SPECIAL PROVISIONS

Montana Fish Wildlife and Parks
Specifications for Work Special Provisions

Contents

SPECIAL PROVISIONS

SP-1 REFERENCED DOCUMENTS

1.A The specifications for this project include by reference the following documents. Although they are not printed in this Project Manual, they are still made part of these Contract Documents and the Contractor shall be required to comply with any and all such regulations, unless modified herein.

Document: Montana Public Works Standard Specifications (MPWSS) Sixth Edition, April 2010

Available from: Montana Contractors Association ,1717 11th Avenue, P.O. Box 4519, Helena, MT 59604, (406)-442-4162

SP-2 DESCRIPTION

2.A **Base Bid:** Base Bid construction is generally described as the expansion and reinforcement of the east bank of Lake Elmo along the Lake Elmo road frontage, the expansion and reinforcement of the north-east bank of Lake Elmo east of the swimming beach, and procurement and stockpiling of bulk stone materials onsite for use by FWP to construct fish habitat structures. The Base Bid items include mobilization, demo, bank & basin grading, rip rap bank stabilization, block rock retaining wall construction, sandstone slab bank reinforcement, granite boulder placement, concrete pedestrian trail construction, topsoil import and placement, native seeding and site restoration, gravel & rip rap material supply and stockpile.

2.B **Additive Alternate A - West Jetty:** Additive Alternate A is generally described as the construction of a new fishing jetty on the west bank of Lake Elmo south of the boat ramp. Additive Alternate A bid items include bank & basin grading, rip rap bank stabilization, concrete pedestrian trail construction, topsoil import and placement, native seeding and site restoration.

2.C **Additive Alternate B – West Bank Restoration:** Additive Alternate B is generally described as the construction of bank projections to the north and south of the existing dog park on the west bank of Lake Elmo. Additive Alternate B bid items include bank & basin grading, block rock retaining wall construction, topsoil import and placement, native seeding and site restoration.

2.D **Additive Alternate C – South Jetty:** Additive Alternate C is generally described as the construction of a new fishing jetty on the south bank of Lake Elmo west of the fishing pier. Additive Alternate C bid items include bank & basin grading, rip rap bank stabilization, gravel pedestrian trail construction, topsoil import and placement, native seeding and site restoration.

SP-3 PROJECT RELATED CONTACTS

3.A Owner: Montana Fish Wildlife and Parks
Contact: Mr. Bardell Mangum

Design and Construction Project Manager
PO Box 200701
Helena, Montana 59620-0701
(406) 841-4012
bmangum@mt.gov

3.B Owner's Representative : Land Design Inc.
Contact: Mr. Michael Verseman
Project Manager
Land Design Inc.
1670 South 48th Street West
Billings, MT 59106
Ph: (406) 655-3550
michael@ldinc.net

SP-4 SITE INSPECTION

4.A All bidders should satisfy themselves as to the construction conditions by personal examination of the site described in this document. Bidders are encouraged to make any investigations necessary to assess the nature of the construction and the difficulties to be encountered.

SP-5 SOILS INFORMTION

5.A See provided Geotech report.

5.B Material suitable for fill of earthen embankment is shown on plans.

SP-6 SCHEDULE

6.A Work Outside of Contract

6.A.1 Work outside of contract includes lake draining and headgate construction.

6.A.2 Work included with lake draining includes all required permitting, and in-basin excavation to gravity drain the lake to approximately 5' of the bottom of the basin. The remaining water will be pumped dry as required until the first hard freeze, and until the headgate improvements are ready for water passage.

6.A.3 Headgate construction includes installation of a new concrete outlet structure and aluminum canal gate. Piping will connect to the existing outlet structure to be abandoned. Proposed work includes associated earthwork, concrete footings and incidentals.

6.A.4 Lake Elmo draw down will begin September 1st 2021.

6.A.5 Headgate improvements will begin October 1st 2021 approximately.

6.A.6 Headgate improvements will be substantially completed November 15th 2021 approximately. (45 calendar days)

6.A.7 Lake Elmo will begin refilling May 15th 2022.

6.B Contracted Work

6.B.1 Notice to proceed is expected to be issued November 8th -15th, 2021, approximately.

6.B.2 Substantial Completion of the work must be achieved by April 15th, 2022.

6.B.3 Final Completion of the work must be achieved by May 15th, 2022.

SP-7 PROJECT COORDINATION

7.A Concurrent Work Outside of Contract

7.A.1 Headgate construction will be running on a separate contract during the same time as the basin improvements described in this document.

7.A.2 It is anticipated that the basin improvements can be executed concurrently with the headgate construction contract at the discretion of the basin contractor. Coordinate with headgate contractor as required.

7.A.3 Contacts for outside contracted work will be provided to the successful bidder prior to construction.

SP-8 PROJECT REPRESENTATIVE, INSPECTIONS, AND TESTING

8.A The Contractor’s work will be periodically tested and observed to ensure compliance with the Contract Documents. Complete payment will not be made until the Contractor has demonstrated that the work is complete and has been performed as required. If the Project Representative detects a discrepancy between the work and the requirements of the Contract Documents at any time, up to and including final inspection, such work will not be completely paid for until the Contractor has corrected the deficiency, see General Conditions, Article 9.

8.B The Project Representative will periodically monitor the construction of work to determine if the work is being performed in accordance with the contract requirements. The Project Representative does not have the authority or means to control the Contractor's methods of construction. It is, therefore, the Contractor's responsibility to utilize all methods, equipment, personnel, and other means necessary to assure that the work is installed in compliance with the Drawings and Specifications, and laws and regulations applicable to the work. Any discrepancies noted shall be brought to the Contractor's attention, who shall immediately correct the discrepancy. Failure of the Project Representative to detect a discrepancy will not relieve the Contractor of his ultimate responsibility to perform the work as required, see General Conditions, Article 3.

8.C The Contractor shall inspect the work as it is being performed. Any deviation from the Contract requirements shall be immediately corrected. Prior to any scheduled observation by the Project Representative, the Contractor shall again inspect the work and certify to the Project Representative that he has inspected the work and it meets the requirements of the Contract Documents. The Project Representative may require uncovering of work to verify the work was installed according to the contract documents, see General Conditions, Article 12.

8.D The work will be subject to review by the Project Representative. The results of all such observations, and all contract administration, shall be directed to the Contractor only through the Project Representative.

8.E Services Required by the Contractor: The Contractor shall provide the following services:

8.E.1 Any field surveys to establish locations, elevations, and alignments as stipulated on the Contract Documents. The Owner reserves the right to set preliminary construction staking for the project. The Contractor is responsible to notify the Owner for any construction staking discrepancies.

8.E.2 Preparation and certification of all required shop drawings and submittals as described in the General Conditions, Article 3.

8.E.3 All testing requiring the services of a laboratory to determine compliance with the Contract Documents shall be performed by an independent commercial testing laboratory acceptable to the Project Representative. The laboratory shall be staffed with experienced technicians properly equipped, and fully qualified to perform the tests in accordance with the specified standards.

8.E.4 Preparation and submittal of a construction schedule, including submittals, see General Conditions, Article 3. The schedule shall be updated as required, as defined in the Contract Documents.

8.E.5 All Quality Control testing as required by the Contractor's internal policies.

8.E.6 All Quality Assurance testing and/or re-testing as stated in the Contract Documents, see General Conditions, Article 13.

8.F Services Provided by the Owner: The Owner shall provide the following services at no cost to the Contractor except as required for retests as defined in the Contract Documents.

8.F.1 The Project Representative may check compaction of backfill and surfacing courses using laboratory testing submittal information supplied by the Contractor. These tests are to determine if compaction requirements are being fulfilled in accordance with the Contract Documents. It is ultimately the responsibility of the Contractor to ensure that this level of compaction is constant and met in all locations.

8.F.2 Any additional Quality Assurance testing deemed appropriate by the Owner, at the Owner's expense.

SP-9 ENGINEERING INTERPRETATIONS

9.A Timely engineering decisions on construction activities or results have an important bearing on the Contractor's schedule. When engineering interpretation affects a plan design or specifications change, it should be realized that more than 24 hours may be required to gain the necessary Owner participation in the decision process including time for formal work directive or change order preparation as required.

SP-10 REJECTED WORK

10.A Any defective work or nonconforming materials or equipment that may be discovered at any time prior to the expiration of the warranty period, shall be removed and replaced with work or materials conforming to the provisions of the Contract Documents, see General Conditions, Article 12. Failure on the part of the Project Representative to condemn or reject bad or inferior work, or to note nonconforming materials or equipment on the Contractors submittals, shall not be construed to imply acceptance of such work. The Owner shall reserve and retain all its rights and remedies at law against the Contractor and its Surety for correction of any and all latent defects discovered after the guarantee period (MCA 27-2-208).

10.B Only the Project Representative will have the authority to reject work which does not conform to the Contract Documents.

SP-11 UTILITIES

11.A The exact locations of existing utilities that may conflict with the work are not precisely known. It shall be the Contractor's responsibility to contact the owners of the respective utilities and arrange for field location services. One Call Locators, 1-800-424-5555

11.B The Contract Documents may show utility locations based on limited field observation and information provided to the Project Representative by others. The Project Representative cannot guarantee their accuracy. The Contractor shall immediately notify the Project Representative of any discrepancies with utility locations as shown on the Contract Drawings and/or bury depths that may in any way affect the intent of construction as scoped in these specifications.

11.C There will be no separate payment for exploratory excavation required to locate underground utilities.

11.C.1 Notification. The Contractor shall contact, in writing, all public and private utility companies that may have utilities encountered during excavation. The notification includes the following information:

11.C.1.1 The nature of the work that the Contractor will be performing.

11.C.1.2 The time, date, and location that the Contractor will be performing work that may conflict with the utility.

11.C.1.3 The nature of work that the utility will be required to perform such as moving a power pole, supporting a pole or underground cable, etc.

11.C.1.4 Requests for field location and identification of utilities.

11.C.2 A copy of the letter of notification shall be provided to the Project Representative. During the course of construction, the Contractor shall keep the utility companies notified of any change in schedule, or nature of work that differs from the original notification.

11.D Identification. All utilities that may conflict with the work shall be the Contractor's responsibility to locate before any excavation is performed. Field markings provided by the utility companies shall be preserved by the Contractor until actual excavation commences. All utility locations on the Drawings should be considered approximate and should be verified in the field by the Contractor. The Contractor shall also be responsible for locating all utilities that are not located on the Drawings.

11.E Utilities are depicted on the Contract Documents in accordance with their achieved “Quality Levels,” as defined in the American Society of Civil Engineer’s Document, ASCE 38, “Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data.” Reliance upon these data for risk management purposes during bidding does not relieve the Contractor, or Utility Owner from following all applicable utility damage prevention statutes, policies, and/or procedures during construction. It is important that the Contractor investigates and understands the scope of work between the project Owner and Project Representative regarding scope of limits of the utility investigations leading to these utility depictions. Definitions of Quality Levels are described as follows:

11.E.1 "QUALITY LEVEL A" – (QLA): LOCATING THROUGH EXCAVATION. QLA data are highly accurate and are obtained by surveying an exposed utility. As such, both horizontal and vertical data are recorded. Survey accuracies are typically set at 15mm (1/2-inch) vertically, and to project survey standards horizontally (typically the same as for topography features), although these survey accuracies and precisions are generally left to the owner to specify in a scope of work. In addition to the applicable standard of care and any other additional standards imposed by commercial indemnity clauses, the accuracy of these location data is also typically guaranteed. Other data typically characterized include material type, surface elevation, utility size/capacity, outside dimensions, and configurations, soil type, and utility condition.

11.E.2 "QUALITY LEVEL B" – (QLB): DESIGNATING. QLB information is obtained through the application of appropriate surface geophysical methods to identify the existence and approximate horizontal location of utilities (a utility's "designation") within the project limits, followed by survey, mapping, and professional review of that designation. Underground utilities are identified by interpretation of received signals generated either actively or passively, and through correlating these received signals with visible objects (QLC) and record data (QLD) to determine function. Designated utilities that can't be identified are labeled as "unknowns." Although approximate has no accuracy associated with it, generally the locations are within inches rather than feet. The more utility congested the area or the deeper the utilities, the less likely it is that the designations will achieve that accuracy. These designations are then surveyed to project accuracies and precisions, typically third-order accuracy similar to other topography features. Note that surveying existing one-call marks does not lead to QLB data, since the genesis of the marks was not under the direct responsible charge of the professional certifying the QLB depictions, and one-call generally does not address unknown utilities, privately owned utilities, utilities without records, abandoned utilities, and so on. Nor does the professional have knowledge of the field technician's qualifications, training, and level of effort.

11.E.3 "QUALITY LEVEL C" – (QLC): SURFACE VISIBLE FEATURE SURVEY. QLC builds upon the QLD information by adding an independent detailed topography site survey for surface-visible appurtenances of subsurface utilities including but not limited to fire hydrants, valves, risers, and manholes. Professional judgment is used to correlate the QLD data to the surveyed features, thus increasing the reliability of both utility location and existence. It is a function of the professional to determine when records and features do not agree and resolve discrepancies. This may be accomplished by depiction of a utility line at quality level D, effectively bypassing or disregarding (but still depicting) a surveyed structure of unknown origin. Additional resolution may result from consultation with utility owners.

11.E.4 "QUALITY LEVEL D" – (QLD): EXISTING RECORDS RESEARCH. QLD is the most basic level of information. Information is obtained from the review and documentation of existing utility records, verbal accounts, and/or one-call markings (to determine the existence of major active utilities and their approximate locations).

11.F Removal or Relocation of Utilities. All electric power, street lighting, gas, telephone, and television utilities that require relocation will be the responsibility of the utility owner. A request for extending the specified contract time will be considered if utility owners cause delays.

11.G Public Utilities. Water, sewer, storm drainage, and other utilities owned and operated by the public entities shall, unless otherwise specifically requested by the utility owner, be removed, relocated, supported or adjusted as required by the Contractor at the Contractor's expense. All such work shall be in accordance with these Contract Documents, or the Owner's Standard Specifications or written instructions when the work involved is not covered by these Specifications.

11.H Other Utilities. Utilities owned and operated by private individuals, railroads, school districts, associations, or other entities not covered in these Special Provisions shall, unless otherwise specifically requested by the utility owner, be removed, relocated, supported or adjusted as required by the Contractor at the Contractor's expense. All work shall be in accordance with the utility owner's directions, or by methods recognized as being the standard of the industry when directions are not given by the owner of the utility.

11.I Damage to Utilities and Private Property. The Contractor shall protect all utilities and private property and shall be solely responsible for any damage resulting from his construction activities. The Contractor shall hold the Owner and Project Representative harmless from all actions resulting from his failure to properly protect utilities and private property. All damage to utilities shall be repaired at the Contractor's expense to the full satisfaction of the owner of the damaged utility or property. The Contractor shall provide the Owner with a letter from the owner of the damaged utility or property stating that it has been repaired to the utility owner's full satisfaction.

11.J Structures. The Contractor shall exercise every precaution to prevent damage to existing buildings or structures in the vicinity of his work. In the event of such damages, he shall repair them to the satisfaction of the owner of the damaged structure at no cost to the Owner.

11.K Overhead Utilities. The Contractor shall use extreme caution to avoid a conflict, contact, or damage to overhead utilities, such as power lines, streetlights, telephone lines, television lines, poles, or other appurtenances during the course of construction of this project.

11.L Buried Gas Lines. The Contractor shall provide some means of overhead support for buried gas lines exposed during trenching to prevent rupture in case of trench caving.

11.M Pavement Removal. Where trench excavation or structure excavation requires the removal of curb and gutter, concrete sidewalks, or asphalt or concrete pavement, the pavement or concrete shall be cut in a straight line parallel to the edge of the excavation by use of a spade-bitted air hammer, concrete saw, colter wheel, or similar approved equipment to obtain a straight, square clean break. Pavement cuts shall be 2 feet wider than the actual trench opening.

11.N Survey Markers and Monuments. The Contractor shall use every care and precaution to protect and not disturb any survey marker or monuments, such as those that might be located at lot or block corners, property pins, intersection of street monuments or addition line demarcation. Such protection includes markings with flagged high lath and close supervision. No monuments shall be disturbed without prior approval of the Project Representative. Any survey marker or monument disturbed by the Contractor during the construction of the project shall be replaced at no cost to the Owner by a licensed land surveyor.

