Montana Fish, Wildlife & Parks

SPECIFICATIONS FOR WORK AND SPECIAL PROVISIONS

Contents:

1.01 PROJECT DESCRIPTION

A. The Project involves construction work associated with:

Tongue River Reservoir State Park Diversified Lodging
Fish, Wildlife & Parks (FWP) project #7216211
Located in Big Horn County, MT

B. The project includes site work (excavation/grading) of an access road and roundabout. As well as prefabricated cabins and pit privy. Reclamation of construction related disturbed areas will follow completion of the site work.

2.01 PROJECT RELATED CONTACTS

Project contacts are designated as follows:

Owner:	Department of Natural Resources and Conservation 1424 Ninth Avenue. PO Box 201601 Helena, MT 59620-1601
FWP Project Representative:	Kevin Harrington, Project Manager FWP Project Manager 1522 9th Avenue Helena, MT 59620 406-841-4002 (wk) 406-439-2876 (cell)

3.01 SITE INSPECTION

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, see General Conditions, Article 3.

4.01 SOILS INFORMATION

A. Geotechnical investigation work has not been done for this Project. It is the responsibility of the Bidders to conduct all investigations and determine the soil type and digging conditions that may be encountered with this Project prior to bid preparation, see General Conditions, Article 3.

5.01 PROJECT REPRESENTATIVE, INSPECTIONS, AND TESTING

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.

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.

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.

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.

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

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

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

C. 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.

D. 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.

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

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

5.01.2 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.

A. 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.

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

6.01 ENGINEERING INTERPRETATIONS

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.

7.01 REJECTED WORK

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).

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

8.01 UTILITIES

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**

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.

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

8.01.1 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:

a. The nature of the work that the Contractor will be performing.

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

c. 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.

d. Requests for field location and identification of utilities.

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.

8.01.2 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.

The design survey includes existing utilities. It is the Contractor’s responsibility to properly identify any existing utilities prior to construction. The Drawings provided show existing utility locations but do not guarantee their accuracy.

8.01.3 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.

8.01.4 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.

8.01.5 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.

8.01.6 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.

8.01.7 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.

8.01.8 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.

8.01.9 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.

8.01.10 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.

8.01.11 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.

8.01.12 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.

9.01 CONSTRUCTION SAFETY

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.

10.01 CONSTRUCTION LIMITS AND AREAS OF DISTURBANCE

A. Construction Limits. Where defined limits of disturbance, construction 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 Owner 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.

B. Areas of Disturbances. 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

C. This includes areas selected by the Contractor outside the defined construction limits for mobilization, offices, equipment, or material storage.

11.01 DECONTAMINATE CONSTRUCTION EQUIPMENT

A. Power wash all construction equipment entering the project site to prevent the spread of noxious weeds and aquatic invasive species. This applies to all FWP projects, whether individual construction permits specifically address cleaning of equipment.

12.01 TREE PROTECTION AND PRESERVATION

A. 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 tree's root system or hinder

its chances for survival. Reasonable variations from the Contract Documents, as directed by the Project Representative, may be employed to ensure the survival of trees.

13.01 CONSTRUCTION SURVEYS

A. 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.

B. 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 are included in the project drawings.

C. 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.

D. 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.

E. The Contractor shall provide construction staking from the Contractor's layouts and the control points. Contractor's construction staking includes at a minimum:

1. Slope stakes located at critical points as determined by the Project Representative.
2. Location and grade stakes for prefabricated cabins and pit privy.
3. Location and grade stakes for drainage features.
4. Location stakes for roadside safety items, permanent and temporary traffic control, and misc. items as determined by the Project Representative.

F. Original field notes, computations and other records taken 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.

14.01 MATERIAL SOURCES AND CONSTRUCTION WATER

A. The Contractor shall be responsible for locating all necessary material sources, including aggregates, earthen borrow and 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.

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

15.01 MATERIALS SALVAGE AND DISPOSAL

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.

B. Haul and waste all waste material to a legal site and obey all state, county, and local disposal restrictions and regulations.

16.01 STORED MATERIALS

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.

17.01 STAGING AND STOCKPILING AREA

A. Contractor shall use staging and stockpiling sites for 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.

18.01 SECURITY

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.

19.01 CLEANUP

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.

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

20.01 ACCESS DURING CONSTRUCTION

A. Provide access to all public and private roadways and approaches within the project throughout the construction period. Coordinate with Tongue River Reservoir State Park's Manager for any access issues.

21.01 CONSTRUCTION TRAFFIC CONTROL

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.

22.01 SANITARY FACILITIES

A. Provide on-site toilet facilities for employees of Contractor and Sub-Contractors and maintain in a sanitary condition. Contractor may use Campground sanitary facility for workers with Tongue River Reservoir State Park's permission.

B. Contractor responsible for cleaning (not pumping) TRRSP Sanitary Facilities, if used.

23.01 CONTRACT CLOSEOUT

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.

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

24.01 MEASUREMENT AND PAYMENT

A. Review these Contract Documents for additional Measurement and Payment specifications for definitions. Quantities are listed on the Bid Proposal for Payment Items. Additional material quantities, volumes, and measurements may be shown on the Contract Document drawings and/or specifications.

B. Unit Price quantities and measurements shown on the Bid Proposal are for bidding and contract purpose only. Quantities and measurements supplied, completed for the project, and verified by the Project Representative shall determine payment. Each unit price will be deemed to include an amount considered by the Contractor to be adequate to cover Contractor's overhead and profit for each bid item.

C. The Owner or Contractor may make a Claim for an adjustment in Contract Unit Price if the quantity of any item of Unit Price Work performed by the Contractor differs materially and/or significantly (increase or decrease by 50%) from the estimated quantity indicated on the Bid Proposal.

D. Lump sum bid item quantities will not be measured. Payment for the lump sum bid proposal items will be paid in full amount listed on the Bid Proposal when accepted by the Project Representative, unless specified otherwise.

Montana Fish, Wildlife & Parks

SPECIFICATIONS FOR WORK

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination with occupants.
5. Work restrictions.
6. Specification and drawing conventions.
7. Miscellaneous provisions.

B. Related Requirements

C. Division 01 Section “Temporary Facilities and Controls” for limitations and procedures governing temporary use of Owner’s facilities.

2.01 PROJECT INFORMATION

A. Project Identification: Tongue River Reservoir State Park Diversified Lodging Project #7216211

1. Project Location:

Tongue River Reservoir State Park
Big Horn County, MT
Latitude/Longitude: (45.10161, -106.79308)

B. Owner: State of Montana Fish Wildlife & Parks

1. Owner's Representative:

Kevin Harrington, Project Manager
State of Montana Fish,
Wildlife and Parks Design & Construction Bureau
1522 Ninth Avenue Helena, Montana
Phone: (406) 841-4002
Cell: 406-439-2876

WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. The work consists of site grading for site preparation for installation of five prefabricated cabins and a single pit privy. Work also includes the construction of an access road with parking areas, culvert installation, installation of a pit privy, installation of five prefabricated cabins, and two dedicated parking ramps will also be completed.

2. All work associated with the lodging project and included in these specifications shall be considered incidental, including but not limited to site prep, parking blocks for parking areas, culvert installation, any fasteners or other material necessary for cabin completion, tree limbing or removal as needed, clean up and associated work.

3. It is the contractor's responsibility to confirm dimensions and layout for quantifying materials.

B. Type of Contract.

1. Project will be constructed under a single prime contract.

1.4 ACCESS TO SITE

A. General: Contractor shall have limited use of project site for construction operations as indicated by requirements of this Section.

B. Staging Area: Designated area for Contractor parking and material storage shall have prior approval from the Owner or Tongue River Reservoir State Park Management.

C. Use of Site: Limit use of Project site to work in areas of the diversified lodging units. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Keep the access and campground driveway entrances clear and available to Owner, Owner's employees, the public, and emergency vehicles at all times, except for the day of delivery of the lodging units. Coordinate the delivery of the lodging units with the Tongue River State Park Manager. Cabin delivery may only occur on Tuesdays, Wednesdays or Thursdays. Exact dates to be submitted and approved by Owner three weeks prior to installation. Security of Contractor’s equipment and materials is not the responsibility of the Owner.

a. Schedule deliveries to minimize use of this site by construction operations.

b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

c. Do not drive vehicles or equipment on the grounds around the buildings or off established roads unless approved by the Tongue River State Park Manager. It is understood that pneumatic- wheeled equipment such as a manlift may be necessary to drive onto the site to perform the work. Any damage to the ground area in the campground shall be repaired by the Contractor at no cost to the Owner.

1.5 COORDINATION WITH OCCUPANTS

A. Owner Occupancy: Owner or Project Representative will occupy site throughout construction period.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

B. On-Site Work Hours: Project work will be limited to the hours of 7:00 a.m. to 6:00 p.m., Monday through Friday. Additional hours or working days are subject to Owner approval with prior notice. Contractor must give Owner a minimum of two (2) days' notice for working hours outside of those indicated above.

C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than two days in advance of proposed disruptive operations.

2. Undesirable language and other such devices such as excessively loud radios and conversation are hereby specifically prohibited on the project site.

D. Smoking is not permitted on the site due to fragile wildfire conditions in and around Tongue River Reservoir State Park. Workers may smoke in their vehicles.

1.7 MISCELLANEOUS PROVISIONS

A. See Special Provisions.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Division 01 Section "Summary" for work restrictions.

1.2 USE CHARGES

A. General: Installation and removal of any necessary temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Owner and authorities having jurisdiction.

B. Utilities from Existing System: Vault latrines are available for the contractor’s use at Tongue River Reservoir State Park at no cost to the Contractor upon approval. The Tongue River Marina is approximately 500 feet south-east of the project location.

C. QUALITY ASSURANCE

D. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service.

1.3 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Vault latrines are available for the contractor’s use at Tongue River Reservoir State Park upon approval.

PART 2 – PRODUCTS

2.1 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units. Contractor’s option- Field office not required at project site.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations. Contractor's option – Storage shed not required at project site.

C. Toilet Facility: Locate in designated staging area, or as otherwise approved by Tongue River State Park Management. Contractor may use Park vault latrines upon approval.

2.2 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures. Due to fragile nature of the structures and location, the contractor must have fire extinguishers on the site daily.

PART 3 – EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Connect to existing service.

B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities. Contractor's option – Use Tongue River State Park's vault latrines upon approval.

C. Electric Power Service: Contractor supplied portable generators if necessary.

3.3 SUPPORT FACILITIES INSTALLATION

A. Parking: Use area(s) designated by Owner for construction personnel.

B. Waste Disposal Facilities: Provide covered waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. The Owner's waste receptacles shall not be used by the Contractor.

C. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION

A. Contractor is solely responsible for security and protection of all temporary facilities, equipment and materials stored on site.

B. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities caused by Contractor.

C. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

D. Tree and Plant Protection: Protect vegetation from damage from construction operations. Replace vegetation damaged from work in this Contract. Replace damaged trees and plants as directed by the Owner.

E. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Termination and Removal: Remove each temporary facility when need for its service has ended. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

END OF SECTION

SECTION 02110 - EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Work shall consist of all labor, equipment, and material necessary for prevention during construction of erosion and sedimentation on the surrounding undisturbed areas and within the construction limits.

B. The Contractor is responsible for any related documentation required for development and implementation such as a Stormwater Pollution Prevention Plan (SWPPP).

C. Excess water shall be prevented from flowing into or out of the construction area by methods selected by the Contractor subject to approval by the Owner.

D. All work not specifically described in this technical specification of this bid document shall be performed in compliance with the applicable technical specification sections found in the current version of Montana Public Works Standard Specifications (MPWSS).

PART 2 – PRODUCTS

2.1 MATERIALS

A. Materials such as culverts, straw bales, or geotextiles may be needed for erosion control during the construction of the project. Pumps, if required, will be supplied by the Contractor in the size, number, and type to remove impounded water from construction areas if such dewatering becomes necessary in order to proceed with the work.

PART 3 – EXECUTION

3.1 PLACEMENT

A. The Contractor shall take sufficient precautions to prevent pollution of streams, lakes, and reservoirs with sediment or other harmful materials. Fuels, oils, bitumens, calcium chloride, cement, or other contaminants that would contribute to the pollution of the water shall not be dumped directly into, or placed where they will leach into the reservoir.

B. Construction operations that would expose land that is subject to erosion shall be completed as rapidly as practicable.

C. Disturbance of lands outside the staked limits of construction will be prohibited, except as ordered and staked by the Owner.

D. Some or all of the temporary erosion control measures employed by the Contractor during construction may, at the discretion of the Owner, remain as permanent erosion control. All materials and/or structures which are not selected to remain as permanent erosion control measures, shall be removed prior to conclusion of the construction project by the Contractor.

E. The Contractor shall incorporate all erosion control features into the project at the earliest practicable time. Temporary pollution control measures shall be used to correct conditions that develop during construction that were not foreseen during the design stage.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Measurement: Erosion and Sediment Control measurement will be Lump Sum (LS).

4.2 PAYMENT

A. Payment: Payment shall include all materials, maintenance and structures or methods employed to meet the requirements of this specification and incidentals required for the completion of the work.

END SECTION

SECTION 02221 – CLEARING/GRUBBING, TOPSOIL SALVAGING/PLACING

PART 1 – GENERAL

1.1 SUMMARY

A. Section consists of clearing, grubbing, excavating and depositing topsoil in accordance with these specifications and in conformity with the lines, grades, thicknesses, and typical cross sections shown on the Drawings or established by the Owner.

B. The Contractor will provide all necessary erosion control and protective measures necessary to ensure the integrity of the project area.

C. It is the Contractor's responsibility to obtain any necessary permits from the Montana Department of Environmental Quality, Water Quality Division, prior to construction.

D. All work not specifically described in this technical specification of this bid document shall be performed in compliance with the applicable technical specification sections found in the current version of Montana Public Works Standard Specifications (MPWSS).

PART 2 – PRODUCTS

2.1 MATERIALS

A. Clearing and Grubbing shall consist of felling trees, disposal of stumps, brush, logs, limbs, vegetation, and other matter within the clearing limits or other areas that interfere with the excavation and embankment limits.

B. Topsoil salvaging and placing shall consist of that material which is considered suitable for the growth of grass or other cover crops, reasonably free of hard dirt, clay, rocks, or other materials which would inhibit the germination of seeds or the growth of the cover crop.

C. Topsoil removal shall be to a depth of the top 6-inches of material in all areas unless otherwise specified or directly by the Owner. Classification of soils suitable for topsoil will be at the discretion of the Owner.

PART 3 – EXECUTION

3.1 PROCEDURES

A. Clearing and Grubbing will be performed when there are trees, stumps, brush, and other matter that are within the boundaries of disturbance activities.

B. Topsoil shall be removed in areas within the boundaries of disturbance activities. If topsoil removal depths exceed the 6-inches specified, the Owner will cease all topsoil removal operations until the quantity of overstripping can be determined by a method approved by the Owner.

C. Topsoil which is not stripped from its original position and placed directly in its final position shall be stockpiled for later incorporation into the work. Stockpiles shall be placed at locations selected by the Contractor and approved by the Owner.

