

DAM TECHNICAL SPECIFICATIONS

1. GENERAL REQUIREMENTS:

1A. SCOPE OF WORK

1A.1 INTENT OF CONTRACT

The intent of the contract is to provide for the construction and completion of the work described. The contractor shall furnish all labor, materials, equipment, tools, transportation and supplies required to complete the work in accordance with the plans, specifications and terms of the contract.

All work shall be in accordance with the lines, grades, typical cross sections, dimensions and other data shown on the plans or as modified by written orders of the engineer, and all other work determined by the engineer as necessary for the proper execution and completion of the project.

1A.2 PLANS AND SPECIFICATIONS

The plans, specifications and other contract documents govern the work. The contract documents are intended to be complementary and cooperative and to describe and provide for a complete project. Anything in the specifications and not on the plans, or visa versa, shall be as though shown or mentioned in both. Reference specifications and standard plans are a part of the contract documents.

The contractor shall, upon discovering any error or omission in the plans or specifications, immediately call it to the attention of the engineer.

1A.3 SHOP DRAWINGS

When shop drawings are required by the engineer, they shall be prepared at contractor's expense in accordance with current engineering practices. Drawings shall show sufficient detail to determine project suitability and be transmitted to the engineer by letter for approval or correction prior to construction or fabrication.

Approval of drawings by the engineer shall not relieve the contractor from the responsibility for errors or omissions in the shop drawings or from deviations from the contract documents unless such deviations were specifically called to the attention of the engineer in the letter of transmittal submitted with the drawings. The contractor is responsible for the correctness of the drawings, for shop fits and field connections, and for the results obtained by use of such drawings.

1A.4 CHANGES IN THE WORK

Changes in the plans or specifications, or in specified methods of construction may be made when approved in writing by the engineer, owner and the contractor. Change orders shall be issued by the engineer and state the dollar value of the change(s); or establish an equitable method of payment, and any adjustments in contract time. Changes in plans or specifications also require the signature of the Director of the Water Resources Department of Oregon.

1A.5 CHANGED CONDITIONS

The contractor shall notify the engineer in writing of the following work site conditions, hereinafter called changed conditions, promptly upon their discovery and before they are disturbed:

- a. Subsurface or latent physical conditions differing materially from those represented in the contract documents.
 - b. Unknown physical conditions of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in work of the character being performed.
- The engineer will promptly investigate conditions which appear to be "changed conditions", then adjustments in the project will be issued by the engineer and change order(s) issued as necessary to complete the work. If the engineer's determination is that "changed conditions" do not exist as defined above and that no additional compensation is justified, the engineer shall so notify the contractor and owner in writing.

1B. CONTROL OF WORK

1B.1 AUTHORITY OF THE ENGINEER

Subject to such authority as is delegated by the owner, the engineer will decide all questions which may arise as to the quantity, quality and acceptability of materials furnished and work performed; the rate of progress of the work; change orders and time extensions; interpretation of the plans and specifications; the measurement of quantities; and the acceptable fulfillment of the contract on the part of the contractor. The engineer's estimates and decisions in these matters shall be final, binding and conclusive upon all parties to the contract.

It is further understood that all work to be done under the contract will not be considered completed until it has passed final inspection by the engineer and is accepted by the owner. It is further understood that the authority of the engineer is such that the contractor shall at all times carry out and fulfill the instructions and directions of the engineer insofar as they concern the work to be done under the contract.

Upon failure on the part of the contractor to comply with any order made under the provisions of this subsection, the engineer shall have the authority to cause unacceptable work to be remedied or removed and replaced, and unauthorized work to be removed, and to deduct the costs thereof from any monies due the contractor.

The engineer has the authority to suspend the work for failure of the contractor to correct conditions unsafe for the workers, the general public, or the owner's employees or representatives; for failure to carry out the provisions of the contract; for failure to carry out orders; all for such periods as the engineer may deem necessary due to conditions considered unsuitable for the performance of the work or for any reason deemed to be in the public interest.

During any suspension of the work the contractor shall be responsible for the care of the work performed and take every precaution to prevent any damage or deterioration of the work including temporary protection devices to warn, safeguard, and protect the public. The contractor shall be responsible for damage to the work that may occur during the suspension(s) of the work the same as though the damage had occurred while the work was in progress.