11.O Temporary Utilities. The Contractor shall provide all temporary electrical, lighting, telephone, heating, cooling, ventilating, water, sanitary, fire protection, and other utilities and services necessary for the performance of the work. All fees, charges, and other costs associated therewith shall be paid for by the Contractor.

SP-12 CONSTRUCTION SAFETY

12.A The Contractor shall be solely and completely responsible for conditions of the jobsite, including safety of all persons (including employees and subcontractors) and property during performance of the work. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to U.S. Department of Labor (OSHA), and all other applicable federal, state, county, and local laws, ordinances, codes, and regulations. Where any of these are in conflict, the more stringent requirement shall be followed. The Contractor's failure to thoroughly familiarize himself with the aforementioned safety provisions shall not relieve them from compliance with the obligations and penalties set forth therein, see General Conditions, Article 10.

SP-13 CONSTRUCTION LIMITS AND AREAS OF DISTURBANCE

13.A Construction Limits. Where construction limits, easements or property lines, are not specifically called out on the Contract Documents, limit the construction disturbance to ten (10) feet, when measured from the edge of the slope stake grading, or to the adjacent property line, whichever is less. Disturbance and equipment access beyond this limit is not allowed without the written approval of both the Project Representative and the Owner of the affected property. If so approved, disturbance beyond construction limits shall meet all requirements imposed by the landowner; this includes existing roads used and/or improved as well as the construction of new access roads. Special construction, reclamation, or post-construction reclamation or other closure provisions required by the landowner on access roads beyond the construction limits shall be performed by the Contractor at no additional cost to the Owner.

13.B Areas of Disturbance. Approved areas of disturbance are those areas disturbed by construction activities within the construction limits and along designated or approved access routes. Such areas may require reclamation and revegetation operations, including grading to the original contours, top soiling with salvaged or imported topsoil, seeding, fertilizing, and mulching as specified herein. Other areas that are disturbed by the Contractor's activities outside of the limits noted above will be considered as site damage or unapproved areas of disturbance, see General Conditions, Articles 3 and 10. This includes areas selected by the Contractor outside the defined construction limits for mobilization, offices, equipment, or material storage.

SP-14 DECONTAMINATE CONSTRUCTION EQUIPMENT

14.A Power wash all construction equipment entering the project site to prevent the spread of noxious weeds and aquatic invasive species.

SP-15 SURVEY

15.A Construction Survey

15.A.1 The Contractor will be responsible for all layout and construction staking utilizing the Project Representative's existing control and coordinate data for the project. Dimensions and elevations indicated in layout of work shall be verified by the Contractor. Discrepancies between Drawings, Specifications, and existing conditions shall be referred to the Project Representative for adjustment before work is performed. The Project Representative may set location and grade stakes prior to construction; however, it is ultimately the responsibility of the Contractor to check and verify all construction staking for the project.

15.A.2 Existing survey control (horizontal and vertical) has been set for use in the design and ultimately the construction of these improvements. A listing of the coordinates and vertical elevation for each of these control points may be included in the project drawings.

15.A.3 The Contractor will be responsible for preserving and protecting the survey control until proper referencing by the Contractor has been completed. Any survey control obliterated, removed, or otherwise lost during construction will be replaced at the Contractor's expense.

15.A.4 Contractor shall be aware of property pins and survey monuments. Damage to these pins will require replacement of such by a registered land surveyor at no cost to the owner.

15.A.5 The Contractor shall provide construction staking from the Contractor's layouts and the control points.

15.A.6 Original field notes, computations and other records take by the Contractor for the purpose of quantity and progress surveys shall be furnished promptly to the Project Representative and shall be used to the extent necessary in determining the proper amount of payment due to the Contractor.

15.B Survey Base Information

15.B.1 Survey base information is provided at meter level accuracy.

15.B.2 Additional survey point information will be provided upon request.

SP-16 MATERIAL SOURCES AND CONSTRUCTION WATER

16.A The Contractor shall be responsible for locating all necessary material sources, including water, necessary to complete the work. The Contractor shall be responsible for meeting all transportation and environmental regulations as well as paying any royalties. The Contractor shall provide the Project Representative with written approvals of landowners from whom materials are to be obtained, prior to approval.

16.B The Contractor may use materials from any source, providing the materials have been tested through representative samples and will meet the Specifications.

16.C Water for compaction and clean-up efforts shall be supplied by the Contractor.

SP-17 MATERIALS SALVAGE AND DISPOSAL

17.A Notify the Owner for any material salvaged from the project site not identified in the Contract Documents. The Owner reserves the right to maintain salvaged material at the project site, compensate the Contractor for relocation of salvaged material, or agreed compensation to Owner for material salvaged by the Contractor.

17.B Haul and waste all waste material to a legal site and obey all state, county, and local disposal restrictions and regulations. Waste material may be wasted at a site within the state park at a location identified in advance by the Owner.

SP-18 STORED MATERIALS

18.A Contractor shall use an approved storage area for materials. Materials and/or equipment purchased by the Contractor may be compensated on a monthly basis. For compensation, provide the Project Representative invoices for said materials, shop drawings and/or submittals for approval, and applicable insurance coverage, see General Conditions, Article 9.

SP-19 STAGING AND STOCKPILING AREAS

19.A Contractor shall use staging and stockpiling sites to facilitate the project as approved by the Owner. Contract Documents may show approved staging and stockpiling locations. Notify Owner within 24 hours for approval of staging and stockpiling sites not shown on the Contract Drawings.

SP-20 SECURITY

20.A The Contractor shall provide all security measures necessary to assure the protection of equipment, materials in storage, completed work, and the project in general.

SP-21 CLEANUP

21.A Cleanup for each item of work shall be fully completed and accepted before the item is considered final. If the Contractor fails to perform cleanup within a timely manner the Owner reserves the right to withhold final payment.

21.B Review these Contract Documents for additional Final Cleanup specifications for specific measures, associated with Contractor responsibilities and final payment.

SP-22 ACCESS DURING CONSTRUCTION

22.A Provide access to all public and private roadways and approaches within the project throughout the construction period.

22.B Provide emergency access at all times within the project throughout the construction period.

SP-23 CONSTRUCTION TRAFFIC CONTROL

23.A The Contractor is responsible for providing safe construction and work zones within the project limits by implementing the rules, regulations, and practices of the Manual on Uniform Traffic Control Devices, current edition.

SP-24 SANITARY FACILITIES

24.A Provide on-site toilet facilities for employees of Contractor and Sub-Contractors and maintain in a sanitary condition.

SP-25 PERMITS

25.A In accordance with article 6.08 of the MPWSS General Conditions, Contractor shall obtain all pay for all construction permits and licenses. Specific information related to several of the required permits, but not necessarily all required permits, is included below.

25.A.1 Montana FWP will be obtaining the required 404 permits for Lake dewatering.

25.A.2 Contractor is responsible for obtaining a SWPP permit as required.

SP-26 PROTECTION, PRESERVATION, AND REPAIR

26.A Existing Structures

26.A.1 The Contractor shall document the preconstruction condition of potentially impacted structures and provide a copy of all such documentation to the owner upon request.

26.A.2 Where construction will be required adjacent to existing structures, the Contractor shall be solely responsible to maintain the structural integrity of the existing structures. The Contractor shall take whatever means necessary to ensure that the existing structure is not damaged and, if necessary, shall install shoring, or other means of supporting the utility or structure, or change the size or type of construction equipment. The contractor shall protect, and in the case of any damage, repair the existing structures at the Contractor's expense.

26.A.3 The Contractor is responsible for the protection of and the cost to repair and replace to the satisfaction of the Owner, any and all asphalt damaged due to any construction or travel (hauling, storage, unloading. etc.) operations. The Contractor shall familiarize themselves with the existing surfacing sections in the project area and consider self-imposed load restrictions conforming to those sections. The Contractor shall use equipment sized and equipped to protect the asphalt. The contractor shall make their own assessment of the conditions and adjust their bid accordingly.

26.B Tree Protection and Preservation

26.B.1 The Contractor and the Owner shall individually inspect all trees within the project construction limits prior to construction. The Owner shall determine which trees are to be removed and which trees are to be preserved. Construction of the grading, utilities and various roadway facilities must not significantly damage the trees root system or hinder it's chances for survival. Reasonable variations from the Contract Documents, as directed by the Project Representative, may be employed to ensure the survival of trees.

SP-27 GROUNDWATER CONSIDERATIONS AND DEWATERING

27.A Lake draining is being performed under a separate contract. That work will result in the lake being drained by gravity approximately 12 feet below the standard lake elevation. The work taking place under this contract will be confined to the top 6'-8' of lakebed. The expectation is that the work area will be sufficiently dry or frozen to allow this work to commence. Bidders are instructed to bid the project assuming the ground conditions as described herein. Prior to commencing work the Contractor and Owner will perform a site inspection of the areas of work to confirm satisfactory conditions exist.

27.B Dewatering for this scope of work is not expected. Contractor and Owner will negotiate dewatering services if adverse conditions require.

SP-28 SITE DEMOLITION & WETLAND PROTECTION

28.A This work shall include the removal, and or relocation of miscellaneous items that are located within the construction limits of the proposed project. These items include removal and disposal of fencing, culverts, inlets, metal scraps, trees, concrete & asphalt paving, rip rap rock and concrete chunks. The Contractor, at the Owner's discretion, may be directed to store demolished rip rap, concrete, and trees on-site, for reuse by Owner as future underwater fish habitat. In such instance, the Contractor and Owner will agree upon a storage location prior to work commencing, and no additional cost for storage of demolished materials will be incurred by the Owner.

28.B Remove all unwanted material from the construction site and legally dispose of off-site in accordance with all Local, State and Federal laws and regulations unless indicated by the Owner to be removed and salvaged.

28.C Wetland protection fence shall be installed to protect the existing wetlands (Cattails and other Wetland Vegetation) outside of the work areas as shown in the drawings. The intent of the Wetland Protection Fence is to separate equipment staging areas and work zones from wetlands. 4' minimum construction fencing is required to protect wetland areas as noted on the drawings when construction will require equipment operation within 20' of the wetlands to be preserved.

SP-29 CONTRACT CLOSEOUT

29.A The Contractor's Superintendent shall maintain at the project site, a "Record Set of Drawings" showing field changes, as-built elevations, unusual conditions encountered during construction, and such other data as required to provide the Owner with an accurate "as constructed" set of record drawings. The Contractor shall furnish the "Record Set" to the Project Representative following the Final Inspection of the Project.

29.B The Contractor's final payment will not be processed until the "Record Set" of drawings are received and approved by the Project Representative.

SP-30 MEASUREMENT AND PAYMENT

30.A General

30.A.1 This special provision shall supersede and replace the methods of measurement and bases of payment described in the various sections of the MPWSS unless otherwise designated below.

30.B Measurement and payment items

30.B.1 Item 101 – General Conditions, Mobilization/Demobilization (LS): This item consists of coordination and scheduling, field engineering, submittals, quality control plan; quality control testing and surveying; construction of temporary facilities; site safety; additional geotechnical studies; product shipment, handling, storage, and protection; manufacturer's services and operation and maintenance manuals; mobilization; record drawings; final cleanup; demobilization; and contract closeout. All required taxes, bonds, and insurance, permit license applications, notices, renewals and terminations, including all associated fees are included in this bid item.

30.B.2 Item 102 – Temporary erosion control (LS): Erosion control plans and erosion control details are not included as part of the construction documents. The contractor is expected to develop erosion control plans and details in accordance with local code. This item consists of all materials, labor, and equipment to complete Work activities for Erosion and Sediment Control. The Work shall include, but not be limited to, installation of silt fences, construction entrances, and other best management practices, maintenance of the Storm Water Pollution Prevention Plan (SWPPP) and subsequent requirements, and incidental items necessary to construct and maintain sediment control barriers and best management practices, and removal and disposal after vegetation is established in accordance with Contract Documents.

30.B.3 Item 103 – Site Demolition (LS): This item will be measured and paid by the contract lump sum price, per demo plans. Payment will include removal and disposal of fence, culverts, inlets, metal scraps, trees, concrete & asphalt paving, rip rap rock and concrete chunks to be removed from the project site, and includes all labor, equipment, tools, and incidentals necessary to complete this work. The Contractor, at the Owner's discretion, may be directed to store demolished rip rap, concrete, and trees on-site, for reuse by Owner as future in-pond fish habitat. In such instance, the Contractor and Owner will agree upon a storage location prior to work commencing, and no additional cost for on-site storage of demolished materials will be incurred by the Owner.

30.B.4 Item 201 – Topsoil, Import and Place (CY): This item is paid at the number of cubic yards. Volume is based on plan quantity computed using plan line and grades. Price and payment is full compensation for all labor, equipment, tools and incidentals necessary to accomplish all clearing and grubbing, excavation, hauling, stockpiling, placing, spreading, and disposal to achieve the final grades as shown in the drawings.

30.B.5 Item 202 – Embankment (CY): This item is paid at the number of cubic yards placed. Volume is based on plan quantity computed using plan line and grades. Price and payment is full compensation for all labor, equipment, tools and incidentals necessary to accomplish all excavation, hauling, placement, and compaction embankment to grade the site as shown in the drawings. The volume of embankment includes onsite excavation and placement of embankment excluding the volume of topsoil.

30.B.6 Item 203 – Rip Rap (CY): This item will be measured and paid at the number of cubic yards and volume is based on plan quantity computed using lines and grades in the drawings. Payment will include geotextile fabric, rip rap, placement, and all labor, equipment, tools, and incidentals necessary to complete this item per plans.

30.B.7 Item 204 – Block Rock (Ton): This item is paid by the number of tons placed. The distribution of the block rock walls as illustrated on the drawings. Price and payment is full compensation for all labor, equipment, tools and incidentals necessary to accomplish all excavation, hauling, preparation of subgrade, and finish grading to place boulder blocks as shown in the drawings.

30.B.8 Item 205 – Granite Boulders (Ton): This item is paid by the number of tons placed. The distribution of granite boulders is as illustrated on the drawings. Price and payment is full compensation for all labor, equipment, tools and incidentals necessary to accomplish all excavation, hauling, preparation of subgrade, and finish grading to place boulders as shown in the drawings.

30.B.9 Item 206 – Sandstone Slab Rock (Ton): This item is paid by the number of tons placed. The distribution of sandstone slabs is as illustrated on the drawings. Price and payment is full compensation for all labor, equipment, tools and incidentals necessary to accomplish all excavation, hauling, preparation of subgrade, and finish grading to place sandstone slab rock as shown in the drawings.

30.B.10 Item 207 – Gravel Base for Concrete (CY): This item will be measured and paid at the number of cubic yards, and the volume is based on plan quantity computed using lines and grades in the drawings. Payment will include gravel, placement, and all labor, equipment, tools, and incidentals necessary to complete this item. Excavation for gravel base rock is incidental to this bid item.

30.B.11 Item 208 – Concrete Pavement (SF): This item will be measured and paid at the number of square feet placed, and the area is based on plan quantity computed using lines and grades in the drawings. Payment will include concrete, reinforcement, placement, and all labor, equipment, tools, and incidentals necessary to complete this item per the drawings.

30.B.12 Item 209 – Soft Surface Trail (SF): This item will be measured and paid at the number of square feet placed, and the area is based on plan quantity computed using lines and grades in the drawings. Payment will include gravel, base rock, edging, fabric, placement, and all labor, equipment, tools, and incidentals necessary to complete this item per the drawings. Excavation for trail is incidental to this bid item.

30.B.13 Item 210 – Gravel for Fish Habitat (CY): This item will be measured and paid at the number of cubic yards delivered and staged onsite. Payment will include gravel and delivery for this quantity to the site.

30.B.14 Item 211 – Rip Rap Rock for Fish Habitat (CY): This item will be measured and paid at the number of cubic yards delivered and staged onsite. Payment will include gravel and delivery for this quantity to the site.

30.B.15 Item 301 – Native Seeding (SF): This item is paid for on a square foot basis to perform native seeding, seed bed preparation, fertilization, and mulching for the site as specified and illustrated on the plans. The amount is based on the plans. Price and payment is full compensation for all labor, equipment, tools, and incidentals necessary to complete this item per the drawings.

