction occupations and rates in the specific localities mentioned herein. These rates will remain in effect until superseded by a more current publication. Current prevailing wage rate schedules for Building Construction, Highway Construction and Nonconstruction Services occupations can be found on the internet at [www.mtwagehourbopa.com](http://www.mtwagehourbopa.com) or by contacting the department at (406) 444-6543.

## **E. Rates to Use for Projects**

ARM, 24.17.127(1)(c), states “The wage rates applicable to a particular public works project are those in effect at the time the bid specifications are advertised.”

## **F. Wage Rate Adjustments for Multiyear Contracts**

Section 18-2-417, MCA states:

*“(1) Any public works contract that by the terms of the original contract calls for more than 30 months to fully perform must include a provision to adjust, as provided in subsection (2), the standard prevailing rate of wages to be paid to the workers performing the contract.*

*(2) The standard prevailing rate of wages paid to workers under a contract subject to this section must be adjusted 12 months after the date of the award of the public works contract. The amount of the adjustment must be a 3% increase. The adjustment must be made and applied every 12 months for the term of the contract.*

*(3) Any increase in the standard rate of prevailing wages for workers under this section is the sole responsibility of the contractor and any subcontractors and not the contracting agency.”*

## **G. Fringe Benefits**

Section 18-2-412, MCA states:

*“(1) To fulfill the obligation...a contractor or subcontractor may:*

*(a) pay the amount of fringe benefits and the basic hourly rate of pay that is part of the standard prevailing rate of wages directly to the worker or employee in cash;*

*(b) make an irrevocable contribution to a trustee or a third person pursuant to a fringe benefit fund, plan, or program that meets the requirements of the Employee Retirement Income Security Act of 1974 or that is a bona fide program approved by the U. S. department of labor; or*

*(c) make payments using any combination of methods set forth in subsections (1)(a) and (1)(b) so that the aggregate of payments and contributions is not less than the standard prevailing rate of wages, including fringe benefits and travel allowances, applicable to the district for the particular type of work being performed.*

*(2) The fringe benefit fund, plan, or program described in subsection (1)(b) must provide benefits to workers or employees for health care, pensions on retirement or death, life insurance, disability and sickness insurance, or bona fide programs that meet the requirements of the Employee Retirement Income Security Act of 1974 or that are approved by the U. S. department of labor.”*

Fringe benefits are paid for all hours worked (straight time and overtime hours). However, fringe benefits are not to be considered a part of the hourly rate of pay for calculating overtime, unless there is a collectively bargained agreement in effect that specifies otherwise.

## **H. Dispatch City**

ARM, 24.17.103(11), defines dispatch city as *“...the courthouse in the city from the following list which is closest to the center of the job: Billings, Bozeman, Butte, Great Falls, Helena, Kalispell, Miles City, Missoula and Sidney.”*

## **I. Zone Pay**

Zone pay is not travel pay. ARM, 24.17.103(25), defines zone pay as *“...an amount added to the base pay; the combined sum then becomes the new base wage rate to be paid for all hours worked on the project. Zone pay must be determined by measuring the road miles one way over the shortest practical maintained route from the dispatch city to the center of the job.”* See section H above for a list of dispatch cities.

## **J. Computing Travel Benefits**

ARM, 24.17.103(23), states *“ ‘Travel pay,’ also referred to as ‘travel allowance,’ is and must be paid for travel both to and from the job site, except those with special provisions listed under the classification. The rate is determined by measuring the road miles one direction over the shortest practical maintained route from the dispatch city or the employee's home, whichever is closer, to the center of the job.”* See section H above for a list of dispatch cities.

## **K. Per Diem**

ARM, 24.17.103(19), states *“ ‘Per diem’ typically covers costs associated with board and lodging expenses. Per diem is paid when an employee is required to work at a location outside the daily commuting distance and is required to stay at that location overnight or longer.”*

## **L. Apprentices**

Wage rates for apprentices registered in approved federal or state apprenticeship programs are contained in those programs. Additionally, Section 18-2-416(2), MCA states, *“...The full amount of any applicable fringe benefits must be paid to the apprentice while the apprentice is working on the public works contract.”* Apprentices not registered in approved federal or state apprenticeship programs will be paid the appropriate journey level prevailing wage rate when working on a public works contract.

### **M. Posting Notice of Prevailing Wages**

Section 18-2-406, MCA, provides that contractors, subcontractors, and employers who are “...performing work or providing construction services under public works contracts, as provided in this part, shall post in a prominent and accessible site on the project or staging area, not later than the first day of work and continuing for the entire duration of the project, a legible statement of all wages and fringe benefits to be paid to the employees.”

### **N. Employment Preference**

Sections 18-2-403 and 18-2-409, MCA require contractors to give preference to the employment of bona fide Montana residents in the performance of work on public works contracts.

### **O. Projects of a Mixed Nature**

Section 18-2-408, MCA states:

*“(1) The contracting agency shall determine, based on the preponderance of labor hours to be worked, whether the public works construction services project is classified as a highway construction project, a heavy construction project, or a building construction project.*

*“(2) Once the project has been classified, employees in each trade classification who are working on that project must be paid at the rate for that project classification”*

### **P. Occupations Definitions**

You can find definitions for these occupations on the following Bureau of Labor Statistics website:

[http://www.bls.gov/oes/current/oes\\_stru.htm](http://www.bls.gov/oes/current/oes_stru.htm)

### **Q. Welder Rates**

Welders receive the rate prescribed for the craft performing an operation to which welding is incidental.

### **R. Foreman Rates**

Rates are no longer set for foremen. However, if a foreman performs journey level work, the foreman must be paid at least the journey level rate.

**S. Proper Classification for Pipefitter and Laborer/Pipelayer Work on Water and Waste Water Treatment Plants** The proper classification for the following work is Pipefitter, when it is performed inside a building structure or performed at a location which will later be inside of a building: Joining steel pipe larger than 12 inches in diameter with bolted flange connections that has been pre-fabricated off site and does not require any modification such as cutting, grinding, welding, or other fabrication in order to be installed. All other work previously classified as pipefitter remains in that classification. The proper classification for that work when it is at a location that will always be outside a building is Pipelayer, which is under the Laborer Group 3 classification.

# WAGE RATES

## BOILERMAKERS

<b>Wage</b>	<b>Benefit</b>
\$34.12	\$31.68

### Duties Include:

Construct, assemble, maintain, and repair stationary steam boilers, boiler house auxiliaries, process vessels, pressure vessels and penstocks. Bulk storage tanks and bolted steel tanks.

### Travel:

#### All Districts

0-120 mi. free zone

>120 mi. federal mileage rate/mi.

### Special Provision:

Travel is paid only at the beginning and end of the job.

### Per Diem:

#### All Districts

0-70 mi. free zone

>70-120 mi. \$65.00/day

>120 mi. \$80.00/day

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## BRICK, BLOCK, AND STONE MASONS

<b>Wage</b>	<b>Benefit</b>
\$32.32	\$16.78

### Travel:

0-70 mi. free zone

>70-90 mi. \$60.00/day

>90 mi. \$80.00/day

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## CARPENTERS

<b>Wage</b>	<b>Benefit</b>
\$33.50	\$14.07

### Zone Pay:

0-30 mi. free zone

>30-60 mi. base pay + \$4.00/hr.

>60 mi. base pay + \$6.00/hr.

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## CEMENT MASONS AND CONCRETE FINISHERS

### No Rate Established

### Duties Include:

Smooth and finish surfaces of poured concrete, such as floors, walks, sidewalks, or curbs. Align forms for sidewalks, curbs, or gutters.

### Zone Pay:

No zone pay established.

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## CONSTRUCTION EQUIPMENT OPERATORS GROUP 1

<b>Wage</b>	<b>Benefit</b>
\$29.11	\$13.80

**This group includes but is not limited to:**

Air Compressor; Auto Fine Grader; Belt Finishing; Boring Machine (Small); Cement Silo; Crane, A-Frame Truck Crane; Crusher Conveyor; DW-10, 15, and 20 Tractor Roller; Farm Tractor; Forklift; Form Grader; Front-End Loader, under 1 cu. yd; Oiler, Herman Nelson Heater; Mucking Machine; Oiler, All Except Cranes/Shovels; Pumpman.

**Zone Pay:**

0-30 mi. free zone  
>30-60 mi. base pay + \$3.50/hr.  
>60 mi. base pay + \$5.50/hr.

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## CONSTRUCTION EQUIPMENT OPERATORS GROUP 2

<b>Wage</b>	<b>Benefit</b>
\$29.70	\$13.80

**This group includes but is not limited to:**

Air Doctor; Backhoe\Excavator\Shovel, up to and incl. 3 cu. yds; Bit Grinder; Bituminous Paving Travel Plant; Boring Machine, Large; Broom, Self-Propelled; Concrete Travel Batcher; Concrete Float & Spreader; Concrete Bucket Dispatcher; Concrete Finish Machine; Concrete Conveyor; Distributor; Dozer, Rubber-Tired, Push, & Side Boom; Elevating Grader\Gradall; Field Equipment Serviceman; Front-End Loader, 1 cu. yd up to and incl. 5 cu. yds; Grade Setter; Heavy Duty Drills, All Types; Hoist\Tugger, All; Hydralift Forklifts & Similar; Industrial Locomotive; Motor Patrol (except finish); Mountain Skidder; Oiler, Cranes\Shovels; Pavement Breaker, EMSCO; Power Saw, Self-Propelled; Pugmill; Pumpcrete\Grout Machine; Punch Truck; Roller, other than Asphalt; Roller, Sheepsfoot (Self-Propelled); Roller, 25 tons and over; Ross Carrier; Rotomill, under 6 ft; Trenching Machine; Washing /Screening Plant

**Zone Pay:**

0-30 mi. free zone  
>30-60 mi. base pay + \$3.50/hr.  
>60 mi. base pay + \$5.50/hr.

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### CONSTRUCTION EQUIPMENT OPERATORS GROUP 3

<b>Wage</b>	<b>Benefit</b>
\$30.65	\$13.80

**This group includes but is not limited to:**

Asphalt Paving Machine; Asphalt Screed; Backhoe\Excavator\Shovel, over 3 cu. yds; Cableway Highline; Concrete Batch Plant; Concrete Curing Machine; Concrete Pump; Cranes, Creter; Cranes, Electric Overhead; Cranes, 24 tons and under; Curb Machine\Slip Form Paver; Finish Dozer; Front-End Loader, over 5 cu. yds; Mechanic\Welder; Pioneer Dozer; Roller Asphalt (Breakdown & Finish); Rotomill, over 6 ft; Scraper, Single, Twin, or Pulling Belly-Dump; YO-YO Cat.

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**Zone Pay:**

0-30 mi. free zone  
>30-60 mi. base pay + \$3.50/hr.  
>60 mi. base pay + \$5.50/hr.

### CONSTRUCTION EQUIPMENT OPERATORS GROUP 4

<b>Wage</b>	<b>Benefit</b>
\$31.65	\$13.80

**This group includes but is not limited to:**

Asphalt\Hot Plant Operator; Cranes, 25 tons up to and incl. 44 tons; Crusher Operator; Finish Motor Patrol; Finish Scraper.

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**Zone Pay:**

0-30 mi. free zone  
>30-60 mi. base pay + \$3.50/hr.  
>60 mi. base pay + \$5.50/hr.

### CONSTRUCTION EQUIPMENT OPERATORS GROUP 5

<b>Wage</b>	<b>Benefit</b>
\$31.75	\$13.80

**This group includes but is not limited to:**

Cranes, 45 tons up to and incl. 74 tons.

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**Zone Pay:**

0-30 mi. free zone  
>30-60 mi. base pay + \$3.50/hr.  
>60 mi. base pay + \$5.50/hr.

### CONSTRUCTION EQUIPMENT OPERATORS GROUP 6

<b>Wage</b>	<b>Benefit</b>
\$32.75	\$13.80

**This group includes but is not limited to:**

Cranes, 75 tons up to and incl. 149 tons; Cranes, Whirley (All).

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**Zone Pay:**

0-30 mi. free zone  
>30-60 mi. base pay + \$3.50/hr.  
>60 mi. base pay + \$5.50/hr.

## CONSTRUCTION EQUIPMENT OPERATORS GROUP 7

<b>Wage</b>	<b>Benefit</b>
\$33.75	\$13.80

**This group includes but is not limited to:**

Cranes, 150 tons up to and incl. 250 tons; Cranes, over 250 tons—add \$1.00 for every 100 tons over 250 tons; Crane, Tower (All); Crane Stiff-Leg or Derrick; Helicopter Hoist.

**Zone Pay:**

0-30 mi. free zone  
>30-60 mi. base pay + \$3.50/hr.  
>60 mi. base pay + \$5.50/hr.

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## CONSTRUCTION LABORERS GROUP 1/FLAG PERSON FOR TRAFFIC CONTROL

<b>Wage</b>	<b>Benefit</b>
\$23.08	\$11.82

**Zone Pay:**

0-30 mi. free zone  
>30-60 mi. base pay + \$3.05/hr.  
>60 mi. base pay + \$4.85/hr.

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## CONSTRUCTION LABORERS GROUP 2

<b>Wage</b>	<b>Benefit</b>
\$26.40	\$11.82

**Zone Pay:**

0-30 mi. free zone  
>30-60 mi. base pay + \$3.05/hr.  
>60 mi. base pay + \$4.85/hr.

**This group includes but is not limited to:**

General Labor; Asbestos Removal; Burning Bar; Bucket Man; Carpenter Tender; Caisson Worker; Cement Mason Tender; Cement Handler (dry); Chuck Tender; Choker Setter; Concrete Worker; Curb Machine-lay Down; Crusher and Batch Worker; Heater Tender; Fence Erector; Landscape Laborer; Landscaper; Lawn Sprinkler Installer; Pipe Wrapper; Pot Tender; Powderman Tender; Rail and Truck Loaders and Unloaders; Riprapper; Sign Erection; Guardrail and Jersey Rail; Spike Driver; Stake Jumper; Signalman; Tail Hoseman; Tool Checker and Houseman and Traffic Control Worker.

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### CONSTRUCTION LABORERS GROUP 3

<b>Wage</b>	<b>Benefit</b>
\$26.07	\$12.44

**This group includes but is not limited to:**

Concrete Vibrator; Dumpman (Grademan); Equipment Handler; Geotextile and Liners; High-Pressure Nozzleman; Jackhammer (Pavement Breaker) Non-Riding Rollers; Pipelayer; Posthole Digger (Power); Power Driven Wheelbarrow; Rigger; Sandblaster; Sod Cutter-Power and Tamper.

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**Zone Pay:**

0-30 mi. free zone  
>30-60 mi. base pay + \$3.05/hr.  
>60 mi. base pay + \$4.85/hr.

### CONSTRUCTION LABORERS GROUP 4

<b>Wage</b>	<b>Benefit</b>
\$26.76	\$11.82

**This group includes but is not limited to:**

Hod Carrier\*\*\*; Water Well Laborer; Blaster; Wagon Driller; Asphalt Raker; Cutting Torch; Grade Setter; High-Scaler; Power Saws (Faller & Concrete); Powderman; Rock & Core Drill; Track or Truck Mounted Wagon Drill and Welder incl. Air Arc

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**Zone Pay:**

0-30 mi. free zone  
>30-60 mi. base pay + \$3.05/hr.  
>60 mi. base pay + \$4.85/hr.

\*\*\*Hod Carriers will receive the same amount of travel and/or subsistence pay as bricklayers when requested to travel.

### DIVER TENDERS

<b>Wage</b>	<b>Benefit</b>
\$43.98	\$17.84

The tender shall receive 2 hours at the straight time pay rate per shift for dressing and/or undressing a Diver when work is done under hyperbaric conditions.

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**Zone Pay:**

0-30 mi. free zone  
>30-60 mi. base pay + \$4.00/hr.  
>60 mi. base pay + \$6.00/hr.



## DIVERS

	<b>Wage</b>	<b>Benefit</b>
Stand-By	\$44.98	\$17.84
Diving	\$89.96	\$17.84

Depth Pay (Surface Diving)

0-20 ft.	free zone
>20-100 ft.	\$2.00 per ft.
>100-150 ft.	\$3.00 per ft.
>150-220 ft.	\$4.00 per ft.
>220 ft.	\$5.00 per ft.

Diving In Enclosures

0-25 ft.	free zone
>25-300 ft.	\$1.00 per ft.

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**Zone Pay:**  
0-30 mi. free zone  
>30-60 mi. base pay + \$4.00/hr.  
>60 mi. base pay + \$6.00/hr.

## ELECTRICIANS

<b>Wage</b>	<b>Benefit</b>
\$36.69	\$16.93

**Travel:**  
No mileage due when traveling in employer's vehicle.

The following travel allowance is applicable when traveling in employee's vehicle:

- 0-18 mi. free zone
- >18-60 mi. federal mileage rate/mi.
- >60 mi. \$75.00/day

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## INSULATION WORKERS - MECHANICAL (HEAT AND FROST)

<b>Wage</b>	<b>Benefit</b>
\$41.07	\$19.87

**Duties Include:**  
Insulate pipes, ductwork or other mechanical systems.

**Travel:**  
**All Districts**  
0-30 mi. free zone  
>30-40 mi. \$25.00/day  
>40-50 mi. \$35.00/day  
>50-60 mi. \$50.00/day  
>60 mi. \$60.00/day plus

- \$0.56/mi. if transportation is not provided.
- \$0.20/mi. if in company vehicle.

>60 mi. \$105.00/day on jobs requiring an overnight stay plus

- \$0.56/mi. if transportation is not provided.
- \$0.20/mi. if in company vehicle.

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## IRONWORKERS – REINFORCING IRON AND REBAR WORKERS

<b>Wage</b>	<b>Benefit</b>
\$30.53	\$27.91

**Duties Include:**

Cut, bend, tie, and place rebar.

**Travel:**

0-45 mi. free zone  
>45-60 mi. \$50.00/day  
>60-100 mi. \$75.00/day  
>100 mi. \$95.00/day

**Special Provision:**

When the employer provides transportation, travel will not be paid. However, when an employee is required to travel over 70 miles one way, the employee may elect to receive the travel pay in lieu of the transportation.

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## IRONWORKERS – STRUCTURAL IRON AND STEEL WORKERS

<b>Wage</b>	<b>Benefit</b>
\$30.53	\$27.91

**Duties Include:**

Structural steel erection; assemble prefabricated metal buildings; energy producing windmill type towers; metal bleacher seating; handrail fabrication and ornamental steel.

**Travel:**

0-45 mi. free zone  
>45-60 mi. \$50.00/day  
>60-100 mi. \$75.00/day  
>100 mi. \$95.00/day

**Special Provision:**

When the employer provides transportation, travel will not be paid. However, when an employee is required to travel over 70 miles one way, the employee may elect to receive the travel pay in lieu of the transportation.

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## LINE CONSTRUCTION – EQUIPMENT OPERATORS

<b>Wage</b>	<b>Benefit</b>
\$37.26	\$17.93

**Duties Include:**

All work on substations

**Travel:**

No Free Zone  
\$60.00/day

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## LINE CONSTRUCTION – GROUNDMAN

<b>Wage</b>	<b>Benefit</b>
\$29.09	\$17.24

**Duties Include:**

All work on substations

**Travel:**

No Free Zone  
\$60.00/day

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## LINE CONSTRUCTION – LINEMAN

<b>Wage</b>	<b>Benefit</b>
\$48.65	\$19.06

**Travel:**  
No Free Zone  
\$60.00/day

### Duties Include:

All work on substations

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## MILLWRIGHTS

<b>Wage</b>	<b>Benefit</b>
\$42.58	\$14.57

**Zone Pay:**  
0-30 mi. free zone  
>30-60 mi. base pay + \$4.00/hr.  
>60 mi. base pay + \$6.00/hr.

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## PAINTERS

<b>Wage</b>	<b>Benefit</b>
\$25.00	\$0.00

**Travel:**  
No travel or per diem established.

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## PILE BUCKS

<b>Wage</b>	<b>Benefit</b>
\$33.50	\$14.07

**Zone Pay:**  
0-30 mi. free zone  
>30-60 mi. base pay + \$4.00/hr.  
>60 mi. base pay + \$6.00/hr.

### Duties Include:

Set up crane; set up hammer; weld tips on piles; set leads; insure piles are driven straight with the use of level or plum bob. Give direction to crane operator as to speed, and direction of swing. Cut piles to grade.

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## PILOT CAR DRIVERS

No Rate Established

**Zone Pay:**  
No zone pay established.

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## PLUMBERS, PIPEFITTERS, AND STEAMFITTERS

<b>Wage</b>	<b>Benefit</b>
\$38.56	\$20.61

### Duties Include:

Assemble, install, alter, and repair pipe-lines or pipe systems that carry water, steam, air, other liquids or gases. Testing of piping systems, commissioning and retro-commissioning. Workers in this occupation may also install heating and cooling equipment and mechanical control systems.

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### Travel:

0-70 free zone  
>70 mi.

- On jobs when employees do not work consecutive days: \$0.55/mi. if employer doesn't provide transportation. Not to exceed two trips.
- On jobs when employees work any number of consecutive days: \$110.00/day.
- 

## SPRINKLER FITTERS

<b>Wage</b>	<b>Benefit</b>
\$35.66	\$24.29

### Duties Include:

Duties Include but not limited to any and all fire protection systems: Installation, dismantling, inspection, testing, maintenance, repairs, adjustments, and corrections of all fire protection and fire control systems, including both overhead and underground water mains, all piping, fire hydrants, standpipes, air lines, tanks, and pumps used in connection with sprinkler and alarm systems.

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### Travel

#### All Districts

The following travel allowance is applicable when traveling in employee's vehicle.

- 0-60 mi. free zone
- >60-80 mi. \$21.00/day
- >80-100 mi. \$31.00/day
- >100 mi. \$115.00/day + the IRS rate per mile and \$8.92 for every 15 miles traveled for one trip out and one trip back

No travel allowance required when in employer's vehicle.

#### Per Diem

No per diem is applicable when traveling in employer's vehicle

The following per diem is applicable when traveling in employee's vehicle.

- 0-100 mi. free zone
- >100 mi. \$105.00/day + the IRS rate per mile and \$8.92 for every 15 miles traveled for one trip out and one trip back.
- >100 mi. \$115.00/day

## TRUCK DRIVERS

	<b>Wage</b>	<b>Benefit</b>
Truck Driver	\$31.28	\$11.96

**Truck drivers include but are not limited to:**

Combination Truck and Concrete Mixer and Transit Mixer; Dry Batch Trucks; Distributor Driver; Dumpman; Dump Trucks and similar equipment; Dumpster; Flat Trucks; Lumber Carriers; Lowboys; Pickup; Powder Truck Driver; Power Boom; Serviceman; Service Truck/Fuel Truck/Tireperson; Truck Mechanic; Trucks with Power Equipment; Warehouseman, Partsman, Cardex and Warehouse Expeditor; Water Trucks.

**Zone Pay:**

**All Districts**

0-30 mi. free zone

>30-60 mi. base pay + \$3.05/hr.

>60 mi. base pay + \$.485/hr.

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**SECTION 00910  
SPECIAL PROVISIONS**

Special Provisions further amend or supplement the Montana Public Works Standard Specifications, 7th Edition (MPWSS) and the City of Kalispell Standards for Design and Construction. All provisions that are not so amended or supplemented remain in full force and effect.

1.01 SECTION 00700 GENERAL CONDITIONS, Paragraph 4.05 – Delays in Contractor’s Progress

Add the following paragraph:

- H. In no case will an adverse weather shutdown be granted when Work is only partially completed, unless otherwise approved by Engineer. Where Engineer determines a shutdown is justifiable, Contractor shall restore all utility services to users in the construction area and open traffic access in the construction area. Contractor shall be responsible for cleaning the Site and staging area and securing the premises.

1.02 EROSION CONTROL

- A. This project requires coverage under the State General Permit for Storm Water Discharges Associated with Construction Activity (Permit). Contractor shall prepare a Storm Water Pollution Prevention Plan (SWPPP) and Notice of Intent (NOI) in accordance with the provisions of the Permit and obtain coverage under the Permit for all Work.
- B. At a minimum, SWPPP shall include Best Management Practices (BMP) as outlined in the latest edition of Montana DEQ’s “Storm Water Management during Construction Field Guide for Best Management Practice” (Field Guide) and shall follow all requirements and/or recommendations outlined therein. SWPPP and NOI shall be submitted to Engineer for review prior to commencement of construction. Engineer may review and require additional BMPs, if in Engineer’s opinion, BMPs fails to comply with the intent of Field Guide.
- C. Contractor shall install and maintain BMP’s throughout construction and thereafter until all vegetation is re-established and the project area is restored as required by permit. Contractor shall provide all administration required under the terms of the Permit. Prior to Final Acceptance of Work, Contractor shall submit one copy of all SWPPP administration records to Engineer.
- D. During construction, Contractor shall notify Engineer in writing of any issues of non-compliance with corrective plan. If Engineer observes any issues of non-compliance, Engineer may require additional BMP’s or corrective actions. However, full responsibility to comply with Permit remains with Contractor. Engineer’s observations, or lack thereof, does not imply any shared responsibility by Engineer or Owner.

1.03 Land Owner Coordination

- A. CHS: Mark Lalum, (406) 755-7410, mark.lalum@chsinc.com
- B. Granite Stone: Dave Wilkins, (406) 755-5717, dave.wilkins@glacierstonesupply.com
- C. Klingler Lumber: Jeff Hammett, (406) 212-8077, jhammett@montanasky.net
- D. Northern Plastics: Mark Hufstetler, (406) 257-6300
- E. FCEDA: Christy Cummings Dawson, (406)257-7711, christy@dobusinessinmontana.com

1.04 Staging and Storage Areas

- A. Location identified: Within the project boundary and FCEDA owned property.