Approval by the engineer signifies favorable opinion and qualified consent; it does not carry with it certification, nor assurance of completeness nor assurance of quality nor assurance of accuracy concerning details, dimensions and quantities. Such approval will not relieve the contractor from responsibility for errors, for improper fabrication, for nonconformance to requirements or for deficiencies within his control.

1B.2 RESPONSIBILITY OF THE CONTRACTOR

The contractor shall do all the work and furnish all labor, materials, equipment, tools and machines necessary for the performance and completion of the project in accordance with the contract documents within the specified time.

Material and construction details of plants, forms, shoring, falsework and other structures built by the contractor, but not a part of the permanent project, shall meet the approval of the engineer, but such approval shall not relieve the contractor from responsibility for their safety and sufficiency.

The contractor shall be responsible for all expense involved in making any required changes in the plans or specifications to accommodate a substitution approved by the engineer for the convenience of the contractor or to circumvent an unforeseen difficulty in obtaining a specified article.

1B.3 SURVEY SERVICE

The contractor shall give notice to the engineer not less than two working days in advance of when survey services will be required in connection with the laying out of any portion of the work.

The owner will furnish and set construction stakes establishing lines and grades as determined necessary by the engineer for all work under the contract and will furnish the contractor all the necessary information relative to the lines and grades.

The contractor shall not disturb permanent survey monuments, stakes, or bench marks without the consent of the engineer, and shall notify the engineer and bear the expense of replacing any that may be disturbed without permission. Replacement shall be done by a registered land surveyor at no expense to the owner.

1B.4 TEMPORARY UTILITIES

The contractor shall furnish temporary light, power and water complete with connecting piping, wiring, lamps and similar equipment necessary for the work as approved. The contractor shall install, maintain, and remove temporary services upon completion of the work and shall obtain all permits and bear all costs for temporary services at no expense to the owner.

1B.5 SUBSURFACE DATA

All information obtained by the engineer regarding subsurface data and groundwater elevations will be available for inspection at the office of the engineer upon request. Such information is offered and supplementary information only. Neither the engineer nor the owner assumes any responsibility for the completeness or interpretation of such supplementary information.

1B.6 FINAL ACCEPTANCE

At such time as all construction work on the project is complete and all required documents have been submitted, the contractor shall advise the engineer in writing that the project is substantially complete. The engineer will inspect the project and review all final submittals from the contractor within 14 days upon receipt of notice.

If, in the opinion of the engineer, the project is complete and conforms to the letter and intent of the contract documents, and all submittals prove to be complete and timely, the engineer will consider that as the final inspection and certify final payment to the contractor.

If any work is found unsatisfactory, or that all certificates and final submittals have not been made, or have been improperly made, then the engineer will issue directive(s) to the contractor for final completion requirements. The contractor, upon completion of all items in the final 'punchlist', shall again notify the engineer that the project is complete and request a final inspection. The engineer will then make the final inspection and certify final payment to the contractor provided that all items are, in fact, completed.

If the contractor has incomplete construction items or submittals after the second inspection by the engineer, a second 'punchlist' will be issued to the contractor and the cost of the engineer's time and expense in reviewing for final completion at that time will be billed to the contractor and arrangements made with the owner to deduct such costs from the contractor's final payment. Engineering costs for 'so called' third final inspections will be at normal office rates for engineer's time and reimbursable expenditures encountered in the execution of the inspection. Final completion and acceptance of the project is based upon the engineer's satisfaction that all contract requirements have been met.

1C. CONTROL OF MATERIALS

1C.1 QUALITY OF MATERIALS

The contractor shall use only new materials, parts, products and equipment in the work which conform to the specified requirements. The contractor shall determine the kind of work, amount of work and other factors that may be necessary or involved in furnishing the specified products or materials. Materials and products which, after approval, have become unsuitable or unacceptable for use, regardless of cause, will be rejected by the engineer and shall not be used.

1C.2 SAMPLING AND TESTING

Tests of materials will be made by the owner in accordance with the methods described or designated in the applicable specifications and at any time during the production, fabrication, preparation and use of the materials. When tests of materials are necessary, as determined by the engineer, such tests will be made by the owner at his expense unless otherwise specified.

In the event the owner requests tests and materials fail, the contractor shall bear all costs for all subsequent testing necessary to meet the specified requirements.

1C.3 STORAGE AND PROTECTION OF MATERIALS

Materials shall be stored so as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work.

