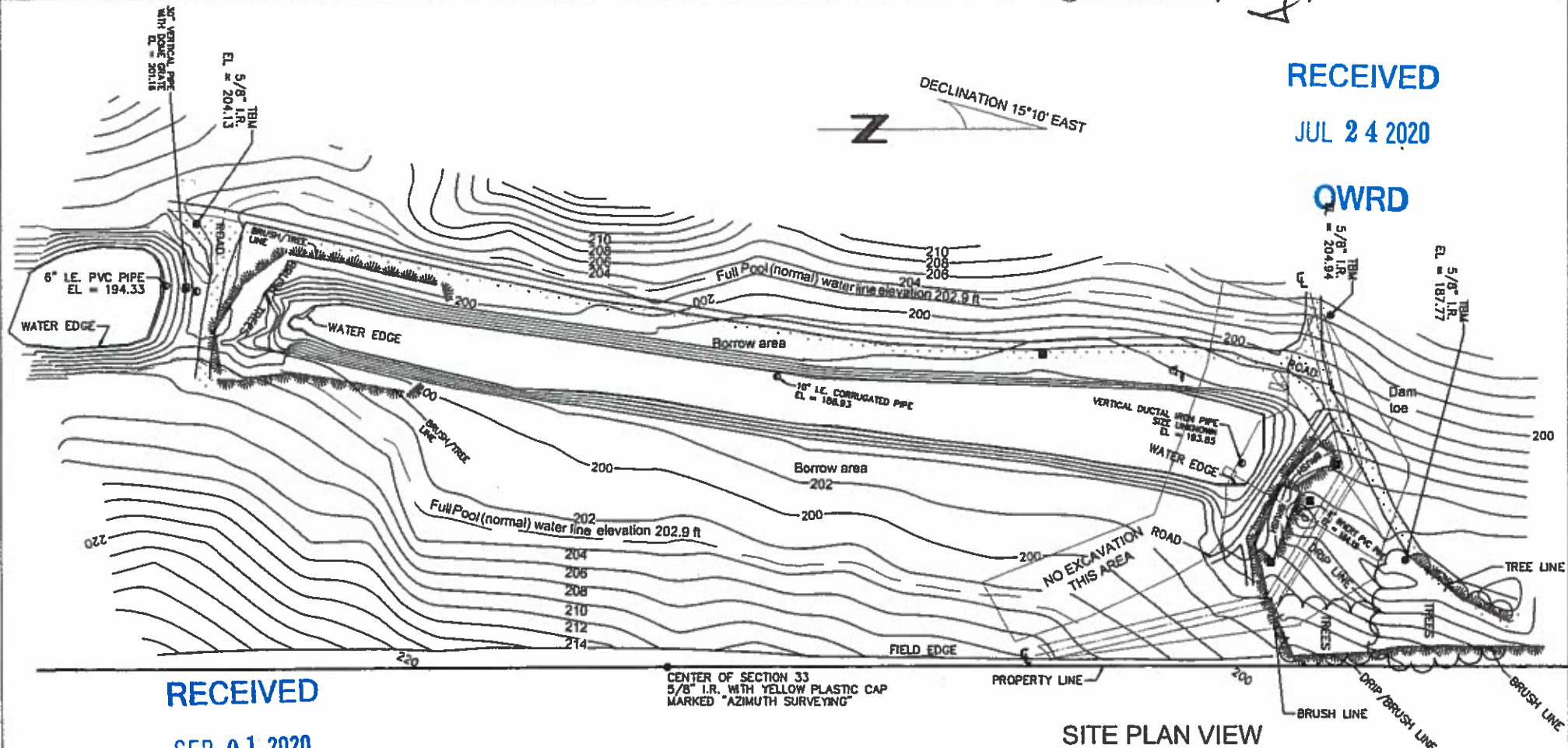


Engineered construction drawings and
Specifications will follow
Leland Hardy, PE

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LEGEND:

- = Found Monument as noted, flush with ground surface and in good condition unless otherwise noted
- = Test Pit
- ⊕ = Transformer
- ⊙ = Pump
- ⊖ = Gate Valve Stem
- I.R. = Iron Rod

NOTES:

1. Contours inside of trees/brush are based on insufficient data and are indicative of general slope only
2. Elevations are based on the ODOT ORGN and are NAVD 88 Datum
3. The contour interval is 2 feet

Constructed top of dam	207.0'
Design top of dam	206.0'
Probable maximum precipitation water surface	204.5'
Design maximum precipitation water surface	204.0'
Full pool (weir crest) water surface	202.9'

*Elevations datum are mean sea level

CONTOUR INTERVAL = 2 FEET

SITE PLAN VIEW

Scale:



EXPIRATION DATE: 6/30/2021

SCHMITZ FARM DAM & RESERVOIR
THOMAS BUCHHOLZ OWNER OPERATOR
SITE PLAN VIEW

CLACKAMAS COUNTY, OREGON
H & R Engineering LLC
SALEM, OREGON

DESIGNED BY: L. Hardy
DRAWN BY: J. Zimel

JULY 2020
Sheet 2 of 12

**CONSTRUCTION SPECIFICATION
FOR
SCHMITZ FARM DAM AND RESERVOIR PROJECT
THOMAS BUCHHOLZ OWNER / OPERATOR**

**OWRD Application R-_____
WOODBURN, OREGON**

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I. SCOPE

The work shall consist of constructing an earth fill embankment and appurtenances to the lines, grades, elevations and dimensions shown on the drawings or as staked in the field for the purpose of constructing a water storage reservoir.

**II. DEFINITIONS AND RELATIONSHIPS
OF PARTIES CONCERNED**

The term "owner" shall refer to the land owner, Thomas Buchholz. The owner is responsible for all expenditures for construction. All items of work to be paid by the owner must have the owner's approval.

It is understood that the owner will execute the drawings and specifications to the best of his ability, and that any changes made as construction progresses will be made with the advice and concurrence of the H & R Engineering, LLC Engineer and prior approval of the Oregon Water Resources Department Dam Safety Engineer as required under State of Oregon Administrative Rules (OAR), 690-20-040.

The term "Engineer" shall refer to the H & R Engineering, LLC Engineer, Leland Hardy, or his authorized representative.

The Engineer acting as a technical advisor for the owner has compiled these drawings and specifications. The Engineer will provide surveys, tests, and technical direction of work so that the job may be constructed as planned. He cannot authorize changes without the owner's approval.

The term OWRD shall be understood to be the Oregon Water Resources Department or their authorized representative.

Schmitz Farm Dam and Reservoir
H & R Engineering, LLC

Under the provisions of Water Laws of Oregon, the OWRD, Dams Safety Division is charged with the examination and approval of sites, drawings and specifications; and inspection of construction to ensure safety of such work with reference to possible damage to life and property.

The current OWRD Dam Safety Engineer is Keith Mills, phone 503-986-0840.

It is further required that all work and materials in association with the construction of the dam and reservoir shall, at all times be subject to the approval of the OWRD and that no change in the drawings or specifications made necessary by the development of unforeseen conditions or otherwise, shall be made without prior approval of the OWRD.

The official Drawings, Specifications and the Construction Summary Worksheet approved by the Oregon Water Resources Department are part of these specifications.

The directions, provisions, and requirements contained herein pertain to the method and manner of performing the work and to the quality of materials to be used.

III. CLEARING AND STRIPPING

The reservoir borrow areas and dam embankment foundation areas shall be cleared of vegetation residue and other organic debris, and shall be stripped to sufficient depth, approximately 8", to remove roots, highly organic soil and all objectionable material.

The limits of the area to be cleared and stripped shall be marked by a suitable method.

All vegetative materials cleared from the designated areas shall be burned, buried, spread on adjacent fields or piled at locations approved by the Engineer or otherwise removed from the site.

Topsoil shall be stockpiled and spread on the completed dam and other disturbed areas to aid the establishment of vegetation.

IV. EXCAVATION

Existing Dam

The existing dam drain conduit, cutoff collars and intake structure, shall be removed and transported off-site to an approved disposal area. Excavation side slopes shall be no steeper than 1:1. Existing dam earth fill can be used as earth fill in the larger dam, if approved by the Engineer.

Borrow Area

All materials required for construction of the embankment that are not available from required excavations, shall be taken from designated borrow areas, located within, and a part of, the proposed reservoir. The proposed extent of borrow excavation shall be carefully stripped of highly organic surface soil and other objectionable material. Top soil from required dam and borrow area stripping will be stockpiled and used on exposed dam and disturbed surfaces to aid the establishment of vegetation.

Embankment Foundation

The dam foundation, including the existing dam, shall be stripped or excavated at least one (1) foot and approved by the Engineer. Embankment foundation excavation shall include: All vegetation, organic materials, highly organic soil, and other material not suitable for foundations. All topsoil materials excavated by stripping shall be stockpiled and spread on exposed surfaces to aid the establishment of vegetation for erosion

control. Before earth fill is placed, the dam foundation and abutment areas shall have their surfaces in a loose and scored condition by plowing or disking to a depth 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. The exposed surface shall have moisture added or shall be compacted if necessary, so that the first layer of fill material can be compacted and bonded to the foundation. The dam foundation shall not be covered by material until the Engineer has inspected and approved the same. Sharp breaks and surfaces shall be sloped no steeper than 1 horizontal to 1 vertical (1:1). The excavated trench bottom width shall be sufficient to accommodate compaction equipment used.