1.05 Permits

- A. Temporary Occupancy Permit from BNSF  
Melissa Leal, Associated Permit Manager  
(817) 230-2626  
Melissa.Leal@am.jll.com

**END OF SECTION**



# DIVISION 1:

GENERAL  
REQUIREMENTS





**SECTION 01050  
FIELD ENGINEERING**

**PART 1 - GENERAL**

**1.01 WORK INCLUDED**

- A. Engineer shall establish the following components of the Work for use by Contractor:
1. Horizontal and vertical project control
  2. Sidewalk (offsets) at 50-foot intervals.
  3. Center of accessibility ramps.
  4. Location of Signs
- B. Contractor shall develop and make all detailed surveys needed for construction that is in addition to that provided by Engineer as specified above. This may include, but is not limited to, slope stakes, batter boards, grade stakes, and other working points, lines and elevations.
- C. From the horizontal and vertical information provided by Engineer, Contractor shall provide laser and/or other line and grade establishment techniques necessary to complete Work and acceptable to Engineer.
- D. Contractor must give a minimum 48 hours advance request for staking needs, in writing, by completing and submitting a "Request for Staking" form. Absolutely no "second time" or "re-staking" work will be done by Engineer unless separate compensation for Engineer's costs are paid directly by Contractor. Engineer shall submit notification of "re-staking work" and cost estimates for Contractor's review and agreement prior to starting the "re-staking" work.

**1.02 PRESERVATION OF REFERENCE POINTS**

Contractor shall carefully preserve benchmarks, reference points, lot corners, section corners and stakes and in case of destruction he shall be responsible for hiring and cost of a Professional Land Surveyor for the resetting of such points and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.

**1.03 SURVEY NOTES**

Contractor shall maintain their survey notes in standard survey notebooks in a neat and legible format. Contractor shall provide a duplicate set of survey notes for all staking operations that will be given to Engineer upon request for record purposes no later than 24 hours after the stakes are set. Engineer reserves the right to monitor the work of survey crews as judged necessary to show conformance with this specification. However, such monitoring shall in no way relieve Contractor of the responsibility for survey accuracy and adequacy to obtain a finished product fully conforming to the plans and specifications.

#### 1.04 COMPENSATION

All stakes, instruments, labor, and other items required for Contractor's layout shall be furnished by Contractor. Contractor's cost for equipment, materials, and personnel as specified herein shall be included in the prices bid for the various bid items listed on the bid sheets.

**PART 2 – PRODUCTS – NOT USED**

**PART 3 – EXECUTION – NOT USED**

**PART 4 – MEASUREMENT AND PAYMENT – NOT USED**

**END OF SECTION**

**SECTION 01200  
MEASUREMENT AND PAYMENT**

**PART 1 - GENERAL**

1.01 SCOPE

- A. This section of these specifications supersedes the method of measurement and basis of payment described in the various sections of the Montana Public Works Standard Specifications.

1.02 GENERAL

- A. The total bid price for each item of the contract shall cover all work shown on the contract drawings and required by the specifications and other Contract Documents. All costs in connection with the Work, including furnishing all materials, equipment, supplies and appurtenances; providing all construction plant, equipment, and tools; and performing all necessary labor and supervision to fully complete the Work, shall be included in the unit and lump sum prices bid. No item that is required by the Contract Documents for the proper and successful completion of the Work will be paid for outside of or in addition to the prices submitted in the bid. All work not specifically set forth as a pay item in the Bid Form, but required in the Contract Documents, shall be considered a subsidiary obligation of Contractor and all costs in connection therewith shall be included in the prices bid.
- B. The unit basis of measurement and payment for each bid item shall be the units specified on the bid form. Pay limits are defined by the lines and grades shown in the Contract Documents. No measurement or payment will be made for quantities outside of the pay limits due to Contractor exceeding the pay limits for Contractor's convenience or due to Contractor not tightly controlling the extents of the Work. Measurement and Payment will only exceed bid quantities if there is an error in the bid quantities or if Engineer directs modifications that require increasing the quantities.

1.03 MEASUREMENT AND PAYMENT ITEMS

Mobilization

No separate measurement will be made for this item. Twenty-five percent (25%) of this item will be paid when five percent (5%) of the contract work is complete. Fifty percent (50%) of this item will be paid when 25% of the Work is complete. The remaining twenty-five percent (25%) will be paid when 100% of the Work is completed.

Taxes, Bonds, and Insurance

No measurement will be made for this item. This item will be paid for at the same time and same ratio as Mobilization.

General Requirements

Payment shall be made as follows: Once 25% of the contract work is complete, 25% of this item will be paid; at 50% of the contract work for the schedule, 25% more of this item will be paid; and

at 100% of the contract work completed, an additional 25% of this item will be paid. The final 25% will be paid upon completion of all of the General Requirement work items.

General Requirements shall consist of: coordination; scheduling; construction notification handouts to residences; attendance at public meetings; submittals and quality control testing; vibratory testing; construction facilities and temporary controls; easement limit fencing; any required temporary fencing; storm water pollution prevention; erosion control and restoration; safety at the site; environmental quality control; permits; additional geotechnical studies; product shipment; handling; storage and protection; manufacturer's services; operation and maintenance manuals; completed record drawings; final cleanup and contract closeout.

#### Erosion Control

Measurement and payment for this item will be at fifty (50%) of the bid price upon receipt of the NOI and the SWPPP submitted to the regulatory agency, and after installation of the initial erosion control measures. The remaining 50% of the bid price shall be paid in proportion to Work completed, provided the approved erosion control plan is maintained throughout the project, and adequately functions as determined by Engineer's observation, and any areas disturbed outside irrigated boulevard are seeded using the non-irrigated seed mix.

#### Miscellaneous Demo

Measurement of Miscellaneous Demo shall be on the basis of Lump Sum.

Payment for Miscellaneous Demo will be on a Lump Sum basis at the lump sum price in the bid form. Payment shall include all material, equipment, tools, labor, and all incidentals necessary to perform the Work as described in the Plans and Specifications.

#### 4" Concrete Sidewalk

Measurement of Concrete Sidewalk shall be on the basis of square yards. Payment shall be in accordance with MPWSS, Section 02529.

Payment shall include the existing sidewalk connections as detailed in the Plans, and shall include all materials, equipment, tools, labor and all incidentals necessary to complete Work. Payment shall include excavation and disposal of unsuitable material in subgrade.

#### 6" Concrete Sidewalk

Measurement of Concrete Sidewalk shall be on the basis of square yards. Payment shall be in accordance with MPWSS, Section 02529.

Payment shall include the existing sidewalk connections as detailed in the Plans, and shall include all materials, equipment, tools, labor and all incidentals necessary to complete Work. Payment shall include excavation and disposal of unsuitable material in subgrade.

#### Reinforced Concrete Sidewalk

Measurement of Concrete Sidewalk shall be on the basis of square yards. Payment shall be in accordance with MPWSS, Section 02529.

Payment shall include the existing sidewalk connections as detailed in the Plans, and shall include all materials, equipment, tools, labor and all incidentals necessary to complete Work. Payment shall include excavation and disposal of unsuitable material in subgrade.

#### Asphalt Concrete – 3" Thick

Measurement of Concrete Sidewalk shall be on the basis of square yards. Payment shall be in accordance with MPWSS, Section 02510.

#### Reinforced Portland Cement

Measurement of Reinforced Portland Cement shall be on the basis of square yards. Payment shall be in accordance with MPWSS, Section 02515.

#### ADA Ramp

Measurement of Accessibility Ramp shall be on the basis of each.

Payment of Accessibility Ramp shall be on basis of each ramp installed at the unit price shown in the Bid Form. Payment shall include all material, equipment, tools, labor and all incidentals necessary to complete Work. Payment shall include excavation (no more than 2' per Third Party Work Plan) and disposal of unsuitable material in subgrade, base course gravel and all other materials required to construct the ramp per the plans and specifications.

#### Detectable Warning Devices

Measurement of Detectable Warning Panels shall be on the basis of each.

Payment for Detectable Warning Panels shall be on the basis of each at the unit price shown in the Bid Form. Payment shall include all material, equipment, tools, labor, and all incidentals necessary to perform the Work as described in the Plans and Specifications.

#### Striping – White Epoxy

Measurement of Striping – White Epoxy shall be on the basis of gallon.

Payment for Striping – White Epoxy is per gallon of striping installed at the unit price shown in the Bid Form. Payment shall include all material, equipment, tools, labor, and all incidentals necessary to perform the Work as described in the Plans and Specifications.

#### Posts – Tubular Steel – Square 2"X2" – Perforated (14 ga)

Measurement of Posts – Tubular Steel – Square 2"X2" – Perforated (14 ga) made in linear feet of installed posts.

Payment for Posts – Tubular Steel – Square 2"X2" – Perforated (14 ga) is made at the contract unit price bid per linear foot which includes furnishing and installing posts in concrete, and all other work necessary or incidental for completion of the item.

#### Signs – Aluminum Reflective Sheet IV

Measurement of Signs – Aluminum Reflective Sheet IV made in square feet installed signs.

Payment for Signs – Aluminum Reflective Sheet IV is made at the contract unit price bid per square foot which includes furnishing and installing signs to posts, and all other work necessary or incidental for completion of the item.

#### Soil Amendment and Fine Grading

Measurement for Soil Amendment and Fine Grading shall be on the basis of cubic yard.

Payment for Soil Amendment and Fine Grading shall be at the lump sum price shown in the Bid Form. Payment shall include all material (topsoil), equipment, tools, labor, and all incidentals necessary to perform the Work as described in the Plans and Specifications.

#### Grading Back of Sidewalk

Measurement for grading back of sidewalk shall be on the basis of cubic yard.

Payment for grading back of sidewalk shall be at the unit price shown in the Bid Form. Payment shall include all material, equipment, tools and labor, and for the performance of all incidentals necessary to complete this item.

#### Non-Irrigated Seed Mix

Measurement for Seed Mix shall be on the basis of square feet.

Payment for Seed Mix shall be at the unit price shown in the Bid Form. Payment shall include all material, equipment, tools and labor, and for the performance of all incidentals necessary to complete this item.

#### Trees

Measurement for Trees shall be on the basis of lump sum.

Payment for Trees shall be at the lump sum price shown in the Bid Form. Payment shall include all material, equipment, tools, labor, and all incidentals necessary to perform the Work as described in the Plans and Specifications.

#### Excavation – Waste Offsite

Measurement of Excavation – Waste Offsite shall be on the basis of cubic yard.

Payment for Excavation – Waste Offsite shall be at the unit price shown in the Bid Form. Payment shall include all material, equipment, tools, labor, and all incidentals necessary to perform the Work as described in the Plans and Specifications.

**END OF SECTION**

# APPENDICES





# Glacier Rail Park Sidewalk Construction

## Third-Party Work Plan

April 12, 2023

### Contact Information:

#### KLJ

Gary Johnson, Project Engineer  
1830 3rd Ave. E., Suite 303  
Kalispell, MT 5901  
W: (406) 755-2763  
C: (406) 890-1193  
[Gary.johnson@kljeng.com](mailto:Gary.johnson@kljeng.com)

Department of Environmental Quality  
Hannah McDermott  
1520 E 6th Avenue  
Helena, MT 59601  
W: (406) 444-6556  
[hannah.mcdermott@mt.gov](mailto:hannah.mcdermott@mt.gov)

Ann Colpitts, Senior Project Manager  
TRC Solutions  
131 E. Lincoln Ave., Suite 200  
Fort Collins, CO 80524  
W: (970) 484-3263  
[acolpitts@trcsolutions.com](mailto:acolpitts@trcsolutions.com)

Flathead County Economic Development  
Authority  
Laura Russell, Project Manager  
44 Second Ave West  
Kalispell, MT 59901  
W: (406)257-7711 ext. 3  
[laura@doingbusinessinmontana.com](mailto:laura@doingbusinessinmontana.com)

City of Kalispell  
Jarod Nygren, Project Manager  
201 First Avenue East  
Kalispell, MT 59901  
W: (406) 758-7742  
[kthompson@kalispell.com](mailto:kthompson@kalispell.com)



## Introduction

The Flathead County Economic Development Authority (FCEDA) is proposing to improve Rail Park Drive to meet city street standards at the Glacier Rail Park. The proposed work includes construction of sidewalks, landscaped boulevards, and ADA ramps on either side of the existing street. The legal description is GLACIER RAIL PARK SUBDIVISION, S08, T28 N, R21 W, ACRES 20.02, COMMON AREA EX TR A, GLACIER RAIL PARK SUB AMD, TRACT 2, Flathead County, Montana. The property geocode is 07-3966-08-2-22-04-0000. The topography of the area slopes gently to the north and east and is within the eastern confines of the Kalispell city limits. **Appendix A** presents a Vicinity Map.

The Kalispell Pole & Timber, Reliance Refinery, and Yale Oil Corp collectively make up the Kalispell Rail Yard (KRY) Comprehensive Environmental Cleanup and Responsibility Act (CECRA) site which is regulated by the Montana Department of Environmental Quality (MDEQ) and located within the northeast corner of the Glacier Rail Park (see **Appendix B** for KRY Facility boundary in reference to proposed work). The following presents a summary of the potential contaminants of concern associated with the KRY (MDEQ & Tetra Tech EM Inc. 2008):

- Kalispell Pole & Timber is a former wood treating operation that operated from approximately 1945 to 1990, encompassing approximately 35 acres. Contaminants at Kalispell Pole & Timber in soil and groundwater have included pentachlorophenol (PCP), dioxins/furans, polynuclear aromatic hydrocarbons (PAHs), and petroleum hydrocarbons including free-product.
- The Reliance Refining Company operated an oil refinery from 1924 to the 1960s encompassing approximately 7 acres. Contaminants in the environment are the result of disposal and leaks of sludge from aboveground storage tanks, releases of petroleum products from operations at the refinery, and railroad operations which resulted in contaminated soil and groundwater associated with petroleum hydrocarbons including free product, metals, PCP, dioxins/furans, and PAHs.
- Yale Oil is a former petroleum bulk plant and product refinery that operated from 1938 to 1978 and encompasses approximately 2.3 acres. Leaks and possible spills from aboveground storage tanks contaminated on-site soils. Soils and groundwater were previously contaminated with low levels of PCP, dioxins/furans, and petroleum hydrocarbons.

MDEQ has requested that a Third-Party Work Plan be prepared to document proposed sample collection methods and laboratory analyses for all soils and backfill material being imported to the project area as well as for sampling of any soils encountered that may contain contaminants of concerns associated with the KRY site.

## Extent of Construction Activities

This project includes the construction of 5-foot-wide sidewalks on either side of Rail Park Drive with 6-foot-wide landscaped boulevards and ADA ramps (**Appendix B**). This work plan covers proposed excavation and fill placement within the KRY Facility boundary which consists of approximately 260 cubic yards of  $\frac{3}{4}$ -inch minus gravel and 230 cubic yards of topsoil that will



be imported. Excavation is not anticipated to exceed 1-foot depth during construction, with topsoil to be placed approximately 6 inches thick along the boulevard area.

## Health and Safety

Prior to beginning any construction activities, the contractor shall contact the Montana One-Call utility locating service to conduct a utility locate; utility companies will then have 48 hours to locate and mark underground lines present in the project area. The excavation contractor will have a health and safety plan and will conduct the work in accordance with Occupational Safety & Health Act (OSHA) standard work practices.

All personnel involved with construction within the KRY Facility boundary and in contact with soil will be 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) certified and have current 8-hour Refresher training per 29 CFR 1910.120. Personal protective equipment will be worn by those handling soils that exhibit signs of contamination including but not limited to nitrile gloves, clothing covering arms and legs, high visibility clothing, and protective eyewear. KLJ will have a trained representative onsite during construction to monitor activities and to determine if contamination is present. The KLJ staff member will also be 40-hour HAZWOPER certified and will adhere to the KLJ Site Specific Health and Safety Plan.

## KRY Facility Soil Excavation and Handling

The soils excavated within the KRY Facility during the proposed work will not exceed a maximum depth of 2 feet. All excavated soils from the KRY Facility will be reused within the Facility boundary to maintain grade in the right-of-way and boulevard between the curb and sidewalk. Soils from the KRY Facility will not be mixed with those from outside the Facility.

## Sampling Methodology

This section presents the soil sampling methodology for all imported backfill and topsoil material and protocols if potentially contaminated soils are encountered. Standard Operating Procedures (SOPs) for each activity are included in **Attachment C**.

### Backfill and Topsoil Sampling

Backfill material must be adequately characterized to demonstrate that the material does not contain contaminants at concentrations greater than applicable cleanup levels or screening levels. MDEQ must approve all proposed backfill and borrow source material before it can be placed within the KRY Facility. Samples from all proposed backfill materials will be analyzed for Resource Conservation Recovery Act (RCRA) 8 metals including arsenic, barium, cadmium, chromium, lead, selenium, silver, and mercury. Additionally, a desktop review of MDEQ's electronic databases (<https://discover-mtdeq.hub.arcgis.com/#InteractiveMaps>) for known contaminated sites will be performed to determine if the property containing the proposed backfill source is in the database as a potentially contaminated site or is adjacent to a site listed in the database. If database records indicate that the source has the potential to contain regulated or hazardous materials, then additional analysis and/or field screening may be necessary for parameters known or suspected to be present at the listed site.



One 5-point composite sample will be collected for every 400 cubic yards of import material from each source, i.e., one sample will be collected from the gravel source and one sample will be collected from the topsoil source. Prior to sample collection, KLJ will describe soil lithologic characteristics encountered in the source area using the Unified Soil Classification System (USCS) as described in ASTM D2488-00 (Visual-Manual Procedure). Soil descriptions may include the following information: major and secondary lithology, color, density/consistency, grain size, plasticity, angularity, qualitative moisture content, soil structure, additional descriptive modifiers (i.e., associated with contaminants), and geologic origin (if possible).

The following sample collection procedures will be followed:

- All stainless-steel sampling tools will be cleaned and decontaminated using an anionic detergent (e.g. Liquinox) and tap water, then rinsed in deionized water before use.
- Heavy equipment supplied and operated by the general contractor may be used to dig into the import stockpiles to a specified depth at each identified sampling location to bring material to the surface to allow for sample collection.
- The decontaminated auger or hand tool will be used to collect a sample directly from the equipment bucket or the test pit and will be placed into a sterile container for mixing such as a 1-gallon Ziplock bag or decontaminated stainless-steel bowl.
- After all soil subsamples are collected for a given composite sample, they will be thoroughly mixed. A composite sample will be collected from the mixed material and placed in the laboratory supplied container. The composite sample will then be appropriately preserved, if required by the analytical method.
- Soil samples will be transported under standard chain of custody procedures and submitted to a licensed analytical laboratory for analysis of RCRA 8 Metals by EPA Methods 6010 and 7000.

#### Contaminated Soil Sampling

If contaminated soil is detected during excavation activities through visual and/or olfactory observations within the KRY Facility, the contractor will immediately inform the MDEQ project officer and KLJ. Excavation may continue by properly trained and equipped personnel but suspected contaminated soil shall be separated from other soil in 55-gallon steel drums or isolated from clean soil on an impermeable membrane pending the results of laboratory tests. If laboratory results indicate contamination above applicable screening levels or cleanup levels is present, additional confirmation samples may be required to ensure all contaminants are removed. KLJ will coordinate lab testing and confirmation sampling with DEQ if potential contamination is encountered. Heavy equipment will be decontaminated inside a decontamination pad staged on-site before moving into uncontaminated area. High pressure heated potable water will be used to decontaminate all equipment. All soil and water from the decontamination pad must be containerized in 55-gallon steel drums and a composite sample shall be submitted to the analytical laboratory for testing following completion of work. As this material will be disposed of in a permitted disposal facility, all analysis will be coordinated with the disposal facility's requirements. In addition, the following sampling procedures will be followed:



- Soil samples will be collected if excavated soil shows evidence of petroleum impacts (i.e., visual staining, hydrocarbon odors, or photo-ionization detector (PID) readings greater than 10 parts per million). The interval from which samples are collected will be recorded in the field logbook, and photographs will be taken of the soil as appropriate.
- One discrete soil sample will be collected from the area of suspected contamination and placed in laboratory supplied containers using decontaminated stainless steel sampling equipment and disposable nitrile gloves.
- Under standard chain of custody procedures samples will be submitted to the analytical laboratory for all analysis required by the disposal facility.

## Reporting

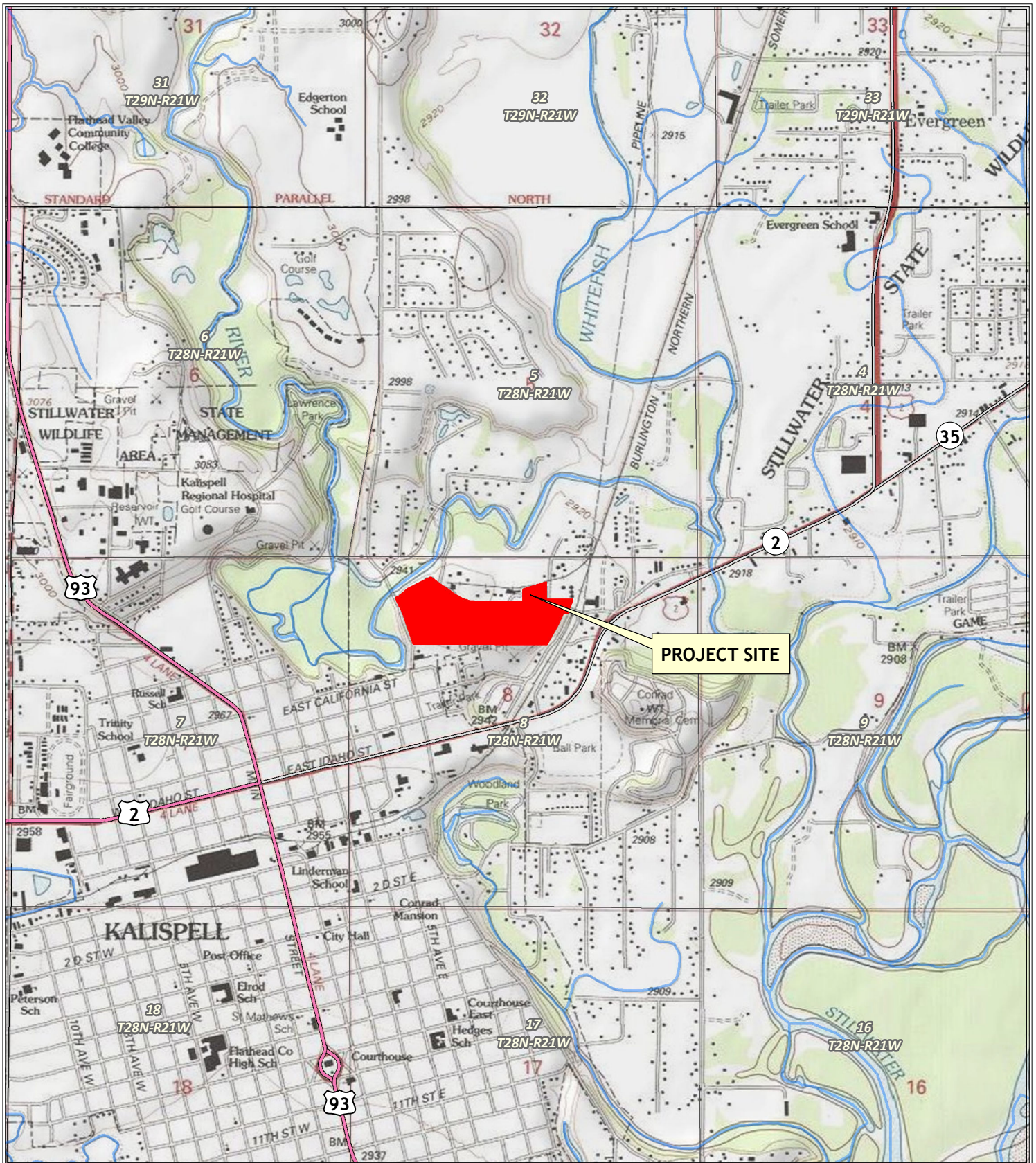
At the conclusion of construction activities, a Soil Sampling Summary Report will be submitted to MDEQ. The report will include a summary of work accomplished within the KRY site boundary, methods of investigation, analytical results and associated data validation reports (MDEQ 2018). The report will also identify any deviations from the scope of work proposed in this plan. The report will be submitted 60 days after the completion of the construction activity or receipt of laboratory analytical results. Supporting documentation will be attached to the report, including but not limited to figures, areas of contamination (if discovered), site characteristics important to future remediation and/or investigation efforts, data tables, and copies of relevant field notes; test pit logs, methods and procedures, laboratory analytical reports, data validation reports; and photographs.

## References

MDEQ & Tetra Tech EM Inc., 2008. Final Feasibility Study Report, KRY Site. Helena, MT. June 2008.