D. All topsoil will be replaced along cut and fill slopes and along the road slopes.

E. The Contractor will be responsible for hauling excess topsoil to approved location by the Owner.

F. Topsoil stripping is not required for the existing access road.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Measurement:

1. Measurement of Clearing and Grubbing will be per Acre (AC).
2. Measurement of Topsoil Salvaging/Placing will be per Cubic Yard (CY).
3. These bid item quantities are shown in the plans and will not be adjusted. Contractor may remove more or less than specified on the plans based on their construction methods and needs. No additional survey will be completed to confirm quantity.

B. Payment:

1. Clearing and Grubbing Payment shall include the removal of trees, stumps, brush, and other matter that are within the boundaries of disturbance activities.

2. Topsoil Salvaging/Placing Payment shall include the number of cubic yards of topsoil stripped (assumed depth of 6-inches) and stockpiled in

location approved by the Owner. Placement shall include the number of cubic yards of topsoil placed to utilize all stockpiled topsoil.

3. Payment shall constitute full compensation for all labor, equipment, tools and incidentals necessary to complete the preparation of the area for topsoil, loading, hauling, placing and grading of the topsoil.

END SECTION

SECTION 02230 – EXCAVATION, BACKFILL AND COMPACTION

PART 1 - GENERAL

1.1 SUMMARY

A. Work shall consist of excavation and embankment construction within the limits of the Work necessary for the construction of the access road, cabin sites, pathways and sealed (vault) pit privy.

B. All excavation and embankment work shall be constructed to the neat lines and elevations as shown in the Drawings.

C. Contractor is responsible for proper excavation of sealed pit privy per Manufacturer's guidelines.

D. All work not specifically described in this technical specification of this bid document shall be performed in compliance with the applicable technical specification sections found in the current version of Montana Public Works Standard Specifications (MPWSS).

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.1 ACCESS ROAD & CABIN EXCAVATION, BACKFILL AND COMPACTION

A. Refer to Drawings to ensure conformity to grade thickness, cross sectional area and grading.

B. The areas to be covered by the compacted fill shall be prepared by scarifying to a minimum depth of 8 inches, smoothing, watering or aerating as necessary to bring the moisture content to within plus four (4) or minus two (2) percentage points of the optimum moisture content, and then compacted to a density not less than 95 percent of the maximum density as determined by ASTM D-698 (Standard Proctor).

C. Cabin pads shall be compacted to 95 percent of the maximum density as determined by ASTM D-698 (Standard Proctor) or approved by Owner.

D. Immediately prior to placing the first layer of compacted fill, all earthen surfaces upon or against which compacted fill is to be placed shall be cleaned of all loose and objectionable materials.

E. When placing compacted earthfill materials, the materials shall be deposited in continuous horizontal layers and compacted as specified below. The excavation, placing, moistening, and compacting operations shall be such that the material will be uniformly compacted throughout. No compacted earthfill shall be placed on or consist of frozen materials.

F. The thickness of each horizontal layer after compaction shall not be more than 6 (six) inches.

3.2 SEALED (VAULT) PIT PRIVY

A. Refer to Manufacturer's guidelines for excavation and elevation for pit.

B. Refer to Manufacturer's guidelines for backfill of sealed (vault) privy.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Measurement: Measurement will be per Cubic Yard (CY).

B. This bid item quantity is shown in the plans and will not be adjusted. Contractor may remove more or less than specified on the plans based on their construction methods and needs. No additional survey will be completed to confirm quantity.

C. See Special Provision 02 for Measurement of Sealed (Vault) Pit Privy.

4.2 PAYMENT

A. Payment will be made for materials actually excavated and removed to obtain proper compaction in cut sections and in foundations for fill sections.

B. Payment shall constitute full compensation for all labor, equipment, tools and incidentals necessary to complete. Additional excavation to ensure proper drainage shall be incidental to this item.

END SECTION

SECTION 02235 - CRUSHED GRAVEL SURFACING AND CRUSHED GRAVEL BASE COURSE

PART 1 – GENERAL

1.1 DESCRIPTION

A. This work consists of all equipment and labor to install the compacted crushed gravel surfacing for the access road, pathways, and prefabricated structures (Lodge Site #1, #2, #3, #4, and #5) in accordance with these specifications and in conformity with the lines, grades, thicknesses, and typical cross sections shown on the Drawings.

B. This Work consists of all equipment and labor to install the compacted crushed gravel base course for the driveway (parking ramp) and sidewalk at Lodge Site #4 in accordance with these specifications and in conformity with the lines, grades, thicknesses, and typical cross sections shown on the Drawings.

C. All work not specifically described in this technical specification of this bid document shall be performed in compliance with the applicable technical specification sections found in the current version of Montana Public Works Standard Specifications (MPWSS).

PART 2 – PRODUCTS

2.1 CRUSHED GRAVEL SURFACING AND BASE COURSE GRADATION

A. Furnish crushed gravel surfacing and crushed gravel base course with crushed aggregate as shown in Table 1, or approved equal. The gravel must not contain deleterious material, such as shale, alkali, mica, or soft flaky particles.

Table 1. Gravel Leveling Course Gradation

Sieve Size	Percent Passing
1”	100
¾”	-
1/2”	-
No. 4	40-70
No. 10	25-55
No. 200	2-10

2.2 CRUSHED BASE COURSE

A. Consists of both fine and coarse fragments of crushed stone or crushed gravel, and/or natural gravel.

B. Use crushed stone or gravel consisting of hard, durable particles of fragments of stone, free of excess of flat, elongated, soft or disintegrated pieces, dirt, or other deleterious matter, and having a percent of wear of not exceeding 50 at 500 revolutions when tested under AASHTO T96.

PART 3 – EXECUTION

3.1 PLACEMENT AND SPREADING

A. Before placing the material, smooth and shape the surface of the underlying subgrade or base course to the cross section shown on the plans.

B. Place material to specified depth as indicated on the Drawings. Deposit and spread the material in a uniform layer and screed to make a uniform, level surface as indicated on the project drawings.

C. Perform compaction efforts by mechanical tamping utilizing a plate compactor as approved by the Owner.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Measurement: Crushed Gravel Surfacing and Base Course measurement shall be per Cubic Yard (CY).

B. This bid item quantity is shown in the plans and will not be adjusted. Contractor may remove more or less than specified on the plans based on their construction methods and needs. No additional survey will be completed to confirm quantity.

4.2 PAYMENT

A. Payment: Payment shall include compacted crushed gravel surfacing and base course placed, based upon the neat lines defined in the Drawings. Payment shall constitute full compensation for all investigations, quality control testing to determine suitability for use, haul, placing, permits, water, and compaction. Price will also include all costs to cover labor, equipment, tools and incidentals to complete the work in accordance with the contract documents.

END SECTION

SECTION 02515 - PORTLAND CEMENT CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work is constructing Portland Cement concrete pavement to the lines, grades, thicknesses, and cross sections on the plans on a prepared subgrade or base course.

B. The following specifications are directly taken from MPWSS and are provided for convenience.

2.1 REFERENCES

ASTM C-143	Slump of Hydraulic Cement Concrete ASTM C-231 Air Content of Freshly Mixed Concrete
ASTM C-138	Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C-39	Compressive Strength of Cylindrical Concrete Specimens ASTM C-78 Flexural Strength of Concrete
ASTM C-150	Standard Specification for Portland Cement
ASTM C-595	Standard Specification for Blended Hydraulic Cements ASTM C-157 Standard Performance Specification for Hydraulic Cement ASTM C-33 Standard Specification for Concrete Aggregates
ASTM C-94	Standard Specification for Ready-Mixed Concrete AASHTO M 85 Standard Specification for Portland Cement AASHTO M 183 Standard Specification for Structural Steel AASHTO M 157 Standard Specification for Ready-Mixed Concrete
AASHTO M 213	Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction
AASHTO M 182	Standard Specification for Sheet Materials for Curing Concrete AASHTO M 148 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

PART 2 - PRODUCTS

2.1 MATERIALS

A. Furnish materials meeting the following, section requirements:

1. Portland Cement Section 3310

a. Use Portland Cement for paving meeting AASHTO M 85, ASTM C150 Types I, II, III and V or ASTM C-595 Type IP or ASTM C-1157 Types GU, MS, HE, and HS. The Engineer will specify the type of cement to be used.

2. Air Entraining Agents — Section 3310
3. Admixtures — Section 3310
4. Water — Section 3310
5. Fine Aggregate for Concrete
   a. Use fine aggregate for concrete meeting ASTM C33.
6. Coarse Aggregate for Concrete
   a. Use coarse aggregate for concrete meeting ASTM C33.
7. Reinforcing Steel
   a. Use reinforcing steel meeting Section 03210 and the following.
   b. Dowels
      1) Use dowel bars for Rigid Pavement Expansion Joints or Devices meeting AASHTO M1 83 (ASTM A36). Assure dowel bars are plain and free from burring or other deformations that prevent slippage in the concrete. Paint one-half the bar length with one coat of zinc or tar paint.
   c. Sleeves
      1) Use metal sleeves for dowel bars of standard manufacture that cover 2-in mm), plus or minus 1/4-inch (6-5 mm), of the dowel, having one closed end and internal stop that holds the dowel bar at least 1-inch (25 mm) from the end. Avoid collapsing the sleeve during construction.

B. Joint Fillers and Sealers

1. Furnish a one-piece joint filler sized the full depth and width of the joint. If a multiple pieced joint filler is approved, fasten the abutting ends following the filler manufacturer's recommendations.
2. Use pourable joint sealer meeting ASTM D3406.
3. Use two-component polyurethane or polysulfide-base sealant meeting A.N.S.I A 116.1-1960 flow and strength requirements where specified.
4. Use either Class A (self-leveling) or Class B (non-sag) sealant for horizontal joints. Use Class B sealant for sloped or vertical joints.
5. Use preformed joint filler meeting, AASHTO M213 requirements, punched to receive the dowels shown on the plans.
6. Use preformed compression joints manufactured to the dimensions specified on the plans, from materials meeting ASTM D 2628.
7. Furnish a certification for each shipment of joints indicating that the material has been sampled, tested, and inspected under ASTM D 2628. Assure each certification furnished is signed by a manufacturer's authorized agent or independent testing agency.
8. If recommended by the manufacturer, use a manufacturer approved lubricant- adhesive to provide lubrication and bond for the joint.

C. Curing and Protective Coating Materials

1. Furnish materials meeting, the following requirements:

AASHTO M182 (Class 3)	Burlap Cloth made from Jute or Kenaf
AASHTO M171 (ASTM C171)	Sheet Materials for Curing Concrete
AASHTO M148	Liquid Membrane-Forming Compounds for Curing Concrete

D. Proportioning

1. Have a qualified independent testing laboratory, approved by the Engineer, determine the mix design to meet flexural or compressive strength of the pavement as specified in the Contract documents. Proportion the concrete mix under Section 03310.2.3 and have a maximum 4" (102 mm) slump and minimum 1.5” (38.5 mm) slump (using slip form method).

PART 3 - EXECUTION

3.1 GENERAL

A. Obtain the Engineer's approval of equipment and tools used for handling, materials and performing all parts of the work. Approval applies to design, capacity, and mechanical conditions. Assure the equipment is on site ahead of the start of construction operations for the Engineer's examination.

3.2 BATCHING PLANT AND EQUIPMENT

A. General

1. The batching plant includes bins, weighing hoppers and scales for the fine aggregate and each coarse aggregate size. Furnish a separate scale, bin, and hopper for cement if cement is used in bulk. Assure the weighing hopper is properly sealed and vented to prevent dust during operation.

B. Bins And Hoppers

1. Provide bins with adequate separate compartments for fine aggregate and for each size of coarse aggregate in the batching plant.

C. Scales

1. Use either beam type or springless-dial type scales for weighing

aggregates and cement. Assure the scale is accurate to within 0.5% throughout the range of use. When beam-type scales are used, equip the scale with a "tell-tale" dial or other device for indicating that the required load in the weighing hopper is being approached. The device on weighing beams must clearly indicate critical position. Assure poises are designed to be secured in any position and to prevent inadvertent change. Assure the weigh beam and "tell-tale" device are in full view of the operator as the hopper is charged and operator has convenient access to all controls.

2. Have certified scales. Have on hand not less than ten, 50-pound (22.7 kg) weights for frequent testing of all scales.
3. Batching plants may be equipped to proportion aggregates and bulk cement using automatic weighing devices of an approved type.
4. Obtain the Engineer's approval for any deviations from the above stated batch plant and equipment requirements before concrete manufacture.

3.3 STOCKPILED AGGREGATE

A. This work is storing aggregate material for use on the project at the specified locations.

B. Materials

1. Assure the aggregates meet the applicable requirements of ASTM C-33; AGGREGATES, for the type of material required.

C. Construction

1. Clear and grub the stockpile site. Assure the site is firm, smooth and well drained. Place an aggregate bed to prevent contamination of the stockpiles.
2. Build the stockpiles in maximum 4 feet (1.22 m) layers, with the preceding layer completely in place before starting the next layer. Deposit the material to prevent coning, excluding fine aggregate approximately 90% finer than a No.4 sieve.
3. Do not dump, cast, or push material over stockpile sides excluding fine aggregate specified above.
4. Space or separate using walls, stockpiles of different aggregate types or sizes to prevent intermingling of the aggregates.
5. Submit and obtain Engineer's approval of operational plan for stockpiling any material obtained by wet pit or dredging operations.
6. The Engineer may take random samples from stockpile areas where equipment has been operated. Stop operating equipment over stockpiles if tests show degradation is occurring
7. Remove and transport stockpiled material to prevent segregation.

3.4 MIXING

A. General

1. Mix concrete on site, at a central plant, or wholly or partially in truck mixers. Assure each mixer has a manufacturer's plate showing the drum capacity of mixed concrete and rotation speed of the mixing drum or blades attached in a prominent place.

B. On Site Mixers

1. Mix concrete in an approved mixer able to combine the aggregates, cement, and water into a thoroughly mixed and uniform mass within the specified mixing period, and of discharging and distributing the mixture without segregation on the prepared grade. Assure the mixer is equipped with an approved timing device that automatically locks the discharge lever when the drum has been charged and releases at the end of the mixing period.
2. Follow the manufacturer's recommendations for cleaning the mixer. Repair or replace the pickup and throw-over blades in the drum or drums when they are worn down 1 inch (25.4 mm) or more.
3. Have available at the job site a copy of the manufacturer's design, showing blade dimensions and arrangement, and original blade height and depth; or place permanent marks on blades 1 inch (25.4 mm) from the new blade end. Drilled holes of 1/4-inch (6.4 mm) diameter near each end and at the mid-point of each blade are acceptable markings.

C. Truck Mixers And Truck Agitators

1. Assure truck mixers for mixing and hauling concrete, and truck agitators used for hauling central-mixed concrete meet Section 03310.3.3 MIXING requirements.

D. Non-Agitator Truck

1. Assure bodies of non-agitating, hauling equipment for concrete are smooth, mortar tight metal containers, capable of discharging the concrete at a controlled rate without segregation. Discharge of concrete should be from the bottom of the container. If the equipment body is tilted to discharge concrete, assure baffles slow down the load.