Core Trench

An artificial barrier or cutoff to help prevent leakage through or under the base of the dam shall be constructed as shown on the drawings or as staked in the field. This barrier will consist of a core trench excavation backfilled with selected impervious material and properly compacted. The trench shall extend the full length of the dam. It shall be excavated to such depths that will prevent excessive seepage under the dam and shall have a minimum bottom width of 10 feet. The side slopes of the trench shall not be steeper than ½ :1. Suitable excavated materials shall be placed at locations approved by the Engineer and used in the required embankment. The trench shall be dewatered before any fill material is placed. No fill material shall be placed in the trench until the engineer has inspected and approved the trench.

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"What If" Spillway Notch

A 1 foot deep by 10-foot wide "what if" notch will be constructed around the east end of the dam. Side slopes shall be 5:1 or flatter. "What If" means precipitation runoff events that exceed the calculated Probable Maximum Precipitation (PMP).

Structure Excavation

Excavation for the concrete encased or cradled 10" diameter drain/irrigation pipeline, 36" diameter spillway conduit cradle and inlet weir box structure shall be to the lines and grades shown on the drawings or as staked in the field. A trench for each conduit shall be used and conform to the neat lines and grades so that the bottom and sides become suitable forms for placing concrete slurry.

No concrete shall be placed until the Engineer has inspected and approved the excavation and in-place steel reinforcement bars.

V. 10" DRAIN/IRRIGATION PIPELINE, 10" INLET STRUCTURE, 36" SPILLWAY CONDUIT AND INLET WEIR BOX

Structures

The 10" drain/irrigation pipeline with 10" inlet structure, and 36" spillway conduit with weir box and outlet structure shall be constructed of the materials and to the dimensions shown on the drawings.

Pipe

Pipe used for the 10" drain/irrigation pipeline, and 36" spillway conduit shall conform to applicable specifications and be suitable for the intended purpose.

The drain/irrigation pipeline shall be a 10" diameter, Class 200 PVC plastic pipe with rubber ring bell and spigot joints, encased or cradled with reinforced concrete through the dam, and as shown on the drawings.

Provision shall be made to assure the 10" pipeline does not float and become misaligned during concrete slurry placement.

The pipeline shall conform to ASTM Specification D-1785.

The reinforced concrete cradled 36" diameter spillway conduit shall be high density polyethylene (HDPE) corrugated outside and smooth inside, water tight, bell and spigot with rubber gasket, plastic pipe conforming to ASTM Specification F-667. Rubber gasket joints shall meet requirements of ASTM D-2312.

Pipe shall be installed according to the manufacturer's instructions. Provision shall be made to assure the 36" pipeline does not float and become misaligned during concrete slurry placement. Pipe shall be firmly and uniformly bedded with reinforced concrete throughout their length and shall be installed to the lines and grade shown on the drawings.

Valve

A flange mounted, 10" diameter, stainless steel, resilient seated, knife gate valve with a hand operated hydraulic pump actuator located at or near the top of dam. Ferguson model FNW 6800B10, or equal, valve shall be installed on the inlet end of the drain/irrigation pipeline to control flows to the pump and if the downstream bolted plate is removed, drain the reservoir. The valve shall be installed as part of the 10" conduit inlet structure.

Concrete

Concrete inlet and outlet structures shall be 4000 psi at 28 days.

Concrete encasement and cradle shall be at least 3,000 psi at 28 days.

Cement. To be Type II Portland Cement of a standard commercial brand, free of lumps and partially set masses.

Water. Applied water shall be free of acid, alkali, oils and organic matter. Generally, the quality of water should be suitable for drinking. The temperature of the water

shall not be more than 150 degrees Fahrenheit when added to the mixer.

Aggregate. Aggregates may be of non-commercial sources, providing they are adequately well graded, clean, hard, strong, durable particles, and are sufficiently free of deleterious substances. The aggregate shall be well graded conforming to ASTM C-33 specification and be sufficiently free of deleterious substance when it meets the following limitations.

1. When separated, the weight passing a number 4 standard screen shall not be less than 30 percent nor more than 50 percent of the total. The maximum size of aggregate shall be 1½ inches.
2. Clay lumps do not exceed 1.5 percent.
3. All other deleterious substances do not exceed 5 percent.
4. The aggregates shall be proportional so that the concrete contains approximately 2,000 lbs. of 1½ inch to number 4 (¼") aggregates, and 1,200 lbs. of well graded coarse sand per cubic yard.

Mixing. Mixing shall be continued for at least 1½ minutes after all materials, including water are in the mixer. Each batch shall be completely discharged before the mixer is recharged. Not more than 6½ gallons of water per sack of cement shall be used. This includes surface water in the aggregates. Air entrainment admixtures may be added for improved slurry workability while placing concrete, providing the air content does not exceed 6 percent. Excessive over-mixing requiring the addition of water to preserve the required concrete consistency shall not be permitted.

Truck mixing will be allowed provided that the use of this method does not violate any applicable provisions of these specifications for concrete.

Measurement and Materials. Equipment used for measuring quantities shall be

calibrated so the correct quantity of material measured is known.

Forms. Forms shall conform to the shape, lines and dimensions of the members as called for on the drawings; and shall be substantially and sufficiently tight to prevent leakage of mortar. They shall be properly braced and tied together so as to maintain position and shape while concrete is being placed. A 1" 45° chamfer (bevel) shall be cast at all outside, (exposed) concrete corners

Placing Concrete. Forms shall be wetted or oiled and thoroughly cleaned of debris and ice. Depositing continuously at one point and letting it flow to distant points shall not be allowed. Mechanical vibrators shall be used as directed by the Engineer. The concrete shall be spaded next to pipelines and forms to prevent honey combing and voids under the haunches of the pipeline. Excess water shall be worked to a low point without causing flow, and be removed.

Conduits shall be protected from floatation and misalignment while placing concrete slurry.

Reinforcing Steel. Steel shall be furnished, fabricated and placed as shown on the drawings. All reinforcing bars shall be 60,000 psi, deformed bars of structural steel grade conforming to the requirements of the current ASTM Specification A-615. Before being placed reinforcing steel, shall be thoroughly cleaned of loose mill and rust, scale, oil, dirt, or other coatings that would prevent proper bonding.

Construction Joints. Joints not indicated on the drawings shall be so made and located as to least impair the strength of the structure. Where a joint is to be made, the surface of the concrete shall be thoroughly cleaned, and all laitance removed. In addition to the foregoing, joints shall be thoroughly wetted, but not saturated, and

flushed with a coat of neat cement grout immediately before the placing of new concrete.

Curing. All concrete shall be kept moist for at least seven (7) days by one of the approved methods of curing. Moisture or a membrane seal shall be applied within thirty (30) minutes after placing. All concrete shall be protected against freezing for a period of at least (10) days. This may be reduced to seven (7) days for high-early-strength concrete.

VI. EARTHFILL PLACEMENT

Foundation Preparation

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

Material

The earth fill portion of the dam, including fill around the 10" encased drain/irrigation pipeline, 36" spillway conduit and inlet weir box shall consist of soil materials from the borrow area or from required excavations, approved by the Engineer. Fill materials shall contain no sod, brush, roots, or other perishable or compressible debris. No stones having maximum dimension of more than four inches shall be placed in the embankment. Any non-conforming stones hauled into the embankment shall be removed prior to compaction, and be disposed of or placed in areas designated by the Engineer.

Placement

The approved mixture of soil materials shall be placed in the embankment 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.

Foundation areas shall be kept free of standing water when fill is being placed on them. An acceptable working range of moisture content shall be established by the Engineer for each type of fill material prior to the start of construction, and no material shall be placed in the embankment which does not have the moisture content within the specified working range. Moisture control shall be determined from a laboratory report or from tests performed in the field.

The fill materials shall be compacted by means of a sheepsfoot tamping roller or a hand directed "jumping jack" type power tamper of such size and weight that the materials will be compacted to the density specified in the Construction Summary Worksheet, or by the Engineer as construction progresses. Density of in-place compacted soil materials shall be determined from a laboratory report or density tests performed in the field.

Placing and spreading of fill material shall be started at the lowest point of the foundation. The first course of fill 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. The thickness of subsequent layers shall not exceed 8 inches and shall be such that the required compaction can be obtained with the equipment used. The fill shall be constructed in continuous horizontal layers except where openings or sectionalized fills are required. In those cases, the slope of the bonding surface between the embankment in place and the embankment to be placed shall not be steeper than 3 horizontal to 1 vertical. The bonding surface shall be treated the same as that specified for the foundation so as to insure a good bond with the new fill. If the roller surface of any lift becomes too smooth for proper bond, it shall be

adequately scarified before placement of the next lift.

The distribution of materials shall be such that the embankment will be free from lenses, pockets, streaks, or layers differing appreciably in texture from the surrounding material. If it is necessary to use materials of varying texture and gradation, the more impervious material shall be placed in the water-side parts of the fill.

Selected backfill material shall be placed around structures and pipe conduits at about the same rate on all sides to prevent damage from unequal loading. Fill placed around structures will be brought up at approximately uniform height on all sides of the structure.

Moisture Control

The surface of the fill, and the materials being placed, shall be maintained at the proper moisture content during the placement operations. The moisture content of the fill material shall be adequate for obtaining the required compaction. As far as practicable the material shall be brought up, or dried, to the proper water content in the borrow area before excavation. The application of water to the fill materials shall be accomplished by irrigation of the borrow areas.