MDEQ, 2018. Data Validation Summary Form. Version 1.3.0, Revised 26 January 2018. [<https://deq.mt.gov/Files/Land/StateSuperFund/Documents/Data%20Validation%20Forms/2018-01-26%20DV%20Guidance%20Checklist%20PDF%20Version%201.3.0%20Distributed.pdf>]

## Appendix A – Vicinity Map



0 1,000 2,000  
 Feet

- NHD Flowline
- Project Boundary

**FLATHEAD COUNTY ECONOMIC  
 DEVELOPMENT AUTHORITY:  
 GLACIER RAIL PARK SIDEWALK  
 FLATHEAD CO., MONTANA  
 S8, T28N, R21W**



Project #: 2225\_01245

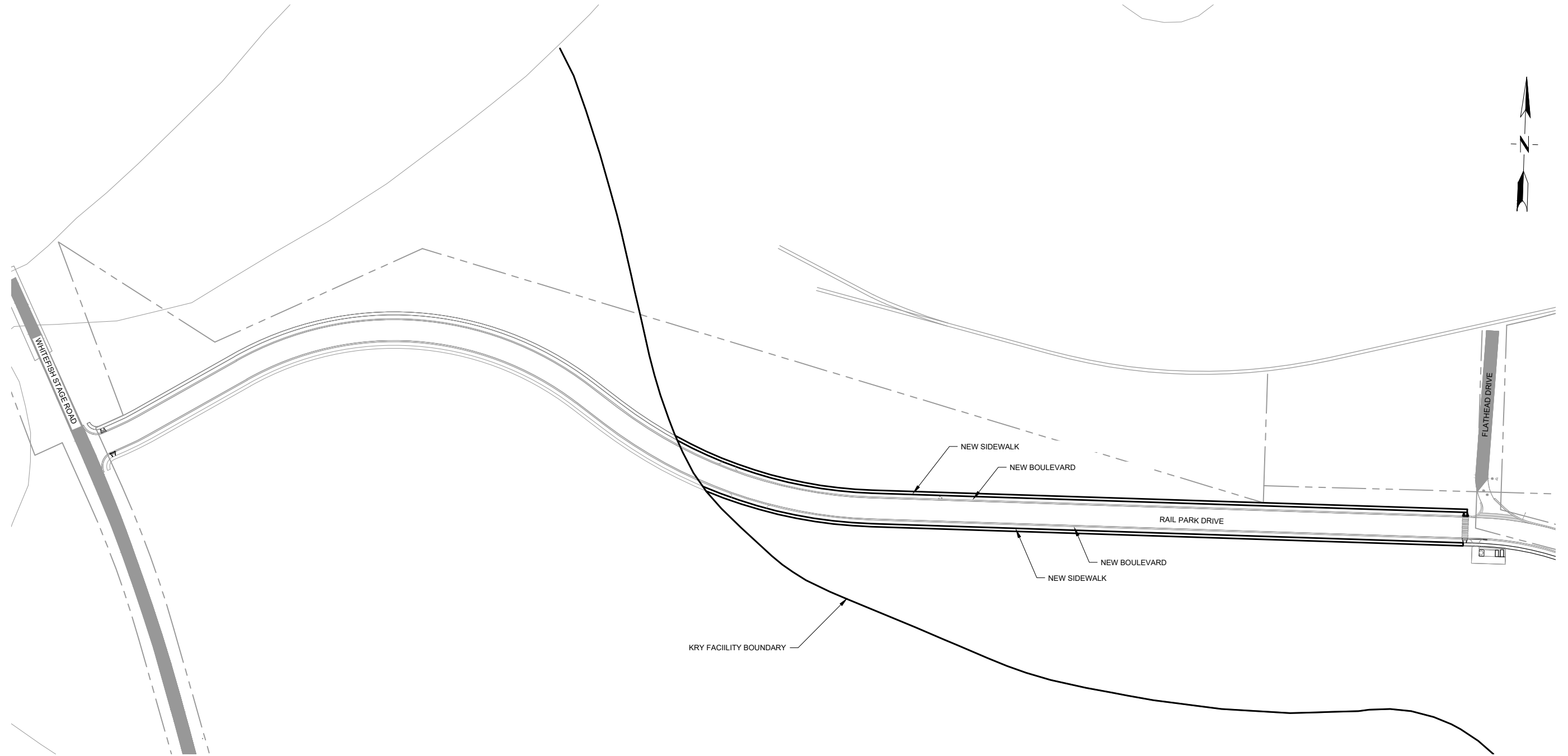
Drawn By: VP

Date: 3/9/2023

**VICINITY MAP**



# Attachment B – Site Plan



NO.	DATE
1	---
2	---
3	---

DRAFTED  
RH  
REVIEWED  
MRR  
PROJECT NUMBER  
2325-01621  
ISSUE DATE  
NOVEMBER 2023

GLACIER RAIL PARK  
CITY OF KALISPELL  
KALISPELL, MONTANA  
GLACIER RAIL PARK 3RD PARTY WORK PLAN

THIS DOCUMENT(S) WAS  
ORIGINALLY ISSUED AND  
SEALED BY ANDREW D.  
EVENSEN, REGISTRATION  
NUMBER 30603 ON 06/02/2017  
AND THE ORIGINAL  
DOCUMENTS ARE STORED AT  
KLJ, KALISPELL. THIS MEDIA  
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A CERTIFIED DOCUMENT.

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X  
DWG. NO.



# Attachment C – Standard Operating Procedures



ENGINEERING, REIMAGINED


# STANDARD OPERATING PROCEDURE

QA101 - Field Notes and Documentation

06/2022

## Review and Approval

Developed By:  Date: 3/4/2022  
Joe McClellan

Reviewed By (PM):  Date: 6/1/2022  
Dan Rangitsch

Approved By (QA Manager): \_\_\_\_\_ Date: \_\_\_\_\_

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# STANDARD OPERATING PROCEDURE – FIELD NOTES AND DOCUMENTATION

## Section 1: Introduction

### **Section 1.1: Purpose**

The purpose of this Standard Operating Procedure (SOP) is to establish consistent data collection during all field activities. This SOP will outline how to properly document field activities through field notes, field maps, and site photographs. The field data must provide sufficient information to successfully complete all final deliverables.

### **Section 1.2: Scope**

This SOP is mandatory for all KLJ field staff when conducting environmental investigation, assessment, observation, and remediation field activities. Subcontractors may use their own methods and procedures for field data collection if it meets similar requirements of this SOP and has been approved by the Project Manager.

### **Section 1.3: Definitions:**

ArcGIS Online Map – A interactive GIS web-based field Map from ESRI.

### **Section 1.4: Precautions:**

Use this SOP in conjunction with the **KLJ Health and Safety Plan** and the **Chain-of- Custody Procedures SOP**.

### **Section 1.5: Responsibility**

Field Staff - The field staff are responsible for the accurate collection of field data as outlined in this SOP

Project Manager - The project manager will ensure that the field staff successfully documents the necessary information as outlined in this SOP and the field staff are equipped the daily log templates and necessary maps to perform the field work.

### **Section 1.6: Equipment:**

The following equipment or supplies will be needed for field notes:

- » Pens and markers
- » Health and Safety Plan (HASP)
- » Site Maps, construction documents, grid paper, or ArcGIS online map (phone or iPad)
- » Field Book/daily field log or iPad with access to electronic daily field logs
- » Charger or battery booster pack
- » Camera
- » Safety PPE (as outlined in **Health and Safety Plan**)

## Section 2: Procedure

This SOP discusses field notes and documentation as outlined in the KLJ Daily Field Log.

### **Section 2.1: Preparation**

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A few days in advance of the field event, the field staff should meet with the Project Manager to identify field data collection requirements, the desired mapping system, and to review the scope of work and additional background information.

Following the meeting, if an ArcGIS online mapping system is required, the field staff must work with GIS staff to create an ArcGIS online Map for field use. Specifics of this mapping system must be determined during the project manager meeting.

Prior to site mobilization, field staff should ensure the iPad/tablet is fully charged prior to departure and the field mapping system is in good working order.

### ***Section 2.2: Field Logs Preparation***

All field staff will use the KLJ Daily Field Log (electronic via tablet or hard copy) when taking field notes to ensure the proper documentation during all project field activities. Field Staff must begin field note documentation upon site arrival and continue documentation until site departure to avoid potential data gaps in the daily log. At a minimum the following information must be included in the daily log:

- » Project name
- » Project number
- » Date
- » Time onsite/offsite
- » KLJ field personnel
- » KLJ Project Manager
- » Temperature/weather conditions
- » Field equipment
- » Onsite personnel (KLJ, subcontractors, regulatory personnel, other)
- » PPE
- » Chronological description of field observations, work activities, actions taken, and any contingency items
- » Correspondence with clients, contractors, or other site personnel
- » Amount and types of waste generated
- » Decontamination procedures
- » PID Field screening results and analytical samples collected
- » Other pertinent documentation to ensure compliance with regulations
- » Preparer signature
- » Photographs of field activities with detailed descriptions

Include as much detail as possible to ensure no gaps will be identified when writing the report. Additionally, any pertinent information not discussed above should be included in the field logs to ensure all relevant details are documented when site activities are completed. It shall be noted that specific site activities (boring and test pit advancement, test pit advancement, etc.) may require additional field record forms.

### ***Section 2.3: Field Maps (Site Sketch)***

Draw an accurate site map, edit/revise an existing site map, or update/add data to ArcGIS online map during all field activities. The site map should include or identify the following:

- » North arrow
- » Scale
- » Site structures with approximate dimensions (drawn to scale)
- » Street names, pertinent landmarks, or other significant site references that can be used to identify the location
- » Locations of all field work activities (field and analytical samples, stockpiles, borings, excavations, test pits, and other pertinent data)

- 
- » Date
  - » Field personnel
  - » Site name and address
  - » Project Number

### ***Section 2.4: Additional Field Forms***

Specific information pertaining to additional field data collection forms (Suspect Asbestos Bulk Sampling Sheet, Test Pit logs, boring logs, Phase I ESA Checklist, etc.) is not discussed in this SOP. This information is discussed in the SOP for that specific task.

### ***Section 2.5: Data and Records Management***

Physical and electronic field logs, maps, and additional field forms should be scanned in or saved to the project folder on a daily basis (when feasible). If daily submittal of field logs and records management is not feasible, the Project Manager must be notified to ensure a contingency management plan is in place to prevent lost or damaged field records. The Project Manager should also be notified when field data has been saved/scanned to the project folder for further review.

## **Section 3: Quality Assurance and Quality Control**

The Project Manager is responsible for reviewing all field staff logs, maps, and additional forms to ensure the records are in compliance with this SOP. If the Project Manager identifies that the SOP is not being followed, the field staff will be required to make the applicable edits and a follow up review will be conducted by the Project Manager on the field staff member.

## **Section 4: Reference Documents**

None




ENGINEERING, REIMAGINED


# STANDARD OPERATING PROCEDURE

QA102 - Chain-of-Custody Procedures

06/2022

## Review and Approval

Developed By:  Date: 3/4/2022  
Joe McClellan

Reviewed By (PM):  Date: 6/1/2022  
Dan Rangitsch

Approved By (QA Manager): \_\_\_\_\_ Date: \_\_\_\_\_

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# STANDARD OPERATING PROCEDURE – CHAIN-OF-CUSTODY PROCEDURES

## Section 1: Introduction

### **Section 1.1: Purpose**

The purpose for the following Standard Operating Procedure is to describe the process for proper completion and management of a Chain-of-Custody (COC) following environmental media sampling and should be used by all KLJ personnel when performing these activities. This SOP will provide a step-by-step procedure to reduce the risk of error and provides a traceable record of movement for samples from the time of collection to laboratory analysis. The COC also serves as the instruction or order form for the laboratory.

### **Section 1.2: Scope**

The following document and all corresponding procedures must be implemented by all KLJ personnel in COC completion for environmental sampling (soil, groundwater, soil vapor, sediment, waste, asbestos-containing materials, lead-based paint, etc.) and no substitutions for COC procedures may be implemented without prior approval by the Project Manager.

### **Section 1.3: Definitions:**

Chain-of-Custody - A chronological documentation or paper trail that records the sequence of custody, control, transfer, analysis, and disposition which is crucial when performing environmental sampling.

### **Section 1.4: Precautions:**

Use this SOP in conjunction with the following SOPs: **Suspect Bulk Asbestos and Lead-Based Paint Sampling, Groundwater Sample Collection, Soil Sample Collection, and Soil Vapor Collection and Laboratory Preparation.**

### **Section 1.5: Responsibility**

Sampler – The sampler is responsible for proper documentation and completion of the COC form prior to laboratory sample submittal as outlined in this SOP. The sampler is also responsible for document control of the final signed COC upon laboratory acceptance.

Project Manager –The project manager is responsible for the overall success of the COC form submittals and final review of COC to ensure completeness for proper analysis.

### **Section 1.6: Equipment:**

- » Safety PPE
- » Chain-of-Custody form
- » Pen
- » Leakproof container or 1-gallon Ziploc bag

- 
- » Field book for additional field notes

## Section 2: Procedure

### **Section 2.1: Preparation**

A few days in advance of the sampling event, the sampler should meet with the Project Manager to identify and review sampling criteria, analytical parameters, sample nomenclature, required COC forms, scope of work, and additional background information for the project.

Following the meeting, the sampler may need to submit a laboratory request for the appropriate sampling equipment which includes the specific COC forms required for the environmental sampling and analysis. The sampler may want to request a few additional COCs for potential errors on the initial COC and to ensure one COC is included in each cooler/shipping container.

Upon arrival of sampling equipment and COCs, the sampler should review the order and ensure the correct COC forms and number of COCs have been delivered.

### **Section 2.2: Chain-of-Custody Completion**

The Sampler(s) must initiate the COC during sample collection in the field and each COC must always accompany the samples during the sampling, transportation, and laboratory submittal of the environmental samples. When feasible, separate COCs should be completed for each cooler and media type (soil, groundwater, waste, etc.).

When filling out the COC make sure to write legibly, in permanent ink, and fill out the COC as completely as possible to ensure the proper sample management when they arrive at the laboratory. Although COCs can vary greatly from one laboratory to another, below is a list of general information that may be required on a typical COC form:

- » Company name and address of the sampler
- » Billing name and address
- » Project name and/or location of the sample collection site
- » Contact information for final report
- » Sample Identifications (must matching sample labels)
- » Date(s) and/or time(s) of sample collection
- » Sampler name and signature
- » Analyte/parameters for analysis
- » Preservatives
- » Number of samples
- » Remarks/comments
- » Turn-around time
- » Relinquished by
- » Received by

This list is not all encompassing and additional details beyond these recommendations may also be required. If the sampler has questions regarding the completion of the COC, the sampler should discuss these questions with the Project manager to ensure the correct information has been included on the COC.

### **Section 2.3: Chain-of-Custody Management**

Anytime the samples are transferred from one person to another (courier, laboratory drop off, etc.), documentation of the transfer (relinquished by and received by) must be completed by the members involved. When COCs are

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stored inside coolers or other shipping containers, the COC should be placed in a leakproof sealed container to avoid potential damage to the COC from ice or moisture.

Upon courier pick up or sample submittal, a carbon copy or scanned copy of the COC must be provided to the sampler for KLJs records. If this is not possible, a photograph of the COC will be sufficient. Once the samples have been transferred, the final COC must be scanned in to the project folder and provided to the project manager as soon as possible for final review and approval.

### **Section 3: Quality Assurance and Quality Control**

The project manager must review the COC for completeness and accuracy upon sample submittal. If errors are identified, the project manager shall discuss these errors with the laboratory and email the required changes to ensure these changes are documented in a trackable manner.

### **Section 4: Referenced Documents**

None




ENGINEERING, REIMAGINED


# STANDARD OPERATING PROCEDURE

QA201 - Calibration of MiniRAE PID

06/2022

## Review and Approval

Developed By:  Date: 3/4/2022  
Joe McClellan

Reviewed By (PM):  Date: 6/1/2022  
Dan Rangitsch

Approved By (QA Manager):                      Date:

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# STANDARD OPERATING PROCEDURE – CALIBRATION OF MINI RAE PID

## Section 1: Introduction

### **Section 1.1: Purpose**

The Purpose of this Standard Operating Procedure (SOP) is to describe the process for proper calibration of a MiniRAE photoionization detector (PID) to ensure consistent measurable data. This document has been prepared in accordance with the MiniRAE Lite User's Guide (July 2010) and in compliance with the Minnesota Pollution Control Agency (MPCA) Soil Sample Collection and Analysis Procedures Guidance Documents, 4-04 (January 2021).

### **Section 1.2: Scope**

The procedures outlined in this document are mandatory for all employees prior to using the MiniRAE PID for field screening activities. No substitutions for calibration or preparation methodologies may be implemented without approval from the Project Manager.

### **Section 1.3: Definitions:**

Photoionization Detector (PID) – Gas detector that uses UV rays to detect the presence of volatile organic compounds (VOCs) and other gases.

### **Section 1.4: Precautions:**

Use this SOP in conjunction with KLJs Health and Safety Plan.

### **Section 1.5: Responsibility**

Calibrator - The calibrator will be the responsible for the proper calibration of the PID prior to field use.

Project Manager - The project manager will ensure that calibrator understand the calibration process and the PID is properly calibrated for each field use.

### **Section 1.6: Equipment and Supplies:**

The following equipment or supplies will be needed for the proper calibration and preparation of the MiniRAE PID:

- » MiniRAE PID with carrying case
- » PID charger
- » Flow regulator with pressure gauge
- » Adaptor for regulator, polyethylene tubing, or silicon tubing (for connection of PID and regulator)
- » 100 ppm isobutylene gas cylinder (span gas)
- » Moisture filters

- 
- » Pen
  - » Calibration logbook
  - » Four AA Batteries
  - » Extra AA battery back

## Section 2: Procedure

### **Section 2.1: Preparation Prior to Site Departure**

The calibrator should ensure the PID is fully charged and sufficient span gas (not expired) is in the cylinder prior to site departure. To perform a span gas check, attach the regulator to the span gas cylinder and if the gauge indicates more than 50 pounds per square inch (PSI). If not replace the cylinder prior to site departure.

### **Section 2.2: Preparation and Calibration Process**

The PID is equipped with the following buttons that may be used in the preparation and calibration process:

- » [Mode or Power] – Upper middle button
- » [Y/+] – Upper Left button
- » [N/-] – Upper Right button
- » [Flashlight on/off key] – Lower middle button

#### **Section 2.2.1: Assembly of the PID**

The following procedures outline the proper assembly of the MiniRAE PID:

- » Check the probe tip and moisture filter for debris/obstructions
- » Screw the probe tip onto the filter assembly
- » Attached a moisture filter to the end of the probe tip

#### **Section 2.2.2: Turn on the PID**

To turn the PID on, press and hold the [Mode or Power] button for a few seconds. Let the PID run through start up procedure (self-test). A screen will pop up that will display “Ready... Start sampling?”

- » Click “yes” [Y/+]

Machine will finish start up procedures

#### **Section 2.2.3: Calibration of the PID**

The proper calibration should be completed at least daily at the site in fresh ambient air. The following procedures must be followed to ensure proper calibration of the PID:

- » Press and hold down the [N/-] and the [Mode or Power] button simultaneously for a few seconds until the password screen is displayed
- » Click [Mode or Power]/Enter to skip and the calibration screen is displayed
- » Click [Y/+] - “Zero Calib” and “Apply zero gas...” will be displayed
- » Click start [Y/+] to start the zero gas calibration.
- » Let the PID run through the zero calibration for the 30-60 seconds countdown. When complete the screen will display “Zeroing is done! Reading = 0.0 ppm”.
- » Record this value on the PID calibration logbook
- » Click [Y/+] – on the “Span Calib” screen option and “C. Gas = isobutylene, Span = 100 ppm, Pleas apply gas 1...” will be displayed
- » Screw the flow regulator onto the calibration gas cylinder and attach the adaptor/tubing to the flow regulator.

- 
- » Once assembled, open the calibration gas valve ½ a turn (counterclockwise)
  - » Ensure the regulator pressure gauge shows more than 50 PSI (otherwise proper calibration may not be possible)
  - » Connect the adaptor/poly tubing to the inlet (moisture filter or probe tip) of the PID and “Calibrating...” will be displayed
  - » Let the PID run for 30 seconds (countdown will occur)
  - » Detach the Calibration gas when the countdown time arrives at 0
  - » Close the calibration gas valve (1/2 turn clockwise)
  - » Record the isobutylene calibration value and “Span 1 is done! Reading = ### ppm” will be displayed on the screen
  - » Record this calibration value on the PID calibration logbook
  - » Ensure the calibration reading is between 95 ppm and 105 ppm
  - » Click [mode or power] “back” and “Update settings” will be displayed on the screen for approximately 5 seconds
  - » Disconnect the poly tubing from the flow regulator
  - » Unscrew the flow regulator from the calibration gas cylinder

Recalibration may be necessary if ambient air will not return to 0.0 ppm or results appear skewed.

### **Section 2.3: Calibration Records**

The MPCA requires calibration records to be onsite during all field screening activities and they reserve the right to request these records at any time. Below is a list of calibration record data that must be included in the calibration log:

- » Name of the calibrator (initial)
- » Date and time of calibration/recalibration
- » Project name and number
- » Zero calibration results
- » Span gas calibration results
- » Span gas lot #/unique ID and expiration date
- » Span gas pass or fail (+ or – 5 ppm)
- » PID details (10.6 eV lamp or 11.7 eV lamp)

## **Section 3: Quality Assurance and Quality Control**

PID calibration must be completed at the site to represent similar condition as encountered in the field. Additionally, if ambient air readings do not return to 0.0 ppm when away from potential VOC exposure or field readings appears skewed, a zero and span recalibration are required to ensure consistent readings are being obtained in the field.

## **Section 4: Reference Documents**

Minnesota Pollution Control Agency “Soil Sample Collection and Analysis Procedures Guidance Document 4-04” (MPCA, 2021)

MiniRAE Lite User’s Guide Rev. D (October 2011)



# PID Calibration Sheet



PID KLJ Specific ID \_\_\_\_\_

<b>Name/ Initials of Calibrator</b>	<b>PID lamp (10.6 / 11.7 eV)</b>	<b>Date of Calibration</b>	<b>Time of Calibration</b>	<b>Project Name or Number</b>	<b>Zero Calibration Results</b>	<b>Span Gas Calibration Results</b>	<b>Span Gas Lot #</b>	<b>Span Gas Expiration Date</b>	<b>Pass or fail (+ or – 5 ppm)</b>



ENGINEERING, REIMAGINED


# STANDARD OPERATING PROCEDURE

QA202 - Organic Vapor Screening

06/2022

## Review and Approval

Developed By:  Date: 3/4/2022  
Joe McClellan

Reviewed By (PM):  Date: 6/1/2022  
Dan Rangitsch

Approved By (QA Manager):                      Date:

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# STANDARD OPERATING PROCEDURE – ORGANIC VAPOR SCREENING

## Section 1: Introduction

### **Section 1.1: Purpose**

The purpose of this Standard Operating Procedure (SOP) is to describe the process for field screening of potentially contaminated soil to ensure precise and accurate results. This SOP also ensures compliance with the Minnesota Pollution Control Agency (MPCA) Guidance Document 4-04 “Soil Sample Collection and Analysis Procedures”.

### **Section 1.2: Scope**

The procedures outlined in this document are mandatory for all employees when conducting organic vapor screening. No substitutions for field screening may be implemented without prior approval from the Project Manager.

### **Section 1.3: Definitions:**

Photoionization Detector (PID) – Gas detector that uses UV rays to detect the presence of volatile organic compounds (VOCs) and other gases.

ArcGIS Online Map – A interactive GIS web-based field Map from ESRI.

### **Section 1.4: Precautions:**

Use this SOP in conjunction with the **KLJ Health and Safety Plan** and the **PID Calibration SOP**

### **Section 1.5: Responsibility**

Sampler - The sampler will be responsible for the collection of representative samples, sample labeling, PID maintenance in the field, and field data recording.

Project Manager - The project manager will ensure that the sampler has the proper training and understand the organic vapor screening process as outlined in this SOP. The Project manager is also responsible for the overall success of the sampling effort.

### **Section 1.6: Equipment:**

The following equipment or supplies will be needed to perform the sampling:

- » MIniRAE PID with a fully charged battery
- » Moisture filters
- » Pen or marker
- » Four AA Batteries
- » AA battery back
- » PPE
- » Disposable nitrile gloves
- » Sealable 1-quart polyethylene freezer bags
- » PID calibration equipment
- » Field log (electronic tablet or hard copy)
- » Field map, sketch book, or ArcGIS online map
- » Shovel or trowel

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## Section 2: Procedure

### **Section 2.1: Preparation**

Prior to departure, the sampler should meet with the Project Manager to identify chemical of concern, soil screening criteria, sample nomenclature, obtain field maps, and to review the scope of work and additional background information. Additionally, based upon the chemicals of concern, the project manager should ensure the correct ionization potential PID lamp (10.6 eV, 11.7 eV, etc.) is utilized for soil screening and the sampler should make sure the PID is fully charged with four additional AA batteries and sufficient calibration gas is present in the cylinder.

Upon site arrival, the PID must be calibrated a minimum of once per day at each project location in compliance with the **PID Calibration SOP**. The MPCA reserves the right to request calibration records at any time, therefore, calibration records must be completely filled out and maintained onsite at all times during a sampling event.

Ensure the PID is properly assembled to include the probe tip with an external filter. This will help prevent moisture, debris, or other potentially clogging materials from entering the probe, preventing premature pump failure, and keeping the sensor and lamp cleaner.

### **Section 2.2: Sample Selection**

Specific sample frequency and sample location selection must be discussed with the project manager prior to conducting field work activities. Additionally, when collecting soil samples for field screening purposes, the material must be representative of the soil in question.

### **Section 2.3: Sample Collection and Preparation**

Below describes the organic vapor screening process in accordance with the MPCA guidelines:

- » Label the sample bag in accordance with the proper sample nomenclature discussed with the Project Manager (sample ID (dept)h, etc.).
- » Using a new disposable nitrile glove grab freshly exposed soils and immediately place the material into a new sealable 1-quart polyethylene freezer bag. If necessary, use a decontaminated shovel or hand trowel to fresh exposed stockpiled or excavated soils for sample collection.
- » Remove any very coarse gravel/rocks, organics, and debris when feasible
- » Ensure the bag is approximately half filled with the soil and seal the bag.
- » Manually break up the soil clumps in the bag and vigorously shake the bag for 15 seconds
- » Allow headspace development for at least 10 minutes at approximate room temperature (~70° Fahrenheit). If temperatures are below the operating range of the instrument significantly below 70° Fahrenheit, the sampler should perform the headspace development and screening in a heated vehicle or building. The headspace screening must take place within 20 minutes of sample collection.
- » Slightly open the sealed disposable bag and insert the PID probe tip with moisture filter to about the halfway point of the headspace in the bag.
- » Record the highest PID meter response reading within 2-5 seconds and document the headspace reading on the field log
- » For each field screening sample, a new disposable nitrile glove and 1-quart polyethylene bag must be used to avoid cross contamination and the PID field screened soil sample material may not be used for laboratory analysis.

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## ***Section 2.4: Data and Records Management***

Observations and additional PID field screening notes should be recorded in compliance with the **Field Notes and Documentation** SOP. Additionally, the following information must be documented during field sample collection and screening:

- » Sample ID
- » Sample Depth
- » Time
- » PID Reading (ppm)
- » Sample Location
- » Sample Description (sample type, indications of contamination, etc.)
- » Other General Observations

## **Section 3: Quality Assurance and Quality Control**

The sampler should ensure the PID is properly calibrated at each project location on a daily basis. Additionally, an ambient air reading and an empty polyethylene headspace reading should be collected for documentation.