3.5 FINISHING EQUIPMENT.

A. Finishing Machine

1. Use a suitable finishing machine.

B. Vibrators

1. Vibrators may be either the surface pan type or the internal type with immersed tube or multiple spuds. Vibrators may be attached to the spreader, the finishing machine, or mounted on a separate carriage. Do not permit vibrators to come in contact with joints, load transfer devices, subgrade, or side forms. Maintain the surface vibrator frequency at 3,500 or more impulses per minute. Maintain frequency of internal types at 5,000 impulses per minute or more for tube vibrators. Maintain 7,000 impulses per minute or more for spud vibrators.
2. Maintain a minimum frequency of 3,500 impulses per minute when spud-type internal vibrators, either hand-operated or attached to spreaders or finishing, machines, are used adjacent to forms.

C. Concrete Saw

1. When sawing concrete joints, use sawing equipment capable of producing the specified cut producing a straight line. Provide artificial lighting for night work to produce work of daytime quality. Assure this equipment is on the job both before and during concrete placement.

D. Forms

1. Use straight side metal forms having:
   a. a minimum 7/32-inch (5.6 mm) thickness
   b. a minimum 10 feet (3.05 m) length.
   c. a depth at least equal to the prescribed edge thickness of the concrete
   d. no horizontal joints
   e. a base width equal to at least the depth of the forms.
2. Use flexible or curved forms for curves of 100-foot (30.5 m) radius or less. Obtain Engineer approval before using flexible or curved forms. Provide form anchors capable of withstanding, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Assure flange braces extend outward on the base at least two- thirds the height of the form.
3. Do not use forms with battered top surfaces, bent, twisted, or broken forms in the work.
4. Do not use repaired forms until inspected and approved. Use built-up forms only where the total pavement area of any specified thickness on the project is less than 2,000 square yards (1672 m^2). Assure the top form face does not vary from a true plane more than 1/8-inch in 10 feet (3.2 mm in 3.05 m), and the upstanding leg does not vary more than 1/4-inch (6.35 mm). Assure the forms are capable of locking the ends of abutting form sections together tightly providing a secure setting.

3.6 GRADE PREPARATION

A. Once the base and/or subgrade is graded and compacted to the specified requirements, trim the grade to specified elevation.

B. Bring the subgrade or base course to the specified cross section when side forms are set to grade.

C. Fill and compact low areas with approved material or fill with concrete integral with the pavement.

D. Maintain the finished grade until the pavement is placed.

E. Keep the subgrade or base course uniformly moist until the concrete is placed. Do not over wet creating mud or water to pond.

3.7 SETTING FORMS

A. Base Support

1. Prepare the foundation under the forms so that when the form is set, it is in contact for its whole length at the specified grade. Fill and compact to grade with granular material, any grade at the form line found to be below established grade. Correct out of specification grade lines by tamping, or by cutting, as required.

B. Form Setting

1. Set forms in advance of concrete placing to prevent placing delays. Once forms are set to correct grade, compact the grade on the inside and outside edges of the form base. Stake forms with at least three pins for each 10- foot (3.05 m) section. Pin each side of every joint. Assure form sections are tightly locked, free from play or movement in any direction. Assure the forms do not deviate from true line in excess of 1/4-inch (6.35 mm) at any point. Correct all form settlement or springing, under the finishing, machine. Clean and oil forms before placing concrete.

C. Grade and Alignment

1. Check and correct all form alignment and grade elevation immediately before placing concrete.

D. Curbs and Gutters as Forms

1. Edges of previously placed concrete gutter section may be used as a form.

3.8 HANDLING, MEASURING, AND BATCHING MATERIALS

A. Set up the batch plant site, layout, equipment, and transporting material to assure an uninterrupted supply of material to the work. Stockpile aggregates from different sources and of different gradations to prevent co-mingling.

B. Handle aggregates from stockpiles or other sources to the batching plant to prevent segregation. Aggregates that are segregated or mixed with earth or foreign material cannot be used in the work. Stockpile or bin all aggregates produced or handled by hydraulic methods and washed aggregates for at least 12 hours before batching. Rail shipment exceeding 12 hours will be accepted as adequate binning only if the car bodies permit free drainage.

C. Separately weigh the fine and coarse aggregate into hoppers in the amounts specified in the mix. Measure cement by the sack or by weight. Use separate scales and hoppers for weighing the cement, with a device that indicates the complete cement batch discharge into the batch box or container. One sack of bulk cement is 94 pounds (42.64 kg).

D. Measure all admixtures into the mixer within ± 3% accuracy.

3.9 MIXING CONCRETE

A. Mix the concrete at the work site using a central-mix plant or truck mixers.

B. Mixing time is measured from the time all materials, except water, are in the drum. Meet AASHTO M 157 and or ASTM C-94 requirements for ready-mix concrete mixing and delivery.

C. Operate the mixer at the manufacturer's recommended drum speed on the name plate. Remove and dispose of outside the work at Contractor expense, any concrete mixed less than the specified time. Do not exceed the mixer’s nominal capacity, in cubic feet, as shown on the manufacturer's standard rating plate on the mixer. An overload up to 10% above the mixer's nominal capacity may be permitted if concrete tests for strength, segregation, and uniform consistency are satisfactory, and if no concrete spill occurs.

D. Re-tempering concrete by adding water or by other means is not permitted. When concrete is delivered in transit mixers or agitators, additional water may be added to the batch materials and additional mixing time to increase the slump to meet the specified requirements, if permitted by the Engineer, providing the following conditions are met:

1. maximum allowable water-cement ratio is not exceeded;
2. maximum allowable slump is not exceeded;

3. maximum allowable mixing and agitating, time (or drum revolutions) is not exceeded;
4. concrete is remixed for at least one-half the minimum required mixing time or number of revolutions.

E. Concrete not meeting these requirements will be rejected. Obtain the Engineer's approval for admixtures that increase the workability or accelerate the set.

3.10 LIMITATIONS OF MIXING

A. Do not mix, place, or finish concrete when light conditions prevent meeting the contract requirements. Obtain the Engineer's approval of artificial lighting.

B. Discontinue concrete mix operations when the ambient temperature is 40° F (4°C) and falling. Do not resume concrete work until the ambient temperature is 35°F (2°C) and rising.

C. When concreting work is approved during cold weather, the aggregates may be heated by either steam or dry heat before being placed in the mixer. Assure the material is uniformly heated without injuring it.

D. Maintain the mixed concrete temperature between 50°F (10°C) and 90°F (32°C) during placement in the forms

E. The Engineer may direct heating the water and aggregates if the air temperature is 35°F (2°C) or less at the time of placing, concrete. Heat water and aggregate to between 70°F (21°C) and 150°F (66°C). Do not place concrete on frozen subgrade or use frozen aggregates in the concrete.

3.11 PLACING CONCRETE

A. Each placing/finishing crew must have at least one ACI Flatwork Finisher Technician level or above on site at all times.

B. Place the concrete on the grade, handling it as little as possible. Assure truck mixers, truck agitators, or non-agitating hauling equipment are capable of concrete discharge without segregating the materials. Unload the concrete into an approved spreader and spread on the grade to prevent segregation. Continuously place concrete between transverse joints without the use of intermediate bulkheads. Perform necessary hand spreading, using only shovels. Do not permit workmen to walk in freshly mixed concrete with boots or shoes coated with earth or foreign substances.

C. Where concrete is to be placed adjoining a previously constructed lane of pavement and mechanical equipment will be operated upon the existing lane of pavement, assure that lane has attained 80% of design strength. If only finishing

equipment is carried on the existing lane, paving in the adjoining lanes may be permitted.

D. Thoroughly consolidate concrete against and along the faces of all forms and along the full length and on both sides of all joint assemblies using vibrators. Do not permit vibrators to contact joint assemblies, the grade, or a side form. Do not operate vibrators more than 15 seconds in any one location.

E. Deposit concrete as close to expansion and contraction joints as possible without disturbing them. Do not dump from the discharge bucket or hopper onto a joint assembly unless the hopper is centered on the joint assembly.

F. Immediately remove any concrete spills from completed slab surfaces, using methods approved by the Engineer.

3.12 TESTING

A. Use ACI Grade I or equivalent certified field-testing technicians for all concrete tests.

1. Furnish the concrete required for testing.
2. Sample, make specimens, and test concrete under the following:

AASHTO T119 (ASTM C143)	Slump
AASHTO T152 (ASTM C231)	Air Content (Gravel or Stone)
ASTM C-173	Air Content (slag or highly porous Aggr.)
AASHTO T121 (ASTM C138)	Cement Content & Unit Weight
AASHTO T22 (ASTM C39)	Strength (Compressive)
AASHTO T97 (ASTM C78)	Strength (flexural, third point method)
AASHTO T23 (ASTM C-31)	Making and Curing Test Specimens in the Field

3. Cure beams in the field by the method specified for the pavement.

3.13 STRIKE-OFF OF CONCRETE AND PLACEMENT OF REINFORCEMENT

A. Place the concrete, strike it off, consolidate, and finish it to the planned cross section and elevation.

B. When placing reinforced concrete pavement in two layers, strike-off the first layer to plan depth and place the reinforcing full length its final position without further manipulation. Place the second concrete layer, strike it off, and screed. Remove and replace any bottom layer concrete that has been in place more than 30 minutes without being covered with the top layer at Contractor expense. When reinforced concrete is placed in one layer, the reinforcement may be positioned in

advance of concrete placement or it may be placed by mechanical or vibratory means in plastic concrete, after the concrete is spread.

C. Assure reinforcing steel is free from dirt, oil, paint, grease, mill scale, and loose or thick rust.

3.14 JOINTS

A. Construct joints as specified in the contract documents.

B. Longitudinal Joint

1. Place deformed steel tie bars of specified length, size, spacing, and material as shown on the plans. Place using approved mechanical equipment or rigidly secured by chairs or other approved supports. Assure tie bars are not painted, coated with asphalt or other material, or enclosed in tubes or sleeves. When adjacent lanes of pavement are constructed separately, use steel side forms that will form a keyway along the construction joint. Tie bars may be bent at right angles against the form of the first lane constructed and straightened into final position before the concrete of the adjacent lane is placed, or instead of bent tie bars, approved two-piece connectors may be used.
2. Longitudinal formed joints are a groove, or cleft, extending downward from, and normal to, the pavement surface. Make these joints using an approved mechanically or manually operated device to the plan dimensions and line while the concrete is in a plastic state. Seal the groove, or cleft, with either a pre- molded strip or poured material as required.
3. Place the longitudinal sawed joints so that their ends contact with any transverse joints.
4. Cut longitudinal sawed joints using approved concrete saws to the plan depth, width, and line. Use guide lines or devices to assure cutting the longitudinal joint as shown on the plans. Saw the longitudinal joint before the cure period ends or shortly thereafter and before any equipment or vehicles are permitted on the pavement. Thoroughly clean the sawed area using both water and compressed air. Immediately remove from the joint all concrete pieces, aggregate and residue left from the sawing. Assure that the cut depth is uniform. Start sealing as soon as the joint is dry. Form longitudinal joints by placing a continuous strip of plastic or other inert material. Assure the joint insert material is strong, non-stretchable, 3 mil thick, 2-inch (50.8 mm) wide, incapable of bonding with the concrete and will form a weakened plane 2-inch (50.8 mm) minimum depth.
5. Insert the joint material using a mechanical device that places the material in a continuous strip, except where intervening structures break the continuity of paving. Splices in the joint material are permitted if they can maintain the continuity of the joint material as placed. Place the joint material so that the top of the strip is not above, nor more than 1/4-inch

(6.35 mm) below, the finished concrete surface. Once placed, assure the vertical axis of the joint material is within 10 degrees of a plane normal to the pavement surface. Assure final strip alignment is parallel with the pavement center line and does not vary more than 1 inch (25.4 mm) from the edge of a 12-foot (3.7 m) straightedge. The installation device must consolidate the concrete about the joint material. Once the joint material is installed, assure the concrete is free of segregation, rock pockets or voids and the finished concrete surface on each side of the joint is in the same plane.

C. Transverse Expansion Joints

1. Place the expansion joint filler continuously from form to form, shaped to the subgrade and the keyway along the form. Furnish preformed joint filler in lengths equal to the pavement width or equal to one lane width. Use damaged or repaired joint filler only with the Engineer's approval.
2. Ensure the expansion joint filler is held vertically. Use an approved installing bar, or other device if required to secure preformed expansion joint filler at the proper grade and alignment during concrete placing and finishing. Assure finished joints do not deviate more than 1/4-inch (6.35 mm) horizontally from a straight line. If joint fillers are assembled in section, no offsets are permitted between adjacent units. No concrete plugs are permitted anywhere within the expansion space.

D. Transverse Contraction Joints

1. Transverse contraction joints are weakened planes created by forming or cutting grooves in the pavement surface and, when shown on the plans, are to include load transfer assemblies.
2. Form transverse strip contraction by installing a parting strip to be left in place.
3. Make formed grooves by depressing an approved tool or device into the plastic concrete. Leave the tool or device in place until the concrete has attained its initial set and then remove it without disturbing the adjacent concrete, unless it is designed to remain in place.
4. Make sawed construction joints by sawing grooves in the pavement surface of the dimensions and spacing and lines on the plans, using an approved concrete saw. Start sawing joints as soon as the concrete has hardened sufficiently to permit sawing without excessive raveling. Saw all joints before uncontrolled shrinkage cracking occurs. When required, continue saw operations both during the day and night, regardless of weather conditions. Do not saw a planned joint when a volunteer crack develops at or near the planned joint location. Discontinue sawing when a crack develops ahead of the saw. Typically, saw all joints in sequence. Saw all contraction joints in lanes and adjacent to previously constructed lanes before uncontrolled cracking occurs. If conditions exist that make it

impractical to prevent erratic cracking by early sawing, form the contraction joint groove before initial set of concrete as provided above.

5. When directed, rout or saw random cracks and fill with joint sealer. Thoroughly clean the sawed area using water and compressed air. Immediately remove all pieces of concrete, aggregate and residue from the joint caused by sawing. Take care to maintain uniform cut depth. Seal the joint as soon as it is dry.
6. Make sure transverse formed contraction joints comply with Section 02515 3.14 requirements for the longitudinal formed joint.
7. Construct transverse construction joints if there is an interruption exceeding 30 minutes in the concreting work. Do not construct a transverse joint within 5 feet (1.5 m) of an expansion joint, contraction joint, or weakened plane. If sufficient concrete has not been mixed at the time of interruption to form a slab at least 5 feet (1.5 m.) long, remove and dispose of excess concrete back to the last preceding joint as directed.

3.15 LOAD TRANSFER DEVICES

A. When used, hold dowels in position parallel to the surface and centerline of the slab by a metal device that is left in the pavement.

B. Thoroughly coat, with an approved lubricant, the portion of each dowel painted with one coat of lead or tar paint, as required under Section 02515.2.1; MATERIALS. Furnish an approved metal dowel cap or sleeve meeting Section 02515.2.1; MATERIALS requirements, for each dowel bar used with the expansion joints. Assure the caps or sleeves fit the dowel bar tightly.

C. Instead of using dowel assemblies at contraction joints, dowel bars may be placed in the full pavement thickness using an approved mechanical device.