If the foundation has insufficient moisture content, water shall be added by sprinkling and then allowed to set approximately 12-hours. Uniform distribution of the moisture shall be obtained by disking, blading or other approved method prior to compaction.

Material that is too wet shall be dried to meet this requirement, or removed, and material that is too dry shall have water added and mixed until the requirement is met.

Adjustments of the moisture content will be made on the determinations of moisture content made by the Engineer during the placement operation. The material should maintain a ball shape when squeezed in the

hand. The moisture shall be maintained within the specified range of percentage points of optimum as determined in the laboratory by ASTM D-698 and specified in the Construction Summary Worksheet.

Compaction Control

Construction equipment shall be operated over each layer of fill to ensure that the required compaction is obtained. Special equipment shall be used if needed to obtain the required compaction. Compaction shall meet the requirements specified on the Construction Summary Worksheet and as described below.

The earth moving contractor is responsible for having Northwest Testing, Inc., Wilsonville, Oregon (phone 503-682-1880) make on-site tests (measurements) to affirm in-place soil densities meet the required 94.0 pounds per cubic foot dry density. It is estimated at least 25 in-place density tests will be required to represent earth fill in the dam core trench and embankment, plus hand compacted earth fill placed adjacent to structures; assuming all measurements meet or exceed required in-place density. The engineer can make or request in-place soil densities at any time.

Immediately following in-place soil density measurements; raw, in-place soil density test results shall be communicated to:

1. The on-site job foreman; and,
2. The engineer

Sheepsfoot Roller. The maximum layer thickness shall be 8 inches before compaction. The roller shall have staggered, uniformly spaced tamping feet and be equipped with suitable cleaners. The weight of the roller shall not be less than 2,500 pounds per foot of width. The maximum speed of the compaction equipment shall be 3 miles per hour. The entire surface of each layer placed should

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receive at least 6 passes of this equipment to attain the necessary compaction.

ASTM D-698, Procedure A shall be used to determine optimum soil moisture for minimum void space and identifying the applicable soil moisture range for compaction. Compaction shall result in densities equal to or greater than 95 percent of the maximum density obtained by laboratory compaction at optimum moisture of like soils in accordance with this procedure.

Heavy compaction equipment shall not be operated within 2 feet of any structure. Vibrating rollers shall not be operated within 5 feet of any structure. Hand directed "jumping jack" type power tampers shall be used on areas not accessible to heavy compaction equipment, and within 2 feet of any structure. Fills compacted in this manner shall be placed in layers not greater than 4 inches in thickness before compaction, and shall meet the same density requirement as for the adjacent area.

Fill not meeting the specified requirements shall be reworked or removed and replaced with acceptable fill.

Fill adjacent to structures and pipe conduits shall be compacted to a density equivalent to that of the surrounding fill by means of hand tamping or manually directed power tampers.

The passage of heavy equipment will not be allowed (1) over any conduits prior to 14 days after placement of the concrete except as approved by the Engineer, or (2) over any type of conduit until the compacted backfill has been placed over the top surface of the structure equal to one-half the clear span width of the structure or pipe, or two feet whichever is greater.

Compaction of backfill adjacent to structures shall not be started until after the expiration of the following minimum time interval after placement of the concrete:

Walls and counterforts 10 days

Conduits 3 days

VII. MISCELLANEOUS STRUCTURAL WORK

Metal Work

All metal parts shall conform to the requirements noted on the drawings. Assembled metal components shall be carefully handled to prevent damage to protective coatings applied at the manufacturing plant.

The 10" diameter 6800B10 knife gate valve shall be installed according to the manufacturer's recommendations and in a manner that will prevent leakage and binding of the gate stem and hydraulic control during operation.

Trask racks for the 36" spillway weir box and 10" inlet structure shall be installed as shown on the drawings or directed by the Engineer. The rack shall be aligned properly with the adjacent structural parts. Bolts shall be securely tightened.

Frames or bracing shall be installed at locations shown on the drawings. Frames shall be carried up true and plumb as required. Temporary bracing shall be placed wherever necessary to resist outside forces. Such bracing shall be left in place as long as necessary for safety. No welding shall be done until as much of the structure as will be stiffened thereby has been properly aligned. All field welding shall be done in conformance to the requirements for shop fabrication.

Painting. Before paint or primer is applied, metal work shall be cleaned of all grease and oil by solvent cleaning. All surface rust, dirt and loose scale shall be removed with a wire brush, steel wool or abrading tool.

Cleaned metal work shall be painted immediately with a primer paint

compounded for metal work. Final coatings shall consist of one or more coats of alkyd gloss enamel or asphalt base paint.

VIII. RIPRAP AND SLOPE PROTECTION

Materials

Riprap materials shall consist of well graded, angular to subangular, dense, durable quarry rock. Rock may contain up to 10% fines, providing there is direct rock to rock contact. A typical rock gradation for rock riprap in the pump inlet pipeline basin would be as follows:

Table 1. – 36" Diameter Spillway Inlet and Outlet Structures

Rock Riprap Gradation

Design %	Range
D ₁₀₀	16" – 24"
D ₇₅	14" – 20"
D ₅₀	12" – 17"
D ₃₀	10" – 14"
D ₁₅	6" – 8"

Filter materials placed under riprap and roadway fill shall consist of well graded coarse sand conforming to Specification ASTM C-33, Fine Aggregate for Concrete. Non-woven 12 ounce per square yard (LINQ275EX or equal) geotextile can also be used.

Well graded 2" to 6" rock riprap 6" thick can be placed on 1) the embankment water side slope and shoreline to help control erosion caused by wave action and a fluctuating water surface elevation, and 2) access road travel ways. Slope and travel way rock riprap may contain up to 20% sand and silt, providing there is direct rock to rock contact.

Use non-woven 12 ounce per square yard (LINQ275EX or equal) geotextile under access road rock.

Well graded 6" to 24" rock riprap 24" thick shall be placed on 1) the 36" inlet structure bench and 36" outlet structure basin to help control erosion caused by water velocities during precipitation runoff periods.

Schmitz Farm Dam and Reservoir
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Subgrade Preparation

The subgrade surfaces for riprap filter aggregates or geotextile shall be shaped to the lines and grade shown on the drawings.

Placing

The riprap and well graded aggregate or geotextile base material shall be placed to the depths specified on the drawings. Riprap rock shall be constructed to the full thickness in one operation and in such a manner as to avoid serious displacement of the underlying materials. Rock shall be delivered and placed in a manner that will ensure that larger rocks are uniformly distributed and firmly in contact with one another, with smaller rock and spalls filling the voids between larger rocks. Riprap shall be placed in a manner that will prevent damage to structures.

IX. VEGETATIVE COVER AND OTHER SURFACE EROSION CONTROL MEASURES

Unless otherwise specified, a protective cover of vegetation shall be established on the disturbed areas not inundated by water stored in the reservoir.

Permanent Vegetation

Seedbed Preparation. A good seedbed shall be prepared on all areas to be protected by vegetation. Where low fertility soils are exposed, topsoil shall be used as needed and a seedbed prepared.

Seeding Mixtures. Approved grasses or grains as shown in Table 2 or as specified on the Construction Summary Worksheet shall be seeded early enough in the year to assure the development of good protective growth before storm runoff begins.

Method of Seeding. Seeding on all slopes less than 3 horizontal to 1 vertical (3:1) shall be seeded with a grass or grain drill.

Seeding direction shall be made approximately on the contour.

On slopes steeper than 3:1, seeding shall be made by hand or machine broadcasting; and hand-raked or harrowed to ensure that the seeding is mixed or has contact with surface soil. Hydro-mulch, seed and fertilizer can also be used.

Table 2. Permanent Vegetation Minimum Drill Seeding Rates – Pounds per Acre^{1/ 2/}

<u>Plant Variety</u>	<u>Pounds per Acre</u>
Creeping Red Fescue	30
Meadow Foxtail	40
Nordan Crested Wheatgrass	16
Siberian Wheatgrass	16
Pubescent Wheatgrass	16
Intermediate Wheatgrass	16

1/ Broadcast seeding rates should be twice the recommended drill rates.

2/ Other grass seed varieties and seeding rates can be proposed, and if appropriate, approved by the Engineer.

Seeding should be made soon after construction is completed and sufficient moisture is available. Seeding can be:

- 1) in early spring - March 10 to April 15,
- 2) when soil temperatures reach 50° F and soils are dry enough to be friable, or
- 3) early fall September 1 to October 15, when soil moisture is adequate. Sprinkler irrigation can be used to provide soil moisture for late summer and early fall seedings.

Fertilizer. Apply 500 lbs. per acre of 16-16-16 commercial fertilizer or its equivalent at seeding time.

Mulching. Use of mulches shall be as designated on the Construction Summary Worksheet.

If used, commercial coir fiber, coconut fiber, and straw mats shall be installed per manufacturer's recommendations. Secure

mats in lace with staples, pins or stakes provided by the manufacturer.

Loose straw mulches needed to protect vegetative seedings during establishment shall be applied at the rate of 2 to 2½ tons of grain straw or equivalent crop or plant residues per surface acre.

Straw or other residues shall be spread uniformly to cover the entire area to be protected. Where specified, the mulches shall be incorporated into the surface soil by disking or by punching with a cultipacking type device.