If erratic or inconsistent (from expectations) readings are observed during field screening, recalibrate the instrument (zero and span) and re-evaluate the meter readings. If the issue is not resolved, contact the project manager.

## **Section 4: Reference Documents**

Minnesota Pollution Control Agency “Soil Sample Collection and Analysis Procedures Guidance Document 4-04” (MPCA, 2021)




ENGINEERING, REIMAGINED

# STANDARD OPERATING PROCEDURE

QA203 - Soil Classification

06/2022

## Review and Approval

Developed By:  Date: 3/4/2022  
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# STANDARD OPERATING PROCEDURE – SOIL CLASSIFICATION

## Section 1: Introduction

### **Section 1.1: Purpose**

The purpose for the following Standard Operating Procedure (SOP) is to provide a reference for classifying soil samples that will be used by all KLJ personnel and to maintain consistent soil classification. Methods outlined in this document will be used for the classification of all soils whenever soil samples are being collected unless approved by the project manager.

### **Section 1.2: Scope**

The following document and all corresponding procedures must be implemented by all KLJ personnel when classifying soil samples during soil sample collection. Procedures outlined in this document were prepared using the ASTM Standard D 2488-00 “Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)” and the ASTM Standard D2487-17 “Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)”.

### **Section 1.3: Definitions:**

Well-Graded – a sample that has all sizes of material present in it (diverse)

Poorly-Graded – a sample that has most of the material consisting of the approximate same size (uniform)

Mottling – a pattern of spots or blotches of different color or shades of color interspread within the dominant soil color

### **Section 1.4: Precautions:**

Use this SOP in conjunction with the **KLJ Health and Safety Plan**, the **USCS chart**, and the **ASTM Standard D 2488-00**.

### **Section 1.5: Responsibility**

Sampler – The sampler is responsible for the implementation of this SOP and the accurate classification of sampled soils.

Project Manager – The project manager will ensure that all soil collection and documentation meet all requirements and adheres to guidelines provided in this SOP and the sampler is equipped with the proper forms/logs to properly identify and classify soils.

### **Section 1.6: Equipment:**

- » PPE
- » Health and Safety Plan
- » Applicable sampling forms and logs
- » Pen and marker
- » Munsell Soil-Color Charts
- » Resealable 1-quart polyethylene bags

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## Section 2: Procedure

Following the collection of a soil sample, the following descriptions must be identified to ensure proper soil classification.

- 1) **Depth interval**
- 2) **Group Symbol and Main Soil Type** - A two letter system and description of the main soil group utilizing the proper USCS terms. Terminology should describe the texture and grain size for the sample (eg., gravel, sand, silt, clay, clayey gravel, organic silt, etc.).

### Coarse-grained soils (50% of material is larger than No. 200 sieve size)\*

- » GW – Well-Graded Gravel (<5% fines)
- » GP – Poorly-Graded Gravel (<5% fines)
- » GM – Silty Gravel (>12% fines)
- » GC – Clayey Gravel (>12% fines)
- » SW – Well-Graded Sand (<5% fines)
- » SP – Poorly-Graded Sand (<5% fines)
- » SM – Silty Sand (>12% fines)
- » SC – Clayey Sand (>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
- » 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

\*If coarse-grained soils, include a brief description of the particle grain size (fine, medium, course). Additionally, gravels or sands with 5 to 12% fines require an additional symbol. It shall be noted that gravel has a sieve analysis range of #4 sieve – 3” in size and sand has a sieve analysis range #200 to #4 sieve.

### Fine-grained soils (50% of material is smaller than No. 200 sieve size)\*\*

- » CL – Lean Clay
- » ML – Silt
- » OL – Organic Clay/Organic Silt
- » CH – Fat Clay
- » MH – Elastic Silt
- » OH – Organic Clay
- » PT – Peat
- » CL-ML – Silty Clay

\*\*If fine-grained soil, include a description of the consistency based on figure pressure of an undisturbed soil sample and the plasticity using the following guidelines:

#### Consistency

- very soft = thumb will penetrate soil more than 1 inch
- soft = thumb will penetrate soil about 1 inch
- firm = thumb will penetrate soil about ¼ inch
- hard = thumb will not indent soil, but thumbnail will easily make a mark

- very hard = thumbnail will not indent soil

#### Plasticity

- Nonplastic = A 1/8-in. (3-mm) 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
- Medium = The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles 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

3) **Secondary Soil Type** - If a second soil group is present in the soil sample, describe the approximate percentage of the soil group as follows:

- » Trace - <5%
- » Few – 5% to 10%
- » Little – 10% to 25%
- » Some – 30% to 45%
- » Mostly – 50% to 100%

4) **Color** - Describe the color of the main soil type using the Munsell Soil-Color Charts for reference to ensure descriptions are accurate and standardized. The sample may contain varying layers (mottling, etc.) or patches (staining, etc.) these colors must also be accounted for in the color description.

5) **Moisture Content** - Describe the overall moisture content of the sample using the terms: Dry, Moist, Wet.

6) **Describe any unusual occurrences** such as unusual odor, cement, glass, or other foreign objects located in the soil sample.

7) **Odor** – Describe any odors or if no odors identify no odor in the description. Odors may include organic (decaying vegetation), chemical, petroleum, etc.). Also note if the odor is strong, slight, faint, etc.

8) **Native soil vs fill soil** – Note native soils, fill soils, and probable fill soils when identified during classification

9) **Debris** – Describe the specific type of debris (concrete, wood, demolition debris, suspect asbestos-containing materials, etc.) with approximate percentages of the quantity of debris intermixed in the soil

10) **Mottling** – If mottling is identified, describe any patches of different colors within the dominant soil color. This usually occurs in wet conditions and can be indicative of fluctuating subsurface water levels. Identify the colors associated with the mottling and approximate depths.

11) **Structure** – For intact soils, describe the structure of intact soils (if they apply) as one of the following terms:

- » Lamination = Up to ¼” thick stratum
- » Varved = Altering laminations of any combination of clay, silt, fine sand, and colors
- » Lenses = Small pockets of different soils in a soil mass
- » Stratified = Altering layers of varying materials or colors
- » Layers = ¼” to 12” thick stratum
- » Fissured = Split or crack forming long narrow openings
- » Slickensided = Smoothly polished surface caused by frictional movement
- » Homogenous = Soil of uniform composition

These descriptions are required, where applicable, but additional details/special conditions for soil descriptions are encouraged (roots, mica, shells, other indications of contamination, etc.)

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## Section 3: Quality Assurance and Quality Control

The Project Manager is responsible for reviewing all soil descriptions to ensure the records are in compliance with this SOP. If the Project Manager identifies that the SOP is not being followed, the field staff will be required to make the applicable edits and a follow up review will be conducted by the Project Manager.

## Section 4: Reference Documents

ASTM Designation: D 2488-00 “Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)”, (ASTM D 2488-00, 2000)

ASTM Designation: D 2487-17e1 “Standard Practice for Classification of Soils for Engineering Purposes)”, (ASTM D 2487-17e1, 2017)



# Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)<sup>1</sup>

This standard is issued under the fixed designation D 2488; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope \*

1.1 This practice covers procedures for the description of soils for engineering purposes.

1.2 This practice also describes a procedure for identifying soils, at the option of the user, based on the classification system described in Test Method D 2487. The identification is based on visual examination and manual tests. It must be clearly stated in reporting an identification that it is based on visual-manual procedures.

1.2.1 When precise classification of soils for engineering purposes is required, the procedures prescribed in Test Method D 2487 shall be used.

1.2.2 In this practice, the identification portion assigning a group symbol and name is limited to soil particles smaller than 3 in. (75 mm).

1.2.3 The identification portion of this practice is limited to naturally occurring soils (disturbed and undisturbed).

NOTE 1—This practice may be used as a descriptive system applied to such materials as shale, claystone, shells, crushed rock, etc. (see Appendix X2).

1.3 The descriptive information in this practice may be used with other soil classification systems or for materials other than naturally occurring soils.

1.4 The values stated in inch-pound units are to be regarded as the standard.

1.5 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. For specific precautionary statements see Section 8.*

1.6 *This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which*

*the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

## 2. Referenced Documents

### 2.1 ASTM Standards:

D 653 Terminology Relating to Soil, Rock, and Contained Fluids<sup>2</sup>

D 1452 Practice for Soil Investigation and Sampling by Auger Borings<sup>2</sup>

D 1586 Test Method for Penetration Test and Split-Barrel Sampling of Soils<sup>2</sup>

D 1587 Practice for Thin-Walled Tube Sampling of Soils<sup>2</sup>

D 2113 Practice for Diamond Core Drilling for Site Investigation<sup>2</sup>

D 2487 Classification of Soils for Engineering Purposes (Unified Soil Classification System)<sup>2</sup>

D 3740 Practice for Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and rock as Used in Engineering Design and Construction<sup>3</sup>

D 4083 Practice for Description of Frozen Soils (Visual-Manual Procedure)<sup>2</sup>

## 3. Terminology

3.1 *Definitions*—Except as listed below, all definitions are in accordance with Terminology D 653.

NOTE 2—For particles retained on a 3-in. (75-mm) US standard sieve, the following definitions are suggested:

*Cobbles*—particles of rock that will pass a 12-in. (300-mm) square opening and be retained on a 3-in. (75-mm) sieve, and

*Boulders*—particles of rock that will not pass a 12-in. (300-mm) square opening.

3.1.1 *clay*—soil passing a No. 200 (75- $\mu$ m) sieve that can be made to exhibit plasticity (putty-like properties) within a range of water contents, and that exhibits considerable strength when air-dry. For classification, a clay is a fine-grained soil, or the fine-grained portion of a soil, with a plasticity index equal to or greater than 4, and the plot of plasticity index versus liquid

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.07 on Identification and Classification of Soils.

Current edition approved Feb. 10, 2000. Published May 2000. Originally published as D 2488 – 66 T. Last previous edition D 2488 – 93 <sup>$\epsilon$</sup> .

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.08.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.09.

\*A Summary of Changes section appears at the end of this standard.

limit falls on or above the “A” line (see Fig. 3 of Test Method D 2487).

3.1.2 *gravel*—particles of rock that will pass a 3-in. (75-mm) sieve and be retained on a No. 4 (4.75-mm) sieve with the following subdivisions:

*coarse*—passes a 3-in. (75-mm) sieve and is retained on a  $\frac{3}{4}$ -in. (19-mm) sieve.

*fine*—passes a  $\frac{3}{4}$ -in. (19-mm) sieve and is retained on a No. 4 (4.75-mm) sieve.

3.1.3 *organic clay*—a clay with sufficient organic content to influence the soil properties. For classification, an organic clay is a soil that would be classified as a clay, except that its liquid limit value after oven drying is less than 75 % of its liquid limit value before oven drying.

3.1.4 *organic silt*—a silt with sufficient organic content to influence the soil properties. For classification, an organic silt is a soil that would be classified as a silt except that its liquid limit value after oven drying is less than 75 % of its liquid limit value before oven drying.

3.1.5 *peat*—a soil composed primarily of vegetable tissue in various stages of decomposition usually with an organic odor, a dark brown to black color, a spongy consistency, and a texture ranging from fibrous to amorphous.

3.1.6 *sand*—particles of rock that will pass a No. 4 (4.75-mm) sieve and be retained on a No. 200 (75- $\mu$ m) sieve with the following subdivisions:

*coarse*—passes a No. 4 (4.75-mm) sieve and is retained on a No. 10 (2.00-mm) sieve.

*medium*—passes a No. 10 (2.00-mm) sieve and is retained on a No. 40 (425- $\mu$ m) sieve.

*fine*—passes a No. 40 (425- $\mu$ m) sieve and is retained on a No. 200 (75- $\mu$ m) sieve.

3.1.7 *silt*—soil passing a No. 200 (75- $\mu$ m) sieve that is nonplastic or very slightly plastic and that exhibits little or no strength when air dry. For classification, a silt is a fine-grained soil, or the fine-grained portion of a soil, with a plasticity index less than 4, or the plot of plasticity index versus liquid limit falls below the “A” line (see Fig. 3 of Test Method D 2487).

## 4. Summary of Practice

4.1 Using visual examination and simple manual tests, this practice gives standardized criteria and procedures for describing and identifying soils.

4.2 The soil can be given an identification by assigning a group symbol(s) and name. The flow charts, Fig. 1a and Fig. 1b for fine-grained soils, and Fig. 2, for coarse-grained soils, can be used to assign the appropriate group symbol(s) and name. If the soil has properties which do not distinctly place it into a specific group, borderline symbols may be used, see Appendix X3.

NOTE 3—It is suggested that a distinction be made between *dual symbols* and *borderline symbols*.

*Dual Symbol*—A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC, CL-ML used to indicate that the soil has been identified as having the properties of a classification in accordance with Test Method D 2487 where two symbols are required. Two symbols are required when the soil has between 5 and 12 % fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart.

*Borderline Symbol*—A borderline symbol is two symbols separated by a slash, for example, CL/CH, GM/SM, CL/ML. A borderline symbol should be used to indicate that the soil has been identified as having properties that do not distinctly place the soil into a specific group (see Appendix X3).

## 5. Significance and Use

5.1 The descriptive information required in this practice can be used to describe a soil to aid in the evaluation of its significant properties for engineering use.

5.2 The descriptive information required in this practice should be used to supplement the classification of a soil as determined by Test Method D 2487.

5.3 This practice may be used in identifying soils using the classification group symbols and names as prescribed in Test Method D 2487. Since the names and symbols used in this practice to identify the soils are the same as those used in Test Method D 2487, it shall be clearly stated in reports and all other appropriate documents, that the classification symbol and name are based on visual-manual procedures.

5.4 This practice is to be used not only for identification of soils in the field, but also in the office, laboratory, or wherever soil samples are inspected and described.

5.5 This practice has particular value in grouping similar soil samples so that only a minimum number of laboratory tests need be run for positive soil classification.

NOTE 4—The ability to describe and identify soils correctly is learned more readily under the guidance of experienced personnel, but it may also be acquired systematically by comparing numerical laboratory test results for typical soils of each type with their visual and manual characteristics.

5.6 When describing and identifying soil samples from a given boring, test pit, or group of borings or pits, it is not necessary to follow all of the procedures in this practice for every sample. Soils which appear to be similar can be grouped together; one sample completely described and identified with the others referred to as similar based on performing only a few of the descriptive and identification procedures described in this practice.

5.7 This practice may be used in combination with Practice D 4083 when working with frozen soils.

NOTE 5—Notwithstanding the statements on precision and bias contained in this standard: The precision of this test method is dependent on the competence of the personnel performing it and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D 3740 are generally considered capable of competent and objective testing. Users of this test method are cautioned that compliance with Practice D 3740 does not in itself assure reliable testing. Reliable testing depends on several factors; Practice D 3740 provides a means for evaluating some of those factors.

## 6. Apparatus

6.1 *Required Apparatus:*

6.1.1 *Pocket Knife or Small Spatula.*

6.2 *Useful Auxiliary Apparatus:*

6.2.1 *Small Test Tube and Stopper* (or jar with a lid).

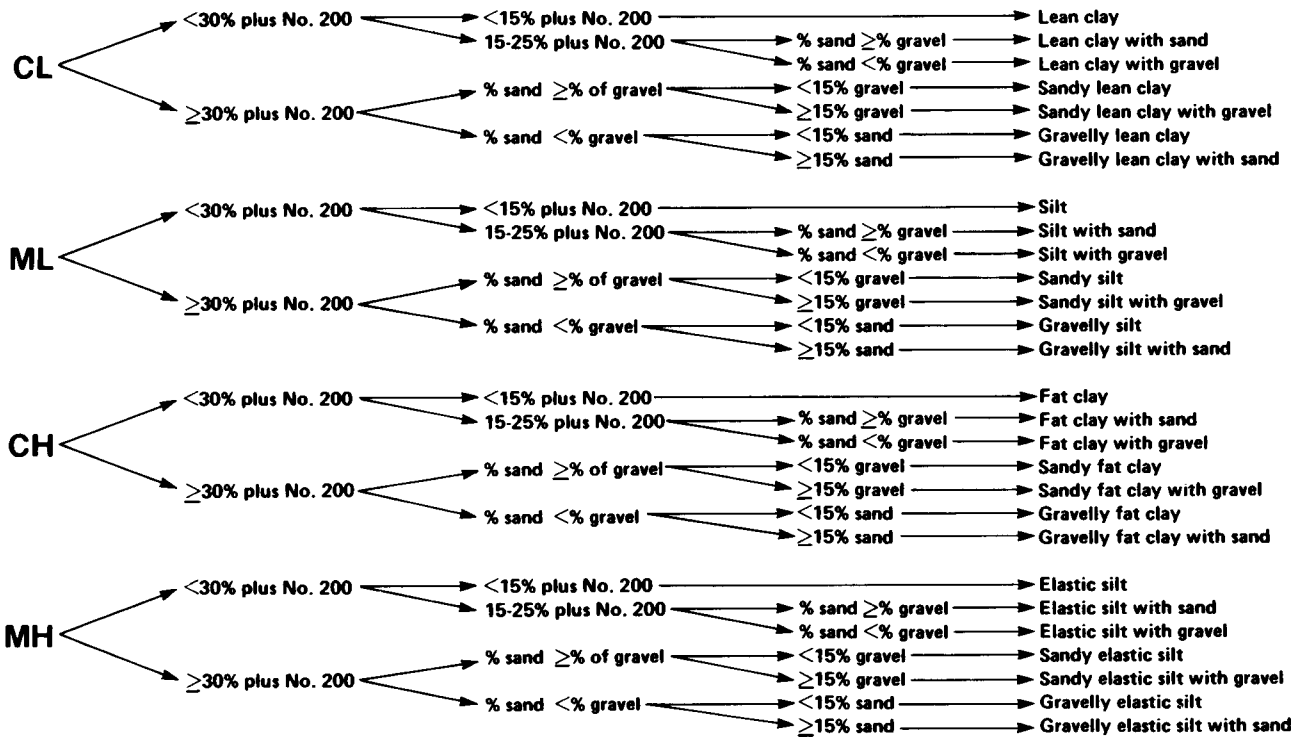
6.2.2 *Small Hand Lens.*

## 7. Reagents

7.1 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean water from a city water

**GROUP SYMBOL**

**GROUP NAME**

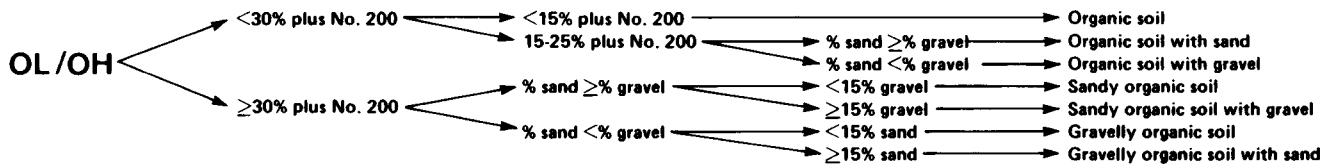


NOTE 1—Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5 %.

FIG. 1a Flow Chart for Identifying Inorganic Fine-Grained Soil (50 % or more fines)

**GROUP SYMBOL**

**GROUP NAME**



NOTE 1—Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5 %.

FIG. 1 b Flow Chart for Identifying Organic Fine-Grained Soil (50 % or more fines)

supply or natural source, including non-potable water.

7.2 *Hydrochloric Acid*—A small bottle of dilute hydrochloric acid, HCl, one part HCl (10 N) to three parts water (This reagent is optional for use with this practice). See Section 8.

**8. Safety Precautions**

8.1 When preparing the dilute HCl solution of one part concentrated hydrochloric acid (10 N) to three parts of distilled water, slowly add acid into water following necessary safety precautions. Handle with caution and store safely. If solution comes into contact with the skin, rinse thoroughly with water.

8.2 **Caution**—Do not add water to acid.

**9. Sampling**

9.1 The sample shall be considered to be representative of the stratum from which it was obtained by an appropriate, accepted, or standard procedure.

NOTE 6—Preferably, the sampling procedure should be identified as

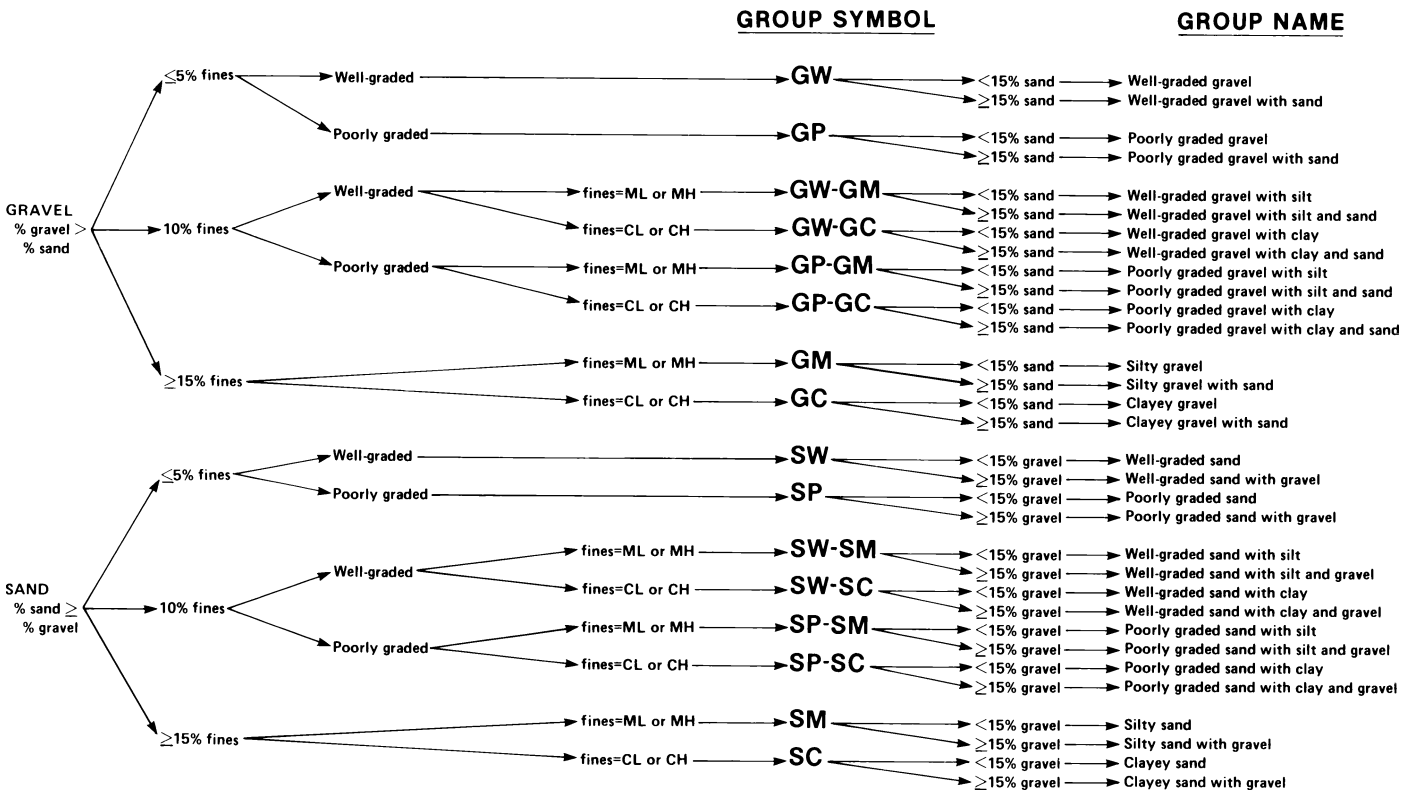
having been conducted in accordance with Practices D 1452, D 1587, or D 2113, or Test Method D 1586.

9.2 The sample shall be carefully identified as to origin.

NOTE 7—Remarks as to the origin may take the form of a boring number and sample number in conjunction with a job number, a geologic stratum, a pedologic horizon or a location description with respect to a permanent monument, a grid system or a station number and offset with respect to a stated centerline and a depth or elevation.

9.3 For accurate description and identification, the minimum amount of the specimen to be examined shall be in accordance with the following schedule:

Maximum Particle Size, Sieve Opening	Minimum Specimen Size, Dry Weight
4.75 mm (No. 4)	100 g (0.25 lb)
9.5 mm (¾ in.)	200 g (0.5 lb)
19.0 mm (¾ in.)	1.0 kg (2.2 lb)
38.1 mm (1½ in.)	8.0 kg (18 lb)
75.0 mm (3 in.)	60.0 kg (132 lb)



NOTE 1—Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5 %.

FIG. 2 Flow Chart for Identifying Coarse-Grained Soils (less than 50 % fines)

NOTE 8—If random isolated particles are encountered that are significantly larger than the particles in the soil matrix, the soil matrix can be accurately described and identified in accordance with the preceding schedule.

9.4 If the field sample or specimen being examined is smaller than the minimum recommended amount, the report shall include an appropriate remark.

### 10. Descriptive Information for Soils

10.1 *Angularity*—Describe the angularity of the sand (coarse sizes only), gravel, cobbles, and boulders, as angular, subangular, subrounded, or rounded in accordance with the criteria in Table 1 and Fig. 3. A range of angularity may be stated, such as: subrounded to rounded.

10.2 *Shape*—Describe the shape of the gravel, cobbles, and boulders as flat, elongated, or flat and elongated if they meet the criteria in Table 2 and Fig. 4. Otherwise, do not mention the shape. Indicate the fraction of the particles that have the shape, such as: one-third of the gravel particles are flat.

TABLE 1 Criteria for Describing Angularity of Coarse-Grained Particles (see Fig. 3)

Description	Criteria
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular	Particles are similar to angular description but have rounded edges
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges
Rounded	Particles have smoothly curved sides and no edges

10.3 *Color*—Describe the color. Color is an important property in identifying organic soils, and within a given locality it may also be useful in identifying materials of similar geologic origin. If the sample contains layers or patches of varying colors, this shall be noted and all representative colors shall be described. The color shall be described for moist samples. If the color represents a dry condition, this shall be stated in the report.