3.16 FINAL STRIKE-OFF, CONSOLIDATION, AND FINISHING

A. Sequence

1. Sequence the work as follows: strike-off, consolidate, float, and remove latency, straight-edge, and final surface finish.
2. If applying water to the surface is permitted, apply it as a fog spray using an approved spray equipment.

B. Finishing at Joints

1. Place the concrete adjacent to joints, under and around all load transfer devices, joint assembly units, and other features designed to extend into the pavement, free of voids or segregation. Mechanically vibrate concrete adjacent to joints meeting Section 02515.3.11; PLACING CONCRETE requirements.

2. Once the concrete has been placed and vibrated adjacent to the joints as required in Section 02515.3.11; PLACING CONCRETE, bring the finishing machine forward, operating it to avoid damage to or misalignment of joints. If uninterrupted operation of the finishing machine, to, over, and beyond the joints causes segregation of concrete, damage to, or misalignment of the joints, lift the finishing machine and set it directly on top of the joint and resume the finishing. When the second screed is close enough to permit the excess mortar in front of it to flow over the joint, lift the screed and carry it over the joint. Thereafter, the finishing machine may be run over the joint without the screeds being lifted, provided there is no segregated concrete immediately between the joint and the screed or on top of the joint.

C. Machine Finishing

1. Vibrate all concrete pavement unless otherwise approved for small areas or for short periods of time due to equipment failure. Assure vibrators for full width vibration of concrete paving slabs meet Section 02515.3.5.B; VIBRATORS requirements. If concrete uniformity and density is not obtained using the vibratory method at joints, along forms, at structures, and throughout the pavement, furnish equipment and methods which will produce pavement meeting specifications.

D. Hand Finishing

1. Hand finishing is permitted under the following conditions:
    a. If mechanical equipment breaks down, hand finishing concrete already deposited on the grade when the breakdown occurs is permitted.
    b. Widths or areas of irregular dimensions where mechanical finishing equipment is impractical.
    c. As soon as concrete is placed, strike it off and screed it. Use an approved portable screed. Provide a second screed for striking off the bottom layer of concrete if reinforcement is used.
    d. Assure the screed for the surface is an approved design, sufficiently rigid to retain its shape, and constructed of metal, and at least 2 feet (.6 m) longer than the maximum width of the slab to be struck off.
    e. Obtain consolidation using a vibrator or other approved equipment.
    f. Move the screed forward on the forms with a combined longitudinal and transverse motion, always moving in the direction the work is progressing and operated to ensure that neither end is raised from the side forms during the strike off process. If necessary, repeat this until the surface is uniform in texture, true to grade and cross section, and free from porous areas.
2. Floating
    a. Once the concrete is struck off and consolidated, use one of the following methods as specified or approved.
    b. Hand Method

1) Use a hand-operated, longitudinal float at least 12 feet (3.7 m) long and 6 inches (152.4 mm) wide, stiffened to prevent flexing and warping. Work the float in a sawing motion, operating from foot bridges resting on the side forms and spanning and not touching the concrete. Move ahead along the pavement centerline in successive sections not exceeding one-half the length of the float. Waste all excess water or soupy material over the side forms on each pass.

c. Mechanical Method

1) Obtain the Engineer's approval of the mechanical float before use. Adjust the float tracks to the required crown. Assure the float is adjusted to the transverse finishing machine to maintain a mortar wave ahead of the float at all times. Ensure the float passes over each pavement area at least twice. Waste all excess water or soupy material over the side forms on each pass.

d. Alternate Mechanical Method

1) As an alternate to item (1) above, the Contractor may use a machine having a cutting and smoothing float, or floats, suspended from and guided by a rigid frame. This frame must be carried by 4 or more visible wheels riding on, and in constant contact with, the side forms.

2) If necessary, following one of the preceding float methods, long- handled floats having blades a minimum 5 feet (1.52 m) long and 6 inches (152.4 mm) wide may be used to smooth and fill in open- textured areas in the pavement. Do not use long-handled floats to float the entire pavement surface in place of, or supplementing, one of the preceding floating methods. When strike-off and consolidation are performed by hand and the pavement crown will not permit using a longitudinal float, float the surface transversely using the long-handled float. Take care to not work the pavement crown during the work.

E. Straight Edge Testing and Surface Correction

1. Once floating is completed, excess water removed, and the concrete is still plastic, test the concrete surface for trueness with a 10-foot (3.05 m) straightedge. Furnish and use a 10-foot (3.05 m) straightedge swung from handles 3 feet (.91 m) longer than one-half the slab width. Hold the straightedge in contact with the surface in successive positions parallel to the road centerline and the go over the whole slab area, as required. Advance along the road in not to exceed one-half the straightedge length. Immediately fill any depressions with fresh mixed concrete, strike off, consolidate, and refinish. Trim high areas and refinish. Give special attention to assure that surfaces across joints meet the smoothness requirements. Continue straightedge testing and surface corrections until

the entire surface meets the required grade and cross section.

F. Final Finish

1. The final finish refers to the type of surface texture as specified in the Contract documents. The following types of surface textures may be specified: Type I - Transverse Tining, Type II - Longitudinal Tining, Type III - Nylon or Artificial Grass Drag, Type IV.- Nylon or Bristle Broom, Type V - Belt Finish, and Type VI - Burlap Drag. When final longitudinal texturing has been completed by the burlap drag, texture the plastic pavement surface to the designated texture as approved by the Engineer. A belt finish does not need to be preceded by a burlap drag.
   a. Type I - Transverse Tining
      1) Produce the mainline finish using mechanical equipment described as follows: The transverse grooving machine must be either a vibrating roller or a comb equipped with steel tines. The machine must be self-propelled and automatically lift the roller or tine comb at the pavement end. Obtain the Engineer's approval of hand grooving methods in those areas where the mechanical equipment is not practical.
      2) Assure the equipment has rectangular or circular shaped spring steel tines that are spaced 1/2- to 1-inch (12.7 - 25.4 mm) center to center. Make the grooves perpendicular to the pavement center line and the transverse grooves being 0.090 to 0. 125 inches (2.3 - 3.2 nun) wide and 1/8- to 3/16-inch (3.2 - 4.8 mm) deep. Acceleration lanes, deceleration lanes, and irregular sections may be finished by methods other than mechanical, if they produce a similar transverse groove.
   b. Type II - Longitudinal Tining
      1) Produce the mainline finish using mechanical equipment meeting the following: The longitudinal grooving machine must be either a vibrating roller or a comb equipped with steel tines, be self-propelled and automatically lift the roller or tine comb at the pavement end. Obtain the Engineer's approval of hand grooving methods in areas where mechanical equipment cannot be used.
      2) Assure the equipment has rectangular or circular shaped spring steel tines that are spaced 1/2- to 1-inch (12.7 - 25.4 mm) center to center. Make the grooves parallel to the pavement center line and the longitudinal grooves 0.090 to 0.125 inches (2.3 - 3.2 mm) wide and 1/8- to 3/16-inch (3.2 - 4.8 mm) deep. Operate the mechanical equipment from a bridge when the pavement is 4.9 m (16 feet) or more in width.

3) Acceleration lanes, deceleration lanes, and irregular sections may be finished by methods other than mechanical, if they produce a similar type of longitudinal groove.

c. Type III - Nylon or Artificial Grass Drag

1) Produce the pavement finish using a nylon or artificial grass drag, approved by the Engineer. Produce a surface by pulling the drag longitudinally. For a pavement width of 16 feet (4.9 m) or more, mount the drag on a bridge that travels on the forms. Use a drag of at least 3 feet (.91 m) wide and maintain full contact the pavements full width. Maintain drags clean and free from encrusted mortar. Replace drags that cannot be cleaned with new ones.

d. Type IV - Nylon or Bristle Broom

1) Apply broom texturing when the water sheen has disappeared. Draw the broom from the center to the edge of the pavement with adjacent strokes overlapping. Perform the brooming so that the surface corrugations are uniform in appearance and have a minimum depth of 1/16-4-inch (1.6 mm) and a maximum depth of 1/8-inch (3.2 mm). Complete brooming before the concrete surface will be tom or roughened by the work. Produce a finished surface free from rough and porous areas, irregularities and depressions resulting from poor workmanship. Mechanical brooming, in lieu of the manual brooming, is permitted if the specified results can be obtained.

e. Type V - Belt Finish (Paving with Rigid Forms)

1) When straight edging is complete and the water sheen has disappeared, and just before the concrete becomes non-plastic, belt the surface with a two-ply, canvas belt a minimum 8 inches (203.2 mm) wide and a minimum 3 feet (.9 m) longer than the pavement width. Equip hand belts with handles to permit controlled, uniform manipulation. Work the belt with short strokes transverse to the road centerline advancing parallel to the centerline.

f. Type VI - Burlap Drag

1) Use a drag of seamless strip damp burlap or cotton fabric to produce a roughened surface, dragging it longitudinally along the pavement’s full width. For pavement 16 feet (4.9 m) or more in width, mount the drag on a bridge that travels on the rails. Use a drag at least 3 feet (.91 m) wide, maintaining contact with the full pavement width. Maintain drags clean and free from

encrusted mortar. Replace drags that cannot be cleaned with new drags.

2.2 EDGING AT FORMS AND JOINTS

A. After the final finish and before the concrete has taken its initial set, round the edges of the pavement along each side of each slab, and on each side of transverse expansion joints, formed joints, transverse construction joints, and emergency construction joints with an approved tool to the specified radius. Produce a radius having a smooth, dense mortar finish. Do not disturb the slab surface with the tool during the work.

B. At all joints, remove all tool marks on the slab adjacent to the joints by brooming the surface. Do not disturb the rounding of the slab comer when brooming the surface. Completely remove all concrete on top of the joint filler.

C. Test all joints with a straightedge before the concrete has set and correct if one side of the joint is higher than the other or if an edge is higher or lower than the adjacent slabs.

3.2 SURFACE TEST

A. As soon as the concrete has hardened to permit testing, test the pavement surface with a 10-foot (3.05 m) straightedge or other approved device. Mark and grind high spots exceeding 1/4-inch (6.35 mm.), but under 1/2-inch in 10 feet (12.7 mm in 3.05 m), using an approved grinding tool to an elevation where the area or spot will not show surface deviations exceeding 1/4-inch (6.35 mm) when tested with a 10- foot (3.05 m) straightedge. Use stacked head, vertical blade grinders that will provide a coefficient of friction approximately equal to that of the un-ground pavement. Keep grinding grooves parallel to the direction of travel. Where the departure from correct cross section exceeds 1/2-inch (12.7 mm)), remove and replace the pavement by hand at Contractor expense.

B. Any area or section so removed cannot be less than 5 feet (1.52 m) long the full lane width. When required to remove and replace a section of pavement remove and replace any remaining portion of the slab adjacent to the joints that is less than 5 feet (1.52 m) long.

2.3 CURING

A. Immediately after the finishing operations are complete and the surface cannot be marred, cover and cure the entire surface of the newly placed concrete meeting one of the following methods. Immediately stop concrete work when insufficient cover material or lack of water would

prevent obtaining the specified cure results. Do not leave the concrete exposed for more than 1/2-hour between stages of curing or during the curing period.

1. Cotton or Burlap Mats
    a. Cover the entire pavement surface with mats, extending at least twice the pavement thickness beyond the slab edges. Assure that the entire surface and both edges of the slab are completely covered. Before placing mats, saturate the mats thoroughly with water. Place and weight the mats to remain in contact with the covered surface. Keep the mats wetted and in place for 72 hours after the concrete has been placed.
2. Waterproofed Paper
    a. Cover the pavement top and sides entirely with waterproofed paper. Lap the units at least 18 inches (.46 m). Place and weight the paper to maintain contact with the surface. Assure the paper extends beyond the slab edges at twice the pavement thickness. If laid longitudinally, paper not manufactured in sizes that will provide this width, must be securely sewed or cemented together with joints being sealed so that they do not open up or separate during the cure period. Maintain the covering in place for 72 hours after the concrete has been placed. Thoroughly wet the pavement surface before placing the paper.
3. Straw Curing
    a. When using this type of curing, initially cure the pavement using burlap or cotton mats, meeting Section 02515.3.19.A.a above, until after final set of the concrete or, in any case, for 12 hours after the concrete is placed. Once the mats are removed, thoroughly wet and cover the surface and sides of the pavement with at least 8 inches (203.2 mm) (wetted thickness) of straw or hay. Repair or replace straw or hay covering displaced during the curing period and saturate with water for 3 days. Thoroughly wet the covering down the morning of the fourth day. Keep this cover in place until the concrete has attained the required strength. When permission is given to open the pavement to traffic, remove and dispose of the covering leaving the right-of-way in a neat and presentable condition. Do not dispose of the covering by burning on, or adjacent to, the pavement.
4. White Pigmented Impervious Membrane
    a. Uniformly spray the entire pavement surface with white pigmented curing compound immediately after the finishing of the surface and before the set of the concrete has taken place, or if the pavement is cured initially with burlap or cotton mats, the curing compound may be applied upon removal of the

mats.

b. Do not apply the curing compound during rainfall.

c. Apply curing compound under pressure at 1 gallon per 150 square feet (3.79 L per 13.95 square meters) using mechanical sprayers. Use spraying equipment of the fully atomizing type equipped with a tank agitator. At the time of use, assure the compound is thoroughly mixed with the pigment uniformly dispersed throughout the vehicle. During application, continuously stir the compound using mechanical means. Hand spraying of odd widths or shapes and on concrete surfaces exposed by the removal of forms is permitted. Do not apply curing compound to the inside faces of joints to be sealed.

d. Use curing compound producing a film that will harden within 30 minutes after application. Immediately re-apply curing compound damaged from any cause within the required curing period.

e. Upon removal of side forms, apply curing compound to the exposed slab sides.

5. White Polyethylene Sheeting

a. Cover entirely the top surface and sides of the pavement with polyethylene sheeting. Lap the pieces at least 18 inches (35 cm). Place and weight the sheeting so it remains in contact with the surface. Lay sheeting so it extends beyond the edges of the slab at least twice the thickness of the pavement. Maintain the covering in place for 72 hours after the concrete has been placed.

B. Curing in Cold Weather

1. When the average daily temperature is below 40°F (4°C), cure by covering the pavement with at least 12 inches (304.8 mm) of loose, dry hay or straw, or equivalent protective covering authorized by the Engineer. Leave covering in place for 10 days.

2. When concrete is placed and the air temperature could drop below 35°F (2°C), provide the volume of straw, hay, grass, or other blanketing material at the work site. Anytime the temperature may be expected to reach the freezing point during the day or night, spread the material over the pavement to the required depth to prevent freezing of the concrete. Maintain the covering for a minimum 10 days. Be responsible for the quality and strength of the concrete placed during cold weather and remove and replace at Contractor expense any concrete injured by freezing.

2.4 REMOVING FORMS

A. Remove forms only after the freshly place concrete has set for 12 hours, excluding auxiliary forms used temporarily in widened areas. Carefully remove forms to prevent damage to the pavement. Once the forms are removed, cure the slab sides as specified herein. Remove and replace major honeycombed areas. The minimum area to be removed is 10 feet in length (3.05 m), the full width of the lane involved. When it is necessary to remove and replace a pavement section, any remaining portion of the slab, adjacent to the joints, less than 5 feet (1.52 m) in length is to be removed and replaced.