Loose mulches may be held in place by disking or with secured fiber, plastic or wire mesh netting such as jute mesh, chicken or hog wire.

Temporary Vegetation

Where intermittent or temporary vegetation is needed and can be established until permanent vegetation can be installed, the following are recommended:

Table 3. Temporary Vegetation Minimum Drill Seeding Rates – Pounds per Acre

<u>Plant Variety</u>	<u>Pounds per Acre^{2/}</u>
Annual rye grass	60
Wheat or barley	100

2/ Broadcast seeding rates should be twice the recommended drill rates.

Method of Seeding. A good seedbed should be prepared. Seedings on all slopes less than 3:1 shall be seeded with a grass or grain drill. Seeding shall be made approximately on the contour.

On slopes steeper than 3:1, seedings shall be made by hand or machine broadcasting; and hand-raked or harrowed to ensure that the seed is mixed or has contact with the surface soil.

Seedings should be made soon after construction is completed and sufficient moisture is available. Fall seedings should be made August 20 - September 30. Spring seedings may be made from April 1 to May 15 if there is ample moisture near the soil surface and seedbed is firm. Sprinkler irrigation can be used to provide soil moisture for late summer and early fall seedings.

Fertilizer. Apply 300 pounds of 16-20-0 commercial fertilizer or its equivalent at seeding time.

Mulching. Mulching may not be needed. If needed, use mulch as indicated under permanent seeding.

Irrigation

Sprinkler irrigation can be used for plant establishment as needed.

Other Erosion Control Measures

Mulches can be used for temporary protection instead of temporary vegetation. Two to three tons per acre of hay, straw, wood chips, sawdust or bark dust should be applied evenly. Gravel or small rock can be used on short, flatter than 1½:1 slopes and highly erodible soils to provide temporary protection when designated by the Engineer. Plastic sheeting securely anchored in place may be used in areas of high-water concentrations and erosion potential.

X. CONTROL OF SOIL EROSION, WATER AND AIR POLLUTION

Construction operations shall be done in such a manner that soil erosion, air and water pollution are minimized and held within legal limits. Construction activities shall not be carried out during extended periods of wet weather unless measures are taken to control soil erosion and water pollution. Hauling of all materials, personnel, or equipment to, from, or within the project shall be limited to those access roads or work

areas actually needed, and approved by the owner. Erosion or pollution control or abatement work shall be carried out

concurrently with regular construction activities to ensure that adequate control be in effect when adverse climatic conditions could create pollution or erosion problems. All items listed under this general heading shall be discussed with or approved by the Engineer.

Water Pollution

Soil erosion on construction sites or pollution of live streams, lakes, ponds, irrigation or drainage channels, or other water courses, will be prevented, controlled or reduced to acceptable limits.

Open fully exposed cut slopes, embankment slopes, and borrow areas shall be protected with permanent vegetation as soon as practical after slopes are finished. Vegetation used shall be as specified under Section IX of these specifications. Fully exposed means that the surface will not be covered by impounded waters at any time.

When over winter shutdowns occur, exposed areas will be adequately protected with temporary vegetation or organic mulch. Vegetation or mulching operations will be made as directed in Section IX of these specifications.

Where needed, debris basins to retain sediment produced on the project construction site by storm runoff will be built at locations shown on the drawings and/or as staked in the field.

Chemical pollutants produced as a by-product of project work such as drained lubricating oils, engine and transmission oils, greases, soaps, asphalt, rubber, etc. shall be contained and removed from the site for proper disposal or recycling.

Sanitary facilities, such as chemical toilets, must be placed at a distance sufficient to prevent contamination of any potable water source.

Air Pollution

Fire prevention measures shall be taken to prevent the start of fires or the spread of fires started as a result of project work. Fire breaks or guards shall be constructed at suitable locations.

All permanent, access, or haul roads used during construction shall be sprinkled as needed to fully suppress dust which may be produced by such use.

XI. CONSTRUCTION OPERATIONS

The owner, operator, contractor or other persons will conduct all work and operations in accordance with applicable safety codes for the type of construction being performed with due regards to the safety of all persons and property.

The completed job shall be work-manlike and present a good appearance.

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PROJECT DESCRIPTION

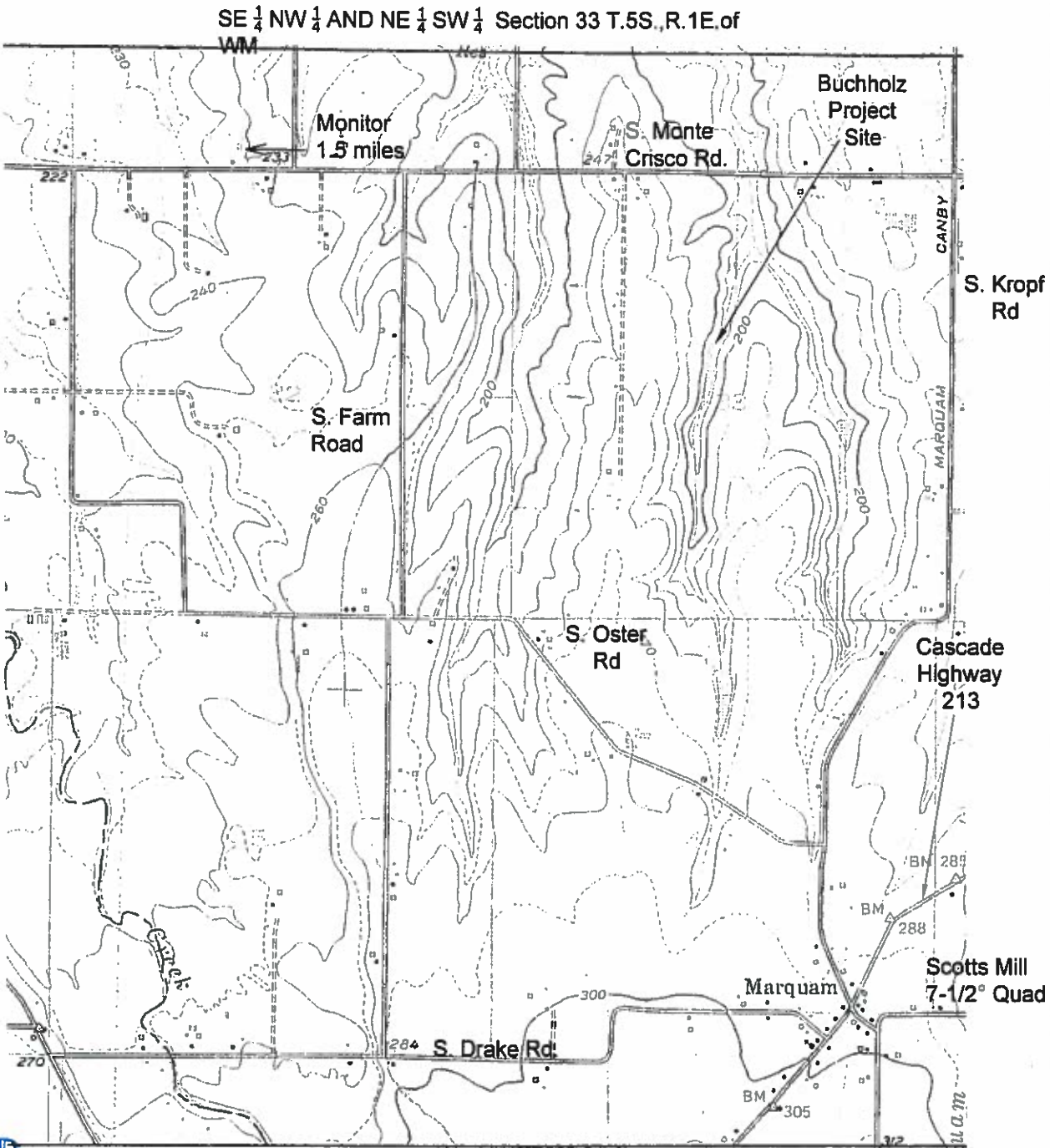
The Buchholz Farm Dam and Irrigation Storage Reservoir Project will replace a 10-foot high earthen dam that stores 8.6 acre feet of water, with a 20-foot high dam that stores 50.0 acre feet. The project consists of constructing a flat "U" shaped earthen dam having a maximum height of 22 feet and a length of 360 feet. The dam will have a 16-foot top width with 3½ to 1 inside and 2½ to 1 outside side slopes and create a 50.0 acre foot reservoir with a surface area of 6.9 acres. A 10-inch diameter PVC pipeline encased in reinforced concrete will be placed through the dam and serve as a supply pipeline for an irrigation pump and also serve as a drain for the reservoir. A 10" diameter stainless steel knife gate will be installed on the inlet. The principal (and emergency) spillway will consist of an 16 foot by 4 foot (inside dimensions) reinforced concrete weir box and a 36 inch diameter, corrugated outside and smooth inside, bell and spigot, watertight, HDPE pipe on a ½ diameter reinforced concrete cradle that will be installed through the dam on the left abutment. An excavated earthen <1% "what if" spillway with a 10-foot bottom width, 100 feet long, will be constructed around the east end of the dam. A 245 foot long chimney style toe drain will be located between dam stations 0+35 to 2+80.