10.4 *Odor*—Describe the odor if organic or unusual. Soils containing a significant amount of organic material usually have a distinctive odor of decaying vegetation. This is especially apparent in fresh samples, but if the samples are dried, the odor may often be revived by heating a moistened sample. If the odor is unusual (petroleum product, chemical, and the like), it shall be described.

10.5 *Moisture Condition*—Describe the moisture condition as dry, moist, or wet, in accordance with the criteria in Table 3.

10.6 *HCl Reaction*—Describe the reaction with HCl as none, weak, or strong, in accordance with the criteria in Table 4. Since calcium carbonate is a common cementing agent, a report of its presence on the basis of the reaction with dilute hydrochloric acid is important.

10.7 *Consistency*—For intact fine-grained soil, describe the consistency as very soft, soft, firm, hard, or very hard, in accordance with the criteria in Table 5. This observation is inappropriate for soils with significant amounts of gravel.

10.8 *Cementation*—Describe the cementation of intact coarse-grained soils as weak, moderate, or strong, in accordance with the criteria in Table 6.



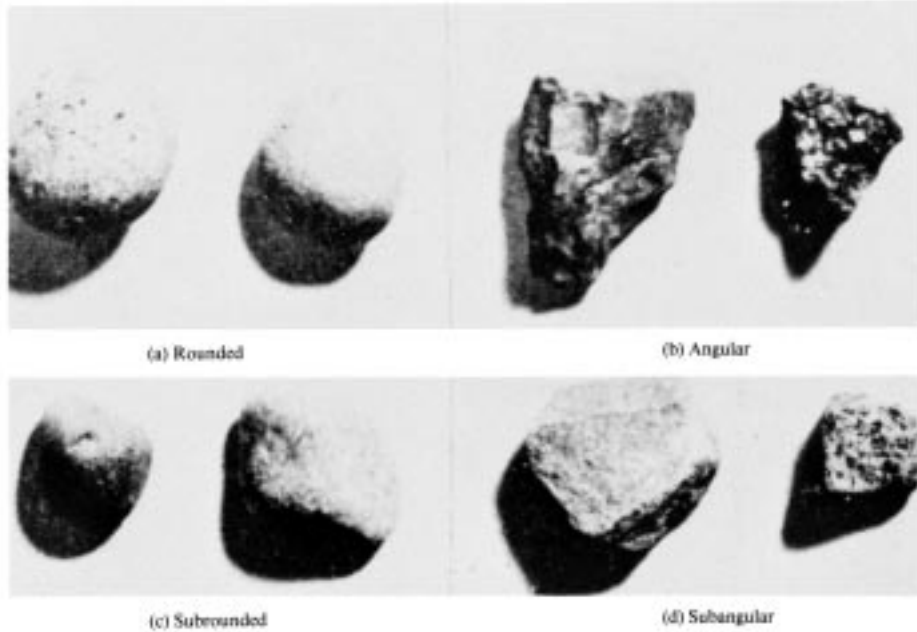


FIG. 3 Typical Angularity of Bulky Grains

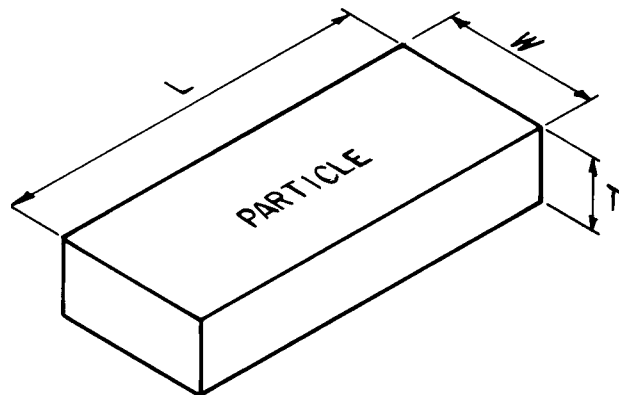
TABLE 2 Criteria for Describing Particle Shape (see Fig. 4)

The particle shape shall be described as follows where length, width, and thickness refer to the greatest, intermediate, and least dimensions of a particle, respectively.

Flat	Particles with width/thickness > 3
Elongated	Particles with length/width > 3
Flat and elongated	Particles meet criteria for both flat and elongated

PARTICLE SHAPE

W = WIDTH  
T = THICKNESS  
L = LENGTH



FLAT:  $W/T > 3$   
 ELONGATED:  $L/W > 3$   
 FLAT AND ELONGATED:  
 - meets both criteria

FIG. 4 Criteria for Particle Shape

10.9 *Structure*—Describe the structure of intact soils in accordance with the criteria in Table 7.

10.10 *Range of Particle Sizes*—For gravel and sand components, describe the range of particle sizes within each component as defined in 3.1.2 and 3.1.6. For example, about 20 % fine to coarse gravel, about 40 % fine to coarse sand.

10.11 *Maximum Particle Size*—Describe the maximum particle size found in the sample in accordance with the following information:

10.11.1 *Sand Size*—If the maximum particle size is a sand size, describe as fine, medium, or coarse as defined in 3.1.6. For example: maximum particle size, medium sand.

10.11.2 *Gravel Size*—If the maximum particle size is a gravel size, describe the maximum particle size as the smallest sieve opening that the particle will pass. For example, maximum particle size, 1½ in. (will pass a 1½-in. square opening but not a ¾-in. square opening).

10.11.3 *Cobble or Boulder Size*—If the maximum particle size is a cobble or boulder size, describe the maximum dimension of the largest particle. For example: maximum dimension, 18 in. (450 mm).

10.12 *Hardness*—Describe the hardness of coarse sand and larger particles as hard, or state what happens when the particles are hit by a hammer, for example, gravel-size particles fracture with considerable hammer blow, some gravel-size particles crumble with hammer blow. “Hard” means particles do not crack, fracture, or crumble under a hammer blow.

10.13 Additional comments shall be noted, such as the presence of roots or root holes, difficulty in drilling or augering

**TABLE 3 Criteria for Describing Moisture Condition**

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

**TABLE 4 Criteria for Describing the Reaction With HCl**

Description	Criteria
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately

**TABLE 5 Criteria for Describing Dilatancy**

Description	Criteria
Very soft	Thumb will penetrate soil more than 1 in. (25 mm)
Soft	Thumb will penetrate soil about 1 in. (25 mm)
Firm	Thumb will indent soil about ¼ in. (6 mm)
Hard	Thumb will not indent soil but readily indented with thumbnail
Very hard	Thumbnail will not indent soil

**TABLE 6 Criteria for Describing Toughness**

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

**TABLE 7 Criteria for Describing Dilatancy**

Description	Criteria
Stratified	Alternating layers of varying material or color with layers at least 6 mm thick; note thickness
Laminated	Alternating layers of varying material or color with the layers less than 6 mm thick; note thickness
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided	Fracture planes appear polished or glossy, sometimes striated
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness
Homogeneous	Same color and appearance throughout

hole, caving of trench or hole, or the presence of mica.

10.14 A local or commercial name or a geologic interpretation of the soil, or both, may be added if identified as such.

10.15 A classification or identification of the soil in accordance with other classification systems may be added if identified as such.

## 11. Identification of Peat

11.1 A sample composed primarily of vegetable tissue in various stages of decomposition that has a fibrous to amorphous texture, usually a dark brown to black color, and an organic odor, shall be designated as a highly organic soil and shall be identified as peat, PT, and not subjected to the identification procedures described hereafter.

## 12. Preparation for Identification

12.1 The soil identification portion of this practice is based

on the portion of the soil sample that will pass a 3-in. (75-mm) sieve. The larger than 3-in. (75-mm) particles must be removed, manually, for a loose sample, or mentally, for an intact sample before classifying the soil.

12.2 Estimate and note the percentage of cobbles and the percentage of boulders. Performed visually, these estimates will be on the basis of volume percentage.

NOTE 9—Since the percentages of the particle-size distribution in Test Method D 2487 are by dry weight, and the estimates of percentages for gravel, sand, and fines in this practice are by dry weight, it is recommended that the report state that the percentages of cobbles and boulders are by volume.

12.3 Of the fraction of the soil smaller than 3 in. (75 mm), estimate and note the percentage, by dry weight, of the gravel, sand, and fines (see Appendix X4 for suggested procedures).

NOTE 10—Since the particle-size components appear visually on the basis of volume, considerable experience is required to estimate the percentages on the basis of dry weight. Frequent comparisons with laboratory particle-size analyses should be made.

12.3.1 The percentages shall be estimated to the closest 5 %. The percentages of gravel, sand, and fines must add up to 100 %.

12.3.2 If one of the components is present but not in sufficient quantity to be considered 5 % of the smaller than 3-in. (75-mm) portion, indicate its presence by the term *trace*, for example, trace of fines. A trace is not to be considered in the total of 100 % for the components.

## 13. Preliminary Identification

13.1 The soil is *fine grained* if it contains 50 % or more fines. Follow the procedures for identifying fine-grained soils of Section 14.

13.2 The soil is *coarse grained* if it contains less than 50 % fines. Follow the procedures for identifying coarse-grained soils of Section 15.

## 14. Procedure for Identifying Fine-Grained Soils

14.1 Select a representative sample of the material for examination. Remove particles larger than the No. 40 sieve (medium sand and larger) until a specimen equivalent to about a handful of material is available. Use this specimen for performing the dry strength, dilatancy, and toughness tests.

14.2 *Dry Strength:*

14.2.1 From the specimen, select enough material to mold into a ball about 1 in. (25 mm) in diameter. Mold the material until it has the consistency of putty, adding water if necessary.

14.2.2 From the molded material, make at least three test specimens. A test specimen shall be a ball of material about ½ in. (12 mm) in diameter. Allow the test specimens to dry in air, or sun, or by artificial means, as long as the temperature does not exceed 60°C.

14.2.3 If the test specimen contains natural dry lumps, those that are about ½ in. (12 mm) in diameter may be used in place of the molded balls.

NOTE 11—The process of molding and drying usually produces higher strengths than are found in natural dry lumps of soil.

14.2.4 Test the strength of the dry balls or lumps by crushing between the fingers. Note the strength as none, low,

medium, high, or very high in accordance with the criteria in Table 8. If natural dry lumps are used, do not use the results of any of the lumps that are found to contain particles of coarse sand.

14.2.5 The presence of high-strength water-soluble cementing materials, such as calcium carbonate, may cause exceptionally high dry strengths. The presence of calcium carbonate can usually be detected from the intensity of the reaction with dilute hydrochloric acid (see 10.6).

#### 14.3 Dilatancy:

14.3.1 From the specimen, select enough material to mold into a ball about 1/2 in. (12 mm) in diameter. Mold the material, adding water if necessary, until it has a soft, but not sticky, consistency.

14.3.2 Smooth the soil ball in the palm of one hand with the blade of a knife or small spatula. Shake horizontally, striking the side of the hand vigorously against the other hand several times. Note the reaction of water appearing on the surface of the soil. Squeeze the sample by closing the hand or pinching the soil between the fingers, and note the reaction as none, slow, or rapid in accordance with the criteria in Table 9. The reaction is the speed with which water appears while shaking, and disappears while squeezing.

#### 14.4 Toughness:

14.4.1 Following the completion of the dilatancy test, the test specimen is shaped into an elongated pat and rolled by hand on a smooth surface or between the palms into a thread about 1/8 in. (3 mm) in diameter. (If the sample is too wet to roll easily, it should be spread into a thin layer and allowed to lose some water by evaporation.) Fold the sample threads and reroll repeatedly until the thread crumbles at a diameter of about 1/8 in. The thread will crumble at a diameter of 1/8 in. when the soil is near the plastic limit. Note the pressure required to roll the thread near the plastic limit. Also, note the strength of the thread. After the thread crumbles, the pieces should be lumped together and kneaded until the lump crumbles. Note the toughness of the material during kneading.

14.4.2 Describe the toughness of the thread and lump as low, medium, or high in accordance with the criteria in Table 10.

14.5 Plasticity—On the basis of observations made during the toughness test, describe the plasticity of the material in accordance with the criteria given in Table 11.

14.6 Decide whether the soil is an *inorganic* or an *organic* fine-grained soil (see 14.8). If inorganic, follow the steps given in 14.7.

**TABLE 8 Criteria for Describing Toughness**

Description	Criteria
None	The dry specimen crumbles into powder with mere pressure of handling
Low	The dry specimen crumbles into powder with some finger pressure
Medium	The dry specimen breaks into pieces or crumbles with considerable finger pressure
High	The dry specimen cannot be broken with finger pressure. Specimen will break into pieces between thumb and a hard surface
Very high	The dry specimen cannot be broken between the thumb and a hard surface

**TABLE 9 Criteria for Describing Dilatancy**

Description	Criteria
None	No visible change in the specimen
Slow	Water appears slowly on the surface of the specimen during shaking and does not disappear or disappears slowly upon squeezing
Rapid	Water appears quickly on the surface of the specimen during shaking and disappears quickly upon squeezing

**TABLE 10 Criteria for Describing Toughness**

Description	Criteria
Low	Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft
Medium	Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness
High	Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness

**TABLE 11 Criteria for Describing Plasticity**

Description	Criteria
Nonplastic	A 1/8-in. (3-mm) 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
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles 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

#### 14.7 Identification of Inorganic Fine-Grained Soils:

14.7.1 Identify the soil as a *lean clay*, CL, if the soil has medium to high dry strength, no or slow dilatancy, and medium toughness and plasticity (see Table 12).

14.7.2 Identify the soil as a *fat clay*, CH, if the soil has high to very high dry strength, no dilatancy, and high toughness and plasticity (see Table 12).

14.7.3 Identify the soil as a *silt*, ML, if the soil has no to low dry strength, slow to rapid dilatancy, and low toughness and plasticity, or is nonplastic (see Table 12).

14.7.4 Identify the soil as an *elastic silt*, MH, if the soil has low to medium dry strength, no to slow dilatancy, and low to medium toughness and plasticity (see Table 12).

NOTE 12—These properties are similar to those for a lean clay. However, the silt will dry quickly on the hand and have a smooth, silky feel when dry. Some soils that would classify as MH in accordance with the criteria in Test Method D 2487 are visually difficult to distinguish from lean clays, CL. It may be necessary to perform laboratory testing for proper identification.

**TABLE 12 Identification of Inorganic Fine-Grained Soils from Manual Tests**

Soil Symbol	Dry Strength	Dilatancy	Toughness
ML	None to low	Slow to rapid	Low or thread cannot be formed
CL	Medium to high	None to slow	Medium
MH	Low to medium	None to slow	Low to medium
CH	High to very high	None	High

#### 14.8 Identification of Organic Fine-Grained Soils:

14.8.1 Identify the soil as an *organic soil*, OL/OH, if the soil contains enough organic particles to influence the soil properties. Organic soils usually have a dark brown to black color and may have an organic odor. Often, organic soils will change color, for example, black to brown, when exposed to the air. Some organic soils will lighten in color significantly when air dried. Organic soils normally will not have a high toughness or plasticity. The thread for the toughness test will be spongy.

NOTE 13—In some cases, through practice and experience, it may be possible to further identify the organic soils as organic silts or organic clays, OL or OH. Correlations between the dilatancy, dry strength, toughness tests, and laboratory tests can be made to identify organic soils in certain deposits of similar materials of known geologic origin.

14.9 If the soil is estimated to have 15 to 25 % sand or gravel, or both, the words “with sand” or “with gravel” (whichever is more predominant) shall be added to the group name. For example: “lean clay with sand, CL” or “silt with gravel, ML” (see Fig. 1a and Fig. 1b). If the percentage of sand is equal to the percentage of gravel, use “with sand.”

14.10 If the soil is estimated to have 30 % or more sand or gravel, or both, the words “sandy” or “gravelly” shall be added to the group name. Add the word “sandy” if there appears to be more sand than gravel. Add the word “gravelly” if there appears to be more gravel than sand. For example: “sandy lean clay, CL”, “gravelly fat clay, CH”, or “sandy silt, ML” (see Fig. 1a and Fig. 1b). If the percentage of sand is equal to the percent of gravel, use “sandy.”

#### 15. Procedure for Identifying Coarse-Grained Soils

(Contains less than 50 % fines)

15.1 The soil is a *gravel* if the percentage of gravel is estimated to be more than the percentage of sand.

15.2 The soil is a *sand* if the percentage of gravel is estimated to be equal to or less than the percentage of sand.

15.3 The soil is a *clean gravel* or *clean sand* if the percentage of fines is estimated to be 5 % or less.

15.3.1 Identify the soil as a *well-graded gravel*, GW, or as a *well-graded sand*, SW, if it has a wide range of particle sizes and substantial amounts of the intermediate particle sizes.

15.3.2 Identify the soil as a *poorly graded gravel*, GP, or as a *poorly graded sand*, SP, if it consists predominantly of one size (uniformly graded), or it has a wide range of sizes with some intermediate sizes obviously missing (gap or skip graded).

15.4 The soil is either a *gravel with fines* or a *sand with fines* if the percentage of fines is estimated to be 15 % or more.

15.4.1 Identify the soil as a *clayey gravel*, GC, or a *clayey sand*, SC, if the fines are clayey as determined by the procedures in Section 14.

15.4.2 Identify the soil as a *silty gravel*, GM, or a *silty sand*, SM, if the fines are silty as determined by the procedures in Section 14.

15.5 If the soil is estimated to contain 10 % fines, give the soil a dual identification using two group symbols.

15.5.1 The first group symbol shall correspond to a clean gravel or sand (GW, GP, SW, SP) and the second symbol shall correspond to a gravel or sand with fines (GC, GM, SC, SM).

15.5.2 The group name shall correspond to the first group

symbol plus the words “with clay” or “with silt” to indicate the plasticity characteristics of the fines. For example: “well-graded gravel with clay, GW-GC” or “poorly graded sand with silt, SP-SM” (see Fig. 2).

15.6 If the specimen is predominantly sand or gravel but contains an estimated 15 % or more of the other coarse-grained constituent, the words “with gravel” or “with sand” shall be added to the group name. For example: “poorly graded gravel with sand, GP” or “clayey sand with gravel, SC” (see Fig. 2).

15.7 If the field sample contains any cobbles or boulders, or both, the words “with cobbles” or “with cobbles and boulders” shall be added to the group name. For example: “silty gravel with cobbles, GM.”

#### 16. Report

16.1 The report shall include the information as to origin, and the items indicated in Table 13.

NOTE 14—*Example: Clayey Gravel with Sand and Cobbles, GC*—About 50 % fine to coarse, subrounded to subangular gravel; about 30 % fine to coarse, subrounded sand; about 20 % fines with medium plasticity, high dry strength, no dilatancy, medium toughness; weak reaction with HCl; original field sample had about 5 % (by volume) subrounded cobbles, maximum dimension, 150 mm.

In-Place Conditions—Firm, homogeneous, dry, brown

Geologic Interpretation—Alluvial fan

NOTE 15—Other examples of soil descriptions and identification are given in Appendix X1 and Appendix X2.

NOTE 16—If desired, the percentages of gravel, sand, and fines may be stated in terms indicating a range of percentages, as follows:

*Trace*—Particles are present but estimated to be less than 5 %

*Few*—5 to 10 %

*Little*—15 to 25 %

*Some*—30 to 45 %

*Mostly*—50 to 100 %

**TABLE 13 Checklist for Description of Soils**

1. Group name
2. Group symbol
3. Percent of cobbles or boulders, or both (by volume)
4. Percent of gravel, sand, or fines, or all three (by dry weight)
5. Particle-size range:
Gravel—fine, coarse
Sand—fine, medium, coarse
6. Particle angularity: angular, subangular, subrounded, rounded
7. Particle shape: (if appropriate) flat, elongated, flat and elongated
8. Maximum particle size or dimension
9. Hardness of coarse sand and larger particles
10. Plasticity of fines: nonplastic, low, medium, high
11. Dry strength: none, low, medium, high, very high
12. Dilatancy: none, slow, rapid
13. Toughness: low, medium, high
14. Color (in moist condition)
15. Odor (mention only if organic or unusual)
16. Moisture: dry, moist, wet
17. Reaction with HCl: none, weak, strong
<i>For intact samples:</i>
18. Consistency (fine-grained soils only): very soft, soft, firm, hard, very hard
19. Structure: stratified, laminated, fissured, slickensided, lensed, homogeneous
20. Cementation: weak, moderate, strong
21. Local name
22. Geologic interpretation
23. Additional comments: presence of roots or root holes, presence of mica, gypsum, etc., surface coatings on coarse-grained particles, caving or sloughing of auger hole or trench sides, difficulty in augering or excavating, etc.

16.2 If, in the soil description, the soil is identified using a classification group symbol and name as described in Test Method D 2487, it must be distinctly and clearly stated in log forms, summary tables, reports, and the like, that the symbol and name are based on visual-manual procedures.

### 17. Precision and Bias

17.1 This practice provides qualitative information only,

therefore, a precision and bias statement is not applicable.

### 18. Keywords

18.1 classification; clay; gravel; organic soils; sand; silt; soil classification; soil description; visual classification

## APPENDIXES

### (Nonmandatory Information)

#### X1. EXAMPLES OF VISUAL SOIL DESCRIPTIONS

X1.1 The following examples show how the information required in 16.1 can be reported. The information that is included in descriptions should be based on individual circumstances and need.

X1.1.1 *Well-Graded Gravel with Sand (GW)*—About 75 % fine to coarse, hard, subangular gravel; about 25 % fine to coarse, hard, subangular sand; trace of fines; maximum size, 75 mm, brown, dry; no reaction with HCl.

X1.1.2 *Silty Sand with Gravel (SM)*—About 60 % predominantly fine sand; about 25 % silty fines with low plasticity, low dry strength, rapid dilatancy, and low toughness; about 15 % fine, hard, subrounded gravel, a few gravel-size particles fractured with hammer blow; maximum size, 25 mm; no reaction with HCl (Note—Field sample size smaller than recommended).

*In-Place Conditions*—Firm, stratified and contains lenses of silt 1 to 2 in. (25 to 50 mm) thick, moist, brown to gray; in-place density 106 lb/ft<sup>3</sup>; in-place moisture 9 %.

X1.1.3 *Organic Soil (OL/OH)*—About 100 % fines with low plasticity, slow dilatancy, low dry strength, and low toughness; wet, dark brown, organic odor; weak reaction with HCl.

X1.1.4 *Silty Sand with Organic Fines (SM)*—About 75 % fine to coarse, hard, subangular reddish sand; about 25 % organic and silty dark brown nonplastic fines with no dry strength and slow dilatancy; wet; maximum size, coarse sand; weak reaction with HCl.

X1.1.5 *Poorly Graded Gravel with Silt, Sand, Cobbles and Boulders (GP-GM)*—About 75 % fine to coarse, hard, subrounded to subangular gravel; about 15 % fine, hard, subrounded to subangular sand; about 10 % silty nonplastic fines; moist, brown; no reaction with HCl; original field sample had about 5 % (by volume) hard, subrounded cobbles and a trace of hard, subrounded boulders, with a maximum dimension of 18 in. (450 mm).

#### X2. USING THE IDENTIFICATION PROCEDURE AS A DESCRIPTIVE SYSTEM FOR SHALE, CLAYSTONE, SHELLS, SLAG, CRUSHED ROCK, AND THE LIKE

X2.1 The identification procedure may be used as a descriptive system applied to materials that exist in-situ as shale, claystone, sandstone, siltstone, mudstone, etc., but convert to soils after field or laboratory processing (crushing, slaking, and the like).

X2.2 Materials such as shells, crushed rock, slag, and the like, should be identified as such. However, the procedures used in this practice for describing the particle size and plasticity characteristics may be used in the description of the material. If desired, an identification using a group name and symbol according to this practice may be assigned to aid in describing the material.

X2.3 The group symbol(s) and group names should be placed in quotation marks or noted with some type of distinguishing symbol. See examples.

X2.4 Examples of how group names and symbols can be incorporated into a descriptive system for materials that are not

naturally occurring soils are as follows:

X2.4.1 *Shale Chunks*—Retrieved as 2 to 4-in. (50 to 100-mm) pieces of shale from power auger hole, dry, brown, no reaction with HCl. After slaking in water for 24 h, material identified as “Sandy Lean Clay (CL)”; about 60 % fines with medium plasticity, high dry strength, no dilatancy, and medium toughness; about 35 % fine to medium, hard sand; about 5 % gravel-size pieces of shale.

X2.4.2 *Crushed Sandstone*—Product of commercial crushing operation; “Poorly Graded Sand with Silt (SP-SM)”; about 90 % fine to medium sand; about 10 % nonplastic fines; dry, reddish-brown, strong reaction with HCl.

X2.4.3 *Broken Shells*—About 60 % gravel-size broken shells; about 30 % sand and sand-size shell pieces; about 10 % fines; “Poorly Graded Gravel with Sand (GP).”

X2.4.4 *Crushed Rock*—Processed from gravel and cobbles in Pit No. 7; “Poorly Graded Gravel (GP)”; about 90 % fine, hard, angular gravel-size particles; about 10 % coarse, hard,

angular sand-size particles; dry, tan; no reaction with HCl.

### **X3. SUGGESTED PROCEDURE FOR USING A BORDERLINE SYMBOL FOR SOILS WITH TWO POSSIBLE IDENTIFICATIONS.**

X3.1 Since this practice is based on estimates of particle size distribution and plasticity characteristics, it may be difficult to clearly identify the soil as belonging to one category. To indicate that the soil may fall into one of two possible basic groups, a borderline symbol may be used with the two symbols separated by a slash. For example: SC/CL or CL/CH.

X3.1.1 A borderline symbol may be used when the percentage of fines is estimated to be between 45 and 55 %. One symbol should be for a coarse-grained soil with fines and the other for a fine-grained soil. For example: GM/ML or CL/SC.

X3.1.2 A borderline symbol may be used when the percentage of sand and the percentage of gravel are estimated to be about the same. For example: GP/SP, SC/GC, GM/SM. It is practically impossible to have a soil that would have a borderline symbol of GW/SW.

X3.1.3 A borderline symbol may be used when the soil could be either well graded or poorly graded. For example: GW/GP, SW/SP.