2.5 SEALING JOINTS

A. If the joints are to be sealed, fill them with joint sealing material before the pavement is opened to traffic and as soon as practical after completion of the curing period. Just before sealing, thoroughly clean each joint of all foreign material, including membrane curing compound, assuring the joint faces are clean and surface dry when the seal is applied. Stir material for hot applied seal during heating.

B. Apply the sealing material to each joint opening meeting the plan details or as directed by the Engineer. Pour so that the material does not spill on the exposed concrete surfaces. Remove and clean from concrete surfaces all excess sealing material. The use of sand or similar material as a cover for the seal is not permitted. Do not place poured joint sealing material when the ambient temperature is less than 50°F (10°C), unless approved by the Engineer.

2.6 PROTECTION OF PAVEMENT

A. Protect the pavement and its appurtenances against both public and Contractor traffic. This includes supplying personnel to direct traffic and the erection and maintenance of warning signs and lights.

B. To protect the concrete against rain before the concrete is sufficiently hardened, have available at all times materials for the protection of the edges and surface of the unhardened concrete. Protective materials consist of standard metal forms or wood plank having a minimum nominal thickness of 2 inches (50.8 mm) and a minimum nominal width of the pavement thickness at its edge for the protection of the pavement edges, and covering material such as burlap or cottonmats, curing paper, or plastic sheeting material for the protection of the surface of the pavement. Stop paving when rain appears imminent and have all available personnel begin placing forms against the side of the pavement and cover the surface of the unhardened concrete with the protective covering.

C. Repair or replace all damage to the pavement occurring before final

acceptance at Contractor expense.

2.7 OPENING TO TRAFFIC

A. Obtain the Engineer's approval to open the pavement to traffic. Pavement cannot be opened to traffic until specimen beams, meeting 3.12; TESTING, have reached the design flexural strength, tested under the third-point method according to Section 3.12; TESTING. If the tests are not performed, the pavement may be opened at the discretion of the Engineer. Clean the pavement before opening to traffic.

2.8 CONCRETE PAVEMENT - SLIPFORM METHOD

A. Pavement may be constructed without using fixed forms. When the slipform method is used, meet the following provisions:

1. Grade
   a. Once the grade or base is placed and compacted to the specified density, cut the grade and areas that will support the paving machine to the required elevation using an approved fine-grading machine. Use a self- propelled or towed fine-grading machine having the weight and power to trim the compacted material without gouging or tearing the surface. Assure the machine is equipped with cutting edges or surface shavers controlled from an independent control reference wire having an automatic control device. To avoid excessive depths of cut, the machine is to fine grade making successive passes, with each pass controlled from the independent reference line through the automatic control. Re- compact to the specified density, all base disturbed by the grading operation, before placing concrete. Maintain the grading operations in advance of concrete placement. Repair damage to the grade caused by traffic before placing the concrete.
2. Placing Concrete
   a. Place concrete using an approved, slipform paver able to spread, consolidate, screed, and float-finish the freshly placed concrete in one complete pass to the specified line, grade, and cross section with a minimum of hand finishing. Assure the machine is equipped with vibrators, vibrating the concrete the pavements full width and depth. Vibrators must be vibrating tubes or arms working in the concrete, or a vibrating screed or pan operating on the concrete surface. Assure the sliding forms are capable of resisting displacement by the wet concrete. Use forms that trail behind the paver and prevent slumping of the concrete during the work.

b. Assure the concrete does not exceed a slump of 2 inches (50.8 mm). Operate the slipform paver at a uniform speed. Coordinate all concrete mixing, delivering, and spreading to maintain uniform progress with minimum stopping and starting of the paving work. Immediately stop vibratory and tamping when it is necessary to stop the paver. Do not apply any outside tractive force to the paver not controlled by it.

3. Finishing
   a. Meet the surface smoothness and texture requirements of Section 02515.3.16.F; FINAL FINISH, and Section 02515.3.18; SURFACE TEST.
4. Curing
   a. Perform curing using one of the methods in Section 02515.3.19; CURING.
5. Joints
   a. Construct all joints under Section 02515.3.14; JOINTS.

3.2 TOLERANCE IN PAVEMENT THICKNESS

A. The pavement thickness will be determined by measuring cores. The actual pavement thickness must be within 1/4-inch (6.35 mm) of the specified thickness.

B. When any core is less than the plan thickness by more than the allowable deviation, additional cores will be taken from the area at minimum 10-foot (3-05 m) intervals parallel to the centerline in each direction from the affected location until, in each direction, a core is found which is not deficient by more than the allowable deviation. The Engineer will evaluate areas found deficient in thickness by more than the allowable deviation. Remove and replace deficient areas to the specified thickness at Contractor expense.

PART 4 - MEASUREMENT AND PAYMENT

2.9 MEASUREMENT AND PAYMENT

A. Measurement and Payment: No payment for Portland Cement Concrete Pavement. It shall be considered incidental and included in the unit price for Concrete Driveway and Sidewalk.

END OF SECTION

SECTION 02529 - CONCRETE DRIVEWAY AND SIDEWALK

PART 1 - GENERAL

1.1 DESCRIPTION

A. This work is the construction of the concrete sidewalk and driveway for Lodge Site #4.

B. All work not specifically described in this technical specification of this bid document shall be performed in compliance with the applicable technical specification sections found in the current version of Montana Public Works Standard Specifications (MPWSS).

1.2 REFERENCES

AASHTO M 213	Standard Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction
AASHTO M 148	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

PART 2 – PRODUCTS

2.1 STRUCTURAL CONCRETE

A. Furnish structural concrete meeting the requirements of Section 03310, STRUCTURAL CONCRETE.

2.2 REINFORCING STEEL

A. Furnish reinforcing steel meeting the requirements of Section 03210, REINFORCING STEEL. Use 6 x 6 x 10 gauge wire mesh unless otherwise specified.

2.3 PRE-FORMED EXPANSION JOINT FILLER MATERIAL

A. Furnish joint material meeting the requirements of AASHTO M213.

2.4 GRAVEL BASE MATERIAL

A. Furnish crushed base material meeting applicable requirements of Section

02235, CRUSHED GRAVEL SURFACING AND CRUSHED GRAVEL BASE COURSE, and meeting the gradation requirements for 1 inch minus material.

2.5 CURING AND PROTECTIVE COATING MATERIALS

A. Liquid Membrane-Forming Compounds for Curing Concrete

1. Use liquid membrane-forming compounds meeting the requirements of AASHTO M148, Type 1, clear or translucent. Apply the compound between April 15 and August 14 unless daily temperatures outside of that date range are between 40 and 90 degrees Fahrenheit (4-32° C).

B. Emulsified Linseed Oil Compound

1. Apply water-soluble or emulsified linseed oil compound between August 15 and April 14 as a protective coat. Assure it meets all requirements of AASHTO M148 and contains at least 2.7 pounds of linseed oil per gallon. Furnish a manufacturer's certification showing that the formulated weight of linseed oil per gallon equals or exceeds this limit.

PART 3 - EXECUTION

3.1 GENERAL

A. Construct the sidewalk and driveway at the locations shown on the plans meeting these specifications and the applicable portions of Section 03310, STRUCTURAL CONCRETE.

B. The use of slip form machines is prohibited for items in this section unless otherwise specified or permitted by the Engineer.

C. During periods of cold weather, Contractor must submit to Engineer a cold weather concreting plan applicable to Section 03310 for approval.

3.2 FOUNDATION PREPARATION

A. Excavate to the specified depth, or as directed by the Engineer. Assure the concrete subgrade has a firm and even surface and is compacted as specified in Section 02230: Excavation, Backfill, and Compaction, as may be modified by the Standard Modifications.

B. Place and compact 8 inches of crushed gravel base course for the driveway (parking ramp) and 4 inches of crushed gravel base course for the sidewalk, compacted to 95% of ASTM D-698. This requirement is waived for concrete if it is

to be installed on street base course material exceeding 3 inches (75 mm) or more in thickness and is approved by Engineer.

C. Do not remove sidewalks, private driveways, or conduct foundation preparation activities more than 4 days prior to the planned concrete pour.

3.3 FORMS

A. Furnish forms to produce the shape, lines, and dimensions shown on the plans and/or drawings. Assure forms prevent leakage of mortar and are maintained in proper position and accurate alignment. Thoroughly clean and oil forms with an approved form oil before placing concrete and remove forms only after the concrete has hardened sufficiently to support all loads without damage.

B. Form radii using flexible or curved forms set to the required curvature. Use wood forms only with the Engineer's approval. Radii may be formed by using segments of straight forms if the length of the straight segment does not exceed one-tenth of the length of the radius.

C. Use forms and pre-formed expansion joint filler material for same depth as concrete.

3.4 REINFORCEMENT

A. Place and hold in position reinforcement meeting the contract requirements, or as directed by the Engineer, before placing the concrete.

3.5 PLACING CONCRETE

A. Assure the subgrade is compacted and brought to specified grade before placing concrete. During extreme drying conditions, dampen the subgrade immediately before placing the concrete. Spade and tamp the concrete into the forms providing a dense, compacted concrete free of rock pockets. Float, finish and broom the exposed surfaces. Each placing/finishing crew shall have at least one ACI Flatwork Finisher Technician level or above, on site at all times.

B. Assure the rate of concrete placement does not exceed the rate at which the various placing and finishing operations can be performed in accordance with these specifications.

3.6 STRIPPING FORMS AND FINISHING

A. Forms
   1. Remove forms when the concrete is sufficiently set to prevent chipping or spalling. When forms are removed before the curing period has expired,

protect the concrete edges with moist earth or spray edges with curing compound. Clean, oil, and examine all forms for defects before they are used again.

B. Finishing

1. Finish the concrete surface true to lines and grades shown on the drawings. Work concrete until the coarse aggregate is forced down into the body of the concrete and no coarse aggregate is exposed. Float the concrete surface using a magnesium float to a smooth and uniform surface. Plastering of the surface is prohibited. Edge all outside edges of the slab and all joints using a ¼ inch (6.4 mm) radius edging tool.
2. Immediately after the forms have been removed, remove all form bolts and tie wires to a depth of at least ½ inch (12.5 mm) below the surface of the concrete. Clean and fill all holes and depressions caused by the removal or setting back of form bolts or tie wires with Portland Cement mortar composed of 1 part cement by volume and 2 parts sand. Chip out, clean and fill all rock pockets, honeycombs, and air pockets with mortar, in compliance with instruction of the Engineer. If, in the judgment of the Engineer, rock pockets are of such an extent or character as to materially affect the strength of the structure or to endanger the life of the steel reinforcement, they may declare the concrete defective and order the complete removal and replacement of that portion of the structure so affected.
3. Carefully make all mortar patches using a very dry mortar tamped firmly in the void. Keep the patches wet for a period of 3 days after which it will be inspected for shrinkage cracks. Excessive cracking will require complete removal and replacement of the patch.
4. Screed, float and light broom finish sidewalks, exterior slabs, approaches, etc. and membrane cure. After concrete has hardened sufficiently, give the surface a broom finish. Obtain Engineer approval of the broom before use. Assure the broom strokes are square across the concrete from edge to edge, overlapping adjacent strokes. Broom without tearing the concrete. Assure the broomed finish produces regular corrugations not exceeding 1/8 inch (3.2 mm) in depth.
5. Steel trowel finish interior floor surfaces which will be exposed after construction is completed, surfaces to be covered with resilient floor coverings or seamless floor coverings, the exposed portion of the top of equipment bases, the top of interior curbs, and other surfaces designated on the drawings. Perform troweling after the second floating when the surface has hardened sufficiently to prevent an excess of fines from being drawn to the surface. Produce a dense, smooth, uniform surface free from blemishes and trowel marks.
6. Apply liquid or shake-on floor hardener to all interior concrete floors which are subject to foot or equipment traffic and are not required to be covered with resilient floor coverings or seamless flooring. Prior to application, thoroughly

clean the floor of all dirt, grease, and other foreign matter. Do not apply curing compounds to floors scheduled to receive floor hardener unless compatibility with the hardener is demonstrated in manufacturer's data.

7. Do not apply additional surface water. The Engineer may permit adding water, but it must be applied by fog spray only. Use of a film forming evaporation retardant, following the manufacturer’s directions, is permitted.

3.7 CURING

A. Cure meeting Section 03310, STRUCTURAL CONCRETE requirements.

3.8 JOINTS

A. Extend isolation joints the full depth of the concrete and fill using ½-inch (12 mm) thick, pre-formed expansion joint filler material as specified in Section 02529.3.3. Place isolation joints meeting this requirement where new concrete abuts existing concrete. Form isolation joints around all appurtenances, such as manholes, utility poles, etc. extending into and through the concrete.

B. Install pre-formed joint filler between concrete and any fixed structure, such as a building or bridge. Assure all expansion joint materials extend the full depth of the concrete. Place isolation joints at radius points, junctions with existing concrete, and opposite to or at expansion joints in adjacent concrete. Form cold joints at unions of consecutive pours as shown on the plans or directed by the Engineer. Assure the cold joint is vertical, the full depth of the concrete, and tooled to a ¼-inch (6.5 mm) radius.

C. Divide sidewalk into sections using contraction joints formed by a jointing tool or other approved methods. Extend the contraction joints into the concrete for at least 25% of its depth and be approximately 1/8-inch (3 mm) wide. Unless otherwise directed, space contraction joints at maximum 10-foot (3 m) intervals or at a distance equal to the sidewalk width, whichever is less. In continuous sidewalk runs, install isolation joints every 100 feet at intervals equal to the nearest multiple of the contraction joint interval.

3.9 BACKFILL

A. In areas adjacent to existing lawns, backfill the top 4 inches (100 mm) using black loam or good topsoil suitable for lawn growth. Place it out from the sidewalk or driveway to replace turf or lawn removed during installation. Place the backfill level with the top of the curb, immediately adjacent to the curb, graded and blended to match the existing undisturbed lawn area.
B. Where lawns do not exist, backfill the top 4 inches (100 mm) with impervious dirt and place to meet the typical sections shown on the plans.

C. Compact backfill to prevent settlement and level the surface to a neat appearing and free draining surface within 4 days after concrete is placed. Where required by the contract, topsoil shall be placed to the lines and grades of the work. The addition of topsoil, seed, and/or sod and all finish grading work shall be completed and ready for inspection within 6 days of concrete placement.

3.10 TOLERANCES

A. Assure all items of construction covered by this section present clean, uniform surfaces and lines free of irregularities and distortions. Plane surfaces and vertical tangent lines are tested with a 10-foot straightedge and cannot deviate more than ¼-inch (6.5 mm) from the straightedge.

3.11 MISCELLANEOUS NEW CONCRETE CONSTRUCTION

A. Construct new street monuments, new street light bases, and other miscellaneous concrete construction in accordance with detail drawings, or as directed by the Engineer.

B. New concrete construction required to maintain or restore existing structures will be considered incidental to the cost of pipe installation and no additional payments made. Include the concrete costs associated with thrust blocks with the unit costs bid for the valve, fittings, or appurtenance requiring the thrust block. New concrete work not included above, or specifically called out on the drawings, must first be approved by Engineer.