SP-31 BID ITEM DESCRIPTIONS

31.A Item 201 - Topsoil, Import and Spread

31.A.1 No topsoil is expected to be generated onsite

31.A.2 Import and place topsoil per included specification section 329200 TURF & GRASSES.

31.A.3 4” minimum coverage on all disturbed areas.

31.A.4 Provide topsoil matching the characteristics of the amended topsoil as provided by Rocky Mountain Compost, or approved equal.

31.B Item 202 - Embankment

31.B.1 Per drawing details & MPWSS Section 02230.

31.B.2 Embankment quantities listed are the FILL volumes calculated to construct the bank features as shown in the drawings. Fill for feature construction is to be harvested from the borrow area designated on the plans.

31.B.3 Contractor is responsible to estimate the needed cut volumes to construct the features based on the provided Geotech report.

31.B.4 No importation of fill is needed to construct the bank improvements.

31.C Item 203 - Riprap

31.C.1 See technical specification section 044000 STONE MATERIALS for description.

31.D Item 204 - Blockrock

31.D.1 See technical specification section 044000 STONE MATERIALS for description.

31.E Item 205 – Granite boulders

31.E.1 See technical specification section 044000 STONE MATERIALS for description.

31.F Item 206 – Sandstone slab rock

31.F.1 See technical specification section 044000 STONE MATERIALS for description.

31.G Item 207 – Gravel base for concrete

31.G.1 Per MPWSS Section 02234.

31.H Item 208 – Concrete Pavement

31.H.1 Per drawing details & MPWSS Section 02515.

31.I Item 209 – Soft Surface Trail

31.I.1 Per drawing details.

31.J Item 210 – Gravel for Fish Habitat

31.J.1 3/8” washed gravel. Quantity per the proposal.

31.J.2 Material will be provided and delivered to the site for use by FWP to create underwater fish habitat structures.

31.K Item 211 – Rip Rap Rock for Fish Habitat

31.K.1 See technical specification section 044000 STONE MATERIALS for description. Quantity per the proposal.

31.K.2 Material will be provided and delivered to the site for use by FWP to create underwater fish habitat structures.

31.L Item 301 – Native Seeding

31.L.1 See technical specification section 329200 TURF AND GRASSES for description

SP-32 TECHNICAL SPECIFICATIONS

32.A Technical Specifications are provided following.

32.B Numbering follows the CSI format.

END OF SECTION 01030

TECHNICAL SPECIFICATIONS (CSI Format)

044000 Stone Materials
329200 Turf & Grasses

APPENDIX
Geotech Report

SECTION 04 40 00 – STONE MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Dry Stack stone.

B. Landscape boulders.

C. Sandstone Slab.

D. Riprap.

1.2 REFERENCES

A. ASTM C 97 - Standard Test Methods for Absorption and Bulk Specific Gravity of Dimension Stone.

1.3 SUBMITTALS

A. Submit under provisions of Section 01 30 00.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Firm with experience of at least five projects of similar construction and scope. Include brief description of each project and name and phone number of Owner's Representative knowledgeable in each listed project. Other verifiable experience may be accepted in lieu of the above at the discretion of the Landscape Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation (as applicable).

B. Prevent excessive mud, fluid concrete, or other deleterious materials from coming in contact with and affixing to stone materials.

1.6 PROJECT CONDITIONS

A. Do not place backfill when subgrade is wet or frozen.

B. Do not place backfill during wet or freezing weather that prevents conformance with specified compaction requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide manufacturer’s name , quarry location, and testing data for approval by Owner’s Representative.

B. Requests for substitutions will be considered based on demonstrated conformance to material testing specification.

2.2 DRY STACK STONE

A. “Blockrock” for use in dry stack retaining walls. Ledge Metamorphic rock as quarried in the general areas South of Laurel and East of Edgar, Montana, having a beige and buff coloration.

1. Sizes per drawings.

2. Material shall conform to the following properties, per referenced testing methods:
   a. LA Abrasion loss, crushed and sized to grading A (ASTM C 535)
      1). 15% Maximum:
   b. Specific Gravity, recommended and average of 8 rocks of varying geology (ASTM D 6473)
      1). 2.40 min
      2). 3% maximum absorption
3. Tonnage Calculations
   a. 1 qty. (Blockrock) symbol on the drawings = 32” height x 48” long x 30” deep = 2.46 ton per symbol on average.

2.3 LANDSCAPE BOULDERS

A. Granite Boulders
   1. Sizes per drawings.
   2. Lichen/moss covered on greater than 25% of surface.
      a. Submit photos for approval by Owner’s Representative.
   3. Tonnage Calculations
      a. 1 qty. (Granite Boulder 3’) symbol on the drawings = 1.2 ton on average.

2.4 SANDSTONE SLAB

A. Sandstone slab rock generally originating from areas surrounding the Musselshell River Valley between Lavina and Harlowton.

B. Sizes range from 5” thick x 4’ long x 2’ wide Minimum to 7” thick x 8’ long x 4’ wide max.

C. As supplied by Vacca Stone or approved equal.

D. Contractor shall submit photographic samples of rock for approval by the Owner’s Representative prior to hauling rock to the site.

E. Tonnage Calculations
   1. 1 qty. (Sandstone slab – 4’) symbol on the drawings = 8” height x 48” long x 30” deep = .56 ton per symbol on average.
   2. 1 qty. (Sandstone slab – 6’) symbol on the drawings = 8” height x 72” long x 30” deep = .84 ton per symbol on average.

2.5 RIPRAP

A. Byproduct from “Blockrock” quarrying.

B. Irregular angular blocks generally conforming to the following minimum size ratios.
   1. 6” Diameter to 18” Diameter
   2. Minimal incidental fines or overburden soil included in rock.

C. Ledge Metamorphic rock as quarried in the general areas South of Laurel and East of Edgar, Montana, having a beige and buff coloration.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Properly prepare substrates for all material

3.2 PREPARATION

A. Clean surfaces thoroughly debris, roots, branches and extraneous materials prior to installation.

3.3 INSTALLATION GENERAL

A. Install in accordance with drawings and specifications.

3.4 INSTALLATION - BLOCKROCK

A. Lay out wall to the lines and grades indicated on the drawings. Use the string line and stakes to mark off any straight portions and marking paint to draw out any curves.

B. Prepare a trench base that follows a string line and/or marking paint. Trench should be 6 inches (152 mm) wider than the stone, bedding depth per details.

C. Fill the trench with bedding layer per drawings.

D. Level the base course of stone & compact per drawings. Place first layer of stone checking for level front to back and side to side and adjust accordingly.

E. Stack the second course on top of the base course. Do not line up the seams between the stones from one course to the other. Select stones that fit well with those on either side. Fit stones per drawings. Shim the stones as required to eliminate wobbling with stone or concrete products.

F. Each course should be set back per drawings to allow the wall to lean back into the ground that it will be retaining. Shim the backs of the stones to eliminate wobbling.

G. Progressively backfill the wall with the drainage aggregate after each two or three courses are stacked. Prior to backfilling, lay the geo-textile fabric on the soil behind the wall, and place the drainage aggregate between the wall and the fabric. The aggregate shall be a minimum of 8 to 12 inches (203 to 305 mm) from the wall to the fabric. Compact each layer of aggregate thoroughly. Fill soil in behind the fabric as the stone is added.

3.5 INSTALLATION – BOULDERS

A. Install boulders per plans

B. Orient boulder faces to expose lichen covered portions to surface.

C. Boulders generally shall occupy the same bury depth as occurred in nature.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Protect adjacent work areas and finish surfaces from damage during product installation.

END OF SECTION 04 40 00

SECTION 32 92 00 - TURF AND GRASSES

PART 1-GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of each Contract, including General Conditions, Supplementary Conditions, and other Division 1 Specification sections, apply to work of this section.

1.2 DESCRIPTION

A. Work in this section consists of furnishing all plant, labor, equipment, and performing all operations to finish grade topsoil, to prepare seedbeds, seeding native grass and seeding or sodding lawn areas, maintenance and protection of all planted areas.

B. All exterior lawn areas within the seeding limits, except surfaces occupied by buildings, plant beds and paving, except areas indicated to be undisturbed shall be seeded or sodded as shown on Plans.

C. All areas disturbed by construction activities including but not limited to irrigation trenches, contractor staging areas and general disturbed areas to be seeded as specified in this section per the drawings.

1.3 RELATED WORK DESCRIBED ELSEWHERE

A. Irrigation System- Section 32 84 00.

B. Landscaping- Section 32 93 00.

1.4 QUALITY ASSURANCE

A. Qualification of Workmen:

1. Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and the best methods for their installation and who shall direct all work performed under this section.

1.5 PRODUCT HANDLING

A. Protection:

1. Upon delivery of sod to the work site use all means necessary to protect and maintain the sod before, during, and after installation and to protect the installed work and materials of all other trades.
2. All seed shall be delivered to the job site in the original bags with tags certifying purity, germination, common and botanical name for each species, and percent weed seed. All tags shall be removed from the bags by the Owner's Representative. Untagged seed bags shall be rejected.

B. Storage:

1. Seed, hydromulch, and hydromulch tackifier shall be kept in dry storage away from contaminants.

C. Replacements:

1. In the event of rejection of the seed or sod, immediately make all replacements necessary to the approval of the Owner's Representative and at no additional cost to the Owner.

D. Notice to Proceed:

1. The Contractor shall not proceed with seeding or sodding operations until the irrigation system has been tested and approved by the Owner's Representative.

E. Schedules:

1. Install seed mixes during the specified time periods. If special conditions exist that may warrant a variance in the specified plant dates or conditions, a written request shall be submitted to the Owner's Representative stating the special conditions and proposed variance.

F. Substitutions:

1. Request for substitutions, shall be submitted in writing prior to bid and in accordance with Section 01 25 00.

PART 2 -MATERIALS

2.1 SEED

A. General: All grass seed shall be:

1. Free from noxious weed seeds, and recleaned.
2. Grade A recent crop seed.
3. Treated with appropriate fungicide.
4. Delivered to the site in sealed containers with dealer's guaranteed analysis.

2.3 FERTILIZER

A. General:

1. All fertilizer to be commercially prepared and shall contain the following percentages by weight:

a. 16% Nitrogen.
b. 16% Phosphoric Acid.
c. 16% Potash.

2. Commercial fertilizer shall be complete, uniform in composition, dry and free-flowing. The fertilizer shall be delivered to the site in the original waterproof containers, each bearing the manufacturer's statement of analysis.

B. Special Protection:

1. If stored at the site, protect fertilizer from the elements at all times.

2.4 MULCH

A. All mulch for hydroseeding shall be North American Green GeoSkin (includes tackifier) as supplied by True North Steel, Billings, MT 59102 (406) 656-2253 or approved equal. Application rate per manufacture’s recommendations.

2.5 TOPSOIL

A. Topsoil: The topsoil shall be loose, friable, and shall contain an ordinary amount of humus. It shall contain no lumps of soil, rocks larger than 1 inch (2.54 cm), or sticks, roots, and other debris. It shall be sufficiently fertile to sustain normal healthy plant growth and shall not have a pH value higher than 7.0 or lower than 5.5. The topsoil shall be delivered in an unfrozen and non-muddy condition and must meet the approval of the Owner’s Representative.

2.6 WATER

A. Water for seeding operations shall be Contractor’s responsibility.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection:

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that seeding or sodding may be completed in accordance with the original design and the referenced standards.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Owner's Representative.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 FINISH GRADING

A. Finish Grading:

1. Grade lawn areas to finish grades, filling as needed or removing surplus dirt and floating areas to a smooth uniform grade. All lawn areas shall slope to drain. Where no grades are shown, surfaces shall have a smooth and continual grade between existing or fixed controls (such as walks, curbs, catch basins, elevations at steps or building). Roll, scarify, rake and level as necessary to obtain true even lawn surfaces. All finish grades shall meet approval of the Owner's Representative before grass seed is sown or sod is laid.

B. Fine Grading:

1. Upon completion of finish grading, perform all fine grading required in planting areas, using topsoil obtained from the site.

C. Weed Control:

1. Prior to application of seed the seed bed shall be roughed up to a depth of 1/8 inch (32mm).
2. Moisten the seedbed to a depth of I inch (2.5 cm) to promote germination of any seeds contained in the topsoil.
3. After weeds have germinated and are growing vigorously, spray with Roundup in strict conformance with manufacturers specifications. Seeding shall be executed 7 days following Roundup application. Do not disturb the sterilized seedbed in any way prior to seeding.

3.3 SOWING NATIVE AND LAWN GRASS

A. Preparation:

1. Seed bed preparation shall pertain to the preparation of the surface of the ground to receive the seed. The ground shall be hand or machine raked so as to remove all debris, clods, rocks, and other material larger than 1 inch (2.5 cm), to a depth of 4 inches (10.2 cm). Such debris, clods, rocks, and other material so removed shall be disposed of off the immediate property. Seed bed preparation shall not commence until the moisture conditions make the ground area and soil friable.
2. If there has been a time lapse following the placement of the topsoil to allow it to become settled and compacted on the surface, the area to be planted with seed shall be thoroughly worked to a depth of 3 to 4 inches (7.6 cm to 10.2 cm) so as to provide a surface of such condition that it will allow application of the seed in compliance with these Specifications.
3. Apply fertilizer at a rate of 5 pounds per 1,000 square feet (2.5 kg per 100 m1. Rake fertilizer lightly into top 1 inch (2.5 cm) of prepared seedbed.
4. Seed beds should be firm prior to seeding. Seed beds should be permitted to settle or should be firmed by rolling before seedings are made.

B. Sowing:

1. Immediately prior to the application of the seed, the soil shall be loose to a depth of at least 1 inch (2.5 cm) and free from all material as specified. If soil is too loose or dry for good handling, it should be moistened and rolled lightly.
2. Seeding Methods
   a. Hand Broadcast –Hand broadcast shall be used in sensitive areas where other methods may cause unnecessary disturbance or in areas where species with a small seed are being applied. Contractor must receive approval for areas of broadcast seeding by Owner’s representative if not designated on the plans. Seed should be applied at double the specified seeding rate in all areas of

broadcast seeding. All broadcast seeded areas shall receive straw or hydro mulch per specifications.

b. Drill Seeding – The seed drill shall be capable of accurately seeding native grass and forb species. Areas where drill seeding can be used will need to be accessible by a tractor and drill.

The drill seeder shall have multiple seed boxes for different types and sizes of seed. Seed agitators are required to drop seed into a series of planters. The planters open a slot in the ground and plant the seeds ensuring that each seed is effectively planted to an optimal depth. The seeder must be able to be calibrated to the rate required for each type of seed, and must be able to be pulled by a wheeled or crawler tractor.

The soil surface shall not be compacted. Shallow tilling (no greater than 2" below soil surface) may be required if soil surface is compacted. All drill seeded areas shall receive straw or hydro mulch.

c. Hydroseeding - All seed shall be placed by hydraulic methods. Seed and mulch shall be applied in separate and distinct operations except that a minimal amount of mulch may be added to the seed slurry as a visual aid during the seeding process. Mulch applied with seed shall not exceed one pound mulch for each five gallons water (25 kg mulch for each liter of water). This mulch shall be deducted from the total quantity to be applied. The application of the seed slurry shall be made with the equipment having a built-in agitation system and operating capacity sufficient to agitate, suspend and homogeneously mix a slurry containing water, seed, and mulch. The slurry shall be sprayed over the soil in a uniform coat. Wherever practical, the slurry shall be applied normal to the surface being treated to effectively drill the seed into the seedbed. Hydromulch application shall follow seeding as soon as practical, with consideration for minimal soil erosion through washing. All seeded areas shall be mulched before work is terminated on any day.

3. Non-irrigated grass areas shall be seeded between March 1 and March 31 or between October 15 and October 31 unless otherwise directed by the Owner's Representative.
4. Seed shall be sown exercising great care that a uniform distribution of seed is obtained.
5. Mulch application shall follow seeding as soon as practical, with consideration for minimal soil erosion through washing. All seeded areas shall be mulched within 24 hours of placement.