X3.1.4 A borderline symbol may be used when the soil could either be a silt or a clay. For example: CL/ML, CH/MH, SC/SM.

X3.1.5 A borderline symbol may be used when a fine-grained soil has properties that indicate that it is at the boundary between a soil of low compressibility and a soil of high compressibility. For example: CL/CH, MH/ML.

X3.2 The order of the borderline symbols should reflect similarity to surrounding or adjacent soils. For example: soils in a borrow area have been identified as CH. One sample is considered to have a borderline symbol of CL and CH. To show similarity, the borderline symbol should be CH/CL.

X3.3 The group name for a soil with a borderline symbol should be the group name for the first symbol, except for:

CL/CH lean to fat clay  
ML/CL clayey silt  
CL/ML silty clay

X3.4 The use of a borderline symbol should not be used indiscriminately. Every effort shall be made to first place the soil into a single group.

### **X4. SUGGESTED PROCEDURES FOR ESTIMATING THE PERCENTAGES OF GRAVEL, SAND, AND FINES IN A SOIL SAMPLE**

X4.1 *Jar Method*—The relative percentage of coarse- and fine-grained material may be estimated by thoroughly shaking a mixture of soil and water in a test tube or jar, and then allowing the mixture to settle. The coarse particles will fall to the bottom and successively finer particles will be deposited with increasing time; the sand sizes will fall out of suspension in 20 to 30 s. The relative proportions can be estimated from the relative volume of each size separate. This method should be correlated to particle-size laboratory determinations.

X4.2 *Visual Method*—Mentally visualize the gravel size particles placed in a sack (or other container) or sacks. Then, do the same with the sand size particles and the fines. Then, mentally compare the number of sacks to estimate the percentage of plus No. 4 sieve size and minus No. 4 sieve size present.

The percentages of sand and fines in the minus sieve size No. 4 material can then be estimated from the wash test (X4.3).

X4.3 *Wash Test (for relative percentages of sand and fines)*—Select and moisten enough minus No. 4 sieve size material to form a 1-in (25-mm) cube of soil. Cut the cube in half, set one-half to the side, and place the other half in a small dish. Wash and decant the fines out of the material in the dish until the wash water is clear and then compare the two samples and estimate the percentage of sand and fines. Remember that the percentage is based on weight, not volume. However, the volume comparison will provide a reasonable indication of grain size percentages.

X4.3.1 While washing, it may be necessary to break down lumps of fines with the finger to get the correct percentages.

### **X5. ABBREVIATED SOIL CLASSIFICATION SYMBOLS**

X5.1 In some cases, because of lack of space, an abbreviated system may be useful to indicate the soil classification symbol and name. Examples of such cases would be graphical logs, databases, tables, etc.

X5.2 This abbreviated system is not a substitute for the full name and descriptive information but can be used in supple-

mentary presentations when the complete description is referenced.

X5.3 The abbreviated system should consist of the soil classification symbol based on this standard with appropriate lower case letter prefixes and suffixes as:

Prefix:

Suffix:

s = sandy  
g = gravelly

s = with sand  
g = with gravel  
c = with cobbles  
b = with boulders

*Group Symbol and Full Name*

*Abbreviated*

CL, Sandy lean clay  
SP-SM, Poorly graded sand with silt and gravel  
GP, poorly graded gravel with sand, cobbles, and boulders  
ML, gravelly silt with sand and cobbles

s(CL)  
(SP-SM)g  
(GP)scb  
g(ML)sc

X5.4 The soil classification symbol is to be enclosed in parenthesis. Some examples would be:

### SUMMARY OF CHANGES

In accordance with Committee D18 policy, this section identifies the location of changes to this standard since the last edition (1993<sup>e1</sup>) that may impact the use of this standard.

(1) Added Practice D 3740 to Section 2.

(2) Added Note 5 under 5.7 and renumbered subsequent notes.

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# Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)<sup>1</sup>

This standard is issued under the fixed designation D2487; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope\*

1.1 This practice describes a system for classifying mineral and organo-mineral soils for engineering purposes based on laboratory determination of particle-size characteristics, liquid limit, and plasticity index and shall be used when precise classification is required.

NOTE 1—Use of this standard will result in a single classification group symbol and group name except when a soil contains 5 to 12 % fines or when the plot of the liquid limit and plasticity index values falls into the crosshatched area of the plasticity chart. In these two cases, a dual symbol is used, for example, GP-GM, CL-ML. When the laboratory test results indicate that the soil is close to another soil classification group, the borderline condition can be indicated with two symbols separated by a slash. The first symbol should be the one based on this standard, for example, CL/CH, GM/SM, SC/CL. Borderline symbols are particularly useful when the liquid limit value of clayey soils is close to 50. These soils can have expansive characteristics and the use of a borderline symbol (CL/CH, CH/CL) will alert the user of the assigned classifications of expansive potential.

1.2 The group symbol portion of this system is based on laboratory tests performed on the portion of a soil sample passing the 3-in. (75-mm) sieve (see Specification E11).

1.3 As a classification system, this standard is limited to naturally occurring soils.

NOTE 2—The group names and symbols used in this test method may be used as a descriptive system applied to such materials as shale, claystone, shells, crushed rock, etc. See Appendix X2.

1.4 This standard is for qualitative application only.

NOTE 3—When quantitative information is required for detailed designs of important structures, this test method must be supplemented by laboratory tests or other quantitative data to determine performance characteristics under expected field conditions.

1.5 This standard is the ASTM version of the Unified Soil Classification System. The basis for the classification scheme is the Airfield Classification System developed by A. Casa-

grande in the early 1940s.<sup>2</sup> It became known as the Unified Soil Classification System when several U.S. Government Agencies adopted a modified version of the Airfield System in 1952.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>3</sup>

- C117 Test Method for Materials Finer than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing
- C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
- C702 Practice for Reducing Samples of Aggregate to Testing Size
- D420 Guide to Site Characterization for Engineering Design and Construction Purposes
- D422 Test Method for Particle-Size Analysis of Soils
- D653 Terminology Relating to Soil, Rock, and Contained Fluids
- D1140 Test Methods for Amount of Material in Soils Finer

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.07 on Identification and Classification of Soils.

Current edition approved May 1, 2011. Published June 2011. Originally approved in 1966. Last previous edition approved in 2010 as D2487-10. DOI: 10.1520/D2487-11.

<sup>2</sup> Casagrande, A., "Classification and Identification of Soils," *Transactions, ASCE*, 1948, p. 901.

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

\*A Summary of Changes section appears at the end of this standard.



- than No. 200 (75- $\mu$ m) Sieve
- D2216** Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- D2488** Practice for Description and Identification of Soils (Visual-Manual Procedure)
- D3740** Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
- D4083** Practice for Description of Frozen Soils (Visual-Manual Procedure)
- D4318** Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- D4427** Classification of Peat Samples by Laboratory Testing
- D6913** Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
- E11** Specification for Woven Wire Test Sieve Cloth and Test Sieves

### 3. Terminology

3.1 *Definitions*—Except as listed below, all definitions are in accordance with Terminology **D653**.

NOTE 4—For particles retained on a 3-in. (75-mm) U.S. standard sieve, the following definitions are suggested:

*Cobbles*—particles of rock that will pass a 12-in. (300-mm) square opening and be retained on a 3-in. (75-mm) U.S. standard sieve, and

*Boulders*—particles of rock that will not pass a 12-in. (300-mm) square opening.

3.1.1 *clay*—soil passing a No. 200 (75- $\mu$ m) U.S. standard sieve that can be made to exhibit plasticity (putty-like properties) within a range of water contents and that exhibits considerable strength when air dry. For classification, a clay is a fine-grained soil, or the fine-grained portion of a soil, with a plasticity index equal to or greater than 4, and the plot of plasticity index versus liquid limit falls on or above the “A” line.

3.1.2 *gravel*—particles of rock that will pass a 3-in. (75-mm) sieve and be retained on a No. 4 (4.75-mm) U.S. standard sieve with the following subdivisions:

*Coarse*—passes 3-in. (75-mm) sieve and retained on  $\frac{3}{4}$ -in. (19-mm) sieve, and

*Fine*—passes  $\frac{3}{4}$ -in. (19-mm) sieve and retained on No. 4 (4.75-mm) sieve.

3.1.3 *organic clay*—a clay with sufficient organic content to influence the soil properties. For classification, an organic clay is a soil that would be classified as a clay except that its liquid limit value after oven drying is less than 75 % of its liquid limit value before oven drying.

3.1.4 *organic silt*—a silt with sufficient organic content to influence the soil properties. For classification, an organic silt is a soil that would be classified as a silt except that its liquid limit value after oven drying is less than 75 % of its liquid limit value before oven drying.

3.1.5 *peat*—a soil composed of vegetable tissue in various stages of decomposition usually with an organic odor, a dark-brown to black color, a spongy consistency, and a texture ranging from fibrous to amorphous.

3.1.6 *sand*—particles of rock that will pass a No. 4 (4.75-mm) sieve and be retained on a No. 200 (75- $\mu$ m) U.S. standard sieve with the following subdivisions:

*Coarse*—passes No. 4 (4.75-mm) sieve and retained on No. 10 (2.00-mm) sieve,

*Medium*—passes No. 10 (2.00-mm) sieve and retained on No. 40 (425- $\mu$ m) sieve, and

*Fine*—passes No. 40 (425- $\mu$ m) sieve and retained on No. 200 (75- $\mu$ m) sieve.

3.1.7 *silt*—soil passing a No. 200 (75- $\mu$ m) U.S. standard sieve that is nonplastic or very slightly plastic and that exhibits little or no strength when air dry. For classification, a silt is a fine-grained soil, or the fine-grained portion of a soil, with a plasticity index less than 4 or if the plot of plasticity index versus liquid limit falls below the “A” line.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *coefficient of curvature, C<sub>c</sub>*—the ratio  $(D_{30})^2 / (D_{10} \times D_{60})$ , where  $D_{60}$ ,  $D_{30}$ , and  $D_{10}$  are the particle sizes corresponding to 60, 30, and 10 % finer on the cumulative particle-size distribution curve, respectively.

3.2.2 *coefficient of uniformity, C<sub>u</sub>*—the ratio  $D_{60}/D_{10}$ , where  $D_{60}$  and  $D_{10}$  are the particle diameters corresponding to 60 and 10 % finer on the cumulative particle-size distribution curve, respectively.

### 4. Summary

4.1 As illustrated in **Table 1**, this classification system identifies three major soil divisions: coarse-grained soils, fine-grained soils, and highly organic soils. These three divisions are further subdivided into a total of 15 basic soil groups.

4.2 Based on the results of visual observations and prescribed laboratory tests, a soil is catalogued according to the basic soil groups, assigned a group symbol(s) and name, and thereby classified. The flow charts, **Fig. 1** for fine-grained soils, and **Fig. 3** for coarse-grained soils, can be used to assign the appropriate group symbol(s) and name.

### 5. Significance and Use

5.1 This standard classifies soils from any geographic location into categories representing the results of prescribed laboratory tests to determine the particle-size characteristics, the liquid limit, and the plasticity index.

5.2 The assigning of a group name and symbol(s) along with the descriptive information required in Practice **D2488** can be used to describe a soil to aid in the evaluation of its significant properties for engineering use.

5.3 The various groupings of this classification system have been devised to correlate in a general way with the engineering behavior of soils. This standard provides a useful first step in any field or laboratory investigation for geotechnical engineering purposes.

5.4 This standard may also be used as an aid in training personnel in the use of Practice **D2488**.

5.5 This standard may be used in combination with Practice **D4083** when working with frozen soils.

NOTE 5—Notwithstanding the statements on precision and bias contained in this standard: The precision of this test method is dependent on the competence of the personnel performing it and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice

**TABLE 1 Soil Classification Chart**

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests <sup>A</sup>				Soil Classification		
				Group Symbol	Group Name <sup>B</sup>	
COARSE-GRAINED SOILS	Gravels (More than 50 % of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5 % fines <sup>C</sup> )	$Cu \geq 4$ and $1 \leq Cc \leq 3^D$	GW	Well-graded gravel <sup>E</sup>	
			$Cu < 4$ and/or $[Cc < 1 \text{ or } Cc > 3]^D$	GP	Poorly graded gravel <sup>E</sup>	
	More than 50 % retained on No. 200 sieve	Gravels with Fines (More than 12 % fines <sup>C</sup> )	Fines classify as ML or MH		GM	Silty gravel <sup>E,F,G</sup>
			Fines classify as CL or CH		GC	Clayey gravel <sup>E,F,G</sup>
		Sands (50 % or more of coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5 % fines <sup>H</sup> )	$Cu \geq 6$ and $1 \leq Cc \leq 3^D$	SW	Well-graded sand <sup>I</sup>
				$Cu < 6$ and/or $[Cc < 1 \text{ or } Cc > 3]^D$	SP	Poorly graded sand <sup>I</sup>
Sands with Fines (More than 12 % fines <sup>H</sup> )	Fines classify as ML or MH		SM	Silty sand <sup>F,G,I</sup>		
	Fines classify as CL or CH		SC	Clayey sand <sup>F,G,I</sup>		
FINE-GRAINED SOILS	Silt and Clays	inorganic	$PI > 7$ and plots on or above "A" line <sup>J</sup>	CL	Lean clay <sup>K,L,M</sup>	
			$PI < 4$ or plots below "A" line <sup>J</sup>	ML	Silt <sup>K,L,M</sup>	
	Liquid limit less than 50	organic	$\frac{\text{Liquid limit} - \text{oven dried}}{\text{Liquid limit} - \text{not dried}} < 0.75$		OL	Organic clay <sup>K,L,M,N</sup> Organic silt <sup>K,L,M,O</sup>
		Silt and Clays	inorganic	PI plots on or above "A" line	CH	Fat clay <sup>K,L,M</sup>
				PI plots below "A" line	MH	Elastic silt <sup>K,L,M</sup>
	Liquid limit 50 or more	organic	$\frac{\text{Liquid limit} - \text{oven dried}}{\text{Liquid limit} - \text{not dried}} < 0.75$		OH	Organic clay <sup>K,L,M,P</sup> Organic silt <sup>K,L,M,Q</sup>
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor			PT	Peat	

<sup>A</sup> Based on the material passing the 3-in. (75-mm) sieve.

<sup>B</sup> If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

<sup>C</sup> Gravels with 5 to 12 % fines require dual symbols:

- 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

<sup>D</sup>  $Cu = D_{60}/D_{10}$   $Cc = (D_{30})^2 / D_{10} \times D_{60}$

<sup>E</sup> If soil contains  $\geq 15$  % sand, add "with sand" to group name.

<sup>F</sup> If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

<sup>G</sup> If fines are organic, add "with organic fines" to group name.

<sup>H</sup> Sands with 5 to 12 % fines require dual symbols:

- 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

<sup>I</sup> If soil contains  $\geq 15$  % gravel, add "with gravel" to group name.

<sup>J</sup> If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

<sup>K</sup> If soil contains 15 to <30 % plus No. 200, add "with sand" or "with gravel," whichever is predominant.

<sup>L</sup> If soil contains  $\geq 30$  % plus No. 200, predominantly sand, add "sand" to group name.

<sup>M</sup> If soil contains  $\geq 30$  % plus No. 200, predominantly gravel, add "gravelly" to group name.

<sup>N</sup>  $PI \geq 4$  and plots on or above "A" line.

<sup>O</sup>  $PI < 4$  or plots below "A" line.

<sup>P</sup>  $PI$  plots on or above "A" line.

<sup>Q</sup>  $PI$  plots below "A" line.

D3740 are generally considered capable of competent and objective testing. Users of this test method are cautioned that compliance with Practice D3740 does not in itself assure reliable testing. Reliable testing depends on several factors; Practice D3740 provides a means for evaluating some of those factors.

## 6. Apparatus

6.1 In addition to the apparatus that may be required for obtaining and preparing the samples and conducting the prescribed laboratory tests, a plasticity chart, similar to Fig. 4, and a cumulative particle-size distribution curve, similar to Fig. 5, are required.

NOTE 6—The "U" line shown on Fig. 4 has been empirically determined to be the approximate "upper limit" for natural soils. It is a good check against erroneous data, and any test results that plot above or to the left of it should be verified.

## 7. Sampling

7.1 Samples shall be obtained and identified in accordance with a method or methods, recommended in Guide D420 or by other accepted procedures.

7.2 Test Methods D6913 provides guidance on selecting size of specimen. Two test methods are provided in this standard. The methods differ in the significant digits recorded

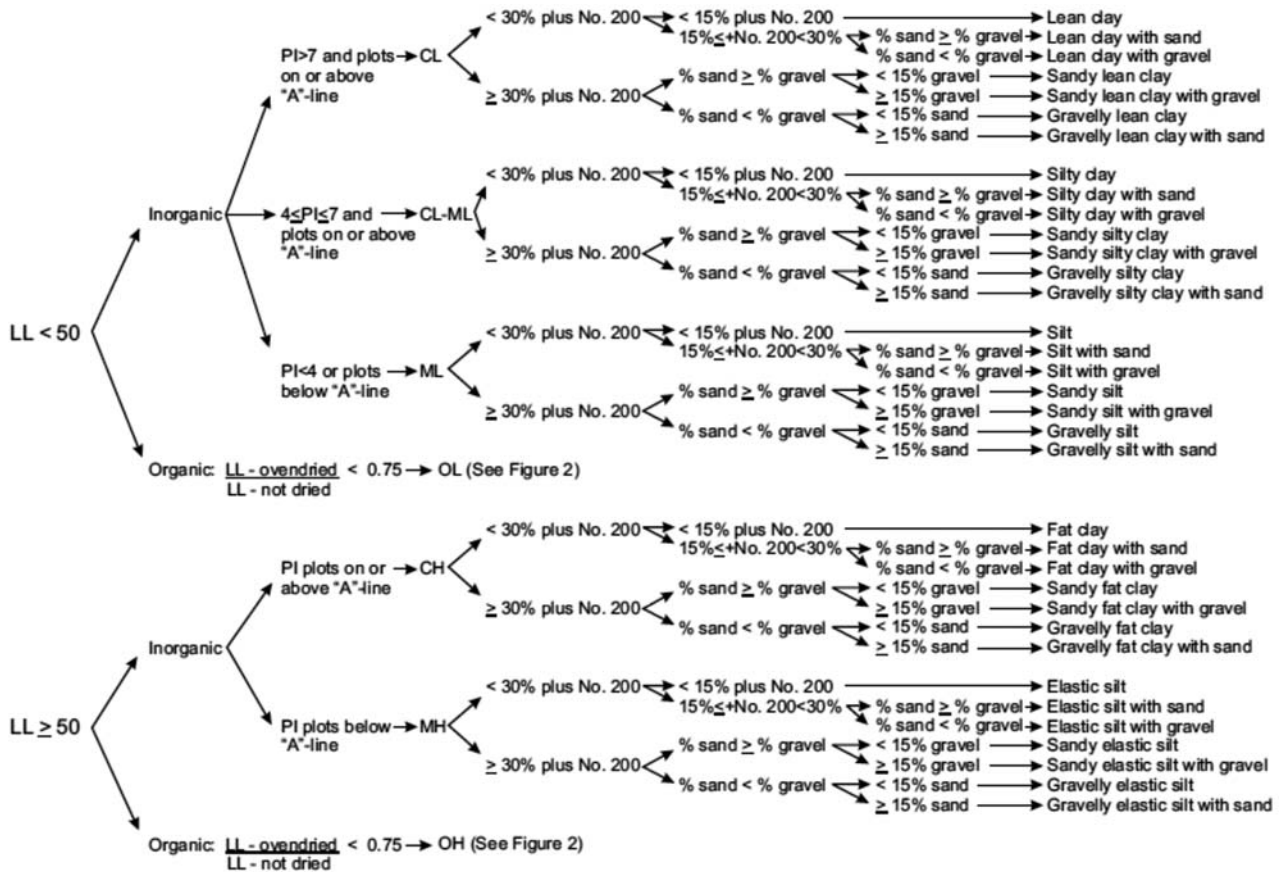


FIG. 1 Flow Chart for Classifying Fine-Grained Soil (50 % or More Passes No. 200 Sieve)

and the size of the specimen (mass) required. The method to be used may be specified by the requesting authority; otherwise Method A shall be performed. Whenever possible, the field samples should have weights two to four times larger than shown.

7.3 If the field sample or test specimen is smaller than the minimum recommended amount, the report shall include an appropriate remark.

8. Classification of Peat

8.1 A sample composed primarily of vegetable tissue in various stages of decomposition and has a fibrous to amorphous texture, a dark-brown to black color, and an organic odor should be designated as a highly organic soil and shall be classified as peat, PT, and not subjected to the classification procedures described hereafter.

8.2 If desired, classification of type of peat can be performed in accordance with Classification D4427.

9. Preparation for Classification

9.1 Before a soil can be classified according to this standard, generally the particle-size distribution of the minus 3-in. (75-mm) material and the plasticity characteristics of the minus No. 40 (425-µm) sieve material must be determined. See 9.8 for the specific required tests.

9.2 The preparation of the soil specimen(s) and the testing for particle-size distribution and liquid limit and plasticity index shall be in accordance with accepted standard procedures.

Two procedures for preparation of the soil specimens for testing for soil classification purposes are given in Appendixes X3 and X4. Appendix X3 describes the wet preparation method and is the preferred method for cohesive soils that have never dried out and for organic soils.

9.3 When reporting soil classifications determined by this standard, the preparation and test procedures used shall be reported or referenced.

9.4 Although the test procedure used in determining the particle-size distribution or other considerations may require a hydrometer analysis of the material, a hydrometer analysis is not necessary for soil classification.

9.5 The percentage (by dry weight) of any plus 3-in. (75-mm) material must be determined and reported as auxiliary information.

9.6 The maximum particle size shall be determined (measured or estimated) and reported as auxiliary information.

9.7 When the cumulative particle-size distribution is required, a set of sieves shall be used which include the following sizes (with the largest size commensurate with the maximum particle size) with other sieve sizes as needed or required to define the particle-size distribution:

- 3-in. (75-mm)
- ¾-in. (19.0-mm)
- No. 4 (4.75-mm)
- No. 10 (2.00-mm)
- No. 40 (425-µm)

No. 200 (75- $\mu$ m)

9.8 The tests required to be performed in preparation for classification are as follows:

9.8.1 For soils estimated to contain less than 5 % fines, a plot of the cumulative particle-size distribution curve of the fraction coarser than the No. 200 (75- $\mu$ m) sieve is required. A semi-log plot of percent passing versus particle-size or sieve size/sieve number is plotted as shown in Fig. 5.

9.8.2 For soils estimated to contain 5 to 15 % fines, a cumulative particle-size distribution curve, as described in 9.8.1, is required, and the liquid limit and plasticity index are required.

9.8.2.1 If sufficient material is not available to determine the liquid limit and plasticity index, the fines should be estimated to be either silty or clayey using the procedures described in Practice D2488 and so noted in the report.

9.8.3 For soils estimated to contain 15 % or more fines, a determination of the percent fines, percent sand, and percent gravel is required, and the liquid limit and plasticity index are required. For soils estimated to contain 90 % fines or more, the percent fines, percent sand, and percent gravel may be estimated using the procedures described in Practice D2488 and so noted in the report.

## 10. Preliminary Classification Procedure

10.1 Class the soil as fine-grained if 50 % or more by dry weight of the test specimen passes the No. 200 (75- $\mu$ m) sieve and follow Section 3.1.2.

10.2 Class the soil as coarse-grained if more than 50 % by dry weight of the test specimen is retained on the No. 200 (75- $\mu$ m) sieve and follow Section 12.

## 11. Procedure for Classification of Fine-Grained Soils

(50 % or more by dry weight passing the No. 200 (75- $\mu$ m) sieve)

11.1 The soil is an inorganic clay if the position of the plasticity index versus liquid limit plot, Fig. 4, falls on or above the “A” line, the plasticity index is greater than 4, and the presence of organic matter does not influence the liquid limit as determined in 11.3.2.

NOTE 7—The plasticity index and liquid limit are determined on the minus No. 40 (425  $\mu$ m) sieve material.

11.1.1 Classify the soil as a *lean clay*, CL, if the liquid limit is less than 50. See area identified as CL on Fig. 4.

11.1.2 Classify the soil as a *fat clay*, CH, if the liquid limit is 50 or greater. See area identified as CH on Fig. 4.

NOTE 8—In cases where the liquid limit exceeds 110 or the plasticity index exceeds 60, the plasticity chart may be expanded by maintaining the same scale on both axes and extending the “A” line at the indicated slope.

11.1.3 Classify the soil as a *silty clay*, CL-ML, if the position of the plasticity index versus liquid limit plot falls on or above the “A” line and the plasticity index is in the range of 4 to 7. See area identified as CL-ML on Fig. 4.

11.2 The soil is an inorganic silt if the position of the plasticity index versus liquid limit plot, Fig. 4, falls below the “A” line or the plasticity index is less than 4, and presence of organic matter does not influence the liquid limit as determined in 11.3.2.

11.2.1 Classify the soil as a *silt*, ML, if the liquid limit is less than 50. See area identified as ML on Fig. 4.

11.2.2 Classify the soil as an *elastic silt*, MH, if the liquid limit is 50 or greater. See area identified as MH on Fig. 4.

11.3 The soil is an organic silt or clay if organic matter is present in sufficient amounts to influence the liquid limit as determined in 11.3.2.

11.3.1 If the soil has a dark color and an organic odor when moist and warm, a second liquid limit test shall be performed on a test specimen which has been oven dried at  $110 \pm 5^\circ\text{C}$  to a constant weight, typically over night.

11.3.2 The soil is an organic silt or organic clay if the liquid limit after oven drying is less than 75 % of the liquid limit of the original specimen determined before oven drying.

11.3.3 Classify the soil as an *organic silt* or *organic clay*, OL, if the liquid limit (not oven dried) is less than 50 %. Classify the soil as an *organic silt*, OL, if the plasticity index is less than 4, or the position of the plasticity index versus liquid limit plot falls below the “A” line. Classify the soil as an *organic clay*, OL, if the plasticity index is 4 or greater and the position of the plasticity index versus liquid limit plot falls on or above the “A” line. See area identified as OL (or CL-ML) on Fig. 4.