C. Construct all curb ramps with detectable warning surfaces in conformance with the requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG). Detectable warning surfaces shall be considered deficient and subject to replacement by the Contractor if more than 5% of the truncated domes on a ramp surface are missing or damaged, if the detectable warning product has lost any adhesion to the concrete, or if the detectable warning product is cracked or shows other signs of distress, at the end of the two-year warranty period.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Measurement: Concrete Driveway and Sidewalk is measured and paid for by the square yard (as defined by the dimensions shown on the plans) at the contract unit price bid for “Concrete Driveway and Sidewalk”.

4.2 PAYMENT

B. Payment: Price and payment are full compensation for all material, excavation, backfill, crushed base material, curing of concrete, pre-molded mastic material, equipment, tools and labor, and for the performance of all work and incidentals necessary to complete this bid item.

END OF SECTION

SECTION 02725 – CULVERT INSTALLATION

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements and guidelines for the installation of an 18-inch diameter Corrugated Metal Pipe (CMP).

B. This work included, but is not limited to, the following items: trenching, installation of bedding materials, and installation of culvert.

C. All work not specifically described in this technical specification of this bid document shall be performed in compliance with the applicable technical specification sections found in the current version of Montana Public Works Standard Specifications (MPWSS).

PART 2 – PRODUCTS

2.1 MATERIAL

A. 18-inch diameter CMP rated for H20 Loading or approved alternative by Owner.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install in accordance with specifications and in conformity with the lines and grades shown on the Drawings.

B. Ensure the soil beneath the bedding layer is undisturbed or a firm, compacted foundation.

C. The full length of pipe shall be in contact with bedding material.

D. After placing the pipe, compact bedding material to 95.0 percent of maximum density as determined by ASTM D-698 (Standard Proctor) and within plus 2 percent to minus 4 percent of optimum moisture content.

E. Bedding material shall be gravel material placed 6-inches below pipe up to pipe spring line.

F. Minimum 1-foot of cover required over top of pipe.

G. If 1-foot of minimum cover cannot be met, additional excavation will be required upon approval by Owner.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Measurement: Measurement shall be per linear-foot (LF) of corrugated metal pipe installed.

4.2 PAYMENT

A. Payment: Payment shall constitute full payment for all labor, trench excavation, imported pipe bedding material, backfill, compaction, shoring (if necessary) and installation as specified in the Drawings, and all other work necessary or incidentals for completion of the item.

END SECTION

SECTION 02910 – REVEGETATION

PART 1 – GENERAL

1.1 SUMMARY

A. Section consists of soil preparation, furnishing and drilling or broadcasting seed, and/or mulching in accordance with these specifications, the Drawings, or as directed by the Owner.

B. All work not specifically described in this technical specification of this bid document shall be performed in compliance with the applicable technical specification sections found in the current version of Montana Public Works Standard Specifications (MPWSS).

PART 2 – PRODUCTS

2.1 GRASS SEED

A. All seeds distributed within the State are subject to inspection and analysis, and must be in compliance with the Montana Seed Law and the Federal Seed Law. Seed must be purchased through a dealer approved by OWNER.

B. All seeds shall be furnished in containers and shall be plainly labeled, with seed tags attached by the supplier.

C. Seed mix shall be Native Pasture seed mix approved by Owner.

PART 3 – EXECUTION

3.1 PROCEDURES

A. Prior to seeding, the slopes to be seeded shall be completed to the designated line and grade. Areas not suitable for scarifying shall be left in a rough condition satisfactory to the OWNER during construction to simulate the scarified areas.

B. The Contractor shall first prepare all of the slopes for seeding. The seed shall then be applied by drilling or broadcasting.

3.2 TIME OF SEEDING

A. Seeding shall be accomplished between the time the frost leaves the ground in the spring, and before the frost enters the ground in the fall, with the following

exception. Seeding may proceed when there is some evidence of frost, provided the seedbed can be kept in a workable condition, as approved by the OWNER.

B. Seed shall not be broadcast when the weather is windy or otherwise unsuitable for the Work.

3.3 DRILLING

A. Drills shall be set for uniform rows with the spacing not to exceed eight inches, and set to distribute the seed at the specified rate. The seed shall be drilled to a depth of ¼ inch to ½ inch.

3.4 BROADCASTING

A. Broadcasting methods will be limited to areas that cannot be effectively seeded by drilling.

B. After the seed has been distributed uniformly over the area by approved mechanical broadcasting devices, the ground shall be raked or dragged to cover the seed. Wherever practicable, scarifying and dragging on the slopes shall be done approximately horizontal (perpendicular to the slope and level to the eye).

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Measurement: Measurement shall be Lump Sum (LS).

4.2 PAYMENT

A. Payment: Payment shall include all labor, equipment, materials, and incidentals required for the completion of the work.

END SECTION

SECTION 03200 – REINFORCING STEEL

PART 1 – GENERAL

1.1 SUMMARY

A. This work is furnishing and placing reinforcing steel or wire fabric meeting the quality, type and size specified in the contract.

B. The following specifications are directly taken from MPWSS and are provided for convenience.

1.2 REFERENCES

ASTM A615	Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A705	Age-Hardening Stainless-Steel Forgings
AASHTO M31	Deformed and Plain Carbon and Low-Alloy Steel Bars for Concrete Reinforcement
AASHTO M32	Steel Wire, Plain, for Concrete Reinforcement
AASHTO M55	Steel Welded Wire, Plain, for Concrete Reinforcement
AASHTO M54	Deformed Steel Bar Mats for Concrete Reinforcement

PART 2 – PRODUCT

2.1 Furnish all new material meeting the following requirements.

A. Bar Reinforcement

1. Furnish deformed reinforcement steel meeting ASTM A615, (AASHTO M31) or ASTM A705, Grade 60. Use only epoxy-coated reinforcement steel supplied by a CRSI certified epoxy-coated reinforcement steel manufacturer.

B. Wire and Wire Mesh

1. Furnish wire meeting cold-drawn steel wire AASHTO M32 (ASTM A82) requirements.

2. Furnish wire mesh for concrete reinforcement meeting AASHTO M 55 (ASTMA A 185).

3. Furnish bar mats meeting AASHTO M54 (ASTM A 184).

PART 3 – EXECUTION

3.1 PROTECTION

A. Protect steel reinforcement from damage at all times. Place steel free from dirt, detrimental scale, paint, oil and other foreign substance. Clean steel reinforcement having easily removed rust, loose scale, and dust using an approved method.

3.2 FABRICATION

A. Furnish four copies of shop details and placing drawings for all reinforcing steel to the Engineer for approval. Once checked, the Engineer will return two marked- up sets of prints or drawings for correction. The Engineer's review is only for general conformity with the plans. Checking the detailed dimensions is the Contractor's responsibility. The Engineer's review does not relieve the Contractor's responsibility to furnish all material meeting the Contract requirements. Detail Reinforcing, steel meeting the ACI "Standard Details and Detailing of Concrete Structures" and the "Manual of Engineering and Placing Drawings for Reinforced Concrete Structures" published by the American Concrete Institute (ACI 315).

B. Assure all bars are bent cold. Do not field bend any bar partially imbedded in concrete except as specified on the plans.

C. Ship bar reinforcement in standard bundles, tagged and marked meeting the "Details and Detailing of Concrete Structures" (ACI 315) requirements.

D. Concrete reinforcement and accessory details, not covered herein or on the drawings, must meet "Details and Detailing of Concrete Structures" and the "Manual of Engineering and Placing Drawings for Reinforced Concrete Structures" (ACI 315 and 315R) requirements.

3.3 PLACING AND FASTENING

A. Accurately place and hold firm all steel reinforcement in the plan locations, or as directed by Engineer, as concrete is being placed. Thrusting dowels into freshly poured concrete is prohibited.

B. Support and fasten together all reinforcement to prevent displacement due to construction loads. It is permissible to use on ground, where necessary, concrete support blocks having a minimum 4 square inches (2580 MM2) bearing area and having a compressive strength equal to the concrete being placed. Use approved bar chairs and spacers over form work. For concrete surfaces exposed to the weather in the finished structure, assure the portions of all accessories within ½-inch (12.7 mm) of the concrete surface are noncorrosive or protected against corrosion.

C. Overlap welded wire fabric for successive mats or rolls providing an overlap measured between outermost cross wires of each fabric sheet not less than the greatest spacing of the cross wires plus 2 inches (50 mm) but not less than 6 inches (150 mm), whichever is greater. Extend the fabric across supporting beams and walls to within 4 inches (100 mm) of concrete edges. It may extend through contraction joints. Adequately support the fabric during concrete placement to maintain its position in the slab using the methods previously described or by laying the fabric on a concrete layer of the required depth before placing the upper slab layer.

D. Offset vertical bars in columns at least one bar diameter at lap splices. Furnish templates for all column dowels.

E. Obtain Engineer approval for all splices not shown on the plans. Mechanical connectors for reinforcing bars may be used if approved.

F. Do not use pebbles, pieces of broken stone, concrete rubble, broken brick or building blocks, metal pipe, or wooden block to position the fabric.

G. Follow the minimum concrete protective covering for reinforcement below, unless noted otherwise on the drawings.

1. Concrete deposited against ground: 76.2 mm (3 inches)

2. Formed surfaces exposed to weather or in contact with the ground:

    a. #6 bars or larger 50.8 mm (2 inches)

    b. Smaller than #6 bars 38.1 mm (1-1/2 inches)

3. Interior Surfaces:

    a. Beams, girders and columns 38.1 mm (1-1/2 inches)

    b. Slabs, walls and joists:

        1) #11 bars or smaller 19.05 mm (3/4-inch)

        2) #14 and #18 bars 38.1 mm (1-1/2 inches)

H. For corrosive atmospheres or fire protection, see special provisions for minimum covering requirements.

I. Obtain Engineer approval of reinforcement placement before placing concrete. Remove and replace concrete placed without Engineer approval of reinforcing.

J. Straighten fabric reinforcement shipped in rolls into flat sheets before placing it.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Measurement and Payment: No payment for Reinforcing Steel. It shall be considered incidental and included in the unit price for Concrete Driveway and Sidewalk.

END OF SECTION

SECTION 03310 – STRUCTURAL CONCRETE

PART 1 – GENERAL

1.1 SUMMARY

A. Work shall consist of ready-mixed and precast structural concrete meeting all specified requirements that is composed of Portland cement, aggregates, water, and admixtures as specified. Furnish ready-mixed concrete meeting ASTM C94 unless otherwise specified.

B. All work not specifically described in this technical specification of this bid document shall be performed in compliance with the applicable technical specification sections found in the current version of Montana Public Works Standard Specifications (MPWSS).

1.2 REFERENCES

ASTM C-94	Standard Specification for Ready-Mixed Concrete
ASTM C-150	Specification for Portland Cement
ASTM C-618	Specification for Coal Flyash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C-989	Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM C-595	Specification for Blended Hydraulic Cements
ASTM C-157	Performance Specification for Hydraulic Cements
ASTM C-33	Specification for Concrete Aggregates
ASTM C-260	Specification for Air-Entraining Admixtures for Concrete
ASTM C-494	Specification for Chemical Admixtures for Concrete
ASTM C-1017	Specification for Chemical Admixtures for Use in producing Flowing Concrete
ASTM C-138	Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C-173	Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C-231	Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C-31	Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C-39	Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C-172	Practice for Sampling Freshly Mixed Concrete
ACI 301	Standard Specification for Structural Concrete for Buildings
ACI 305	Hot Weather Concrete
ACI 306	Cold Weather Concrete

ACI 318 Building Code Requirements for Reinforced Concrete

1.3 QUALITY ASSURANCE

A. Codes and Standards: The codes and standards referred to in this section are declared to be part of this specification as if fully set forth herein. In addition, the following ACI Standards are incorporated in their entirety, unless specifically required otherwise:

1. ACI Standard 301, "Specifications for Structural Concrete for Buildings," American Concrete Institute, Edition.

2. ACI Standard 318, "Building Code Requirements for Reinforced Concrete", American Concrete Institute, current edition.

3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".

4. International Building Code of I.C.B.O.

B. Concrete Testing: The Contractor shall employ at his expense a testing laboratory acceptable to the Engineer to perform material evaluation tests and/or perform the mix design prior to placing any concrete. Retesting or additional testing of concrete or materials failing to meet the requirements of these specifications shall be done by the Contractor at no additional cost to the

1.4 SUBMITTALS

A. Source Submittals

1. Complete concrete mix design meeting all specification requirements. Meet the mix proportions specified in ACI 301. Submittals will include the following:

Mix Proportions	
- cement in lbs	Type and source of supply
- coarse aggregate	Size and source of supply
- fine aggregate	Source of supply
- water, gallons	City or well
- admixtures	Brand and description

B. Material Submittals

1. Specific gravity (bulk s.s.d. Basis) of coarse and fine aggregate and 1% absorption coarse aggregate unit weight (dry-rodded)-ASTM C33 quality tests including the following:

a. Fine Aggregate

1) gradation AASHTO, T27 and T11 deleterious substances soundness (AASHTO T104) organic impurities (AASHTO T21) mortar-making properties (AASHTO T71)

b. Coarse Aggregate

1) Deleterious substances gradation (AASHTO T27 and T11) soundness (AASHTO T104) percentage of wear (AASHTO T96)

c. Current chemical analysis of mixing water (if well)

d. Current cement and fly ash mill analysis

2. Concrete Mix Data

a. Slump (First Truck of Each Day)

b. % air content (First Truck of Each Day)

c. Unit weight

d. 7 day and 28-day compressive strength (Every 50 CY)

3. Variations

a. The following variations will be cause for a new mix design

1) Change of aggregate source

2) Change of cement source

3) Addition or exclusion of certain admixtures including, but not limited to, pozzolans, accelerators, retarders and water reducers

4) Change in aggregate size

5) Change in type of cement

6) Failure to attain the strength requirements as outlined in ACI 301 or ASTM C94

b. A variation in any of the following will require informing the Engineer and Owner.

1) Change of cement supplier

2) Change of admixture brands or dosages (not types)

3) Minor adjustments of aggregate proportions accompanying material changes to accommodate placement conditions (same w/c ratio)

C. Certification of Ready Mixed Concrete Production Facilities

1. Concrete producers are to allow access to their facilities by Engineer or the Owner representatives for inspecting their facilities and/or sampling materials. All facilities should meet the requirements of the "National Ready-Mix Concrete Association" check list for concrete production facilities.

2. Items directly affecting a facility's ability to properly proportion, transport and deliver concrete may be reason for disqualifying that facility as a source of supply until such deficiencies are corrected. Examples would include cement and aggregate scales that will not accurately weigh materials or mixer units that will not thoroughly mix concrete materials.

PART 2 – PRODUCT

2.1 CLASSIFICATION

A. Concrete is classified as set forth by aggregates size referenced in ASTM C33, sizes 4 and 467 for Class C concrete and 56, 57, and 6 for Class M concrete. Place the specified class of concrete for each structure element as specified.

1. Use M-4500 (f'c=4,500 psi) concrete. The maximum allowable water cement (w/c) for this concrete is 0.45.

A. If concrete strength or durability requirements established by design exceed the above strength classifications, the Engineer may specify additional concrete classifications to meet those requirements, contractor shall verify this on the structural general notes found in the Drawings.