GENERAL NOTES

- The owner is responsible for obtaining and complying with all permits related to the construction and operation of this project.
- No representation as to existence or nonexistence of utilities, public or private is made. It is the responsibility of the contractor to comply with provisions of ORS 757.541 and 757.571 and to determine the location of utilities (1-800-332-2344). Within the project area are buried and above ground electric facilities that provide energy for an irrigation pump. The contractor will be liable for any damage resulting from disruption of service caused by construction activities.
- The owner shall contact H&R Engineering at office: (503) 581-9272 or cell: 503-559-0551, a minimum of two weeks prior to the start of construction to arrange a preconstruction site meeting with the owner and contractor.
- The contractor shall be responsible for on-site construction activities and safety of all personnel during construction. These drawings and associated specifications are not intended to provide means or methods of construction.
- The following items must be documented during construction in order to show the dam and reservoir meet the requirements of the drawings and specifications, and can be approved:
- 1. Contractor provided compaction tests showing the embankment meets compaction requirements.
 - 2. The dimensions of embankment and excavation activities.
 - 3. The dimensions, Invert elevations of the principle (and emergency) spillway, and reservoir drain pipeline.

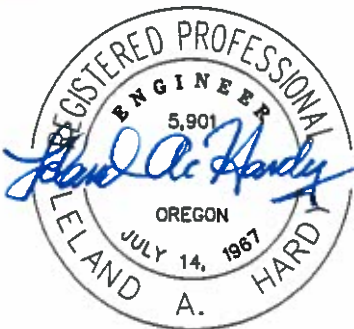
INDEX OF DRAWINGS

Sheet Number	Subject
1.	Project Description, General Notes and Location Map
2.	Dam and Reservoir Site – Plan View
3.	Dam Plan View Details and 36" Inlet Structure Trash Rack
4.	Profile on Centerline of Dam and Area–Capacity Curves
5.	Cross Section of Dam Station 1+50 (Drain Conduit Centerline), Diaphragm and Toe Drain Details
6.	Profile on 36" Diameter Conduit Centerline, 10" Conduit Encasement plus 10" and 36" Conduit Cradle details
7.	36" Conduit Inlet Structure
8.	36" Conduit Outlet Structure and Rock Riprap.
9.	10" Conduit Inlet Structure and Valve, 36" conduit Inlet Structure Rock Riprap Cross Section
10.	36" Conduit Inlet Structure Concrete Reinforcing Steel Details
11.	36" Conduit Outlet Structure Concrete Reinforcing Steel Details
12.	10" Conduit Outlet Tee Assembly



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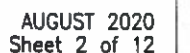
LOCATION MAP
Scale: 1" = 2000'

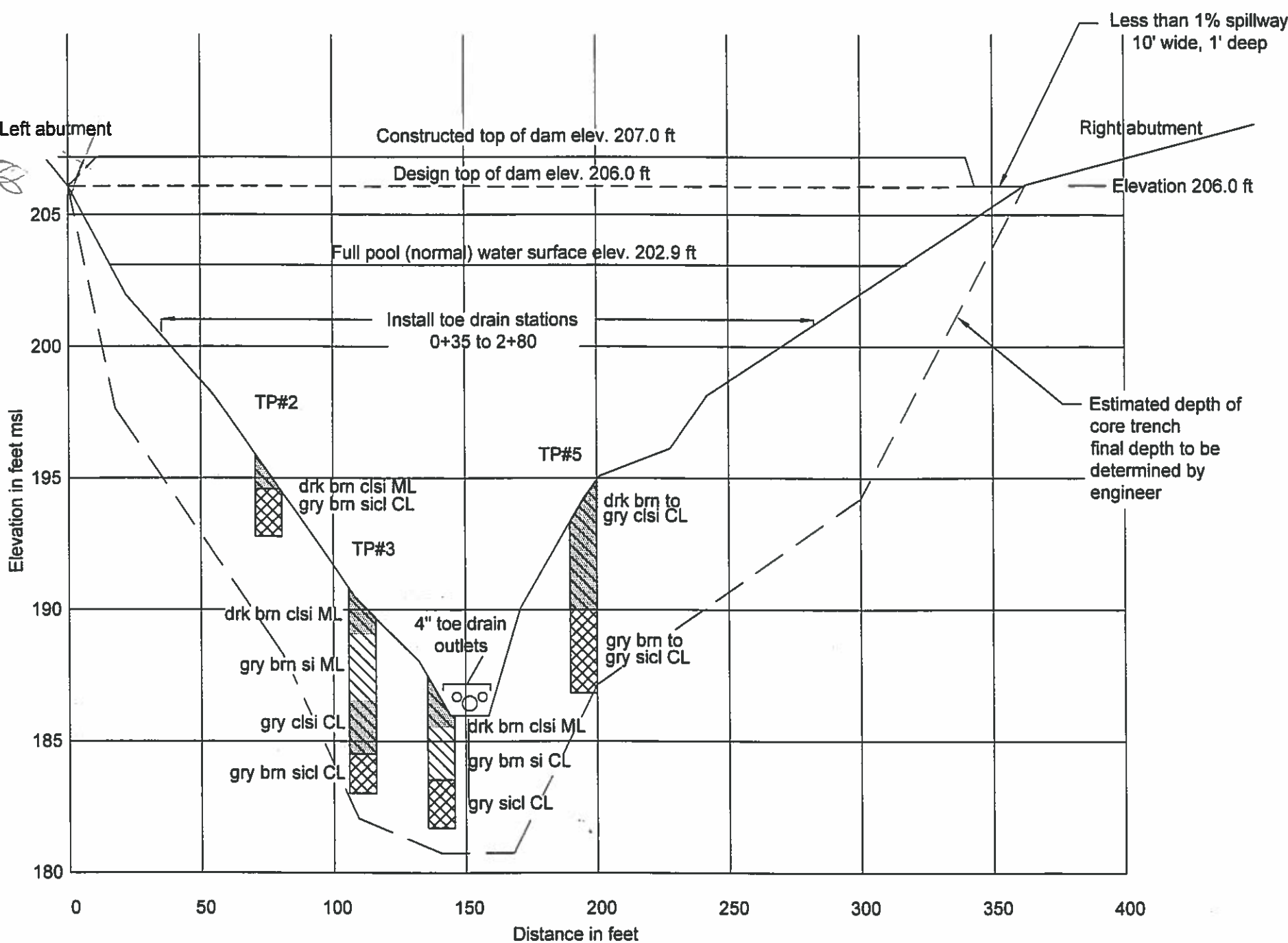


SIGNED: 8/22/2020

SCHMITZ FARM DAM & RESERVOIR
THOMAS BUCHHOLZ OWNER OPERATOR
CLACKAMAS COUNTY, OREGON
H & R Engineering LLC
SALEM, OREGON

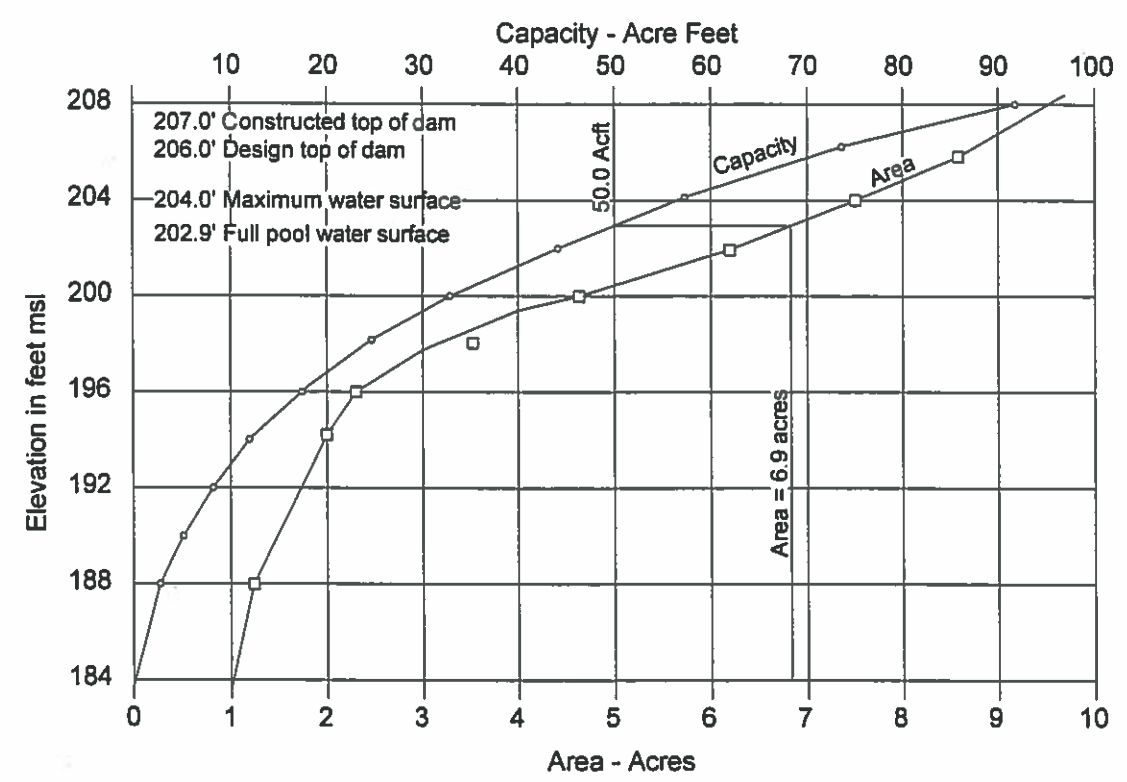
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PROFILE ON DAM CENTERLINE