11.3.4 Classify the soil as an *organic clay* or *organic silt*, OH, if the liquid limit (not oven dried) is 50 or greater. Classify the soil as an *organic silt*, OH, if the position of the plasticity index versus liquid limit plot falls below the “A” line. Classify

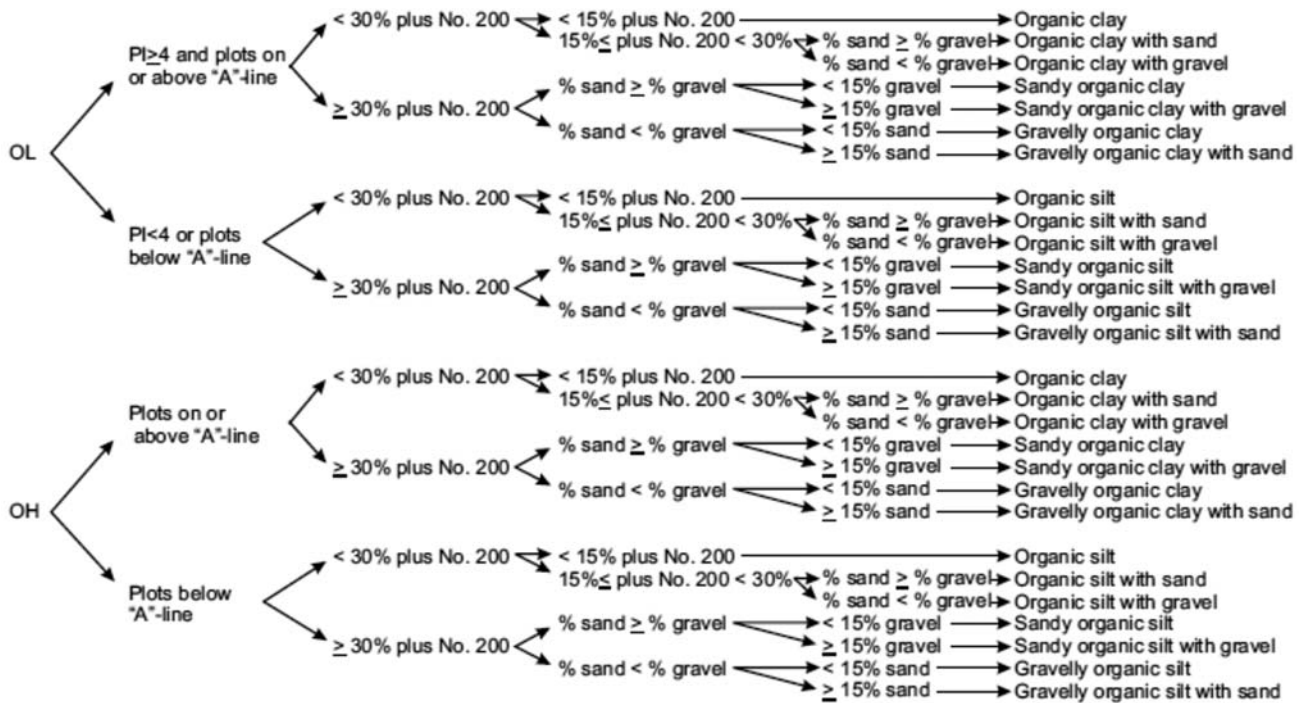


FIG. 2 Flow Chart for Classifying Organic Fine-Grained Soil (50 % or More Passes No. 200 Sieve)

the soil as an *organic clay*, OH, if the position of the plasticity index versus liquid-limit plot falls on or above the “A” line. See area identified as OH on Fig. 4.

11.4 If less than 30 % but 15 % or more of the test specimen is retained on the No. 200 (75-μm) sieve, the words “with sand” or “with gravel” (whichever is predominant) shall be added to the group name. For example, lean clay with sand, CL; silt with gravel, ML. If the percent of sand is equal to the percent of gravel, use “with sand.”

11.5 If 30 % or more of the test specimen is retained on the No. 200 (75-μm) sieve, the words “sandy” or “gravelly” shall be added to the group name. Add the word “sandy” if 30 % or more of the test specimen is retained on the No. 200 (75-μm) sieve and the coarse-grained portion is predominantly sand. Add the word “gravelly” if 30 % or more of the test specimen is retained on the No. 200 (75-μm) sieve and the coarse-grained portion is predominantly gravel. For example, sandy lean clay, CL; gravelly fat clay, CH; sandy silt, ML. If the percent of sand is equal to the percent of gravel, use “sandy.”

## 12. Procedure for Classification of Coarse-Grained Soils

(more than 50 % retained on the No. 200 (75-μm) sieve)

12.1 Class the soil as gravel if more than 50 % of the coarse fraction [plus No. 200 (75-μm) sieve] is retained on the No. 4 (4.75-mm) sieve.

12.2 Class the soil as sand if 50 % or more of the coarse fraction [plus No. 200 (75-μm) sieve] passes the No. 4 (4.75-mm) sieve.

12.3 If 12 % or less of the test specimen passes the No. 200 (75-μm) sieve, plot the cumulative particle-size distribution, Fig. 5, and compute the coefficient of uniformity,  $C_u$ , and coefficient of curvature,  $C_c$ , as given in Eqs 1 and 2.

$$C_u = D_{60}/D_{10} \quad (1)$$

$$C_c = (D_{30})^2 / (D_{10} \times D_{60}) \quad (2)$$

where:

$D_{10}$ ,  $D_{30}$ , and  $D_{60}$  = the particle-size diameters corresponding to 10, 30, and 60 %, respectively, passing on the cumulative particle-size distribution curve, Fig. 5.

NOTE 9—It may be necessary to extrapolate the curve to obtain the  $D_{10}$  diameter.

12.3.1 If less than 5 % of the test specimen passes the No. 200 (75-μm) sieve, classify the soil as a *well-graded gravel*, GW, or *well-graded sand*, SW, if  $C_u$  is greater than or equal to 4.0 for gravel or greater than 6.0 for sand, and  $C_c$  is at least 1.0 but not more than 3.0.

12.3.2 If less than 5 % of the test specimen passes the No. 200 (75-μm) sieve, classify the soil as *poorly graded gravel*, GP, or *poorly graded sand*, SP, if either the  $C_u$  or the  $C_c$  criteria for well-graded soils are not satisfied.

12.4 If more than 12 % of the test specimen passes the No. 200 (75-μm) sieve, the soil shall be considered a coarse-grained soil with fines. The fines are determined to be either clayey or silty based on the plasticity index versus liquid limit plot on Fig. 4. (See 9.8.2.1 if insufficient material available for testing) (see Note 7).

12.4.1 Classify the soil as a *clayey gravel*, GC, or *clayey sand*, SC, if the fines are clayey, that is, the position of the plasticity index versus liquid limit plot, Fig. 4, falls on or above the “A” line and the plasticity index is greater than 7.

12.4.2 Classify the soil as a *silty gravel*, GM, or *silty sand*, SM, if the fines are silty, that is, the position of the plasticity index versus liquid limit plot, Fig. 4, falls below the “A” line or the plasticity index is less than 4.

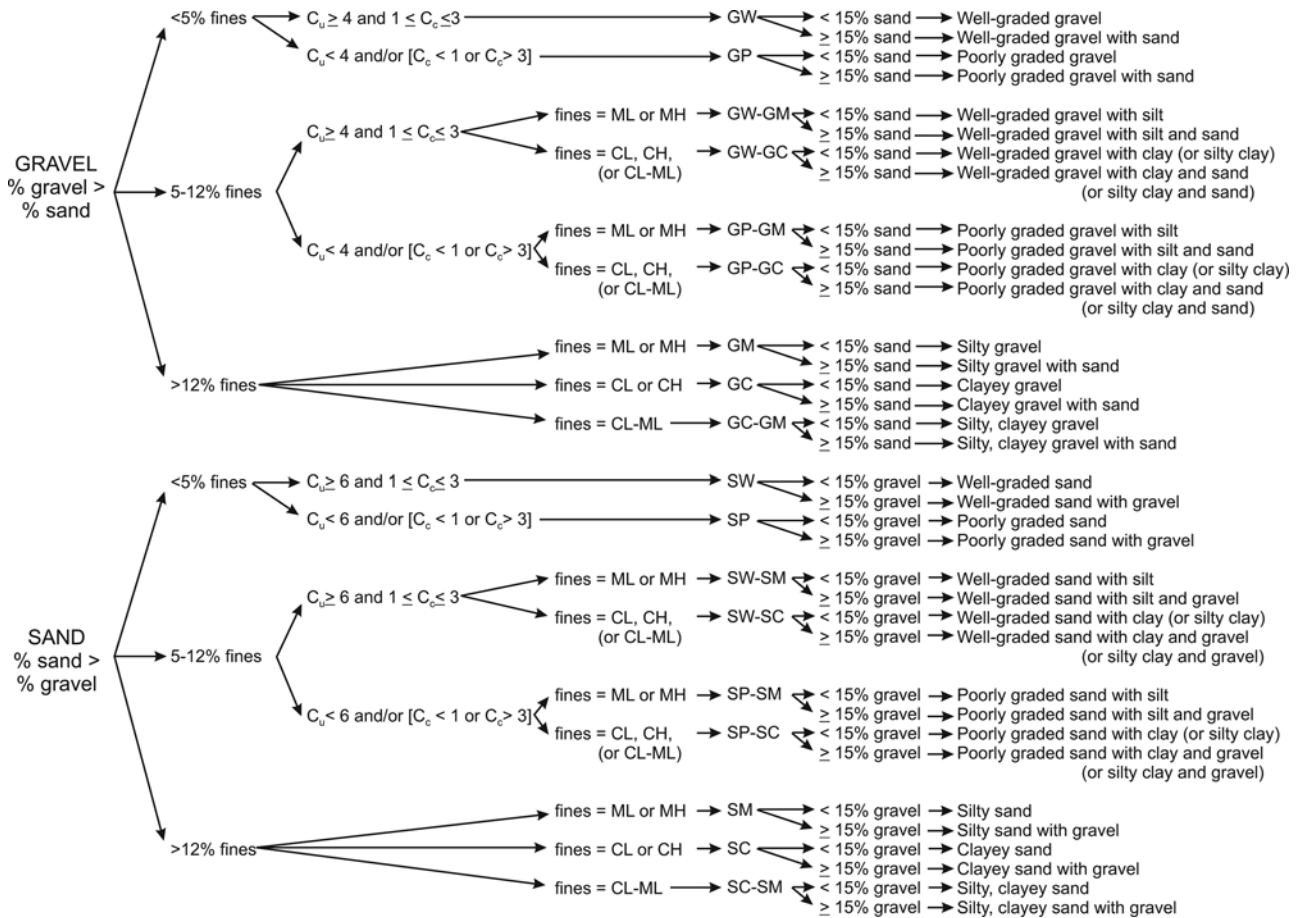


FIG. 3 Flow Chart for Classifying Coarse-Grained Soils (More Than 50 % Retained on No. 200 Sieve)

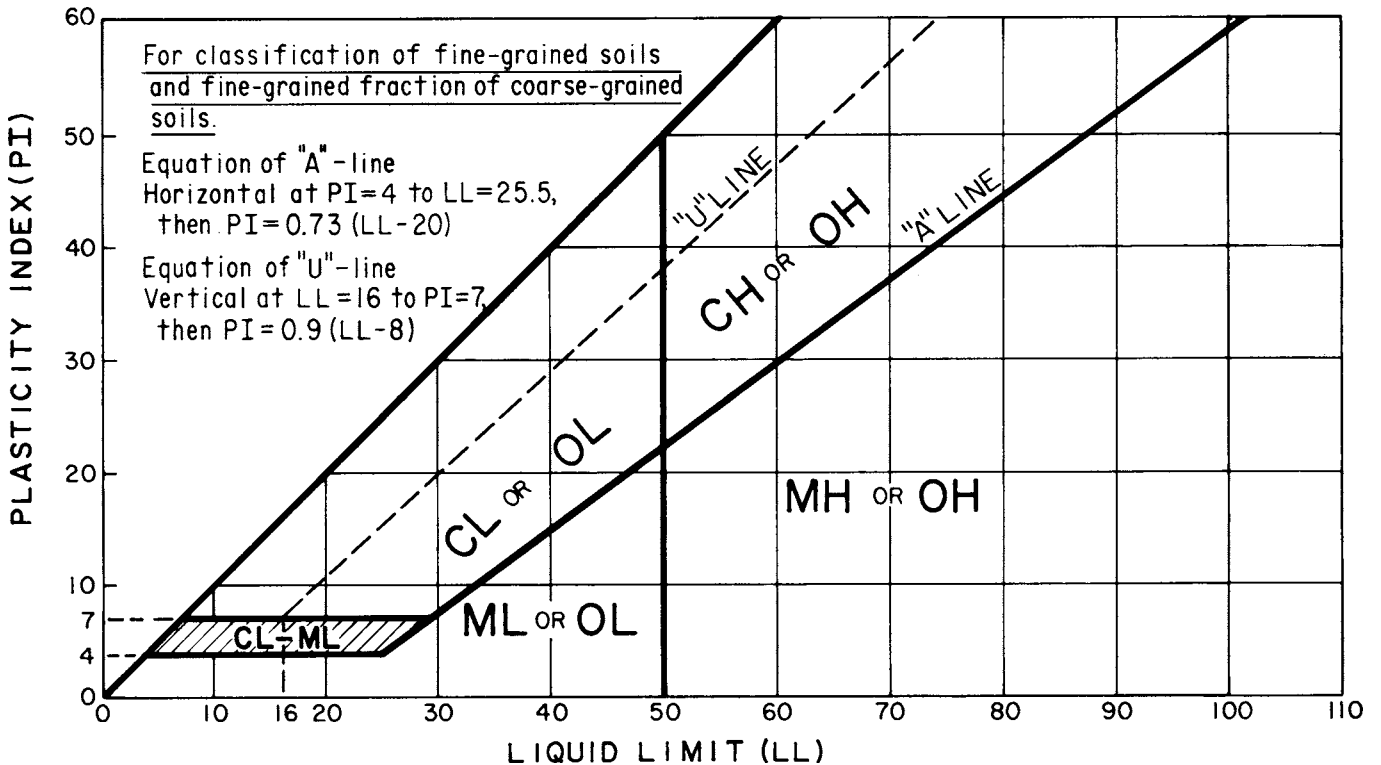
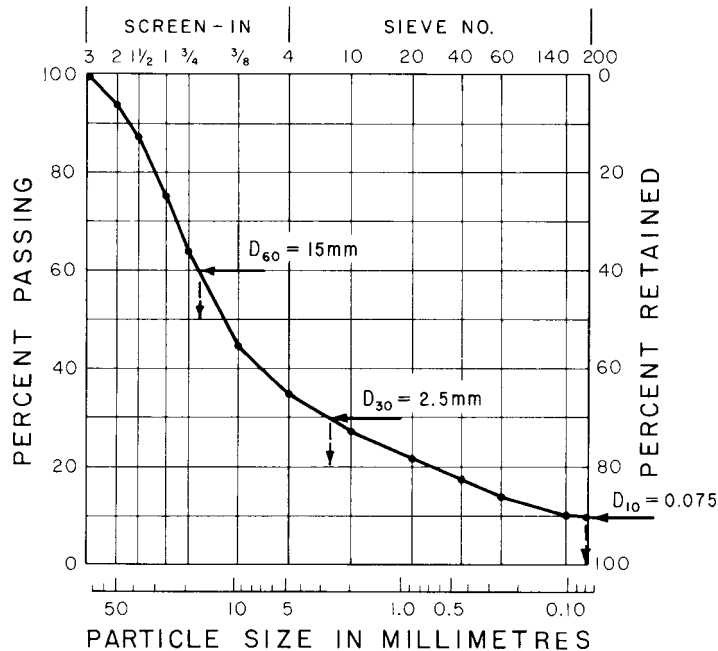


FIG. 4 Plasticity Chart

SIEVE ANALYSIS



$$C_u = \frac{D_{60}}{D_{10}} = \frac{15}{0.075} = 200 \quad C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = \frac{(2.5)^2}{0.075 \times 15} = 5.6$$

FIG. 5 Cumulative Particle-Size Plot

12.4.3 If the fines plot as a silty clay, CL-ML, classify the soil as a *silty, clayey gravel*, GC-GM, if it is a gravel or a *silty, clayey sand*, SC-SM, if it is a sand.

12.5 If 5 to 12 % of the test specimen passes the No. 200 (75-µm) sieve, give the soil a dual classification using two group symbols.

12.5.1 The first group symbol shall correspond to that for a gravel or sand having less than 5 % fines (GW, GP, SW, SP), and the second symbol shall correspond to a gravel or sand having more than 12 % fines (GC, GM, SC, SM).

12.5.2 The group name shall correspond to the first group symbol plus “with clay” or “with silt” to indicate the plasticity characteristics of the fines. For example, well-graded gravel with clay, GW-GC; poorly graded sand with silt, SP-SM (See 9.8.2.1 if insufficient material available for testing).

NOTE 10—If the fines plot as a *silty clay*, CL-ML, the second group symbol should be either GC or SC. For example, a poorly graded sand with 10 % fines, a liquid limit of 20, and a plasticity index of 6 would be classified as a poorly graded sand with silty clay, SP-SC.

12.6 If the specimen is predominantly sand or gravel but contains 15 % or more of the other coarse-grained constituent, the words “with gravel” or “with sand” shall be added to the group name. For example, poorly graded gravel with sand, clayey sand with gravel.

12.7 If the field sample contained any cobbles or boulders or both, the words “with cobbles,” or “with cobbles and boulders” shall be added to the group name. For example, silty gravel with cobbles, GM.

13. Report

13.1 The report should include the group name, group symbol, and the results of the laboratory tests. The particle-size distribution shall be given in terms of percent of gravel, sand, and fines. The plot of the cumulative particle-size distribution curve shall be reported if used in classifying the soil. Report appropriate descriptive information according to the procedures in Practice D2488. A local or commercial name or geologic interpretation for the material may be added at the end of the descriptive information if identified as such. The test procedures used shall be referenced.

NOTE 11—Example: *Clayey Gravel with Sand and Cobbles* (GC)—46 % fine to coarse, hard, subrounded gravel; 30 % fine to coarse, hard, subrounded sand; 24 % clayey fines, LL = 38, PI = 19; weak reaction with HCl; original field sample had 4 % hard, subrounded cobbles; maximum dimension 150 mm.

In-Place Conditions—firm, homogeneous, dry, brown,  
Geologic Interpretation—alluvial fan.

NOTE 12—Other examples of soil descriptions are given in Appendix X1.

14. Precision and Bias

14.1 Criteria for acceptability depends on the precision and bias of Test Methods D422, D1140 and D4318.

15. Keywords

15.1 Atterberg limits; classification; clay; gradation; gravel; laboratory classification; organic soils; sand; silt; soil classification; soil tests

## APPENDIXES

### (Nonmandatory Information)

#### X1. EXAMPLES OF DESCRIPTIONS USING SOIL CLASSIFICATION

X1.1 The following examples show how the information required in 13.1 can be reported. The appropriate descriptive information from Practice D2488 is included for illustrative purposes. The additional descriptive terms that would accompany the soil classification should be based on the intended use of the classification and the individual circumstances.

X1.1.1 *Well-Graded Gravel with Sand (GW)*—73 % fine to coarse, hard, subangular gravel; 23 % fine to coarse, hard, subangular sand; 4 % fines; Cc = 2.7, Cu = 12.4.

X1.1.2 *Silty Sand with Gravel (SM)*—61 % predominantly fine sand; 23 % silty fines, LL = 33, PI = 6; 16 % fine, hard, subrounded gravel; no reaction with HCl; (field sample smaller than recommended). *In-Place Conditions*—Firm, stratified and contains lenses of silt 1 to 2 in. thick, moist, brown to gray; in-place density = 106 lb/ft<sup>3</sup> and in-place moisture = 9 %.

X1.1.3 *Organic Clay (OL)*—100 % fines, LL (not dried) = 32, LL (oven dried) = 21, PI (not dried) = 10; wet, dark brown, organic odor, weak reaction with HCl.

X1.1.4 *Silty Sand with Organic Fines (SM)*—74 % fine to coarse, hard, subangular reddish sand; 26 % organic and silty dark-brown fines, LL (not dried) = 37, LL (oven dried) = 26, PI (not dried) = 6, wet, weak reaction with HCl.

X1.1.5 *Poorly Graded Gravel with Silt, Sand, Cobbles and Boulders (GP-GM)*—78 % fine to coarse, hard, subrounded to subangular gravel; 16 % fine to coarse, hard, subrounded to subangular sand; 6 % silty (estimated) fines; moist, brown; no reaction with HCl; original field sample had 7 % hard, subrounded cobbles and 2 % hard, subrounded boulders with a maximum dimension of 18 in.

#### X2. USING SOIL CLASSIFICATION AS A DESCRIPTIVE SYSTEM FOR SHALE, CLAYSTONE, SHELLS, SLAG, CRUSHED ROCK, ETC.

X2.1 The group names and symbols used in this standard may be used as a descriptive system applied to materials that exist in situ as shale, claystone, sandstone, siltstone, mudstone, etc., but convert to soils after field or laboratory processing (crushing, slaking, etc.).

X2.2 Materials such as shells, crushed rock, slag, etc., should be identified as such. However, the procedures used in this standard for describing the particle size and plasticity characteristics may be used in the description of the material. If desired, a classification in accordance with this standard may be assigned to aid in describing the material.

X2.3 If a classification is used, the group symbol(s) and group names should be placed in quotation marks or noted with some type of distinguishing symbol. See examples.

##### **X2.4 Examples of how soil classifications could be incorporated into a description system for materials that are not naturally occurring soils are as follows:**

X2.4.1 *Shale Chunks*—Retrieved as 2- to 4-in. pieces of shale from power auger hole, dry, brown, no reaction with HCl.

After laboratory processing by slaking in water for 24 h, material classified as “Sandy Lean Clay (CL)”—61 % clayey fines, LL = 37, PI = 16; 33 % fine to medium sand; 6 % gravel-size pieces of shale.

X2.4.2 *Crushed Sandstone*—Product of commercial crushing operation; “Poorly Graded Sand with Silt (SP-SM)”—91 % fine to medium sand; 9 % silty (estimated) fines; dry, reddish-brown, strong reaction with HCl.

X2.4.3 *Broken Shells*—65 % gravel-size broken shells; 31 % sand and sand-size shell pieces; 4 % fines; Cc = 2.4, Cu = 1.9; would be classified as “Poorly Graded Gravel with Sand (GP)”.

X2.4.4 *Crushed Rock*—Processed gravel and cobbles from Pit No. 7; “Poorly Graded Gravel (GP)”—89 % fine, hard, angular gravel-size particles; 11 % coarse, hard, angular sand-size particles, dry, tan; no reaction with HCl; Cc = 2.4, Cu = 0.9.



### X3. PREPARATION AND TESTING FOR CLASSIFICATION PURPOSES BY THE WET METHOD

X3.1 This appendix describes the steps in preparing a soil sample for testing for purposes of soil classification using a wet-preparation procedure.

X3.2 Samples prepared in accordance with this procedure should contain as much of their natural water content as possible and every effort should be made during obtaining, preparing, and transporting the samples to maintain the natural moisture.

X3.3 The procedures to be followed in this standard assume that the field sample contains fines, sand, gravel, and plus 3-in. (75-mm) particles and the cumulative particle-size distribution plus the liquid limit and plasticity index values are required (see 9.8). Some of the following steps may be omitted when they are not applicable to the soil being tested.

X3.4 If the soil contains plus No. 200 (75- $\mu$ m) particles that would degrade during dry sieving, use a test procedure for determining the particle-size characteristics that prevents this degradation.

X3.5 Since this classification system is limited to the portion of a sample passing the 3-in. (75-mm) sieve, the plus 3-in. (75-mm) material shall be removed prior to the determination of the particle-size characteristics and the liquid limit and plasticity index.

#### X3.6 The portion of the field sample finer than the 3-in. (75-mm) sieve shall be obtained as follows:

X3.6.1 Separate the field sample into two fractions on a 3-in. (75-mm) sieve, being careful to maintain the natural water content in the minus 3-in. (75-mm) fraction. Any particles adhering to the plus 3-in. (75-mm) particles shall be brushed or wiped off and placed in the fraction passing the 3-in. (75-mm) sieve.

X3.6.2 Determine the air-dry or oven-dry weight of the fraction retained on the 3-in. (75-mm) sieve. Determine the total (wet) weight of the fraction passing the 3-in. (75-mm) sieve.

X3.6.3 Thoroughly mix the fraction passing the 3-in. (75-mm) sieve. Determine the water content, in accordance with Test Method D2216, of a representative specimen with a minimum dry weight as required in 7.2. Save the water-content specimen for determination of the particle-size analysis in accordance with X3.8.

X3.6.4 Compute the dry weight of the fraction passing the 3-in. (75-mm) sieve based on the water content and total (wet) weight. Compute the total dry weight of the sample and calculate the percentage of material retained on the 3-in. (75-mm) sieve.

#### X3.7 Determine the liquid limit and plasticity index as follows:

X3.7.1 If the soil disaggregates readily, mix on a clean, hard surface and select a representative sample by quartering in accordance with Practice C702.

X3.7.1.1 If the soil contains coarse-grained particles coated with and bound together by tough clayey material, take extreme care in obtaining a representative portion of the No. 40 (425- $\mu$ m) fraction. Typically, a larger portion than normal has to be selected, such as the minimum weights required in 7.2.

X3.7.1.2 To obtain a representative specimen of a basically cohesive soil, it may be advantageous to pass the soil through a 3/4-in. (19-mm) sieve or other convenient size so the material can be more easily mixed and then quartered or split to obtain the representative specimen.

X3.7.2 Process the representative specimen in accordance with the Wet Preparation Method in Test Method D4318.

X3.7.3 Perform the liquid-limit test in accordance with Test Method D4318, except the soil shall not be air dried prior to the test.