B. Mulching:
1. Mulch all seeded areas. Topsoil or seed which washes out for reasons attributable to the Contractor's activities or failure to take proper precautions, shall be replaced at the Contractor's expense.
2. Hydro Mulching:
   a. All structures shall be protected from hydraulic application of mulch material. Any material deposited on walks, streets, inlets, or other structures, shall be removed.
   b. Mulch shall not be applied in the presence of free surface water, but may be applied on damp ground.
   c. Apply tank mixed mulch and tackifier at a rate of 2000 pounds per acre.
   d. Tank Mix:
      1. Tank mix shall meet the manufacturer's specifications and proportions:
      2. Add tackifier and mulch to hydroseeder with machine in operation. Run hydroseeder agitator for a minimum of 2 minutes prior to applying tank mix to prepared seedbeds.
3. Straw Mulching:

a. Straw mulching shall be used only on areas of drill or broadcast seeding. The work consists of placing a straw mulch cover on slopes or other designated areas following seeding. Crimped straw consists of a layer of straw or hay spread or blown over the seeded or graded soil surface. The straw is then mechanically anchored to the soil surface. The action of rolling an implement over the surface of the straw creates rows of straw that stand up. The remainder of the straw protects the soil's surface.

b. Materials- Grass Hay or Straw Mulch: Grass hay or straw mulching material shall be certified noxious weed seed free. The mulch shall have been baled dry, in bales of approximately equal weight and shall be relatively dry when applied. Materials having characteristics making them unsuitable for the purpose intended will be rejected. The Owner's representative shall approve the materials prior to installation.

c. Placing- The straw mulch shall be placed within 24 hours after the seeding or grading has been completed. Mulching operations shall not be performed during periods of high winds, which impede the proper placing of the mulch. The placing of mulch shall begin on the windward side of the areas to be covered. On gentle to moderate slopes, straw mulch can be applied by hand broadcasting to a uniform depth of 2 - 3 inches. On steep slopes, the straw should be blown onto the slope to achieve the same degree of cover. For machine application, the machine shall blow or eject mulch, by a constant air stream, that controls the amount of mulch. The machine shall cause a minimum of cutting or breakage of the mulch. Mulch containing excessive moisture, which prevents uniform feeding through the machine, shall not be used. Mulch shall be placed uniformly over the seeded areas at a rate of 4000 pounds per acre (or one 74 pound bale per 800 square feet). Approximately 10 -20 percent of the soil surface shall be visible through the mulch blanket prior to mulch tiller (punching) operation. Excessive cover, which will smother seedlings, shall be avoided. The Owner's Representative may order the placement of mulch on any area where protection is necessary to prevent erosion or encourage vegetation establishment. The mulch shall extend into existing vegetation or be stabilized on all sides to prevent wind or water damage which may start at the edges.

d. Punching- Immediately following application, the mulch shall be punched into the soil. Punching shall be accomplished using one of three methods depending on slope and equipment availability:

   1. Hand Punching- A spade or shovel is used to punch straw into the slope until all areas have straw standing perpendicularly to the slope and embedded at least 4 inches into the slope. It shall be punched about 12 inches apart.

   2. Roller Punching- A roller equipped with straight studs not less than 6 inches long, from 4 - 6 inches wide and approximately one inch thick shall be rolled over the slope.

   3. Crimper Punching- Like roller punching, the crimper has a series of dull, flat disks with notched or cutout edges. The disks shall be approximately 20 inches (500 mm) in diameter, ¼ inch (6 mm) thick, spaced approximately 8 inches (200 mm) apart which force straw mulch into the soil. Crimping shall be done in two directions with the final pass across the slope. Tiller members shall be ballasted; to push mulch into the soil approximately three inches with ends exposed above the soil surface. The mulch tiller shall follow as closely as possible behind the mulcher. More than one pass of the mulch tiller may be required to assure adequate anchoring.

Example of crimped straw

Example of mechanical straw crimper

C. Protection: Protect all seeded areas by erecting temporary fences, barriers, signs, etc. as necessary to prevent traffic. Barriers shall remain in place for at least six (6) weeks unless other arrangements are made with the Owner's Representative.

3.4 MAINTENANCE

A. General:

1. Maintain all native grass and lawn areas for a period of 30 days following substantial completion of the job.
2. Contractor shall coordinate with the Owner to ensure seed establishment in disturbed areas. Overall turf maintenance of areas outside disturbed/seeded is not the responsibility of the Contractor. Reseeding of areas as needed is the responsibility of the Contractor.

B. Work Included:

1. All irrigated areas shall be watered as required.
2. All areas shall be watched closely so that they are "not permitted to dry out or to form puddles of water, or to be washed by over-application.
3. Mow all lawn at 1- 1/2 inches (3.8 cm) with a self bagging mower each time its height reaches 3 inches (7.6 cm). Maintain through minimum three mowings to provide an even

stand over the entire seeded area. Continue mowing all lawns at 1-1/2 inches (3.8 cm) until acceptance.

4. Mow native areas to a height of 6” per direction of Owner’s representative, for a maximum of 4 mowings throughout seed establishment.

C. Replacements:

1. Any area that fails to produce an adequate stand of grass as determined by the Owner until Final Completion shall be reseeded by the Contractor at no additional expense to the Owner. If seeding is found to be unsatisfactory the final completion date shall be extended as required until seeding acceptance by Owner at the Contractor’s expense.
2. Replacements required because of vandalism or other causes beyond the control of the Contractor are not part of the Contract.

D. Extension of Maintenance Period:

1. Continue the maintenance period at no additional cost to the Owner until all previously noted deficiencies have been corrected, at which time the final inspection shall be made.

END OF SECTION 02820

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APPENDIX

Memo

To: Mike Ruggles – Montana Fish Wildlife and Parks

From: Chad Raisland

CC: Jason Decker, Jeff Riedel, Charlie Peterson

Date: 5/19/2021

Re: Geotechnical Investigation and Materials Testing for Lake Elmo Habitat and Access Improvement Project

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GEOTECHNICAL INVESTIGATION

On April 6, 2021, Pioneer Technical Services, Inc. (Pioneer) excavated 10 test pits (TP-01, TP-02, TP-03, TP-04, TP-05, TPL-01, TPL-02, TPL-03, TPL-04, and TPL-05). The test pit locations were selected to provide subsurface geotechnical information for proposed habitat and access improvements and delineate sediment buildup for Lake Elmo. Montana Fish Wildlife and Parks (FWP) completed the test pit excavations using a Bobcat E42 Mini-Excavator. Test pit locations are shown on Figure 1.

Soil samples were field classified in general accordance with American Society for Testing and Materials (ASTM) D2488 (Standard Practice for Description and Identification of Soils [Visual Manual Procedure]). Appendix A contains test pit logs that list detailed soil descriptions for each of the test pits, and Appendix B contains photographs of the investigation. The stratification lines shown on the test pit logs represent the approximate boundary between soil types as observed within the test pits. The actual *in-situ* transition is variable due to the nature and depositional characteristics of natural soil. Interpolation of subsurface conditions beyond the location of the test pits may be unreliable as soil conditions can change rapidly in both lateral and vertical directions.

Select soil samples were analyzed at Pioneer's Materials Testing Laboratory in Bozeman, Montana. Laboratory testing results are included in Appendix C. A summary of the investigation and laboratory testing is provided in in the sections below.

SUBSURFACE CONDITIONS

Soil Investigation Details and Results

Generally, at the surface the team observed 2 to 4 feet of olive brown clay with sand and/or gravel, with no to medium plasticity; 2 to 6 feet of dark gray to olive brown sandy silt, with no plasticity; or 1 to 4.5 feet of olive brown gravel with varying proportions of sand, silt, and clay. The test pit logs in Appendix A contain detailed descriptions of the subsurface soil encountered during the test pit investigation. Specific materials observed for each test pit are listed below.

Test Pits TP-01 through TP-05

Test pits TP-01 through TP-05 were completed to evaluate the depth of sediment buildup along the western and southern shoreline of Lake Elmo. The list below describes the material descriptions for each test pit:

1. Sediment buildup (surficial materials) varied from 2.5 to 6.0 feet of sandy silt (ML) or lean clay (CL) to clay with gravel (CL).
2. At test pit TP-01, the surficial materials (0.0 to 3.0 feet) were underlain by organic clay (OL) with medium to high plasticity from 3.0 to 5.5 feet below ground surface (bgs). At 5.5 feet, material transitioned to non-plastic silt with sand (ML) to a depth of 9.0 feet bgs where the test pit was completed. Heavy material sloughing was observed at approximately 5.5 feet bgs.
3. At test pit TP-02, the surficial materials (0.0 to 5.0 feet) were underlain by lean clay (CL) with low to medium plasticity from 5.0 to 6.0 feet bgs where the test pit was completed.
4. At test pit TP-03, the surficial materials (0.0 to 6.0 feet) were underlain by clay with sand (CL) with low to medium plasticity from 6.0 to 8.5 feet bgs where the test pit was completed. Significant water seepage was observed at approximately 5.0 feet bgs.
5. At test pit TP-04, the surficial materials (0.0 to 2.5 feet) were underlain by clayey gravel with sand (GC) with low plasticity from 2.5 to 6.5 feet bgs where the test pit was completed. Water seepage was observed at approximately 6.0 feet bgs.
6. At test pit TP-05, the surficial materials (0.0 to 2.5 feet) were underlain by clayey gravel with sand (GC) with low plasticity from 2.5 to 7.0 feet bgs.
7. No Atterberg limits or gradation testing was performed on materials from these test pits.

Test Pits TPL-01 through TPL-05

Test pits TPL-01 through TPL-05 were completed to evaluate material properties at locations where access improvements are proposed along the shoreline of Lake Elmo. The list below describes the material descriptions for each test pit:

1. Test pit TPL-01 was located within the proposed fishing jetty northwest of the FWP office and consisted of 0.0 to 2.0 feet bgs non-plastic, poorly graded gravel with silt and sand (GP-GM) weathered shale underlain by non-plastic, poorly graded gravel with silt and sand or weathered shale bedrock from 2.0 to 4.0 feet bgs where the test pit was completed. The mini-excavator hit refusal at 4.0 feet bgs and was unable to advance the test pit any further.
2. Test pit TPL-02 was located within the proposed new boat ramp area north of the FWP office and consisted of 0.0 to 4.5 feet bgs of clayey gravel with sand (GC) with low plasticity. The mini-excavator encountered weathered shale bedrock and hit refusal at 4.5 feet bgs and was unable to advance the test pit any further.
3. Test pit TPL-03 was located south of the irrigation headgate adjacent to Lake Elmo Drive and consisted of 0.0 to 1.0 feet bgs non-plastic silty sand with gravel (SM) underlain by clayey gravel with sand (GC) from 1.0 to 10.0 feet bgs where the test pit was completed. During test pitting, material sloughing was observed at approximately 4.0 to 10 feet bgs and competent bed rock was encountered at approximately 10.0 feet bgs.
4. Test pit TPL-04 was located within the proposed waterfront picnic nodes along the north shoreline and consisted of 0.0 to 10.0 feet bgs sandy clay (CL) with low to medium plasticity. Water seepage was observed at approximately 4.0 feet bgs with heavy sloughing observed during excavation from 4.0 to 10.0 feet bgs where the test pit was completed.
5. Test pit TPL-05 was located within the existing beach along the north shoreline and consisted of 0.0 to 1.0 feet bgs non-plastic, non-native, silty sand with gravel (SM) underlain by sandy clay (CL) with low plasticity from 1.0 to 5.0 feet bgs. The sandy clay (CL) transitioned to clayey gravel with sand (GC) with

low plasticity from 5.0 to 10.0 feet bgs where the test pit was completed. Heavy water seepage was observed at 6.0 feet bgs and competent bedrock was encountered at approximately 10.0 feet bgs.

Atterberg limits, moisture content, and gradation testing were performed on representative samples from test pits TPL-01 through TPL-05 to aid in material properties and classifications. Results are in Appendix C.

Index Properties

The Pioneer Materials Testing Laboratory in Bozeman, Montana, completed the soil index property testing, which included moisture content, gradation, and Atterberg limits. Moisture contents within the native materials ranged between 11.50 to 23.89 percent with an average value of 18.67 percent. Generally, the gravel materials with sand, silt, and clay had lower moisture contents (11.50 to 16.76 percent) than the sandy clay materials (20.14 to 23.89 percent). Six gradation tests, 6 Atterberg limit tests, and 6 moisture content tests were performed to verify field identification and plasticity characteristics. Appendix C contains the geotechnical soil testing results.

Shrink/Swell Characteristics

Based on the test results, the volume change potential of the native clayey gravels can be considered 'low' due to the low percentage of plastic fines present in these materials. The volume change potential of the native sandy clays can be considered 'low' to 'medium' based on the higher percentage of plastic fines in the subgrade soil.

Site Geology and Static Groundwater Conditions

The Lake Elmo area is underlain by the Cretaceous-aged Claggett Formation consisting of dark gray marine shale (USGS & MBMG, 2012).

A search of well logs in the vicinity of Lake Elmo revealed typical depth to water and other geologic conditions that exist in the subject area. Several nearby well logs were on file with the Montana Ground Water Information Center (GWIC) (MBMG, 2021). A review of these logs revealed that soil and bedrock conditions of the area consisted of fine-grained alluvial and colluvium deposits overlying a shale bedrock. The alluvial and colluvial sediments range in thickness from 10 to 25 feet and consist of lean clay to silty sand, interbedded with gravels and course rock fragments. Groundwater is present in the alluvial and colluvial deposits ranging in depth from 6 to 12 feet bgs. Shale bedrock is present in the area ranging in depth from 10 to 25 feet bgs.

The closest well, located approximately 100 feet south of Lake Elmo, on record with GWIC is well GWIC #21644, which consists of a 2-inch diameter groundwater monitoring well installed by the Montana Bureau of Mines and Geology in 2004 (the well report is included in Appendix D). This well is 13 feet deep and encountered sandy silt to 10 feet where a dark gray shale was encountered. Additionally, this well has been gauged for depth to water for several years and the static water level in the well ranges from 7 to 10 feet bgs. This well is likely representative of the groundwater and soil conditions present in the vicinity of the lake; however, site specific conditions will vary.

USE OF MEMORANDUM

This memorandum is for the exclusive use of Montana FWP and their design team. In the absence of Pioneer's written approval, Pioneer makes no representation and assumes no responsibility to other parties regarding this memorandum. The data provided may not be appropriate for other structures or purposes. Pioneer recommends that other parties contemplating other structures or purposes contact us.

REFERENCES

MBMG, 2021. Groundwater Information Center, MBMG Data Center, Montana Bureau of Mines and Geology, Web Mapping Application. Available at http://mbmggwic.mtech.edu/. Accessed May 11, 2021.

Attachments: Figure 1 and Appendix A through D.