Scale:
 Horiz: 1" = 50'
 Vert: 1" = 5'



**RESEVOIR AREA-CAPACITY CURVES
 WITH BORROW REMOVED**

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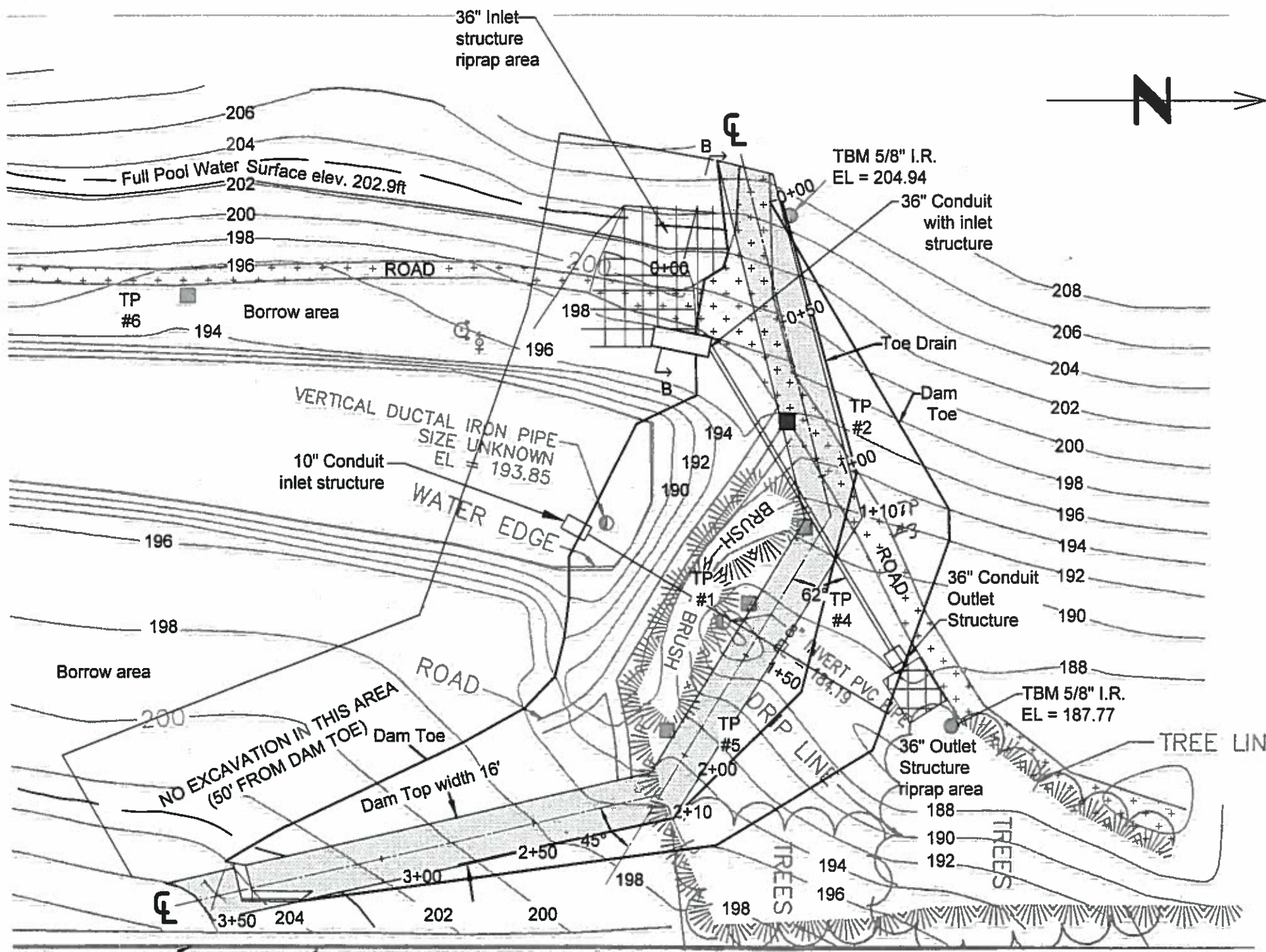


EXPIRATION DATE: 6/30/2021

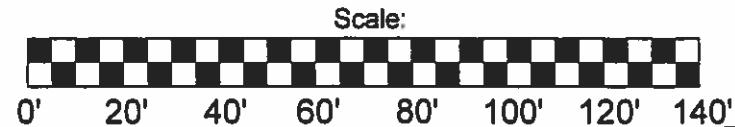
SIGNED: 8/20/2020

SCHMITZ FARM DAM & RESERVOIR
THOMAS BUCHHOLZ OWNER OPERATOR
PROFILE ON DAM CENTERLINE
AREA-CAPACITY CURVES
CLACKAMAS COUNTY, OREGON
H & R Engineering LLC
 SALEM, OREGON

DESIGNED BY: L. Hardy
 DRAWN BY: J. Zimel



DAM PLAN VIEW



CONTOUR INTERVAL = 2 FEET

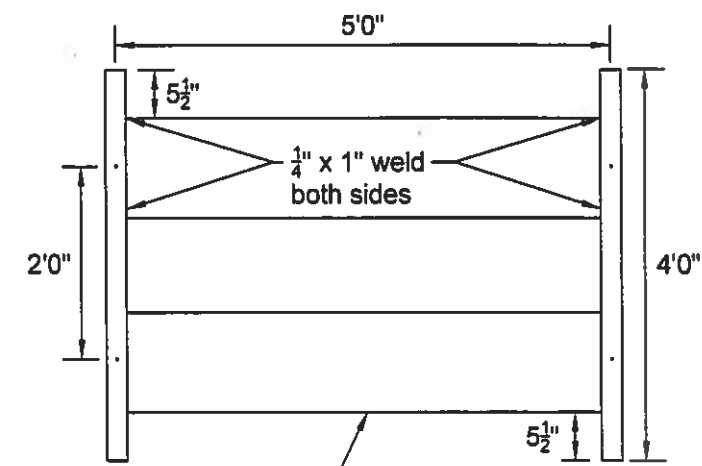
Constructed top of dam	207.0'
Design top of dam	206.0'
Full pool (weir crest)	202.9'

*Elevations are mean sea level datum



2" x 2" x 1/4" square tubing (use 8)

Drill 3/4" holes for anchorbolts 2'0" c-c (use 16)

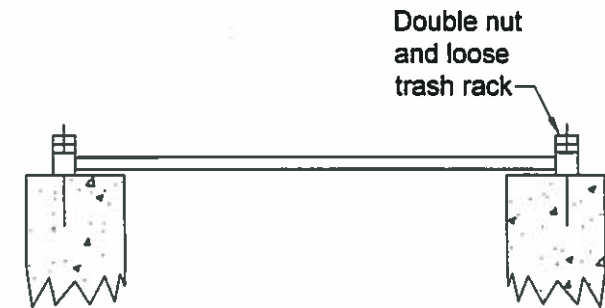


36" INLET STRUCTURE TRASH RACK PANEL PLAN VIEW

(use 4)
Scale: 1" = 2'

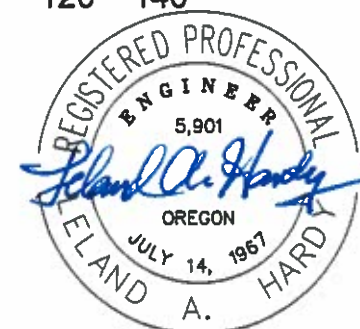
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5/8" dia. rod 12" long, Threaded one end, embedded 6" in concrete (use 16)



36" INLET STRUCTURE TRASH RACK SIDE VIEW

Scale: 1" = 2'

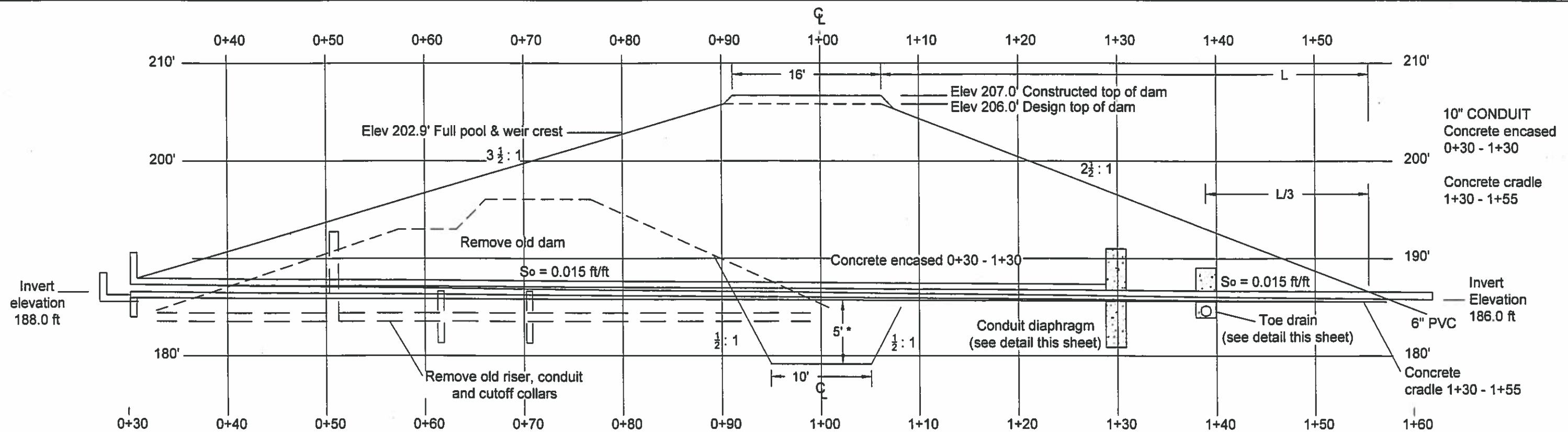


EXPIRATION DATE: 6/30/2021

SIGNED: 8/22/2020

SCHMITZ FARM DAM & RESERVOIR
THOMAS BUCHHOLZ OWNER OPERATOR
DAM PLAN VIEW AND 36" INLET
STRUCTURE TRASH RACK
CLACKAMAS COUNTY, OREGON
H & R Engineering LLC
SALEM, OREGON