X3.7.4 Perform the plastic-limit test in accordance with Test Method D4318, except the soil shall not be air dried prior to the test, and calculate the plasticity index.

#### X3.8 Determine the particle-size distribution as follows:

X3.8.1 If the water content of the fraction passing the 3-in. (75-mm) sieve was required (X3.6.3), use the water-content specimen for determining the particle-size distribution. Otherwise, select a representative specimen in accordance with Practice C702 with a minimum dry weight as required in 7.2.

X3.8.2 If the cumulative particle-size distribution including a hydrometer analysis is required, determine the particle-size distribution in accordance with Test Method D422. See 9.7 for the set of required sieves.

X3.8.3 If the cumulative particle-size distribution without a hydrometer analysis is required, determine the particle-size distribution in accordance with Test Method C136. See 9.7 for the set of required sieves. The specimen should be soaked until all clayey aggregations have softened and then washed in accordance with Test Method C117 prior to performing the particle-size distribution.

X3.8.4 If the cumulative particle-size distribution is not required, determine the percent fines, percent sand, and percent gravel in the specimen in accordance with Test Method C117, being sure to soak the specimen long enough to soften all clayey aggregations, followed by Test Method C136 using a nest of sieves which shall include a No. 4 (4.75-mm) sieve and a No. 200 (75- $\mu$ m) sieve.

X3.8.5 Calculate the percent fines, percent sand, and percent gravel in the minus 3-in. (75-mm) fraction for classification purposes.

#### X4. AIR-DRIED METHOD OF PREPARATION OF SOILS FOR TESTING FOR CLASSIFICATION PURPOSES

X4.1 This appendix describes the steps in preparing a soil sample for testing for purposes of soil classification when air-drying the soil before testing is specified or desired or when the natural moisture content is near that of an air-dried state.

X4.2 If the soil contains organic matter or mineral colloids that are irreversibly affected by air drying, the wet-preparation method as described in Appendix X3 should be used.

X4.3 Since this classification system is limited to the portion of a sample passing the 3-in. (75-mm) sieve, the plus 3-in. (75-mm) material shall be removed prior to the determination of the particle-size characteristics and the liquid limit and plasticity index.

**X4.4 The portion of the field sample finer than the 3-in. (75-mm) sieve shall be obtained as follows:**

X4.4.1 Air dry and weigh the field sample.

X4.4.2 Separate the field sample into two fractions on a 3-in. (75-mm) sieve.

X4.4.3 Weigh the two fractions and compute the percentage of the plus 3-in. (75-mm) material in the field sample.

X4.5 Determine the particle-size distribution and liquid

limit and plasticity index as follows (see 9.8 for when these tests are required):

X4.5.1 Thoroughly mix the fraction passing the 3-in. (75-mm) sieve.

X4.5.2 If the cumulative particle-size distribution including a hydrometer analysis is required, determine the particle-size distribution in accordance with Test Method D422. See 9.7 for the set of sieves that is required.

X4.5.3 If the cumulative particle-size distribution without a hydrometer analysis is required, determine the particle-size distribution in accordance with Test Method D1140 followed by Test Method C136. See 9.7 for the set of sieves that is required.

X4.5.4 If the cumulative particle-size distribution is not required, determine the percent fines, percent sand, and percent gravel in the specimen in accordance with Test Method D1140 followed by Test Method C136 using a nest of sieves which shall include a No. 4 (4.75-mm) sieve and a No. 200 (75- $\mu$ m) sieve.

X4.5.5 If required, determine the liquid limit and the plasticity index of the test specimen in accordance with Test Method D4318.

#### X5. ABBREVIATED SOIL CLASSIFICATION SYMBOLS

X5.1 In some cases, because of lack of space, an abbreviated system may be useful to indicate the soil classification symbol and name. Examples of such cases would be graphical logs, databases, tables, etc.

X5.2 This abbreviated system is not a substitute for the full name and descriptive information but can be used in supplementary presentations when the complete description is referenced.

**X5.3 The abbreviated system should consist of the soil classification symbol based on this standard with appropriate lower case letter prefixes and suffixes as:**

Prefix

Suffix

s = sandy  
g = gravelly

s = with sand  
g = with gravel  
c = cobbles  
b = boulders

**X5.4 The soil classification symbol is to be enclosed in parentheses. Some examples would be:**

Group Symbol and Full Name	Abbreviated
CL, Sandy lean clay	s(CL)
SP-Sm, Poorly graded sand with silt and gravel	(SP-SM)g
GP, poorly graded gravel with sand, cobbles, and boulders	(GP)scb
ML, gravelly silt with sand and cobbles	g(ML)sc

**SUMMARY OF CHANGES**

Committee D18 has identified the location of selected changes to this practice since the last issue, D2487–10, that may impact the use of this practice. (Approved May 1, 2011)

(I) Deleted reference to Practice D2217 in **11.3.2** and **X3.7.2**.

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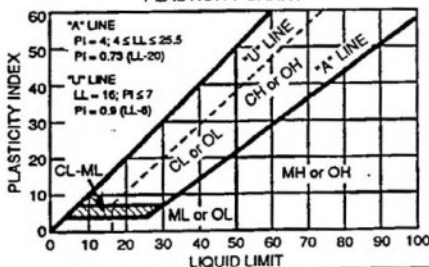
# UNIFIED SOIL CLASSIFICATION SYSTEM

Soils are visually classified for engineering purposes by the Unified Soil Classification System. Grain-size analyses and Atterberg Limits tests often are performed on selected samples to aid in classification. The classification system is briefly outlined on this chart. Graphic symbols are used on boring logs presented in this report. For a more detailed description of the system, see "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)" ASTM Designation: 2488-84 and "Standard Test Method for Classification of Soils for Engineering Purposes" ASTM Designation: 2487-85.

MAJOR DIVISIONS		GRAPHIC SYMBOL	GROUP SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS Less than 50% passes No. 200 sieve	GRAVELS (50% or less of coarse fraction passes No. 4 sieve)		GW	Well graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures
			GP	Poorly graded gravels, gravel-sand mixtures, or sand-gravel-cobble mixtures
			GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS (50% or more of coarse fraction passes No. 4 sieve)		SW	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
		SM	Silty sands, sand-silt mixtures	
		SC	Clayey sands, sand-clay mixtures	
FINE-GRAINED SOILS (50% or more passes No. 200 sieve)		ML	Inorganic silts, clayey silts of low to medium plasticity	
		MH	Inorganic silts, micaceous or diatomaceous silty soils, elastic silts	
		CL	Inorganic clays of low to medium plasticity, gravelly, sandy, and silty clays	
		CH	Inorganic clays of high plasticity, fat clays, sandy clays of high plasticity	
		OL	Organic silts and clays of low to medium plasticity, sandy organic silts and clays	
		OH	Organic silts and clays of high plasticity, sandy organic silts and clays	
ORGANIC SOILS	PRIMARYLY ORGANIC MATTER (dark in color and organic odor)	PT	Peat	

NOTE: Coarse-grained soils with between 5% and 12% passing the No. 200 sieve and fine-grained soils with limits plotting in the hatched zone on the plasticity chart have dual classifications.

PLASTICITY CHART



DEFINITION OF SOIL FRACTIONS

SOIL COMPONENT	PARTICLE SIZE RANGE
Boulders	Above 12 in.
Cobbles	12 in. to 3 in.
Gravel	3 in. to No. 4 sieve
Coarse gravel	3 in. to 3/4 in.
Fine gravel	3/4 in. to No. 4 sieve
Sand	No. 4 to No. 200 sieve
Coarse sand	No. 4 to No. 10 sieve
Medium sand	No. 10 to No. 40 sieve
Fine sand	No. 40 to No. 200 sieve
Fines (silt and clay)	Less than No. 200 sieve




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# STANDARD OPERATING PROCEDURE

QA204 - Soil Sample Collection and Laboratory Preparation

06/2022

## Review and Approval

Developed By:  Date: 3/4/2022  
Joe McClellan

Reviewed By (PM):  Date: 6/1/2022  
Dan Rangitsch

Approved By (QA Manager): \_\_\_\_\_ Date: \_\_\_\_\_

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# STANDARD OPERATING PROCEDURE – SOIL SAMPLE COLLECTION AND LABORATORY PREPARATION

## Section 1: Introduction

### **Section 1.1: Purpose**

The purpose for the following Standard Operating Procedure is to describe the process for proper soil sampling techniques and additional laboratory preparation when dropping off samples at the laboratory. The following document was written in accordance with MPCA’s “Soil Sample Collection and Analysis Procedures” and should be used by all KJL personnel when performing these activities.

### **Section 1.2: Scope**

The following document and all corresponding procedures must be implemented by all KJL personnel in the collection or laboratory submittal of soil samples. Procedures outlined in this document are only applicable for soil grab sampling, composite soil sampling, stockpile soil sampling, split spoon sampling, hand auger sampling, push probe sampling, and test pit soil sampling and no substitutions for sampling methodologies may be implemented without prior approval by the Project Manager.

### **Section 1.3: Definitions:**

Grab Sample – a single sample collected at one location and one point in time

Composite Sample – a mixture of multiple soil samples collected to create a uniform sample from multiple sample points

Test Pit – an excavation mechanically dug by an excavator to evaluate below grade conditions

Split Spoon – a single tube split into two equal halves lengthwise to retrieve a subsurface soil sample using a drill rig to access below grade materials

Push Probe – a dual tube sampler to retrieve a subsurface soil sample using a drill rig to access below grade material

### **Section 1.4: Precautions:**

Use this SOP in conjunction with the **KJL Health and Safety Plan** and the following SOPs: **Chain-of- Custody Procedures** and **Organic Vapor Screening**.

### **Section 1.5: Responsibility**

Sampler – The sampler is responsible for collecting representative soil samples, accurately labeling, documentation of pertinent data, and additional sample preparation as identified during the sampling event.

Project Manager –The project manager is responsible for the overall success of the sampling event and will ensure the sample collection, documentation, and submittal meet all regulatory requirements as provided in this SOP.

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## **Section 1.6: Equipment:**

- » Safety PPE
- » Shovel, hand auger, hand trowel
- » Disposable nitrile gloves
- » Stainless steel spoon and bowl
- » Ice
- » Waterproof pens/markers
- » Decontamination equipment
- » Camera
- » Coring Device
- » T-handle probe samplers or scale (if T-handles probe samplers are not available)
- » Sealable 1-quart polyethylene freezer bags and 1-gallon polyethylene freezer bags
- » Sample Containers
- » Sample Labels
- » Sample Coolers
- » Custody seal
- » Chain-of-Custody form
- » Temperature Blanks
- » Trip Blanks
- » Bubble wrap/additional sample bags
- » Hand tools
- » Field map, sketch book, or ArcGIS online map

## **Section 2: Procedure**

### **Section 2.1: Pre-Sampling Preparation**

A few days in advance of the sampling event, the sampler should meet with the Project Manager to identify chemical of concern, proposed sample locations, soil sampling criteria, analytical parameters, sample nomenclature, obtain field maps/site plans, and to review the scope of work and additional background information.

Following the meeting, the sampler must submit a laboratory bottle order identifying the number of samples and analytical parameters to complete the sampling event. Make sure to order a few additional sample jars to account for potential breakage or additional sample collection during field activities.

Once the bottle order arrives, the sampler should review the bottle order to ensure the correct bottles have been delivered in addition to correct labels, trip blanks, temperature blanks, chain-of-custody forms, custody seals, bubble wrap, T-handle probe samplers, and additional packaging to protect each sample set. If the sampler is unfamiliar with the sampling containers, sample volumes, or specific laboratory procedures required for laboratory analysis, the sampler should request an explanation from the laboratory or discuss these sampling requirements with the project manager.

### **Section 2.2: Sampling Collection**

Prior to soil sample collection ensure that all sampling equipment has been decontaminated in compliance with the **Decontamination of Sampling Equipment** SOP. If soil samples will be collected for field screening purposes and laboratory analysis, make sure to collect two separate sample of the material and label each sample bag/container to easily identify the samples. Additionally, make sure the field screening sample is half filled for organic vapor reading purposes and confirm the sample collection and preparation areas are located up wind and away from the area of fuel powered equipment



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### **Grab Sample**

Grab soil sampling techniques must be used when collecting samples will be analyzed for volatile organic compounds (VOCs), specific Petroleum VOCs (PVOCs), gasoline range organics (GRO), and diesel range organics (DRO), but is also used for additional analyses as necessary (SVOCs, metals, PCB, PAHs, etc.)

- » Don a new disposable nitrile glove
- » Grab freshly exposed soil from the desired location/depth and place the sample into the appropriate sample bag or container. If necessary, use a decontaminated shovel or hand trowel to dig down 6" to obtain freshly exposed soil sample

### **Composite/Stockpile Sample**

Composite soil sampling may only be collected for non-volatile parameters such as metals, SVOCs, PCBs, PAHs. Pesticides, herbicides, and other parameters. The composite sampling process must consist of the following:

- » Determine the number of single samples that will comprise the composite/stockpile soil sample. MPCA guidance identifies composite soil sample to be comprised of 15 separate samples for characterization for off-site treatment/disposal.
- » Don new disposable nitrile gloves
- » Grab or scoop equal parts of the sample at random locations from the stockpile or soil source. Make sure samples are collected from freshly exposed soils or dig down 6" to obtain a fresh sample
- » Place the samples into a new sample collection devise or decontaminated container (stainless steel bowl or 1-gallon polyethylene freezer bag)
- » Mix the sub-samples thoroughly in the container or bag
- » Remove a single homogeneous sub-sample that will be utilized as the laboratory analysis sample

### **Split Spoon Sample**

- » Advance the split spoon to the desired depth
- » Don new disposable nitrile gloves
- » Collect and place the desired interval sample into a sealable 1-quart polyethylene bag as soon as possible after extraction

### **Hand Auger Sample**

- » Advance the hand auger to the desired depth
- » Don new disposable nitrile gloves
- » Collect and place the desired interval sample into a sealable 1-quart polyethylene bag as soon as possible after extraction

### **Push Probe Sample**

- » Advance the push-probe to the desired depth
- » Place the plastic liner (macrocore) on the cutting table
- » Note the top or bottom of the macrocore sample
- » Cut the macrocore lengthwise
- » Don new disposable nitrile gloves
- » Collect and place the desired 2-to-2.5-foot interval sample into a sealable 1-quart polyethylene bags as soon as possible after extraction

### **Test Pit Sample**

- 
- » Don a new disposable nitrile glove
  - » Grab freshly exposed soil from the excavator bucket from the desired location/depth and place the sample into the appropriate sample bag or container. Make sure to collect the sample from the center of the bucket to avoid cross contamination and ensure the material is representative of the desired sampling interval/location. If necessary, use a hand trowel to scoop the material into the polyethylene bag.

### **Section 2.3: Sample Preparation**

Upon collection of the soil samples, the following procedures will be implemented to prepare samples for laboratory analysis:

- » Identify specific analyses for each soil sample that will be submitted for laboratory analysis.
- » Fill out the appropriate label using a waterproof pen/marker with the following information:
  - Sample number
  - Sample depth
  - Date
  - Time
  - Sampler initials
  - Analysis
  - Preservatives
  - Project number/name (if necessary)
- » Adhere the label to the appropriate laboratory supplied container
- » Record the soil sample information to the Chain-of-Custody as outlined in the **Chain-of-Custody Procedures SOP**.
- » Don a new disposal pair of nitrile gloves
- » Remove any coarse gravel/rocks, organics, and debris when feasible
- » Transfer the sample interval contents into the laboratory supplied container using a stainless-steel spoon, new disposable nitrile glove, or T-handle probe sampler.
  - Details regarding specific parameters (DRO, GRO, VOCs, etc.) vary from one laboratory to another laboratory, therefore field personnel must be familiar with the laboratory requirements or request details for proper sample preparation.
- » Clean container threads if soil or debris is present
- » Secure the lid back on to the sample container
- » Clean the outside of the container using a damp paper towel (if necessary)
- » Place samples into additional bubble wrap or plastic containers
- » Immediately stored soil samples in a cooler on ice from the time of preparation until they arrive at the laboratory for analysis
- » One temperature blank per cooler and one trip blank for VOCs, PVOCs, and GRO samples should accompany each cooler until the samples are dropped off at the laboratory
- » Place Chain-of-custody into leakproof/waterproof containers inside the cooler
- » Close coolers and place a custody seal over the front opening
- » Initial the custody seal

## **Section 3: Quality Assurance and Quality Control**

Details regarding quality assurance and quality control are included throughout this SOP and must be followed.

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## Section 4: Reference Documents

Minnesota Pollution Control Agency “Soil Sample Collection and Analysis Procedures Guidance Document 4-04” (MPCA, 2021)

Minnesota Pollution Control Agency “Excavation of Petroleum-Contaminated Soil and Tank Removal Sampling” (MPCA, 2021)



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# STANDARD OPERATING PROCEDURE

QA501 - Decontamination of Sampling Equipment

06/2022

## Review and Approval

Developed By:  Date: 3/4/2022

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Reviewed By (PM):  Date: 6/1/2022

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# STANDARD OPERATING PROCEDURE – DECONTAMINATION OF SAMPLING EQUIPMENT

## Section 1: Introduction

### **Section 1.1: Purpose**

The purpose of this Standard Operating Procedure (SOP) is to describe the process for the proper decontamination of reusable sampling equipment used for soil, groundwater, soil vapor, asbestos, lead-paint, and polychlorinated biphenyls (PCB) caulking. This will reduce the potential for cross contamination to occur during the sampling event and will ensure the results are reflective of the actual material being sampled.

### **Section 1.2: Scope**

The procedures outlined in this document are mandatory for all employees when conducting soil, groundwater, soil vapor, suspect asbestos-containing materials, suspect lead-based paint, and suspect PCB containing caulking sampling. No substitutions for decontamination may be implemented without prior approval by the project manager and these decontamination procedures must be implemented prior to the collection of each sample.

### **Section 1.3: Definitions:**

Asbestos Containing Material (ACM) – Material that contains more than 1% asbestos by weight

Lead-Based Paint – Paint or other surface coatings that contain lead equal to or exceeding 1.00 milligrams per square centimeter, 0.5 percent by weight, or 5,000 parts per million by weight.

### **Section 1.4: Precautions:**

Use this SOP in conjunction with the **KLJ Health and Safety Plan** and the following SOPs: **Suspect Bulk Asbestos and Lead-Based Paint Sampling, Groundwater Sample Collection, Soil Sample Collection, and Soil Vapor Collection and Laboratory Preparation**. Additionally, any personnel involved in the sampling or decontamination of these materials must be properly trained, certified, and enrolled in KLJ specific training/programs as necessary. The personnel performing these activities should discuss these potential requirements prior to engaging in activities associated with the decontamination of these materials.

Do not attempt to decontaminate or reuse the following sampling equipment:

- » Nitrile gloves
- » Polyethylene tubing
- » Teflon tubing
- » Silicon tubing/sleeve
- » Vapor pin protective caps
- » Polyethylene sealable bags

These materials are to be disposed of after a single use and may not be reused for a second sample collection event.

### **Section 1.5: Responsibility**

Field Staff: The field staff is responsible for the proper decontamination procedures prior to and following the sampling event.

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Project Manager: The project manager will ensure that all field staff are properly trained and provided with the necessary decontamination supplies to successfully decontamination reusable sampling equipment during field activities.

### **Section 1.6: Equipment:**

- » PPE
- » Potable water
- » Spray bottles (polyethylene)
- » Distilled/deionized water
- » Cleaning detergent (Alconox or Liquinox )
- » Isopropyl alcohol
- » Nylon scrub brush
- » Paper towels
- » Disposable nitrile gloves
- » Clean 5-gallon bucket
- » Garbage Bags
- » Wet wipe
- » HEPA vacuum (ACM sampling)

## **Section 2: Procedure**

### **Section 2.1: Soil Sampling Equipment**

Soil sampling equipment that may need to be decontamination prior to or following sample collection may include hand augers, shovels and hand trowels and the decontaminator procedures are as follows:

- » Mix alconox/ liquinox with potable water in the clean 5-gallon bucket to the products recommendations
- » Remove bulk soil/debris materials from the equipment using a nitrile glove, paper towel, or scrub brush
- » Scrub the tool(s) with potable water and alconox/liquinnox mixture using a paper towel or scrub brush until all soil/debris has been removed from the hand tool
- » Rinse with distilled/deionized water
- » If soil/debris still remain repeat this process until no soil/debris remains on the sampling equipment

### **Section 2.2: Groundwater Sampling Equipment**

Groundwater sampling equipment that may need to be decontaminated prior to or following sample collection may include water level indicator, product level indicator, pumps or other sampling equipment and the decontamination procedures are as follows:

- » Wipe or remove any bulk soil/debris materials from the equipment using a nitrile glove, paper towel, or scrub brush
- » Scrub the equipment (inside and outside) with potable water and alconox/liquinnox mixture using a paper towel or scrub brush until all soil/debris is no longer present
- » Rinse with distilled/deionized water

If equipment has been in contact with free product or highly contaminated groundwater, follow these decontamination procedures:

- » Wash equipment using a diluted isopropyl alcohol solution

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- » Rinse with potable water
  - » Rinse with distilled/deionized water

### **Section 2.3: Soil Vapor Pin**

Soil vapor pins (brass or stainless steel) must be decontaminated prior to reuse using the following procedures:

- » Using hot water and alconox/liquinox mixture wash the vapor pins
- » Heat the oven to 265°F and heat the vapor pins for 8 minutes if brass pins are used and 30 minutes if stainless steel pins are used.

### **Section 2.4: Suspect Bulk Asbestos-Containing Materials, Suspect Lead-Based Paint, and Suspect PCB Caulking Sampling Equipment**

Sampling tools that may need to be decontaminated prior to or following sample collection may include hand tools, coring equipment, and drilling equipment and decontamination procedures are as follows:

- » Remove any bulk debris from the sampling equipment using a nitrile glove and wet wipe or damp paper towel
- » If debris remains on the equipment repeat this process until no debris remains on the sampling device

## **Section 3: Quality Assurance and Quality Control**

Quality Assurance and Quality Control procedures have been established to ensure the reliable results and avoid cross contamination.

## **Section 4: Reference Documents**

The following documents were referenced in the construction of this document and samplers should become familiar with the following regulatory documents prior to conducting decontamination procedures:

- » Pollution Control Agency “Soil Sample Collection and Analysis Procedures Guidance Document 4-04” (MPCA, 2021)
- » Minnesota Pollution Control Agency “Groundwater Sample Collection and Analysis Procedures Guidance Document 4-05” (MPCA, 2022)



**KLJ, INC.**  
**STAKING REQUEST FORM**

Contractor: \_\_\_\_\_ Project Name: Rail Park Drive Improvements

Owner: Flathead County Economic Development Authority Owner Project No.: \_\_\_\_\_ KLJ Project No: 2325-01621

Drawing No.	First Request	Re-staking Request	Staking Type and Location (Street, Utility, Stationing, etc.)	Offset Position (Side)	Offset Distance	Staking Interval	Date Area Ready	Date Staking To Be Utilized

Additional Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Requested by: \_\_\_\_\_  
 Contractor Representative

Date: \_\_\_\_\_

Received by: \_\_\_\_\_  
 KLJ Representative

Date: \_\_\_\_\_

Time: \_\_\_\_\_



TRANSMITTAL OF  
SHOP DRAWINGS  
OR SUBMITTALS

DATE:

NEW SUBMITTAL No.

RESUBMITTAL No.

TO: KLJ  
1830 3<sup>rd</sup> Ave E #201  
Kalispell, Montana 59901

FROM:

TRANSMITTAL NO:

KLJ PROJECT NO:  
2325-01621

ATTN: RYAN BLUMER, PE  
[ryan.blumer@kljeng.com](mailto:ryan.blumer@kljeng.com)

PROJECT TITLE: Rail Park Drive Improvements

LOCATION:

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED (Type, size, model number, etc.)	MANUFACTURER OR SUPPLIER	NO. OF COPIES	SPECIFICATION PARAGRAPH & PAGE NO.	DRAWING NO.	BID ITEM NO.
1						
2						
3						
4						
5						
6						
7						
8						

LIST ALL VARIANCES FROM CONTRACT DOCUMENT REQUIREMENTS:

I hereby certify that all Contractor's responsibilities under the Contract Documents with respect to review and submission of the above shop drawings or submittals have been satisfied that that each shop drawing or submittal has been stamped and/or marked to indicate Contractor's compliance with the submittal review requirements:

SIGNED: \_\_\_\_\_

(Name & Title of Contractor's Representative)



DATE:
RFI NO.

## RFI - REQUEST FOR INFORMATION

<b>TO:</b> KLJ <b>ATTN: RYAN BLUMER, PE</b> 1830 3 <sup>RD</sup> Ave E #201 Kalispell, Mt 59901	<b>Author RFI:</b>  <b>Author Title:</b>	<b>AUTHOR COMPANY:</b>				
<b>KLJ PROJECT NUMBER: 2325-01621</b>  <b>KLJ PROJECT DESCRIPTION:</b> <b>Rail Park Improvements</b>	<b>KLJ PROJECT LOCATION:</b>  <b>KALISPELL, MT</b>	<b>IMPORTANCE:</b>  <b>ANSWER COMPANY:</b>  <b>ANSWERED BY:</b>				
<b>SUBJECT:</b>	<b>DISCIPLINE:</b>	<b>CATEGORY:</b>				
<b>CONTRACTOR DOCUMENT REFERENCE: (If Applicable)</b>						
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<b>RESPONSE:</b>	<b>RESPONSE DATE:</b>					
<b>CC: RFI Log &amp; File</b>  <b>File:</b>						

NOTE: INCLUDE DRAWINGS, PHOTOS, PRODUCT DATA, SHOP DRAWINGS, AND OTHER INFORMATION NECESSARY TO FULLY DESCRIBE ITEMS NEEDING INTERPRETATION. SUPPLEMENTARY DRAWINGS PROVIDED BY THE CONTRACTOR SHALL INCLUDE DIMENSIONS, THICKNESSES, STRUCTURAL GRID REFERENCES, AND DETAILS OF AFFECTED MATERIALS ASSEMBLIES AND ATTACHMENTS