2.2 COMPOSITION OF CONCRETE

B. Upon receipt of the notice of award of the contract, furnish the Engineer with names of suppliers and locations of sources of materials proposed for use.

2. Materials

a. Cementitious Material: Cementitious material consists of Portland cement meeting ASTM C 150, with or without the addition of cementitious or pozzolanic mineral admixtures meeting, ASTM C618 or ASTM C989, or blended hydraulic cement meeting ASTM C595 or hydraulic cement meeting ASTM 1157. Unless otherwise specified, assure cementitious

material meets ASTM C 150 Type I or Type II. Assure cementitious material used in concrete is the same brand and type and from the same plant of manufacture as the cementitious material used in the concrete represented by the submitted field test date or used in the trial mixtures.

b. Aggregates: Assure aggregates meet ASTM C33.When a single size or a combination of two or more sizes of coarse aggregates are used, assure the final gradation meets the grading requirements of ASTM C33. Obtain concrete aggregates from the same source and use the same size ranges as the aggregates used in the concrete represented by submitted historical data, or used in trial mixtures.

c. Water and Ice: Use concrete mixing water and water to make ice meeting requirements of ASTM C94.

d. Admixtures: Use admixtures meeting the following requirements:

1) Air entraining, admixtures - ASTM C260

2) Chemical admixtures - ASTM C494

3) Chemical admixtures for use in producing flowing concrete - ASTM C1017

4) Calcium Chloride - ASTM D98

5) Use admixtures in the concrete that are the same as those used in the concrete represented by submitted field test data or in trial mixtures.

3. Change of Materials

a. When brand, type, size, or source of cementitious materials, aggregates, water, ice or admixtures are requested to be changed, submit new field data or data from new trial mixtures or furnish evidence that indicates that the change will not adversely affect the relevant properties of the concrete for acceptance before using the concrete.

B. Performance and Design Requirements

1. Assure the cementitious material content is adequate to meet the specified requirements for strength, water-cement ratio and finishing requirements. For concrete used in floors, assure the cement content is at least that indicated in Table 1. For concrete exposed to freezing and thawing or concrete exposed to deicers, assure a maximum water-cement ration of 0.45.

Table 1. Minimum Cement Content Requirements

Nominal Maximum Size of Aggregate (in)	Minimum Cement Content lb/yd^3
1 ½	470*
1	520
¾	540
3/8	641

* Minimum cement content is 520 lb/yd^3 and maximum H2O/cement ratio of 0.45 if concrete will be exposed to freezing and thawing and/or in the presence of deicing chemicals.

2. Furnish concrete at the point of delivery having a slump of 4 inches (max) determined by ASTM C 143.Meet slump tolerances in ACI 117. When a plasticizing admixture is used meeting ASTM C 10 17 or when a Type F or G high range water reducing admixture meeting ASTM C494 is approved to increase the concrete slump, assure the concrete has a slump of 2 to 4 inches before the admixture is added and a maximum slump of 8 inches at the point of delivery after the admixture is added.

3. Assure the nominal maximum size of coarse aggregate does not exceed three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sided of forms or one-third of the thickness of slabs or toppings.

4. Concrete must be air entrained. Measure air content under ASTM C 138, C 173 or C231. Unless otherwise specified, ASTM C231 shall be used.

Table 2. Total Air Content of Concrete for Various Sizes of Course Aggregate

Nominal Maximum Size of Aggregate (in)	Total Air Content %
Less than 3/8	9
3/8	7.5
½	7
¾	6
1	6
1 ½	5.5
2	5
3	4.5
6	4

a. When admixtures are specified in the Contract Documents for particular parts of the Work, use type specified. Use of calcium chloride is not allowed.

b. When the average of the highest and lowest temperature during the period from midnight to midnight is expected to drop below 40°F for more than three successive days, deliver concrete in accordance with ASTM C-94.

2.3 PROPORTIONING AND DESIGN OF MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. If trial batch method used, use an independent testing facility acceptable to the Engineer for preparing and reporting proposed mix designs.

B. Submit written reports of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed and approved.

PART 3 – EXECUTION

3.1 CONCRETE MIXES

A. Job-Site Mixing: Mix materials for concrete in appropriate drum type batch match mixer. For mixers of 1 cu. yd., or small capacity, continue mixing at least 1-½ minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than one cu. yd., increase minimum 1-½ minutes of mixing time by 2.5 minutes for each additional cu. yd., or fraction thereof. Aggregates or bags of cement containing lumps or crusts shall not be used.

B. Provide batch ticket in compliance with ASTM C94 for each batch discharged and used in work.

C. When air temperature is between 85°F and 90°F, reduce mixing and delivery time from 1-½ hours to 75 minutes, and when air temperature is above 90°F, reduce mixing and delivery time to 60 minutes, unless a hot weather concreting plan has been approved.

D. The mix may be designed for delayed set time to allow for long haul or other project conditions. Information pertaining to the delayed set admixture needs to be included on the Batch Ticket. Include with the mix design submittal information on the delayed set provisions of the design and specific time to final placement requirements.

3.2 MIXING

A. Thoroughly mix concrete to assure a uniform distribution of the materials throughout the mass. Mix concrete only in quantities required for immediate use and place it within the time limits specified. Waste all concrete which initial set has begun. Retempering of concrete is prohibited. Mix concrete in an approved truck mixer meeting the requirements of ASTM C94 herein.

1. WATER:

a. Do not exceed the approved w/c ratio.

b. The addition of water is allowed only one time and a minimum of 30 revolutions at mixing speed are required before discharge of concrete.

c. Do not add water if part of the batch has been discharged as a w/c ratio has not been determined.

d. Do not add water if the slump is within the specified range.

2. ADMIXTURE

a. Do not exceed manufacturer's recommended dosage rates unless approved in the mix design stage.

b. Only admixtures included in the approved mix design may be dosed on-site.

c. A minimum of 30 revolutions at mixing speed are required before discharging concrete.

d. Do not add admixtures if any concrete has been discharged from the mixer other than the minimal amount for initial testing.

e. When measured plastic air content or slump exceeds the upper test limit and there is time available within the discharge time limit specified, rotate the load at agitation speed and re-test the air content and/or slump

f. Do not use admixtures to reduce the air content and/or slump.

B. The capacity of the plant and the transportation equipment must ensure delivery at a rate that will permit proper handling, placement and finishing at the point of delivery. Maintain the concrete delivery rate to provide for the continuous operation of placing, handling and finishing concrete as is practical. Maintain the interval between delivery of loads so that layers or lifts of concrete in place do not harden before succeeding layers or lifts are placed. In general, no lift or layer of concrete can remain exposed for more than 20 minutes before being covered by fresh concrete.

C. The volume of mixed concrete in the mixing drum shall not exceed the manufacturer's rating on the capacity plate.

D. A recording water metering device is always required at the primary point in the batching operation.

E. Do not add water to concrete in transit. Water may be introduced into the mixer at the job site, one time only, at the discretion of the Engineer, if the specified water-cement ratio is not exceeded. Water must be added in accordance with ASTM C94, assuring that the drum revolves continuously after introduction of the cement and water until the concrete is discharged.

F. Begin mixing immediately after introduction of the cement and water and continue for at least 70 revolutions of the drum at mixing speed. This minimum revolution count will be waived when the concrete is produced at a central mixing plant. Not more than 100 drum revolutions can exceed 6 revolutions per minute. All other revolutions must be at agitating speed of not less than 2 or more than 6 revolutions per minute.

G. Provide a revolution counter on each truck that registers the number of revolutions of the drum.

3.3 PLACING CONCRETE

A. Thoroughly consolidate concrete into its final position. Assure it is thoroughly consolidated around fittings and embedded items. Assure all reinforcement and embedded items are accurately placed as shown on the plans and are clean and free from coatings of dried mortar, detrimental rust, scale, oil or foreign matter. Place concrete meeting the applicable requirements of Sections 02529.

3.4 CURING CONCRETE

A. Protect freshly placed concrete from freezing, high temperature, large temperature differentials, premature drying, excessive moisture, and moisture loss for a period of time necessary to develop the desired concrete properties.

B. Thoroughly cure concrete surfaces by covering as soon as possible with canvas, plastic sheets with sealed joints, burlap and sand or other satisfactory materials and keep concrete moist. If the concrete surfaces are not covered, keep them moist by flushing or sprinkling. Continue curing for at least 7 days after placing the concrete. Concrete surfaces placed against forms may be cured by leaving the forms in place for at least 7 days, when approved.

C. Protect concrete against freezing or other conditions detrimental to strength development meeting the applicable requirements of this specification.

D. To aid finishing, side forms on ornamental work, curbs and sidewalks, railing and parapets may be removed after 12 hours, not to exceed 48 hours, depending on weather conditions. Continue moist curing during the concrete finishing operation.

E. Untreated forms and existing concrete must be kept continuously wet for at least 1 hour before any concrete is placed. Keep wet until covered with concrete except

that adequately treated forms must be thoroughly washed with a water spray immediately before placing the concrete.

F. The curing of concrete, by either water curing or membrane curing, must be as follows unless otherwise approved by the Engineer.

1. Water Curing

a. Keep all concrete top surfaces continuously moist after finishing, with a fine water spray, until the concrete has set. Cover the moist concrete with water or an approved curing covering.

b. Cure concrete deck slabs and concrete floors for at least 7 days. Cure by placing burlap, cotton mats or other absorptive material as close behind the finishing operation as possible without marring the finished surface. Keep the absorptive material continuously moist for the full time it is used. The absorptive material may be kept in place for the entire curing period or it may be removed as soon as practical and the entire surface covered with approximately 1-1/2 inches (38.1 mm) of sand, kept continuously moist for the entire curing period.

c. Remove forms and repair surface irregularities without interfering with any of the curing requirements. As soon as the vertical forms have been removed and the surface irregularities repaired, cover the concrete with absorptive material, kept continuously wet for the balance of the curing period.

2. Impervious Membrane Curing

a. Assure membrane curing compounds are delivered to the job in the manufacturer’s original container, clearly labeled to show the name of the manufacturer and the contents. The clear curing compound must be sufficiently transparent and free from permanent color that would change the color of the natural concrete. Use clear compound containing a fugitive dye having color sufficient to render the film visible on the concrete for at least 4 hours after application. The concrete surface must maintain its natural color after curing.

b. Use a compound ready for use as shipped by the manufacturer. Dilute following the manufacturer's recommendations. Use curing compound only with written approval. Sampling will not be required if manufacturer's certification is available. Apply the curing compound under pressure with a spray nozzle to cover the entire exposed surface thoroughly and completely with a uniform film not exceeding manufacturer's specifications. Maintain the required pressure in the spray machine to force the material to leave the nozzle in a fine mist. Keep all concrete surfaces moist with a fine water

spray or with wetted burlap until the sealing compound is applied. Keep the curing compound application close to the finishers of the top surface of concrete at all times. Seal the concrete immediately after the finishing operations have been completed, to the satisfaction of the Engineer.

c. If it is necessary to allow workers or equipment on the surface before the 7-day curing period is completed, protect the concrete from damage and maintain the curing environment.

d. Keep concrete, which has not completed its curing period, continuously moist during the stripping and surface repair operations. Remove all surface irregularities, repair all depressions, voids or holes, including those formed by trapped air, to the satisfaction of the Engineer. Immediately apply the curing compound before the surface has had an opportunity to dry out. Keep concrete, from which forms have been stripped, continuously moist until surface repair and finishing are completed and the impervious membrane curing has been applied.

3.5 WEATHER AND NIGHT LIMITATIONS

A. General

1. Stop concreting operations when darkness prevents obtaining the specified placing and finishing work. Night operations may be conducted with written approval and when approved artificial lighting is provided.

2. Cold weather concreting is governed by ACI 306.1 unless otherwise specified herein. Cold weather exists when the ambient air temperature has fallen, or is expected to fall below 40°F during the protections and curing period. The protection and curing period is defined as the time required to prevent concrete from being affected by exposure to cold weather.

3. When cold weather conditions are expected, all concreting operations will be suspended unless authorized by the Engineer. Contractor may receive authorization from concrete placement in cold weather by submitting a cold weather concreting plan for review and approval. The plan shall include detailed procedures to protect the fresh concrete from freezing during placement and maintaining the concrete surface temperature at a minimum of 55°F during the curing period.

4. Assume all risk of placing concrete in cold weather. Placing concrete during cold weather does not relieve the Contractor of the responsibility for obtaining the specified results. Remove and replace all concrete injured by frost at Contractor expense.

5. Before any concrete is placed, remove all ice, snow and frost completely from the formwork receiving the concrete. The subgrade must be frost free and above freezing before any concrete can be placed. Increase the temperature of formwork, reinforcement, subgrade, and base gravel to a minimum of 35°F.

6. Protection of Concrete

    a. Unless otherwise approved, Maintain the surface temperature of the concrete in place between 55° F and 75° F for a minimum of 7 days using approved heating devices or enclosures during the protection and cure period. The minimum 7-day protection and cure period is intended only to protect the concrete from the effects of cold. A longer protection period may be needed for the concrete to gain additional strength to support the loads it will experience when in service. Contractor may, bearing all expenses, field cure concrete test cylinders with the in-place concrete and discontinue protection and curing when the field test cylinders reach 3500 psi. Contractor shall monitor the concrete temperature daily throughout the protection and cure period and make adjustments as needed to maintain the temperature between 55° F and 75° F. Forms shall be kept in place for the duration of the protection and cure period. When the protection and cure period has ended reduce the heat gradually so the concrete surface temperature does not decrease faster than 15° per hour until the concrete temperature is the same as the outside temperature. Modifications may be allowed if approved by Engineer and in conformance with ACI 306.1.

    b. A Contractor may, at their expense, determine the in-place strength of the concrete using appropriate test methods and discontinue protection when those test methods indicate the concrete has reached 3500 psi.

3.6 TESTING

A. All concrete quality assurance testing must be performed by an ACI Grade I certified testing technician. Unless otherwise specified, the Engineer shall be responsible for all quality assurance testing during the on-site placement of the concrete.

1. Materials

    a. The Engineer or their representative must have access to the ready mix production facility for sampling constituent materials during production to assure the materials meet these specifications and represent those stated on the approved mix design.

2. Standard Slump Tests

a. The Engineer shall, during each day’s placement, check the consistency of the concrete by slump test. A slump test will also be made each time that strength specimens are made. Slump tests are performed meeting ASTM C143 "Method of Test for the Slump of Portland Cement Concrete".

3. Air Content Tests

   a. The Engineer shall during each strength test, check the air content by either the "Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method" (ASTM C231), "Method of Test for Air Content of Freshly Mixed Concrete by the Volumetric Method" (ASTM C173) or "Method of Test for Unit Weight, Yield and Air Content (Gravimetric) of Concrete" (ASTM C138).