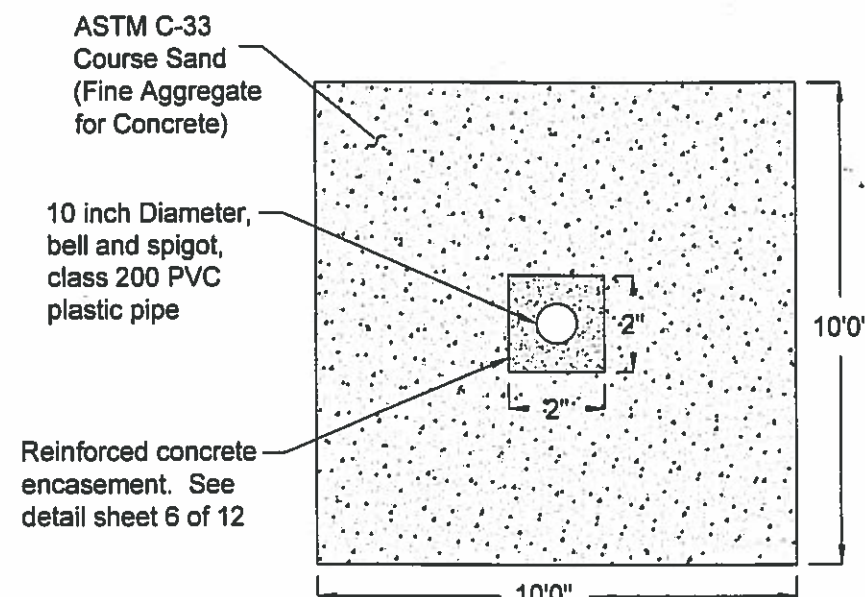
DESIGNED BY: L. Hardy
DRAWN BY: J. Zimel



CROSS SECTION OF DAM STATION 1+50

Scale: 1" = 10'0"

* Final core trench depth to be determined by engineer



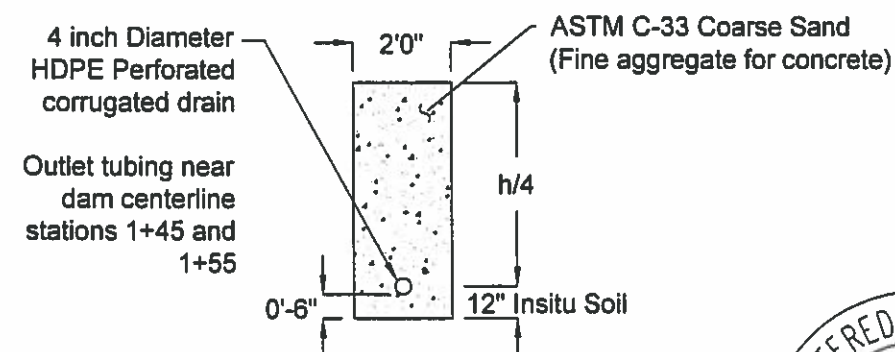
10" CONDUIT DIAPHRAGM DETAIL CONDUIT STATION 1+30

2 feet wide
Scale: 1" = 4'

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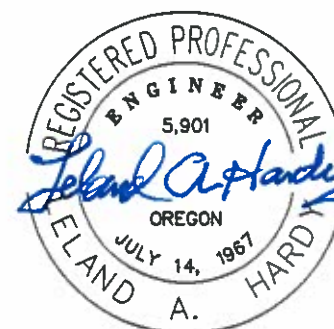
TOE DRAIN DETAIL

Dam Stations 0+35 to 2+80

h = Height of dam

Note:
Drainage diaphragm and toe drain material is to consist of sand that meets the fine aggregate requirements of ASTM C-33 meeting the following gradation:

Sieve No.	Percent Finer
3/8"	100
#4	95-100
#8	80-100
#16	50-85
#30	25-60
#50	10-30
#100	2-10
#200	3-5



EXPIRATION DATE: 6/30/2021

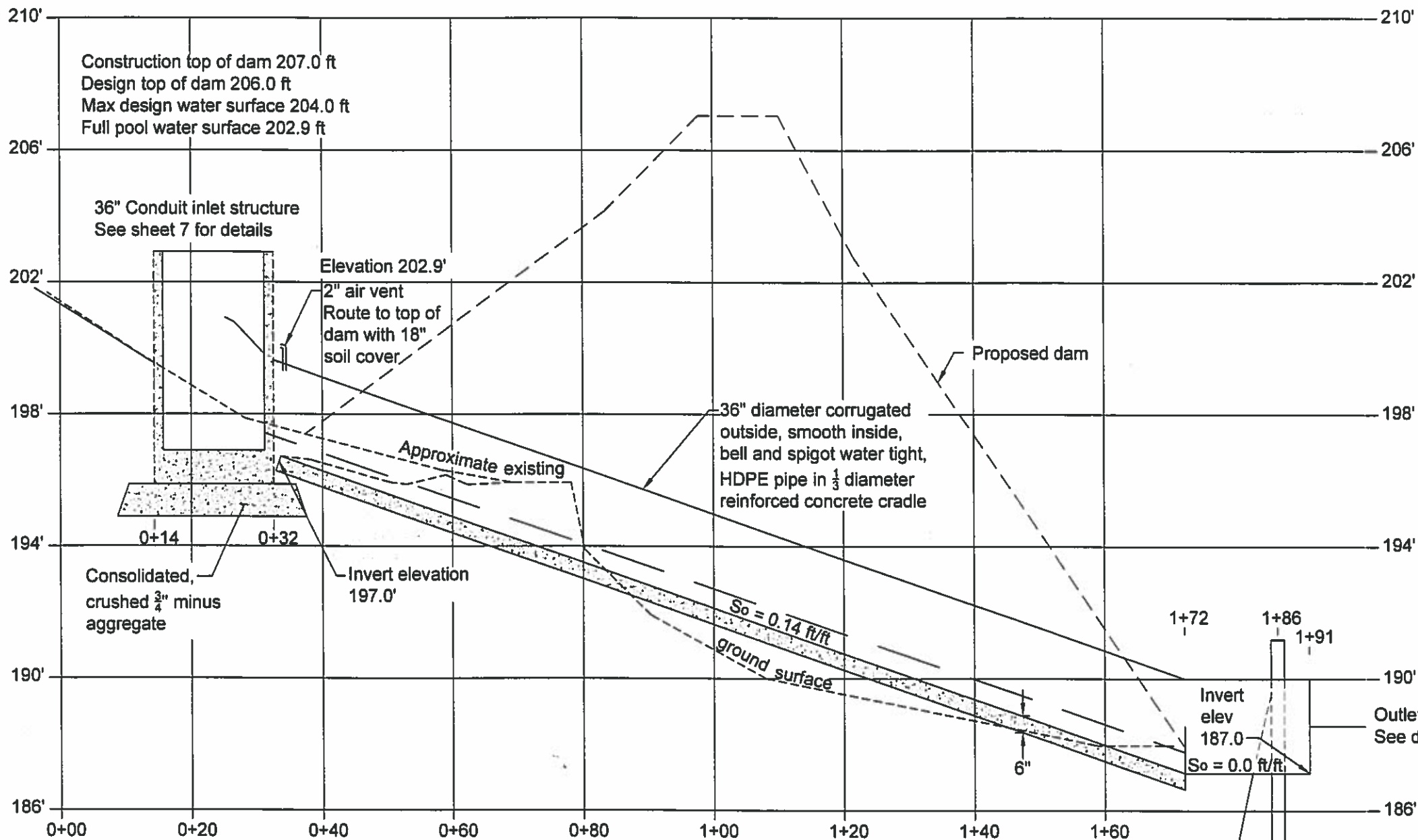
SIGNED: 8/22/2020

DESIGNED BY: L. Hardy
DRAWN BY: J. Zimel

SCHMITZ FARM DAM & RESERVOIR
THOMAS BUCHHOLZ OWNER OPERATOR
CROSS SECTION AT DAM STATION 1+50
(on 10" conduit centerline)
CLACKAMAS COUNTY, OREGON
H & R Engineering LLC
SALEM, OREGON

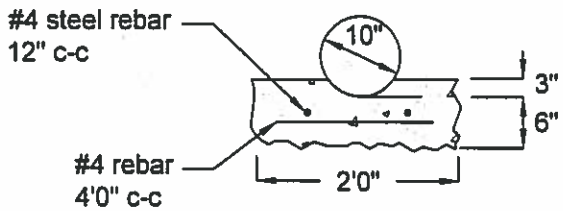
AUGUST 2020
Sheet 5 of 12

Conduit Station 1+100 = Dam centerline station 1+17



PROFILE ON 36" CONDUIT $\mathcal{C}$
(36" Conduit Station 1+00 = Dam station 1+25)