Figure 1. Lake Elmo Test Pit Locations Map

LEGEND:

TEST PIT LOCATION TO DETERMINE DEPTHS OF SEDIMENT (NO LAB TESTING)

TEST PIT LOCATION (WITH LAB TESTING)

5/14/2021 3:15:45 PM Z:\SHARED\ACTIVE PROJECTS\FWP\LAKEELMO\CADD\FIGURES\LE-FIG-001-21.DWG

DISPLAYED AS:
COORD SYS/ZONE: MSP
DATUM: NAD 83
UNITS: INT. FEET
SOURCE: BING

SCALE IN FEET
0 200 400

FIGURE 1

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LAKE ELMO
TEST PIT
LOCATIONS MAP

DATE: MAY 2021

Appendix A
Test Pit Logs

Drill Hole No. TP-01

PROJECT NAME: Lake Elmo Habitat Improvements Project	
DATE STARTED / FINISHED: 4/6/21 - 4/6/21	DRILLER: FWP
LOGGED BY: Jason Decker	DRILL TYPE: Bobcat B42 Backhoe
GROUND SURFACE ELEVATION:	HOLE DIAMETER:
BOREHOLE LOCATION: 45.8433, -108.48223	HAMMER TYPE:

WELL LOG	GRAPHIC LOG	DEPTH (FT)	SAMPLES: DRIVE	SAMPLES: UNDISTURBED	SAMPLES: BULK	SAMPLE ID	RECOVERY (%)	MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	FIELD SPT 'N'	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
		1				G21231		Moist, Olive brown [2.5Y 4/4], CLAY with Gravel, CL, low plasticity, sedimentation.						
		2												
		3												water level measured at 3.5' bgs while excavating on 4-6-2021
▼		4				G21232		Saturated, Black [2.5Y 2.5/1] Light olive brown [2.5Y 5/4], ORGANIC CLAY, OL, medium to high plasticity, trace of sand and gravel.						
		5												
		6						Saturated, Olive brown [2.5Y 4/4], SILT with Sand, ML, non-plastic.						heavy sloughing at 5.5'
		7				G21233								
		8												
		9												Total depth=9.0', didn't reach competent bedrock
		10												
		11												
		12												

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ADDRESS: 2300 Lake Elmo Drive Billings, Montana 59105	
PHONE NUMBER:	

DRILL HOLE LOG ELMOLAKEGINTLOGS 041520021.GPJ 5/19/21

PROJECT NAME: Lake Elmo Habitat Improvements Project	Drill Hole No. TP-02	PAGE 1 of 1
DATE STARTED / FINISHED: 4/6/21 - 4/6/21	DRILLER: FWP	
LOGGED BY: Jason Decker	DRILL TYPE: Bobcat B42 Backhoe	
GROUND SURFACE ELEVATION:	HOLE DIAMETER:	
BOREHOLE LOCATION: 45.83923, -108.48289	HAMMER TYPE:	

WELL LOG	GRAPHIC LOG	DEPTH (FT)	SAMPLES: DRIVE	SAMPLES: UNDISTURBED	SAMPLES: BULK	SAMPLE ID	RECOVERY (%)	MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	FIELD SPT 'N'	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
		0						This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.						
		0						Moist to wet, Very dark gray [2.5Y 3/1], SANDY SILT, ML, non-plastic.						0-5' Sediment Buildup
▼		3				G21234		Saturated, Very dark gray [2.5Y 3/1], SANDY SILT, ML, non-plastic.						Water level measured at 2.5' bgs during excavation on 4-6-2021
		5				G21235		Saturated, Pale yellow [2.5Y 8/2], LEAN CLAY, CL, low to medium plasticity.						
		6												Total depth=6.0'
		7												
		8												
		9												
		10												
		11												
		12												

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DRILL HOLE LOG ELMOLAKEGINTLOGS 041520021.GPJ 5/19/21

PROJECT NAME: Lake Elmo Habitat Improvements Project	Drill Hole No. TP-03	PAGE 1 of 1
DATE STARTED / FINISHED: 4/6/21 - 4/6/21	DRILLER: FWP	
LOGGED BY: Jason Decker	DRILL TYPE: Bobcat B42 Backhoe	
GROUND SURFACE ELEVATION:	HOLE DIAMETER:	
BOREHOLE LOCATION: 45.83825, -108.48225	HAMMER TYPE:	

WELL LOG	GRAPHIC LOG	DEPTH (FT)	SAMPLES: DRIVE	SAMPLES: UNDISTURBED	SAMPLES: BULK	SAMPLE ID	RECOVERY (%)	MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	FIELD SPT 'N'	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
▼		1						This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.						
		2						Saturated, Dark grayish brown [2.5Y 4/2], SANDY SILT, ML, low plasticity, sediment buildup.						
		3				G21236								Water level measured at 3.0' bgs while excavating on 4-6-2021
		4												
		5												significant seepage at 5' observed
		6						Saturated, Olive brown [2.5Y 4/4], CLAY with Sand, CL, low to medium plasticity.						
		7				G21237								
		8												Total depth=8.5'
		9												
		10												
		11												
		12												

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DRILL HOLE LOG ELMOLAKEGINTLOGS 041520021.GPJ 5/19/21

Drill Hole No. TP-04

PROJECT NAME: Lake Elmo Habitat Improvements Project	
DATE STARTED / FINISHED: 4/6/21 - 4/6/21	DRILLER: FWP
LOGGED BY: Jason Decker	DRILL TYPE: Bobcat B42 Backhoe
GROUND SURFACE ELEVATION:	HOLE DIAMETER:
BOREHOLE LOCATION: 45.83788, -108.48112	HAMMER TYPE:

WELL LOG	GRAPHIC LOG	DEPTH (FT)	SAMPLES: DRIVE	SAMPLES: UNDISTURBED	SAMPLES: BULK	SAMPLE ID	RECOVERY (%)	MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	FIELD SPT 'N'	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
		1				G21238		Dry, Dark grayish brown [2.5Y 4/2], LEAN CLAY, CL, non-plastic.						Sediment buildup 0-2.5'
▼		2						Saturated, Dark grayish brown [2.5Y 4/2], CLAYEY GRAVEL with Sand, GC, low plasticity, possible weathered Shale.						Water level measured at 2.5' bgs while excavating on 4-6-2021
		3												
		4				G21239								
		5												
		6												water seepage at 6.0' bgs
														Total depth=6.5'
		7												
		8												
		9												
		10												
		11												
		12												

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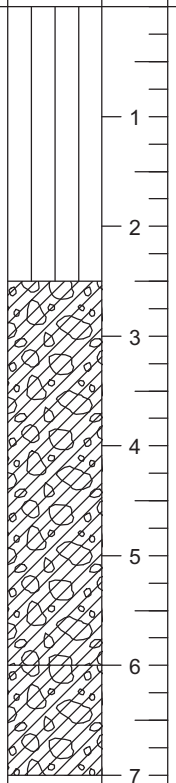
DRILL HOLE LOG ELMOLAKEGINTLOGS 041520021.GPJ 5/19/21

Drill Hole No. TP-05

PAGE 1 of 1

PROJECT NAME: Lake Elmo Habitat Improvements Project	
DATE STARTED / FINISHED: 4/6/21 - 4/6/21	DRILLER: FWP
LOGGED BY: Jason Decker	DRILL TYPE: Bobcat B42 Backhoe
GROUND SURFACE ELEVATION:	HOLE DIAMETER:
BOREHOLE LOCATION: 45.83827, -108.47985	HAMMER TYPE:



DEPTH (FT)	SAMPLES: DRIVE	SAMPLES: UNDISTURBED	SAMPLES: BULK	SAMPLE ID	RECOVERY (%)	MATERIAL DESCRIPTION	REMARKS / TESTING
1				G21240		Dry, Olive brown [2.5Y 4/3], SANDY SILT, ML, no to low plasticity.	0-2' Sediment buildup
2							
3						Moist, Olive brown [2.5Y 4/3], CLAYEY GRAVEL with Sand, GC, low plasticity, possible decomposed Shale.	
4				G21241			
5							
6						Saturated, Olive brown [2.5Y 4/3], CLAYEY GRAVEL with Sand, GC, low plasticity.	Water level measured at 6.0' bgs while excavating on 4-6-2021 Lake water elevation above 6', but no water or seepage present in test pit until 6.0' Total depth=7.0'
7							
8							
9							
10							
11							
12							

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LIQUID LIMIT | PLASTIC LIMIT | FIELD SPT 'N' | DRY DENSITY (pcf) | MOISTURE (%)

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DRILL HOLE LOG ELMOLAKEGINTLOGS 041520021.GPJ 5/19/21

Drill Hole No. TPL-01

PROJECT NAME: Lake Elmo Habitat Improvements Project	
DATE STARTED / FINISHED: 4/6/21 - 4/6/21	DRILLER: FWP
LOGGED BY: Jason Decker	DRILL TYPE: Bobcat B42 Backhoe
GROUND SURFACE ELEVATION:	HOLE DIAMETER:
BOREHOLE LOCATION: 45.83933, -108.47871	HAMMER TYPE:

WELL LOG	GRAPHIC LOG	DEPTH (FT)	SAMPLES: DRIVE	SAMPLES: UNDISTURBED	SAMPLES: BULK	SAMPLE ID	RECOVERY (%)	MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	FIELD SPT 'N'	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
		1			X	G21221		This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered. Dry, Light olive brown [2.5Y 5/6], POORLY GRADED GRAVEL with SILT AND SAND, GP-GM, non-plastic, weathered Shale.	0	0			11.5	
		2			X			Moist, Light olive brown [2.5Y 5/6], POORLY GRADED GRAVEL with SILT AND SAND, GP-GM, non-plastic, weathered Shale Bedrock.						
▼		3			X	G21222			0	0			11.5	
		4			X			Saturated, Light olive brown [2.5Y 5/6], POORLY GRADED GRAVEL with SILT AND SAND, GP-GM, non-plastic.						Water level measured at 3.5' bgs while excavating on 4-6-2021 Total depth=4.0'
		5												
		6												
		7												
		8												
		9												
		10												
		11												
		12												

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DRILL HOLE LOG ELMOLAKEGINTLOGS 041520021.GPJ 5/19/21

PROJECT NAME: Lake Elmo Habitat Improvements Project	Drill Hole No. TPL-02	PAGE 1 of 1
DATE STARTED / FINISHED: 4/6/21 - 4/6/21	DRILLER: FWP	
LOGGED BY: Jason Decker	DRILL TYPE: Bobcat B42 Backhoe	
GROUND SURFACE ELEVATION:	HOLE DIAMETER:	
BOREHOLE LOCATION: 45.84003, -108.47697	HAMMER TYPE:	

WELL LOG	GRAPHIC LOG	DEPTH (FT)	SAMPLES: DRIVE	SAMPLES: UNDISTURBED	SAMPLES: BULK	SAMPLE ID	RECOVERY (%)	MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	FIELD SPT 'N'	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
▼		0				G21223		Moist to wet, Olive brown [2.5Y 4/3], CLAYEY GRAVEL with Sand, GC, low plasticity, Weathered; Angular/Blocky Shale.					16.0	Water level measured at 4.5' bgs while excavating on 4-6-2021 Total depth=4.75', excavator refusal in the shale bedrock
		1												
		2												
		3												
		4												
		5												
		6												
		7												
		8												
		9												
		10												
		11												
		12												

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PHONE NUMBER:	

DRILL HOLE LOG ELMOLAKEGINTLOGS 041520021.GPJ 5/19/21

PROJECT NAME: Lake Elmo Habitat Improvements Project	Drill Hole No. TPL-03	PAGE 1 of 1
DATE STARTED / FINISHED: 4/6/21 - 4/6/21	DRILLER: FWP	
LOGGED BY: Jason Decker	DRILL TYPE: Bobcat B42 Backhoe	
GROUND SURFACE ELEVATION:	HOLE DIAMETER:	
BOREHOLE LOCATION: 45.84051, -108.47574	HAMMER TYPE:	

WELL LOG	GRAPHIC LOG	DEPTH (FT)	SAMPLES: DRIVE	SAMPLES: UNDISTURBED	SAMPLES: BULK	SAMPLE ID	RECOVERY (%)	MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	FIELD SPT 'N'	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
		0				G21224		Moist, Olive brown [2.5Y 4/4], SILTY SAND with Gravel, SM, non-plastic, with organics and mild odor.						
▼		1						Saturated, Grayish brown [2.5Y 5/2], CLAYEY GRAVEL with Sand, GC, low plasticity, possible weathered Shale, gravels angular.						Water level measured at 1.0' bgs while excavating on 4-6-2021
		2												
		3												
		4												at 4' sloughing in badly
		5												
		6				G21225			31	18			16.8	
		7												
		8												
		9												
		10												Total depth=10.0', scraping more competent, Shale, rock layer
		11												
		12												

PIONEER TECHNICAL SERVICES, INC.

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PHONE NUMBER:

DRILL HOLE LOG ELMOLAKEGINTLOGS 041520021.GPJ 5/19/21

PROJECT NAME: Lake Elmo Habitat Improvements Project	Drill Hole No. TPL-04	PAGE 1 of 1
DATE STARTED / FINISHED: 4/6/21 - 4/6/21	DRILLER: FWP	
LOGGED BY: Jason Decker	DRILL TYPE: Bobcat B42 Backhoe	
GROUND SURFACE ELEVATION:	HOLE DIAMETER:	
BOREHOLE LOCATION: 45.8415, -108.4758	HAMMER TYPE:	

This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered.

WELL LOG	GRAPHIC LOG	DEPTH (FT)	SAMPLES: DRIVE	SAMPLES: UNDISTURBED	SAMPLES: BULK	SAMPLE ID	RECOVERY (%)	MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	FIELD SPT 'N'	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
		0						Moist, Olive brown [2.5Y 4/3], SANDY CLAY, CL, low to medium plasticity.						
▼		1												
		2				G21226		Saturated, Olive brown [2.5Y 4/3], SANDY CLAY, CL, low to medium plasticity.	36	15			23.8	Water level at 1.5' bgs while excavating on 4-6-2021
		3												
		4						Saturated, Olive brown [2.5Y 4/4], SANDY CLAY, CL, low plasticity.						seepage at 4.0'
		5												
		6												
		7				G21227			42	16			23.9	
		8												heavy sloughing from 4-10' during test pitting
		9												
		10												Total depth=10.0'
		11												
		12												

PIONEER TECHNICAL SERVICES, INC.

CLIENT: Montana Fish Wildlife and Parks
ADDRESS: 2300 Lake Elmo Drive Billings, Montana 59105
PHONE NUMBER:

DRILL HOLE LOG ELMOLAKEGINTLOGS 041520021.GPJ 5/19/21

PROJECT NAME: Lake Elmo Habitat Improvements Project	Drill Hole No. TPL-05	PAGE 1 of 1
DATE STARTED / FINISHED: 4/6/21 - 4/6/21	DRILLER: FWP	
LOGGED BY: Jason Decker	DRILL TYPE: Bobcat B42 Backhoe	
GROUND SURFACE ELEVATION:	HOLE DIAMETER:	
BOREHOLE LOCATION: 45.84229, -108.47753	HAMMER TYPE:	

WELL LOG	GRAPHIC LOG	DEPTH (FT)	SAMPLES: DRIVE	SAMPLES: UNDISTURBED	SAMPLES: BULK	SAMPLE ID	RECOVERY (%)	MATERIAL DESCRIPTION	LIQUID LIMIT	PLASTIC LIMIT	FIELD SPT 'N'	DRY DENSITY (pcf)	MOISTURE (%)	REMARKS / TESTING
		0				G21228		This log is part of a report prepared by Pioneer Technical, Inc. for this project and should be read with the report. This summary applies only at the location of the boring and at the time of the drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplication of actual conditions encountered. Moist to wet, Olive brown [2.5Y 4/3], SILTY SAND with Gravel, SM, non-plastic, Imported Sand.						
		1						Moist, Dark grayish brown [2.5Y 4/2], SANDY CLAY, CL, low plasticity.						
		2												
		3				G21229			39	14			20.1	
		4												
▼		5						Wet, Olive brown [2.5Y 4/3] Yellow [2.5Y 7/8], CLAYEY GRAVEL with Sand, GC, low plasticity, possible weathered Shale.						Water level measured at 5.0' bgs while excavating on 4-6-2021
		6												heavy seepage into test pit at 6.0'
		7												
		8				G21230								
		9												
		10												Total depth=10.0', scraping, difficult digging
		11												
		12												

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PHONE NUMBER:

DRILL HOLE LOG ELMOLAKEGINTLOGS 041520021.GPJ 5/19/21

Appendix B
Photographs

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: Overview of TP-01.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-01 during excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.

Task: Test Pitting Investigation
Date: 04/06/2021
Description: TP-01 during excavation.
Location: Lake Elmo, Billings, Montana
Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.

Task: Test Pitting Investigation
Date: 04/06/2021
Description: TP-01 at bottom of excavation and soil sloughing.
Location: Lake Elmo, Billings, Montana
Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-01 at bottom of excavation and soil sloughing.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-01 at bottom of excavation and soil sloughing.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-01 with groundwater accumulation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-01 with groundwater accumulation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.

Task: Test Pitting Investigation
Date: 04/06/2021
Description: TP-01 excavated materials stockpile.
Location: Lake Elmo, Billings, Montana
Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.