1C.4 TRADE NAMES, APPROVED EQUALS OR SUBSTITUTES

In order to establish a basis of quality, certain processes, types of machinery and equipment, or kinds of materials may be specified either by description or process or by designating a manufacturer by name and referring to that brand or product designation or by specifying a kind of material. It is not the intent of the specifications to exclude other processes, equipment or materials of equal value, utility or merit.

If it is desirable to furnish items of equipment by manufacturers other than those specified, as a substitution after the contract is executed, the contractor shall secure approval prior to purchase.

2. CLEARING:

2A. CUTTING

Trees and other woody vegetations shall be so cut that the remaining stumps extend no higher than 12 inches above the ground.

2B. MARKING

The limits of the area to be cleared shall be marked by a suitable method. Trees to be left standing shall be designated by special markings.

2C. CLEARING

All trees not marked for preservation and all snags, logs, brush, shrubs, and rubbish shall be cleared from within the limits of the marked area.

2D. DISPOSAL

All materials cleared from the designated areas shall be burned, buried, or piled at locations approved by the engineer, or otherwise removed from the site, all in compliance with federal, state, and local laws and ordinances.

3. EXCAVATION:

3A. BORROW PITS

All materials required for construction of the embankment that are not available from required excavation shall be taken from borrow pits. The proposed locations and extent of borrow pits are shown on the plan. Borrow pits shall be carefully stripped of all surface soil, vegetation, roots, brush, sod and other objectionable material. This material shall not be used in any part of the fill. All materials wasted by stripping shall be disposed of as directed by the engineer.

3B. EMBANKMENT FOUNDATION

The dam foundation shall be stripped or excavated to the depth shown on the drawings to remove all surface soil, vegetation, roots, brush, sod and other material not suitable for foundations. All materials wasted by stripping shall be disposed of as directed by the engineer. Before fill is placed, the foundation and abutment areas shall have their surfaces in a loose and scored condition by plowing or discing to depths of 3 to 4 inches to provide a good bond between the foundation and the embankment. Loose earth shall not be left on the foundation area to a depth in excess of 6 inches above approved, undisturbed foundation material. This loose bonding surface shall contain adequate moisture for proper compaction when fill material is placed on it. No foundations or abutments shall be covered by material of the dam until the engineer has inspected and approved the same.

3C. CUTOFF TRENCH

An artificial barrier or cutoff to prevent leakage through or under the base of the dam shall be constructed as shown on the drawings. This barrier will consist of a cutoff trench backfilled with selected impervious material, properly compacted. The trench shall extend the full length of the dam. It shall be excavated to impervious material or to such depths that will prevent excessive seepage as shown on the drawings. Trench shall be dewatered before any fill material is placed. No fill material shall be placed until the trench excavation has been inspected and approved by the engineer.

3D. SPILLWAY

Excavate spillway channel at location shown and to lines and grades as shown on the drawings and as staked in the field. Material excavated from the spillway may be used in the main embankment, if approved suitable by the engineer. Unsuitable material is to be disposed of. Confine excavation to neat lines and grades as shown on the drawings. Over excavation to be filled and tamped to provide a degree of compaction equal to the adjacent undisturbed earth.

3E. STRUCTURE EXCAVATION

Excavation for structures shall be to lines and grades shown on the drawings and as staked in the field. Excavation for anti-seep collars to be confined to neat lines and grades so that the bottom and sides of the excavation are suitable for pouring against native material. No concrete shall be poured prior to inspection and approval of the engineer.

4. OUTLET CONDUIT:

Construct outlet conduit as shown on the drawings. Outlet conduit pipe must conform to the applicable requirements of ASTM specifications.

Pipe to be 16 gauge close-ribbed corrugated metal pipe, asphalt coated inside and outside, 18 inch diameter as shown.

Pipe joints made watertight by use of watertight rod and lug type couplings having a minimum width of 24 inches. Field welding of joints is prohibited.

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5. VEGETATED SPILLWAY:

Seeding: Permanent vegetation shall be established on designated areas of the spillway as shown on the drawings. Refer to specification 7 for erosion control.

6. EARTH EMBANKMENT:

6A FOUNDATION PREPARATION

The foundation for the earth fill shall be so prepared by leveling and rolling that the surface materials of the foundation will be as compact and well bonded with the first layer of fill as herein specified for the subsequent layers of earth fill.