4. Compressive Strength Tests

   a. A minimum of three specimens, 6 inch (150 mm) in diameter or 4 inch (100 mm), shall be made and tested for every concrete placement. Mold and test one set of test cylinders for every 100 yards (76.5 cubic meters) of concrete or fraction thereof placed each day. On a given project, if the total volume of concrete is such that frequency of testing required above would generate less than 5 strength tests for a given class of concrete, make tests from at least 5 randomly selected batches or from each batch if fewer than 5 batches are used. Cure these cylinders under laboratory conditions except that additional test cylinders cured entirely under field conditions may be required by the Engineer to check the adequacy of curing and protection of the concrete.

   b. Take samples for strength tests in accordance with ASTM C172.

   c. Mold test cylinders and laboratory-cure in accordance with ASTM C31. Test cylinders in accordance with ASTM C39, entitled " "Method of Test for Compressive Strength of Cylindrical Concrete Specimens", ASTM C39, using an independent testing laboratory, as approved by the Engineer.

   d. Of each of the 3 cylinders take for a pour, test 1 for information strength at 7 days and test 2 for acceptance strength at 28 days. To meet this specification, average strength of two cylinders from the same sample, tested at 28 days or the specified earlier age, is required for each strength test. Strength level of an individual class of concrete is considered satisfactory if both of the following requirements are met:

      1) The average of all sets of 3 consecutive tests equal or exceed the specified strength.

2) No individual strength test (average of two cylinders) falls below specified strength by more than 500 psi (3400 kPa).

e. Cure field cured cylinders under field conditions meeting Section 7.4 of "Method of Making and Curing Concrete Test Specimens in the Field" (ASTM C31).

f. Mold field cured test cylinders at the same time and from the same samples as laboratory cured test cylinders. Improve procedures for protecting and curing concrete when strength of field cured cylinders at the test age designated for measuring specified strength is less than 85 percent of that of companion laboratory cured cylinders. When laboratory cured cylinder strengths are appreciably higher than the specified strength, field cured cylinder strengths need not exceed the specified strength by more than 500 psi (3400 kPa) even though the 85 percent criterion is met.

g. The strengths of any specimens cured on the job are to indicate the adequacy of protection and curing of the concrete and may be used to determine when the forms may be stripped, shoring removed or the structure placed in service. When the strengths of the job cured specimens are below those specified above, the Contractor must improve the procedures for protecting and curing the concrete.

h. When concrete fails to meet the requirements above or when tests of field cured cylinders indicate deficiencies in protection and curing, the Owner's representative may order tests on the hardened concrete under Chapter 17.3 of ACI-301-84 or order load tests in Chapter 20 of the ACI Building Code (ACI 318-83) for that portion of the structure where the questionable concrete has been placed. In the event the load or core tests indicate that the structure is unsatisfactory, make all modifications as directed by the Engineer to make the structure sound. If the load or core tests indicate the concrete is satisfactory, all cost of testing shall be paid by Owner.

5. Temperature

a. Test hourly when air temperature is 40°F (4°C) and below, and when 80°F (27°C) and above; and each time a set of compression test specimens is made.

3.7 Reinforcing Steel

A. Support and fasten together all reinforcement to prevent displacement due to construction loads. It is permissible to use on ground, where necessary, concrete

support blocks having a minimum 4 square inches (2580 MM2) bearing area and having a compressive strength equal to the concrete being placed. Use approved bar chairs and spacers over form work. For concrete surfaces exposed to the weather in the finished structure, assure the portions of all accessories within ½-inch (12.7 mm) of the concrete surface are noncorrosive or protected against corrosion.

B. Overlap welded wire fabric for successive mats or rolls providing an overlap measured between outermost cross wires of each fabric sheet not less than the greatest spacing of the cross wires plus 2 inches (50 mm) but not less than 6 inches (150 mm), whichever is greater. Extend the fabric across supporting beams and walls to within 4 inches (100 mm) of concrete edges. It may extend through contraction joints. Adequately support the fabric during concrete placement to maintain its position in the slab using the methods previously described or by laying the fabric on a concrete layer of the required depth before placing the upper slab layer.

C. Offset vertical bars in columns at least one bar diameter at lap splices. Furnish templates for all column dowels.

D. Obtain Engineer approval for all splices not shown on the plans. Mechanical connectors for reinforcing bars may be used if approved.

E. Do not use pebbles, pieces of broken stone, concrete rubble, broken brick or building blocks, metal pipe, or wooden block to position the fabric.

F. Follow the minimum concrete protective covering for reinforcement below, unless noted otherwise on the drawings.

1. Concrete deposited against ground: 76.2 mm (3 inches)

2. Formed surfaces exposed to weather or in contact with the ground:

    a. #6 bars or larger 50.8 mm (2 inches)

    b. Smaller than #6 bars 38.1 mm (1-1/2 inches)

3. Interior Surfaces:

    a. Beams, girders and columns 38.1 mm (1-1/2 inches)

    b. Slabs, walls and joists:

        1) #11 bars or smaller 19.05 mm (3/4-inch)

        2) #14 and #18 bars 38.1 mm (1-1/2 inches)

H. For corrosive atmospheres or fire protection, see special provisions for minimum covering requirements.

I. Obtain Engineer approval of reinforcement placement before placing concrete. Remove and replace concrete placed without Engineer approval of reinforcing.

J. Straighten fabric reinforcement shipped in rolls into flat sheets before placing it.

PART 4 - MEASUREMENT AND PAYMENT

MEASUREMENT AND PAYMENT

A. Measurement and Payment: No payment for Structural Concrete. It shall be considered incidental and included in the unit price for Concrete Driveway and Sidewalk.

END OF SECTION

SPECIAL PROVISION 01 – PREFABRICATED STRUCTURES (2-ROOM CABIN) INSTALLATION

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements and guidelines for the installation of prefabricated lodging units.

1.2 RELATED SECTIONS

A. Division 01 Section “Summary” for work restrictions and Section 015000 Temporary Activities and Controls.

1.3 SUBMITTALS

A. Prior to installing prefabricated cabin, the Owner must approve the foundation for placement of cabin. The Contractor shall provide the Owner 2 days’ notice for approval of the pad.

B. Submit manufacturer’s information under General Conditions Section 3.12.

C. Product Data

1. Manufacturer’s data sheet or information for product to be used
2. Preparation instructions and recommendations
3. Handling requirements
4. Installation method

D. Shop Drawings: Include details of materials, construction, and finish.

E. Certificates: Product certificates signed by the manufacturer certifying material compliance with specified performance characteristics and criteria and physical requirements.

F. Permits: State Building Permit.

G. Warranty: Warranty documents.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum 3 years documented experience.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.

C. Adherence to applicable State and local codes: Contractor shall be responsible for all State building permits, any special engineering calculations or architectural drawings required. Owner will be responsible for any local code or regulation requirements.

1.5 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference approximately two weeks before scheduled delivery of prefabricated lodging unit or any alternative approved by the Owner. Attendees shall include at a minimum, Tongue River State Park Manager, Owner, Contractor, and any other trades involved. This is in addition to the Pre-Construction conference convened by the Owner prior to the start of all work on the site.

1.6 DELIVERY STORAGE AND HANDLING

A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

1.7 PROJECT CONDITIONS

A. Do not install product under environmental conditions outside the manufacturer's limits.

1.8 WARRANTY

A. Provide the Manufacturer's standard limited warranty, which at a minimum shall comply with General Conditions 1.5.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Prairie Kraft Specialties, LLC 1500 51st Street S, Great Falls, MT 59405. Contact: Bethany Benedict, 406-727-3192. Website: https://www.pkscabins.com/

B. Substitutions: Other manufacturers permitted provided the product meets the same specifications otherwise known as "or-equal". Requests for substitution will be considered only during the pre-bid phase with prior approval, in accordance with General Conditions 3.4.2.

2.2 PREFABRICATED WOOD STRUCTURES

A. Basis of Design: Prefabricated and preassembled wood cabins supplied by Prairie Kraft Specialties, LLC.

   1. Cabins shall have a minimum of two rooms with an interior door between rooms. Cabin dimensions shall be 14’-0” X 16’-7” plus a 6’-0” front porch. Interior side walls shall be a minimum 5’-6” from floor decking to ceiling decking. Ceiling shall be a minimum 9’-71/2” from floor decking to ridge beam.

B. Construction: Tongue and groove, machined solid wood log “D-log” walls providing a rounded log look on the exterior and flat vertical walls on the interior of the building. Predrilled for electrical. All wood to be kiln dried. Skids to be pressure treated wood. Ceiling decking shall be bevel-sided tongue and groove, solid wood.

C. Building Sealant: Wall logs caulked with a 35-year siliconized acrylic latex-caulk.

D. Paints and Stains: Exterior walls, gables, fascia, soffit, rails and posts to be stained with an exterior, all-season, semi-transparent 10-yr wood stain for logs. Exterior wood porch to be coated with water based polyurethane floor finish. Interior walls, ceiling and furnishings to be coated with water based polyurethane wood finish.

E. Windows and Glazing: Minimum of three (3) vinyl insulated slider-operating windows. Front windows to utilize tempered Low-E glass. Rear window to be sized to meet egress requirements. Trim to be pre-stained.

F. Roof: Roof to be gable style. Roof to meet R-19 insulation value Roofing to be minimum 26-gauge metal, prefinished, with delta rib profile. Color choice by Owner.

G. Electric: Building shall be pre-wired for standard 15A service plug in each cabin.

H. Interior Flooring: Flooring shall be smooth finished, fir or larch tongue and groove wood flooring.

I. Door: Prefinished wood exterior door with deadbolt lock.

J. Porch: Exterior wood porch flooring shall be top-radiused decking with ¼” gap for drainage. Posts and rails to be peeled lodgepole pine or fir.

K. Furnishings Package:

   1. Three (3) beds to include 2 – twin sized log bunk bed with two (2) 5” memory foam mattresses and 1-log double bed with 8” memory foam mattress. Mattresses to be covered with antimicrobial material.
   2. 2- Wood wall table, 3-wood wall bench, and 2-wood chair.

3. 1- Ready to hang log porch swing.
4. 3- Clothes hooks/hangers

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify rough-in of required electrical services prior to placement of the structure.

B. Verify structure meets required specifications prior to placement.

C. Verify access is appropriate for truck, trailer and/or equipment to be utilized to deliver the structure.

3.2 PREPARATION

A. Prepare gravel pad for structure, per dimensions shown in plans.

B. Submit plan to Architect/Owner for phasing of structure placement, if more than one.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions, approved submittals and in proper relationship with adjacent construction.

B. Place structure on prepared gravel pad as described in the project plans.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.

3.5 CLEANING AND PROTECTION

A. Clean products in accordance with manufacturer's recommendations

B. Protect installed products until completion of project.

C. Touch-up, repair or replace damaged products before Project Completion.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Measurement: Measurement shall be per Each Cabin.

4.2 PAYMENT

A. Payment: Payment shall be at the contract unit price bid per Each Cabin as listed in the Proposal. Payment shall include delivery, setting and securing of the structure, final restoration, and all labor, materials, and incidental required to complete the item in place.

B. Alternative 1 Payment: Payment shall be at the contract unit price bid per Each Cabin as listed in the Proposal. Payment shall include delivery, setting and securing of the structure, final restoration, and all labor, materials, and incidental required to complete the item in place.

END SECTION

SPECIAL PROVISION 02- SEALED (VAULT) PIT PRIVY INSTALLATION

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes requirements and guidelines for the preparation work and installation of precast sealed (vault) pit privy.

B. “Aspen” vault model is used for reference. Due to product availability, an approved equal is required.

1.2 SUBMITTALS

A. Submit manufacturer’s information under General Conditions Section 3.12.

B. Product Data shall be submitted to the Owner and the Engineer for approval.

1. Manufacturer’s data sheet or information for product to be used.
2. Preparation instructions and recommendations
3. Handling requirements
4. Installation method

C. Shop Drawings: Include details of materials, construction, and finish.

D. Certificates: Product certificates signed by the manufacturer certifying material compliance with specified performance characteristics and criteria and physical requirements.

E. Warranty: Warranty documents.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum 3 years documented experience.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.

C. Adherence to applicable State and local codes: Manufacturer shall be

responsible for all State building permits, any special engineering calculations or architectural drawings required. Owner will be responsible for any local code or regulation requirements.

1.4 PRE-INSTALLATION CONFERENCE

A. Convene a pre-installation conference approximately two weeks before scheduled delivery of prefabricated sealed (vault) pit privy. Attendees shall include at a minimum, Tongue River State Park Manager, Owner, Contractor, and any other trades involved. This is in addition to the Pre-Construction conference convened by the Owner prior to the start of all work on the site.

1.5 DELIVERY STORAGE AND HANDLING

A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

1.6 PROJECT CONDITIONS

A. Do not install product under environmental conditions outside the manufacturer's limits.

1.7 WARRANTY

A. Provide the Manufacturer's standard limited warranty, which at a minimum shall comply with General Conditions 1.5.

PART 2 – PRODUCTS

2.1.1 PRE-CAST SEALED (VAULT) PIT PRIVY

A. Referenced Manufacturer: "Aspen" Single Vault Toilet by Missoula Concrete 8012 Deschamps Ln, Missoula, MT 59808.

B. Approved Manufacturer: Manufacturers will be permitted provided the product meets the same specifications otherwise known as "or-equal". Manufacturer will be considered during the bidding phase, in accordance with General Conditions 3.4.2

2.2 MATERIALS

A. Bedding material to be sand or 3/8" minus crushed or screened aggregate.

B. Sealant between vault and toilet floor to be 1.5" x 1.5" Butyl Rubber Sealant.

C. Refer to Manufacturer’s Specifications for full list of materials.

PART 3 – EXECUTION

3.1 LOCATION AND ACCESS TO SITE

A. The area must be free of overhead or underground obstructions.

B. Care must be taken to not place excavated material in the area where the equipment to install the precast concrete vault toilet will sit.

C. Verify that bridges/culverts enroute to the site are rated for HS-20 loading.

D. Deliveries may be delayed if road conditions are hazardous or unsuitable for normal trucks and trailers.

E. Trucks must be able to reach the site under their own power.

3.2 EXCAVATION

A. Comply with all applicable OSHA Standards for excavation

B. Aspen single vault toilet requires a hole that is 8’ x 16’ x 4’-9”.

C. Finish floor elevation will be 4-6” above natural grade measured at the front (entrance) of the exterior slab unless otherwise approved by the Owner. The Contractor will install buildings at these sites with the floor elevation within +/- 0.05-feet of the specified floor elevation.

D. Installation of vault toilet must provide drainage away from the structure according to Manufacturer's specifications.

3.3 BEDDING AND COMPACTION

A. Bedding will compose of natural ground at the bottom of the vault excavation with compaction conforming to Manufacturer’s specifications.

B. Compacted with a minimum of two passes with a whacker-type mechanical compactor or equivalent approved by the Owner.

C. Spread excess excavated material from the vault around structure. Intended final grade is flush with the top of the front slab. Allow for placement of topsoil to reach grade. Grade backfill away from structure at maximum slope of 5 (five) percent

unless otherwise approved by the Owner.

3.4 FINISH GRADING

A. Excess excavated material will be spread around the structure. Grade backfill away from structure at a maximum slope of 5 (five) percent unless otherwise approved by Owner.

PART 4 – MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Measurement: Measurement shall be per Each Sealed (Vault) Pit Privy.

4.2 Payment

A. Payment: Payment shall be at the contract unit price bid per Sealed (Vault) Pit Privy as listed in the Proposal. Payment shall include excavating, bedding and compaction, setting and securing of the structure, final restoration, and all labor, materials, and incidental required to complete the item in place.

END SECTION