Task: Test Pitting Investigation
Date: 04/06/2021
Description: TP-01 excavated materials stockpile.
Location: Lake Elmo, Billings, Montana
Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-01 excavated materials stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: Overview of TP-02.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-02 during excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-02 bottom of excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-02 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-02 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: Overview of TP-03.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-03 bottom of excavation with groundwater accumulation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-03 during exaction.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-03 bottom of excavation with groundwater accumulation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-03 bottom of excavation with groundwater accumulation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-03 bottom of excavation with groundwater accumulation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-03 bottom of excavation with groundwater accumulation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: Overview of TP-03 and excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: Overview of TP-04.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-04 during excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-04 during excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-04 bottom of excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-04 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-04 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: Overview of TP-05.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-05 during excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.

Task: Test Pitting Investigation
Date: 04/06/2021
Description: TP-05 bottom of excavation.
Location: Lake Elmo, Billings, Montana
Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.

Task: Test Pitting Investigation
Date: 04/06/2021
Description: TP-05 bottom of excavation.
Location: Lake Elmo, Billings, Montana
Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-05 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TP-05 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: Overview of TPL-01
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-01 bottom of excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-01 bottom of excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-01 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-01 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: Overview of TPL-02.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-02 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-02 bottom of excavation with groundwater accumulation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-02 bottom of excavation with groundwater accumulation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-02 bottom of excavation with groundwater accumulation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: Overview of TPL-03.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-03 during excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-03 bottom of excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

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PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-03 bottom of excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-03 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-03 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-03 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-03 bottom of excavation with groundwater accumulation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: Overview of TPL-04.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-04 bottom of excavation with groundwater accumulation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-04 bottom of excavation with groundwater accumulation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-04 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-04 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: Overview of TPL-05
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.

Task: Test Pitting Investigation
Date: 04/06/2021
Description: TPL-05 during excavation.
Location: Lake Elmo, Billings, Montana
Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.

Task: Test Pitting Investigation
Date: 04/06/2021
Description: TPL-05 during excavation.
Location: Lake Elmo, Billings, Montana
Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-05 bottom of excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-05 bottom of excavation.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

Task: Test Pitting Investigation
Date: 04/06/2021
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Location: Lake Elmo, Billings, Montana
Project: Lake Elmo Habitat and Access Improvements Project

Task: Test Pitting Investigation
Date: 04/06/2021
Description: TPL-05 excavated material stockpile.
Location: Lake Elmo, Billings, Montana
Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-05 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

PIONEER TECHNICAL SERVICES, INC.	Task: Test Pitting Investigation
	Date: 04/06/2021
	Description: TPL-05 excavated material stockpile.
	Location: Lake Elmo, Billings, Montana
	Project: Lake Elmo Habitat and Access Improvements Project

Appendix C
Laboratory Results

May 7, 2021

Jason Decker
Pioneer Technical Services

RE: Montana FWP- Lake Elmo
Laboratory Report

Dear Mr. Decker,

On April 8, a total of twenty-one samples were delivered to Pioneer Technical Service's Bozeman Laboratory for the Lake Elmo project. The samples selected for testing were referenced and assigned Laboratory Nos. as listed in Table 1. The testing was performed in general accordance with the following Standards:

Table 1

Client Sample I.D.	Sample Identification	Moisture Content (%)
TPL-01 (0-2')/TPL-01 (2-4')	G21221/G21222	11.50
TPL-02 (0-4.75')/TPL-05 (5-10')	G21223/G21230	15.95
TPL-03 (1-10')	G21225	16.76
TPL-04 (0-4')	G21226	23.78
TPL-04 (4-10')	G21227	23.89
TPL-05 (1-5')	G21229	20.14

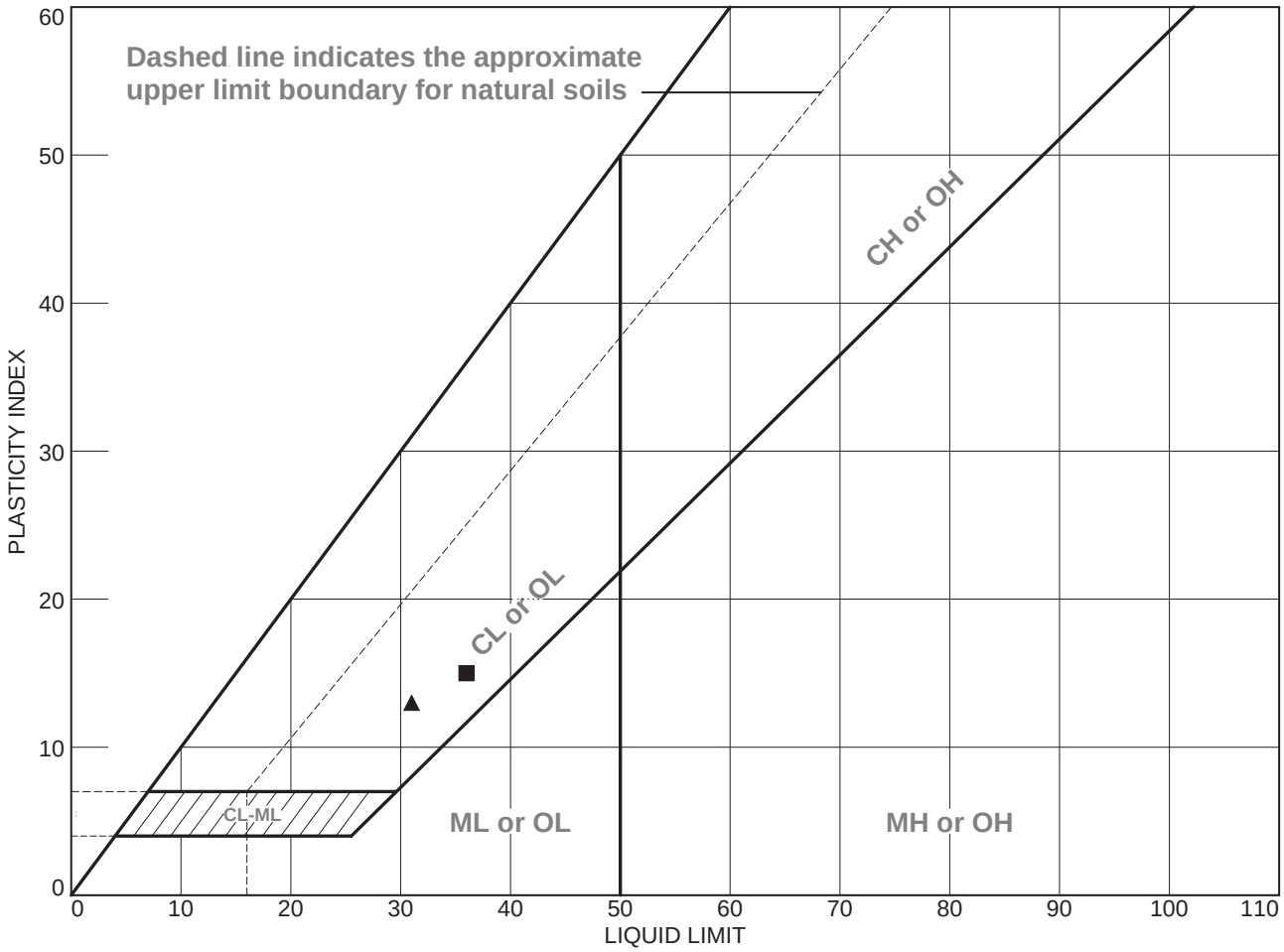
- Particle Size Distribution of Soils (ASTM D6913);
- Atterberg Limits (ASTM D4318); and
- Moisture Content (ASTM D2216).

The particle size distribution curves and Atterberg Limits results are attached, moisture content results are reported in Table are included with this report. Thank you for using Pioneer Technical Services for your geotechnical and materials testing requirements. If you have any questions regarding these results, please contact us at (406) 388-8578.

Sincerely,
PIONEER TECHNICAL SERVICES, INC.

Niki Griffis
Senior Scientist/Laboratory Manager

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	TPL-01/TPL-05	G21221/G21222	0-4'		NP	NP	NP	GP-GM
■	TPL-02/TPL-05	G21223/G21230	0-4.75'/5-10'		21	36	15	GC
▲	TPL-03	G21225	1-10'		18	31	13	GC

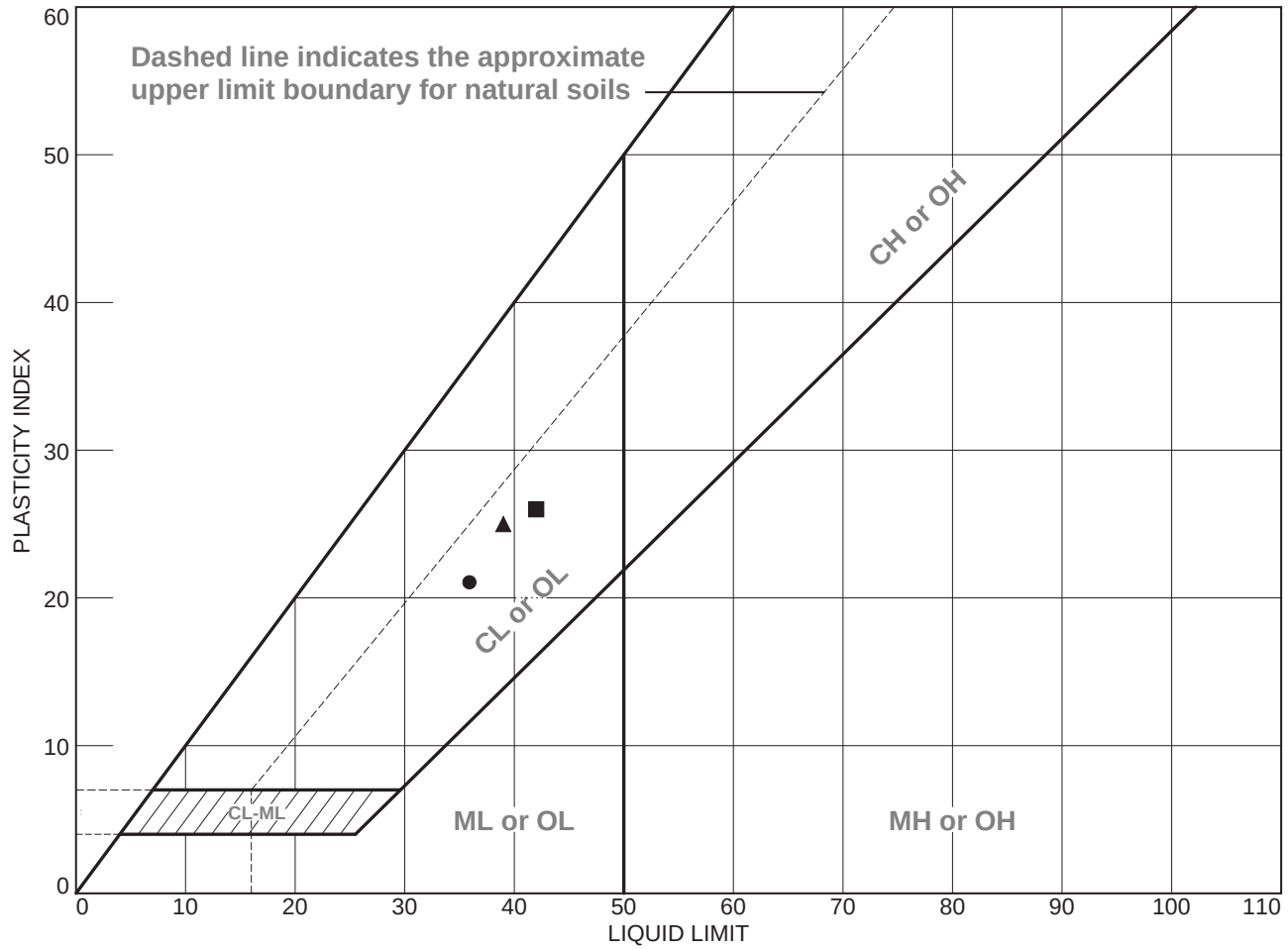
Pioneer Technical Services, Inc.
106 Pronghorn Trail, Suite A - Bozeman, MT 59718
Ph. 406-388-8578 - Fax 406-388-8579

Client: Montana FWP
Project: Lake Elmo Habitat & Access Improvement #21-21

Project No.: **Figure**

Tested By: ○ LPS □ LPS △ LPS 5-6-2021 **Checked By:** NG

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	TPL-04	G21226	0-4'		15	36	21	CL
■	TPL-04	G21227	4-10'		16	42	26	CL
▲	TPL-05	G21229	1-5'		14	39	25	CL

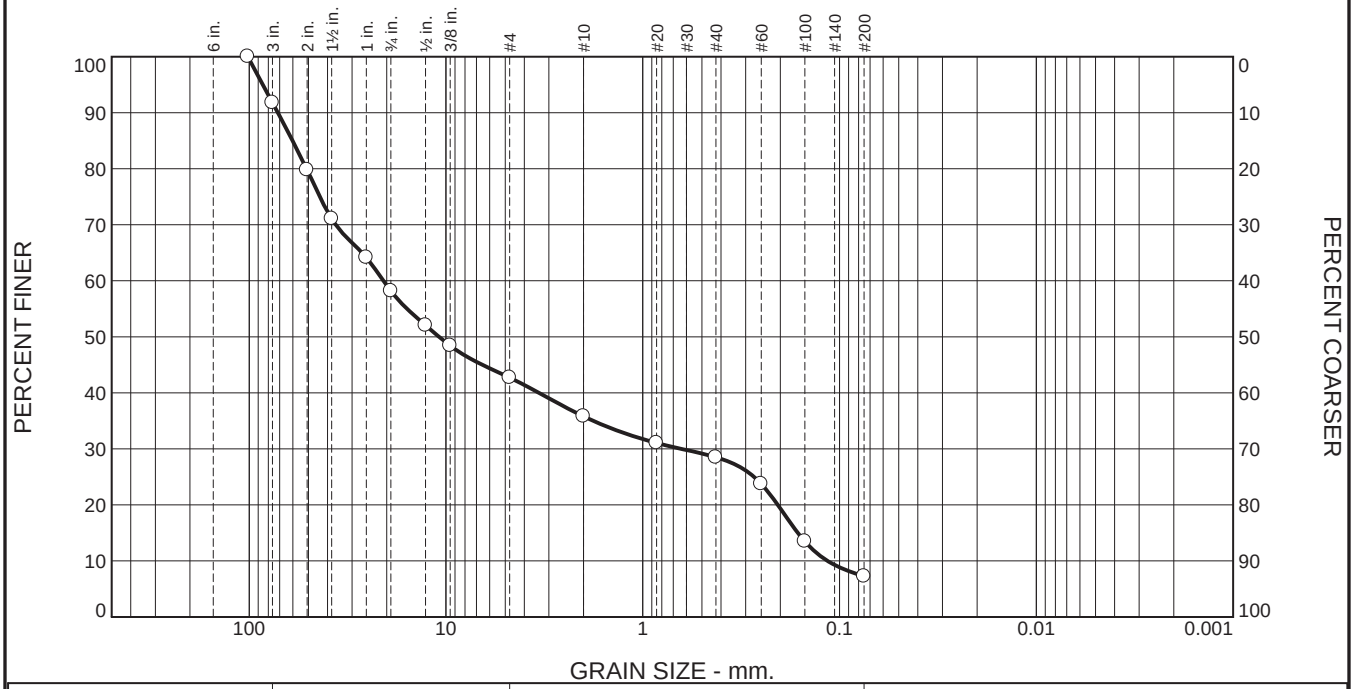
Pioneer Technical Services, Inc.
106 Pronghorn Trail, Suite A - Bozeman, MT 59718
Ph. 406-388-8578 - Fax 406-388-8579

Client: Montana FWP
Project: Lake Elmo Habitat & Access Improvement #21-21

Project No.: **Figure**

Tested By: ○ LPS/TS □ TS △ TS **Checked By:** NG

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
8.2	33.6	15.5	6.9	7.3	21.3	7.2	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
4"	100.0		
3"	91.8		
2"	79.8		
1 1/2"	71.1		
1"	64.1		
3/4"	58.2		
1/2"	52.1		
3/8"	48.4		
#4	42.7		
#10	35.8		
#20	31.1		
#40	28.5		
#60	23.7		
#100	13.5		
#200	7.2		

* (no specification provided)

Material Description

poorly graded gravel with silt and sand

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NP **PI=** NP

Classification

USCS (D 2487)= GP-GM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 71.6098 D_{85}= 60.2087 D_{60}= 20.8120
D_{50}= 10.8531 D_{30}= 0.6322 D_{15}= 0.1627
D_{10}= 0.1151 C_u= 180.87 C_c= 0.17

Remarks

Date Received: 4-8-2021 **Date Tested:** 4-28-2021

Tested By: TS

Checked By: NG

Title: Laboratory Manager

Source of Sample: TPL-01 **Depth:** 0-4' **Date Sampled:** 4-6-2021

Sample Number: G21221/G21222

Pioneer Technical Services, Inc.