6B QUALITY OF MATERIALS

The earth fill portion of the dam, including the fill around the outlet conduit and in the cutoff trenches, shall consist of soil material, approved by the engineer, from borrow areas as shown and from excavations required for other parts of the work. No brush, roots, sod, or other perishable or compressible debris shall be placed in the embankment. No stones having maximum dimensions of more than five (5) inches shall be placed in the embankment; any such stones shall be removed before rolling.

6C PLACEMENT OF MATERIALS

Fill material shall be placed in the embankment in the following manner:

a. The approved mixture of materials shall be placed in continuous rows, windrows, or spread layers in a direction parallel to the main axis or centerline of the dam. Rows or windrows shall be spread before compaction is started. Spread layers shall not be more than 8 inches in thickness before compaction.

b. An acceptable working range of moisture content shall be established by the engineer for each type of fill material prior to start of construction, and no material shall be placed in the embankment which does not have a moisture content within its specified working range. Moisture control to be determined from laboratory report or from density tests performed in the field.

c. The distribution of materials shall be such that the embankment will be free from lenses, pockets, streaks, or layers differing appreciably in textures from the surrounding material.

d. The fill material shall be compacted by means of a tamping roller of such weight that the materials will be compacted to the densities specified herein.

e. The first course of fill material shall be spread over the foundation in a thin layer such that the combined thickness of this layer and the scarified surface of the foundation shall not exceed 8 inches before compaction.

f. If the roller surface of any lift becomes too smooth for proper bond, it shall be adequately scarified before placement of the next lift.

6D MOISTURE CONTROL

The abutments, the surface of the fill, and the materials being placed shall be maintained at the proper moisture content during the placement operations and shall be controlled in the following manner:

a. If the foundation and/or abutments have insufficient moisture, water shall be added by sprinkling.

b. The application of water to the fill materials shall be accomplished by irrigation of the borrow areas.

c. Any material or surface which has dried to below the required moisture content shall be uniformly moistened by sprinkling before the material is compacted or before a dried surface is covered by additional fill material.

d. Material having a moisture content higher than that specified by the engineer shall be removed from the fill or allowed to dry to an acceptable condition before being compacted.

e. Adjustment of moisture content will be made on the basis of determinations of moisture content made by the engineer or inspector as construction progresses.

6E COMPACTION CONTROL

a. Fill material shall be compacted to at least 95% of the maximum density obtained in compaction tests of the fill materials performed by Method A, ASTM D-698. The moisture content of the fill material shall not vary more than plus/or/minus 2% of the optimum moisture content.

b. The types and kinds of equipment shall be furnished and operated to compact the fill materials in the specified manner or to the specified density.

c. Compaction may be made by a sheepfoot tamping roller, a pneumatic tired roller, a smooth wheel vibrating roller, or by routing the hauling and spreading equipment over all portions of the embankment. The types and weights of the equipment used shall be approved by the engineer before construction begins.

d. Compaction equipment shall traverse the entire surface of each layer or lift of material the number of times required to achieve compaction.

e. Adjacent to structures, compaction of fill shall be by means of hand tamping, or manually directed power tampers or plate vibrators. Heavy equipment, except vibrating rollers, shall not be operated within 2 feet of any structure. Vibrating rollers shall not be operated within 5 feet of any structure.

f. The passage of heavy equipment over any conduit shall not be permitted for 14 days after placement of the conduit except as approved by the engineer. At least 2 feet of hand compacted fill shall be placed over any conduit or cutoff collar before heavy equipment is permitted to cross.

The rate of placement of fill material will be adjusted as required on the basis of determinations of fill density, in place, made by the engineer as construction progresses.

7. EROSION CONTROL AND SLOPE PROTECTION:

7A SLOPE PROTECTION

Slopes shall be protected as directed by the engineer and in any event the filled portions of the dam proper and those portions of the spillway where shown shall be protected under erosion control. If, in the judgment of the engineer, riprap is required in any area, it shall consist of well graded, sound, dense, and durable rock and grades as directed by the engineer. Filter material for placement under riprap shall consist of a well graded sand and gravel mixture.

Riprap and filter material shall be placed where directed by the engineer and to the specified depths. Rocks shall be installed in one operation to full thickness without serious damage to subgrade. Place larger rocks uniformly and firmly in contact with one another so that smaller rock and spalls fill the voids between larger rocks. Placement shall be done in a manner to protect all structures.