106 Pronghorn Trail, Suite A - Bozeman, MT 59718

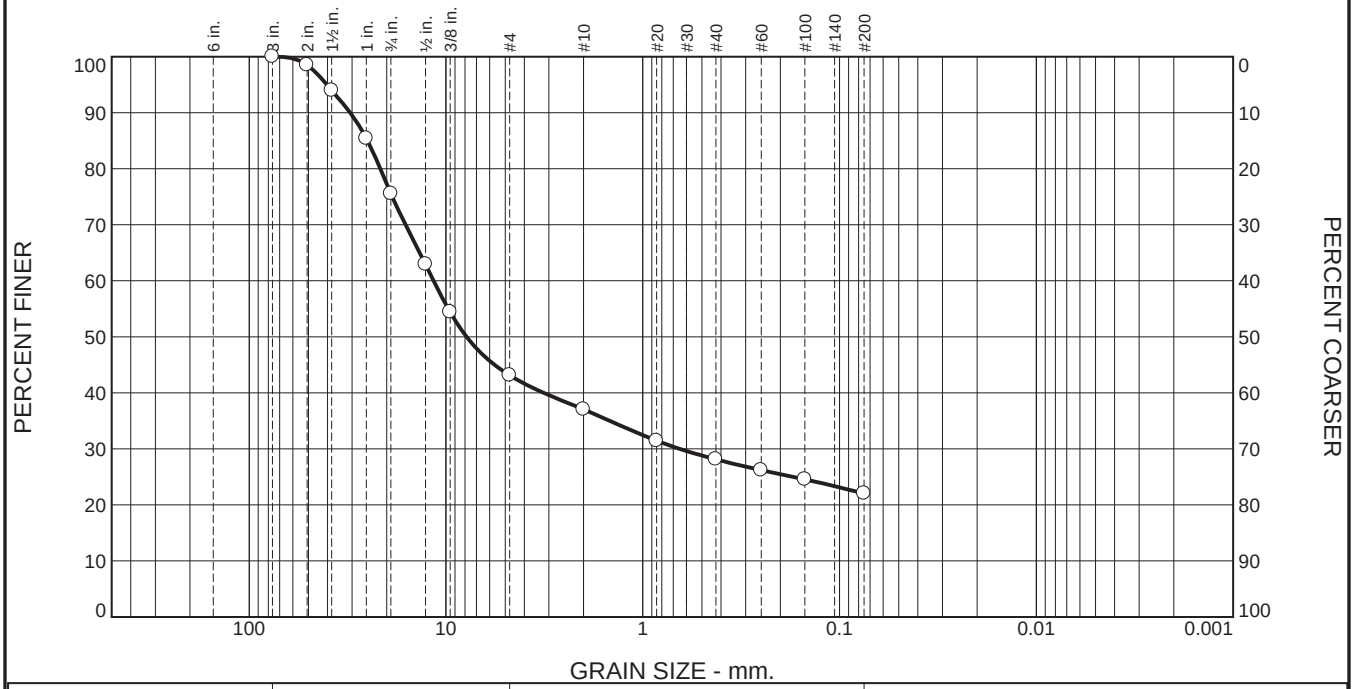
Ph. 406-388-8578 - Fax 406-388-8579

Client: Montana FWP

Project: Lake Elmo Habitat & Access Improvement #21-21

Project No: **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	24.4	32.5	6.0	9.0	6.1	22.0	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
2"	98.5		
1 1/2"	94.0		
1"	85.4		
3/4"	75.6		
1/2"	62.9		
3/8"	54.4		
#4	43.1		
#10	37.1		
#20	31.4		
#40	28.1		
#60	26.2		
#100	24.6		
#200	22.0		

* (no specification provided)

Material Description

clayey gravel with sand

Atterberg Limits (ASTM D 4318)

PL= 21 **LL=** 36 **PI=** 15

Classification

USCS (D 2487)= GC **AASHTO (M 145)=** A-2-6(0)

Coefficients

D_{90}= 30.6557 D_{85}= 25.0564 D_{60}= 11.5468
D_{50}= 7.8576 D_{30}= 0.6485 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 4-8-2021 **Date Tested:** 4-28-2021

Tested By: TS

Checked By: NG

Title: Laboratory Manager

Source of Sample: TPL-02/TPL-05 **Depth:** 0-4.75'/5-10' **Date Sampled:** 4-6-2021

Sample Number: G21223/G21230

Pioneer Technical Services, Inc.

106 Pronghorn Trail, Suite A - Bozeman, MT 59718

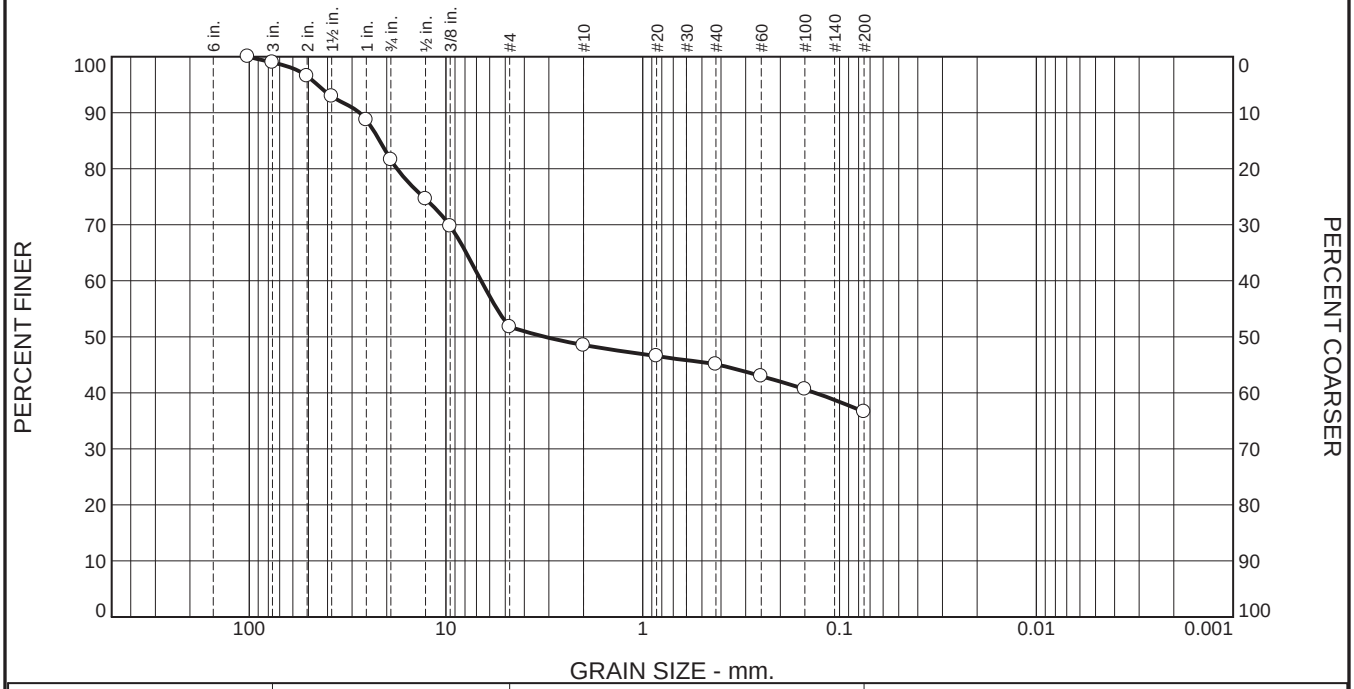
Ph. 406-388-8578 - Fax 406-388-8579

Client: Montana FWP

Project: Lake Elmo Habitat & Access Improvement #21-21

Project No: **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
1.0	17.4	29.8	3.3	3.4	8.5	36.6	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
4"	100.0		
3"	99.0		
2"	96.5		
1 1/2"	92.9		
1"	88.7		
3/4"	81.6		
1/2"	74.6		
3/8"	69.7		
#4	51.8		
#10	48.5		
#20	46.6		
#40	45.1		
#60	43.0		
#100	40.6		
#200	36.6		

* (no specification provided)

Material Description

clayey gravel with sand

Atterberg Limits (ASTM D 4318)

PL= 18 **LL=** 31 **PI=** 13

Classification

USCS (D 2487)= GC **AASHTO (M 145)=** A-6(1)

Coefficients

D_{90}= 27.5467 D_{85}= 21.7365 D_{60}= 6.6213
D_{50}= 3.1217 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 4-8-2021 **Date Tested:** 5-3-2021

Tested By: TS

Checked By: NG

Title: Laboratory Manager

Source of Sample: TPL-03 **Depth:** 1-10' **Date Sampled:** 4-6-2021
Sample Number: G21225

Pioneer Technical Services, Inc.

106 Pronghorn Trail, Suite A - Bozeman, MT 59718

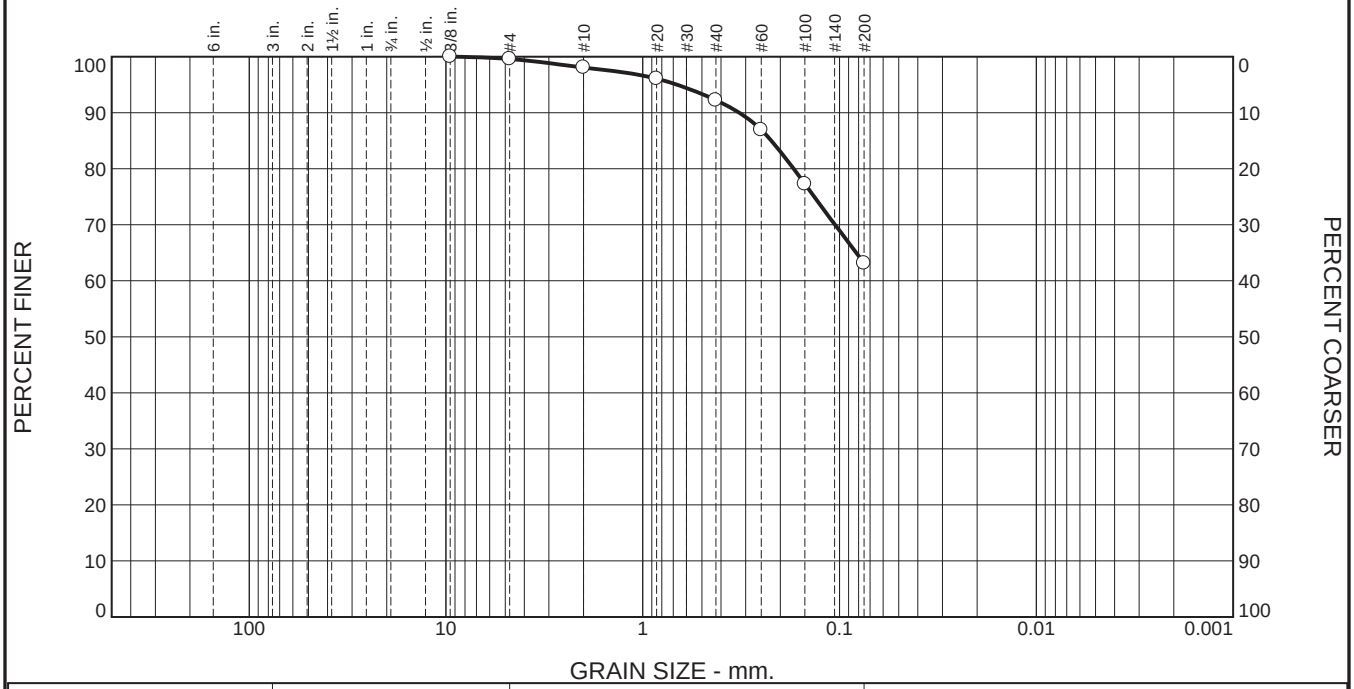
Ph. 406-388-8578 - Fax 406-388-8579

Client: Montana FWP

Project: Lake Elmo Habitat & Access Improvement #21-21

Project No: **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	1.5	5.9	29.1	63.1	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8"	100.0		
#4	99.6		
#10	98.1		
#20	96.1		
#40	92.2		
#60	86.9		
#100	77.3		
#200	63.1		

* (no specification provided)

Material Description

sandy lean clay

Atterberg Limits (ASTM D 4318)

PL= 15 **LL=** 36 **PI=** 21

Classification

USCS (D 2487)= CL **AASHTO (M 145)=** A-6(10)

Coefficients

D_{90}= 0.3229 D_{85}= 0.2218 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 4-8-2021 **Date Tested:** 5-3-2021

Tested By: LPS

Checked By: NG

Title: Laboratory Manager

Source of Sample: TPL-04 **Depth:** 0-4' **Date Sampled:** 4-6-2021

Sample Number: G21226

Pioneer Technical Services, Inc.

106 Pronghorn Trail, Suite A - Bozeman, MT 59718

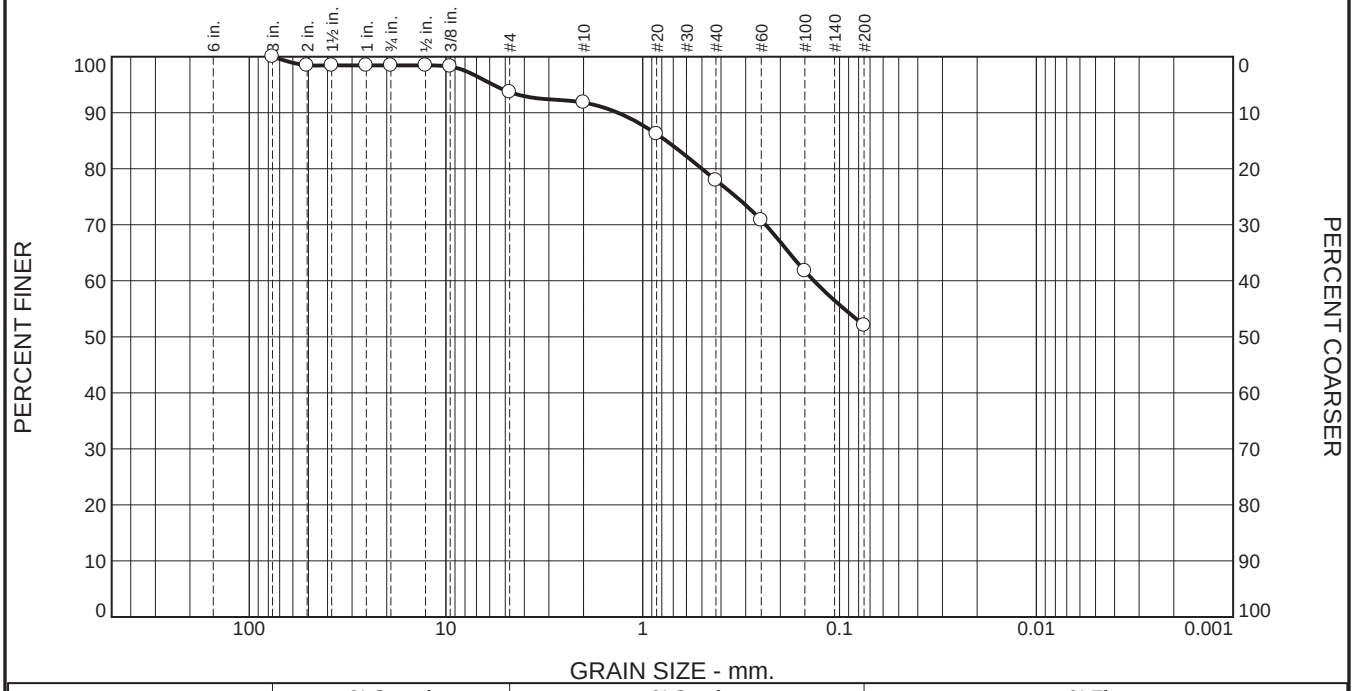
Ph. 406-388-8578 - Fax 406-388-8579

Client: Montana FWP

Project: Lake Elmo Habitat & Access Improvement #21-21

Project No: **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.6	4.7	1.9	13.9	25.9	52.0	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3"	100.0		
2"	98.4		
1 1/2"	98.4		
1"	98.4		
3/4"	98.4		
1/2"	98.4		
3/8"	98.3		
#4	93.7		
#10	91.8		
#20	86.2		
#40	77.9		
#60	70.8		
#100	61.7		
#200	52.0		

* (no specification provided)

Material Description

sandy lean clay

Atterberg Limits (ASTM D 4318)

PL= 16 **LL=** 42 **PI=** 26

Classification

USCS (D 2487)= CL **AASHTO (M 145)=** A-7-6(9)

Coefficients

D_{90}= 1.3390 D_{85}= 0.7601 D_{60}= 0.1349
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 4-8-2021 **Date Tested:** 5-3-2021

Tested By: TS

Checked By: NG

Title: Laboratory Manager

Source of Sample: TPL-04 **Depth:** 4-10' **Date Sampled:** 4-6-2021

Sample Number: G21227

Pioneer Technical Services, Inc.