7B EROSION CONTROL

a. Seedbed Preparation. Seedbed preparation shall be prepared on all areas to be protected by vegetation, where low fertility soils are exposed, topsoil shall be used as needed.

b. Seeding mixtures. Approved grasses or grains shall be seeded early enough in the year to assure the development of good protective growth before storm runoff begins.

Minimum Seeding Rate/Pounds Per Acre
Nordan Crested Wheatgrass = 16 lbs./A
Siberian Wheatgrass = 16 lbs./A

c. Method of seeding. Seedings on all slopes less than 3 to 1 shall be seeded with a grass or grain drill. Seeding shall be made at right angles to the centerline of the spillway section for the bottom and interior slopes of the spillway section. On all other areas, drilling shall be made approximately on the contour.

On slopes steeper than 3 to 1, seedings shall be made by hand or machine broadcasting; and handraked or harrowed to insure that the seeding is mixed or has contact with the surface soil.

Seedings should be made soon after construction is completed. Fall seedings should be made from August 20 to September 30. Spring seedings may be made from April 1 to May 15 if there is ample moisture near the soil surface and the seedbed is firm.

d. Fertilizer. Apply 500 lbs. per acre of 16-20-0 commercial fertilizer or its equivalent at seeding time. Fertilize the established stand with at least 200 lbs. of 21-0-0 per acre or equivalent annually or as needed to maintain a uniform vigorous stand.

e. Mulching. Use of mulches shall be designated by the engineer when their use is needed. Mulches needed to protect vegetative seedings during establishment shall be applied at the rate of 2 to 2-1/2 ton of grain straw equivalent crop or plant residues per acre.

f. Irrigation. Irrigation should be where it is needed and practicable.

g. Fencing. Emergency spillway flow sections and vegetative slopes shall be protected from grazing and trampling of livestock by fencing.

8. STRUCTURES:

8A CONCRETE STRUCTURES

8A.1 MATERIALS

Portland Cement: Shall conform to the following type as specified. Type II A: Air-entraining cement for moderate sulfate resistance or moderate heat of hydration.

Aggregates: As required to produce 300 psi concrete compressive strength at 28 day cure and essentially conforming to requirements of Oregon State Highway Department specifications. Maximum aggregate size = 1-1/2 inches.

Admixtures: Air entraining admixture shall conform to requirements of ASTM C260 as directed by engineer. Chlorine content not to exceed 1/2% by weight.

Time of placing and hauling: Concrete transported in a truck mixer shall be discharged at the job and placed in its final position in the forms within 1-1/2 hours after initial mixing with water.

Adverse weather conditions: Concrete placed during hot weather shall be protected as required under A C I 305.

Concrete placed in cold weather shall be protected as required under A C I 306. No concrete shall be poured under 35 degrees F.

Reinforcing Steel: Bars shall be deformed and of billet-steel conforming to ASTM A615, grade 40 unless otherwise specified. Reinforcement shall be accurately placed in position as shown on the plans and firmly secured to prevent distortion or deflection while pouring concrete. Placement shall conform to requirements of chapter 8 of the Manual of Practice, Concrete Reinforcing Steel Institute.

8B MISCELLANEOUS STEEL AND EQUIPMENT

8B.1 MATERIALS: SHOP DRAWINGS REQUIRED FOR ALL MATERIALS THIS SECTION.

Miscellaneous Steel: Materials shall conform to the requirements of the applicable ASTM specification. Dimensions and tolerances shall conform to those published in the Manual of Steel Construction, American Institute of Steel Construction.

Carbon Steel: ASTM spec. A36, A514.
Nuts, Bolts & Washers: ASTM A325, unless otherwise specified.
Steel Pipe Sleeves: ASTM A120, unless otherwise specified.

Equipment: Shall be as manufactured by Armco or as approved equal. Lift gate handwheel and supporting hardware as recommended and detailed in Technical Release #46, "Gated Outlet Apparatuses - Earth Dams by U.S.D.A.", Soil Conservation Service, Engineering Division.

Inlet Lift Gate: Armco #101 with minimum frame, 18" diameter.

Gate Stem: Steel, 1-1/8" diameter.

Handwheel: 14" diameter per details D-9 and D-11; USDA-SCS T.R. #46.

Construction: Fabrication and installation of equipment and miscellaneous steel shall be as detailed on the drawings and as referenced detailed. Adjust equipment for smooth operation.

Provide miscellaneous steel hasps as required to provide locking outlet gates at the weir openings.

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