106 Pronghorn Trail, Suite A - Bozeman, MT 59718

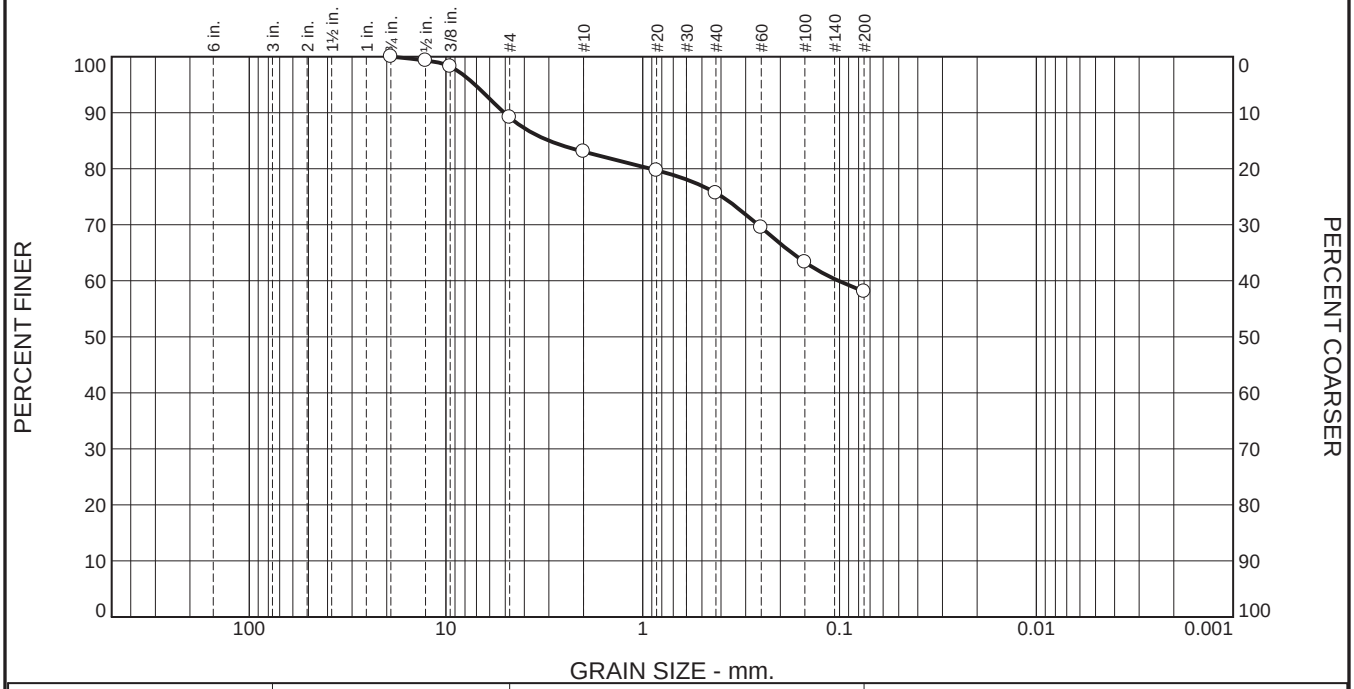
Ph. 406-388-8578 - Fax 406-388-8579

Client: Montana FWP

Project: Lake Elmo Habitat & Access Improvement #21-21

Project No: **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	10.8	6.1	7.4	17.6	58.1	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4"	100.0		
1/2"	99.3		
3/8"	98.2		
#4	89.2		
#10	83.1		
#20	79.7		
#40	75.7		
#60	69.5		
#100	63.3		
#200	58.1		

* (no specification provided)

Material Description

sandy lean clay

Atterberg Limits (ASTM D 4318)

PL= 14 **LL=** 39 **PI=** 25

Classification

USCS (D 2487)= CL **AASHTO (M 145)=** A-6(11)

Coefficients

D_{90}= 5.0578 D_{85}= 2.9936 D_{60}= 0.1009
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 4-8-2021 **Date Tested:** 5-5-2021

Tested By: TS

Checked By: NG

Title: Laboratory Manager

Source of Sample: TPL-05 **Depth:** 1-5' **Date Sampled:** 4-6-2021

Sample Number: G21229

Pioneer Technical Services, Inc.

106 Pronghorn Trail, Suite A - Bozeman, MT 59718

Ph. 406-388-8578 - Fax 406-388-8579

Client: Montana FWP

Project: Lake Elmo Habitat & Access Improvement #21-21

Project No: **Figure**

Appendix D
Well Log Report

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View hydrograph for this site
View field visits for this site

Site Name: MLP 9
GWIC Id: 216441

Section 1: Well Owner(s)

1) MBMG (MAIL)
1300 N. 27TH ST.
BILLINGS MT 59101 [11/03/2004]

Section 2: Location

Township	Range	Section	Quarter Sections
01N	26E	15	SW¼ NW¼ SE¼ NW¼

County / **Geocode**
YELLOWSTONE

Latitude	Longitude	Geomethod	Datum
45.8375	-108.4809	NAV-GPS	NAD83

Ground Surface Altitude	Ground Surface Method	Datum	Date
3200.2			3/7/2005

Measuring Point Altitude	MP Method	Datum	Date Applies
3202.5			12/29/2004

Addition / **Block** / **Lot**

Section 3: Proposed Use of Water

MONITORING (1)

Section 4: Type of Work

Drilling Method: AUGER
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, November 3, 2004

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	13	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2.3	13	2				PVC SCH40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
8	13	2			PVC 10-20 SLOT

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	13	BENTONITE	

Section 7: Well Test Data

Total Depth: 13
Static Water Level:
Water Temperature:

Unknown Test Method *

Yield _ gpm.
Pumping water level _ feet.
Time of recovery _ hours.
Recovery water level _ feet.

** During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

Section 8: Remarks

WELL WAS DRY WHEN INSTALLED

Section 9: Well Log

Geologic Source
Unassigned

From	To	Description
0	1	SILT; SANDY WITH CHUNKS OF CALCIUM; DARK; OLIVE GREY (5Y 3/2); DRY; TOPSOIL
1	3	SILT; SANDY; OLIVE (5Y 5/3); DRY; POWDERY; COLLUVIAM
3	10	CLAY; SILTY; SLIGHTLY SANDY; OLIVE GREY (5Y 4/2); DAMP; COLLUVIAM
10	13	SHALE; DARK; OLIVE GREY (5Y 4/2); DRY

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: FRED SCHMIDT
Company: MT BUREAU OF MINES & GEOLOGY
License No: -
Date Completed: 11/3/2004

Billings

1N 26E 10 D 02

Yellowstone

095798

Huntingdon

Chen-Northern, Inc., Division

LOG OF MONITORING WELL INSTALLATION

PROJECT: BLUE BASKET STORE #2
2347 MAIN STREET
JOB NO: 91-601
DRILL TYPE: MOBILE B-53 HOLLOWSTEM AUGER

DRILLED BY: B Krueger
LOGGED BY: D Tyler
REMARKS: SPLIT SPOON SAMPLE DESCRIPTION

WELL NO: BB-10
SHEET NO: 1 OF 1
LOCATION: BOULEVARD STRIP IN FRONT OF KMART

ELEVATION: TOP OF HOLE
GROUNDWATER

DATE: HOLE STARTED 8/27/92
COMPLETED 8/27/92

40'N, 190'W of SE corner sec 10, T1N, R26E.

DEPTH (FT)	GRAPHIC LOG	CLASSIFICATION AND DESCRIPTION	SAMPLE INTERVAL	S.P.T. (IN) (BLOWS/FT.)	ORGANIC VAPOR CONTENT (PPM)	WELL COMPLETION
						WATER TIGHT LOCKING CAP; FLUSH MOUNT TRAFFIC BOX
		Clayey SILT and SAND FILL: Gravel				CONCRETE
		Sandy Lean CLAY; moist, brown, scattered pebbles up to 1 1/2" in diameter	LSS	11		BENTONITE PELLETS; 2 INCH DIA SOLID PVC CASING
5.0		GWL (8/27/92)				
10.0		SAND; brown, wet, very poorly sorted, medium grain, gravel, no odor	LSS	23		GRADE 10-20 SILICA SAND
15.0		SAND; brown, wet, coarse, grading to very poorly sorted 2" diameter gravel, no odor	LSS	63		0.02 INCH SLOTTED PVC SCREEN
20.0		SAND; brown, wet, coarse, grading down to 1 1/2" diameter gravel at bottom, no odor	LSS	50/4		
21.5		Bottom of Hole				WELL POINT

HG

M:133614

01N 26E 10 AC

MONTANA WELL LOG REPORT

Form No. 603 R2-04

Well ID# ______________

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with MBMG within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.**

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name: Steve Degenhart
Mailing address: 2931 Lake Elmo Dr.
Billings, Mt. 59105

2. WELL LOCATION: List ¼ from smallest to largest
___ ¼ ___ ¼ SW ¼ NE ¼, Section 10
Township 1 N/S Range 26 E/W County Yellowstone
Lot ___, Tract/Blk ___ Subdivision Name ___
Well Address 2931 Lake Elmo Dr.
GPS ☒ Yes ☐ No
Latitude N45.26837 Longitude W108.28574
Horizontal datum ☒ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☒ Irrigation ☐ Public water supply ☐ Monitoring Well ☐ Other

4. TYPE OF WORK:
☒ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☐ Other: ___

5. WELL CONSTRUCTION DETAILS:

Borehole:
Dia. 7.5 in. from 0 ft. to 25 ft.
Dia. ___ in. from ___ ft. to ___ ft.
Dia. ___ in. from ___ ft. to ___ ft.

Casing:
Steel: Wall thickness .250 ☐ Threaded ☒ Welded
Dia. 6 5/8 in. from -1.5 ft. to 21 ft.
Dia. ___ in. from ___ ft. to ___ ft.

Plastic: Pressure Rating ~~160~~ lbs. ☐ Threaded ☐ Welded
Dia. ___ in. from ___ ft. to ___ ft.

Perforations/Slotted Pipe:
Type of perforator used ___
Size of perforations/slots ___ in. by ___ in.
___ no. of perforations/slots from ___ ft. to ___ ft.
___ no. of perforations/slots from ___ ft. to ___ ft.

Screens: ☒ Yes ☐ No
Material PVC
Dia. 5" Slot size .125 from 5 ft. to 25 ft.
Dia. ___ Slot size ___ from ___ ft. to ___ ft.

Gravel Packed: ☒ Yes ☐ No
Size of gravel ___
Gravel placed from ___ ft. to ___ ft.

Packer: ☐ Yes ☒ No
Type ___ Depth(s) ___

Grout: Material used Casing seal
Depth from ___ ft. to ___ ft. OR ☒ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☒ Static water level 12 ft. below top of casing or
☐ Closed-in artesian pressure ___ psi.
How was test flow measured: bucket/stopwatch, weir, flume, flowmeter, etc. ___
Yellowstone Controlled Groundwater Area - Water Temperature ___ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
35 gpm with drill stem set at 20 ft. for 2 hours
Time of recovery 1 hrs/min. Recovery water level 12 ft.

OR Bailer test*
___ gpm with ___ ft. of drawdown after ___ hours
Time of recovery ___ hrs/min. Recovery water level ___ ft.

OR Pump test*
Depth pump set for test ___ ft.
___ gpm pump rate with ___ ft. of drawdown after ___ hours
Time of recovery ___ hrs/min. Recovery water level ___ ft.

OR Flowing Artesian*
___ gpm for ___ hours
Flow controlled by ___

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

7. WELL LOG: HG

Depth, Feet From	To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	1	Topsoil
1	12	Sand & clay
12	25	Fractured rock & gravel
25		Sandstone

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AUG 27 2007
M.B.M.G.

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 7-20-07

9. REMARKS:

10. DRILLER/CONTRACTOR'S CERTIFICATION:
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.
Name, firm, or corporation (print) Bertram Drilling
Address 510 Klruck Ln.
Signature ___
Date 7-20-07 License no. 605

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID# 238467

01N26E 10

MONTANA WELL LOG REPORT

Form No. 603 R2-04

Well ID# _____

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with MBMG within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.**

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name _____
Mailing address _____

2. WELL LOCATION: List ¼ from smallest to largest
____ ¼ ____ ¼ ____ ¼ ____ ¼, Section
Township ___ N/S Range ___ E/W County
Lot ____, Tract/Blk ___ Subdivision Name
Well Address
GPS ☐ Yes ☐ No
Latitude _____ Longitude _____
Error as reported by GPS locator (± feet) _____
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☐ Monitoring Well ☐ Other:

4. TYPE OF WORK:
☐ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☐ Other: _____

5. WELL CONSTRUCTION DETAILS:

Borehole:
Dia. 6 in. from 0 ft. to 62 ft.
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Casing:
Steel: Wall thickness .250 ☐ Threaded ☐ Welded
Dia. 6 5/8 in. from 2.6 ft. to 36 ft.
Dia. _____ in. from _____ ft. to _____ ft.

Plastic: Pressure Rating _____ lbs. ☐ Threaded ☐ Welded
Dia. 4½ in. from 40 ft. to 60 ft.

Perforations/Slotted Pipe:
Type of perforator used Slot slot
Size of perforations/slots ¼ in. by 6 in.
____ no. of perforations/slots from 40 ft. to 60 ft.
____ no. of perforations/slots from _____ ft. to _____ ft.

Screens: ☐ Yes ☐ No
Material _____
Dia. _____ Slot size _____ from _____ ft. to _____ ft.
Dia. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel Packed: ☐ Yes ☐ No
Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Packer: ☐ Yes ☐ No
Type _____ Depth(s) _____

Grout: Material used Portland
Depth from 0 ft. to 24 ft. OR ☐ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☐ Static water level 62 ft. below top of casing **or**
☐ Closed-in artesian pressure _____ psi
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc _____
Yellowstone Controlled Groundwater Area - Water Temperature _____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*:
3 gpm with drill stem set at 62 ft. for 2 hours
Time of recovery 2 hrs/min. Recovery water level 63 ft.

OR Bailer test*:
____ gpm with ____ ft. of drawdown after ____ hours
Time of recovery ____ hrs/min. Recovery water level ____ ft.

OR Pump test*:
Depth pump set for test _____ ft.
____ gpm pump rate with ___ ft. of drawdown after __ hrs pumping
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Flowing Artesian*:
_____ gpm for _____ hours
Flow controlled by _____

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.*

7. WELL LOG: H61

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (examples: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	2	Top Soil
2	11	Clay
11	25	Yellow Clay with rock
25	28	Shale
28	62	Coal seam

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APR 11 2013
MBMG

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 3/19/04

9. REMARKS: _____

10. DRILLER/CONTRACTOR'S CERTIFICATION:
All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.
Name, firm, or corporation (print) _____
Address _____
Signature _____
Date 3/19/04 License no. _____

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID# 271929

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