Scale:
Horiz 1" = 20'
Vert 1" = 4'



10" CONDUIT CRADLE DETAIL

Scale: 1" = 2'

Use excavated trench for bottom and side walls

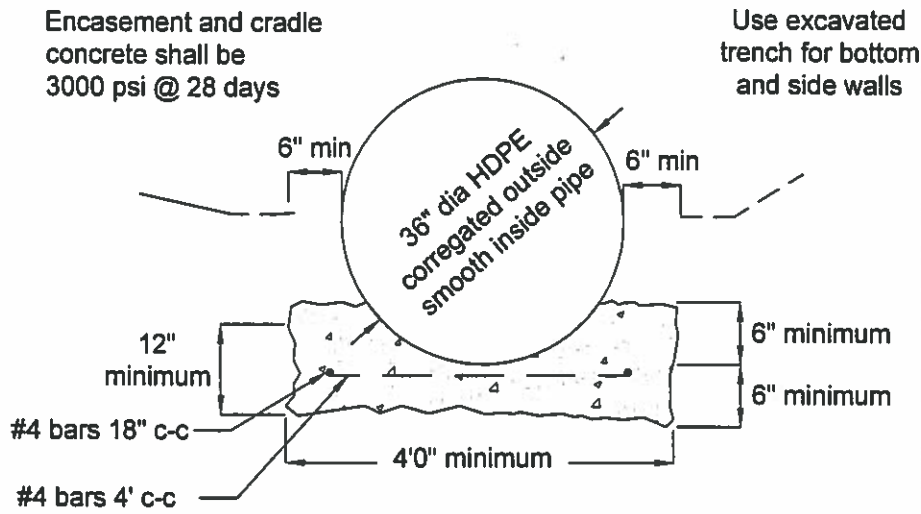
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EXPIRATION DATE: 6/30/2021

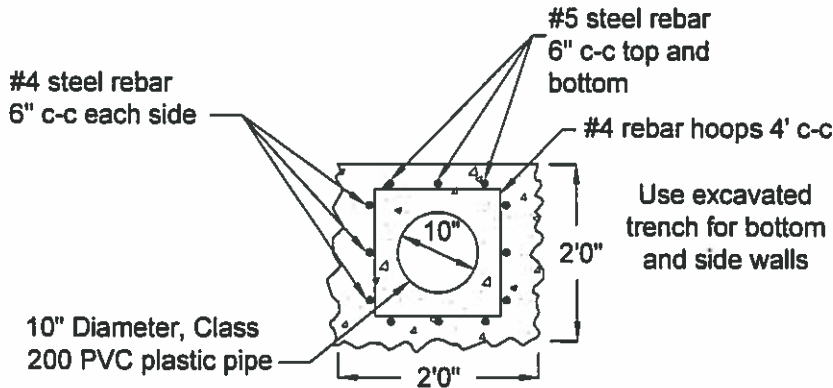
SIGNED: 8/22/2020

Encasement and cradle concrete shall be 3000 psi @ 28 days



36" CONDUIT CRADLE DETAIL

Scale: 1" = 2'



REINFORCED CONCRETE ENCASEMENT DETAIL

Scale: 1" = 2'

SCHMITZ FARM DAM & RESERVOIR
THOMAS BUCHHOLZ OWNER OPERATOR
PROFILE ON 36" CONDUIT $\mathcal{C}$,
36" CRADLE AND 10" ENCASEMENT DETAIL
CLACKAMAS COUNTY, OREGON
H & R Engineering LLC
SALEM, OREGON

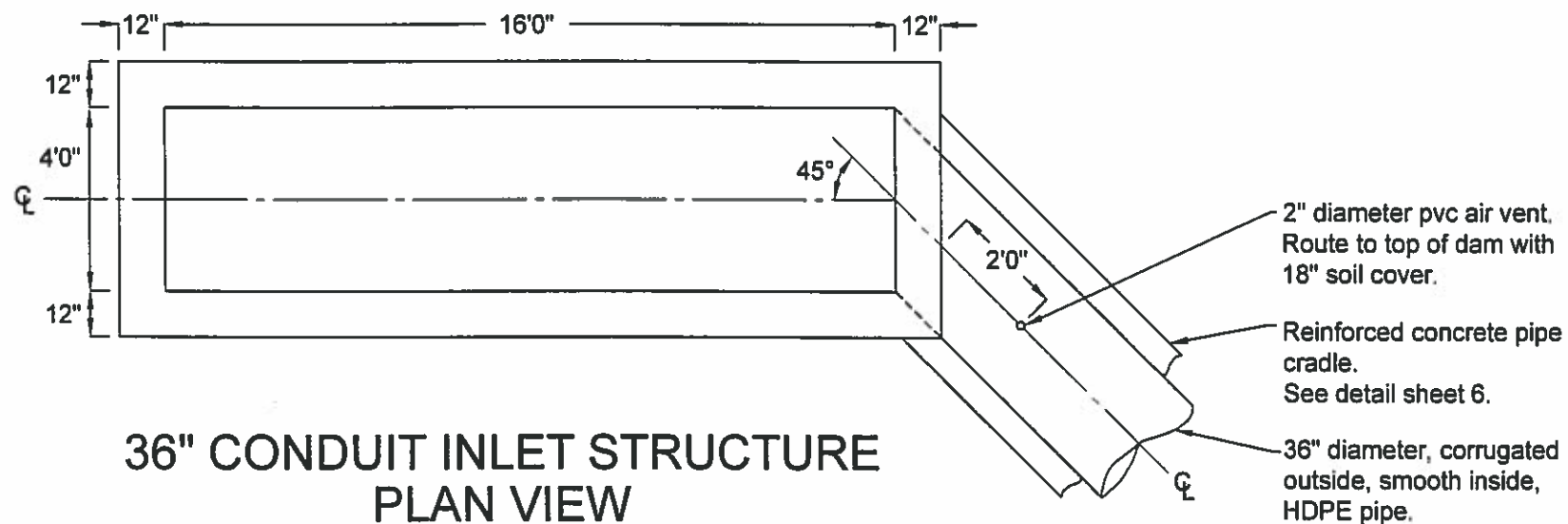
DESIGNED BY: L. Hardy
DRAWN BY: J. Zimel

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Sheet 6 of 12

See sheet 9 for rock
riprap cross section.

Inlet structure concrete shall
be 4000 psi at 28 days.

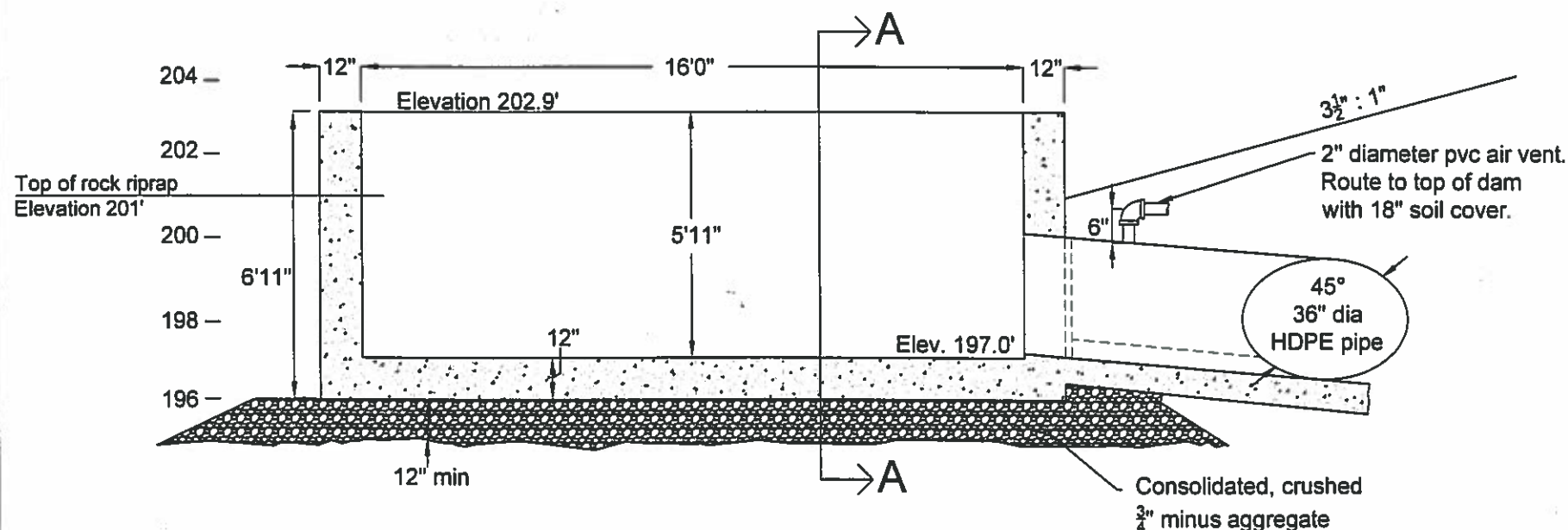
See sheet 10 for
steel rebar details.



36" CONDUIT INLET STRUCTURE PLAN VIEW

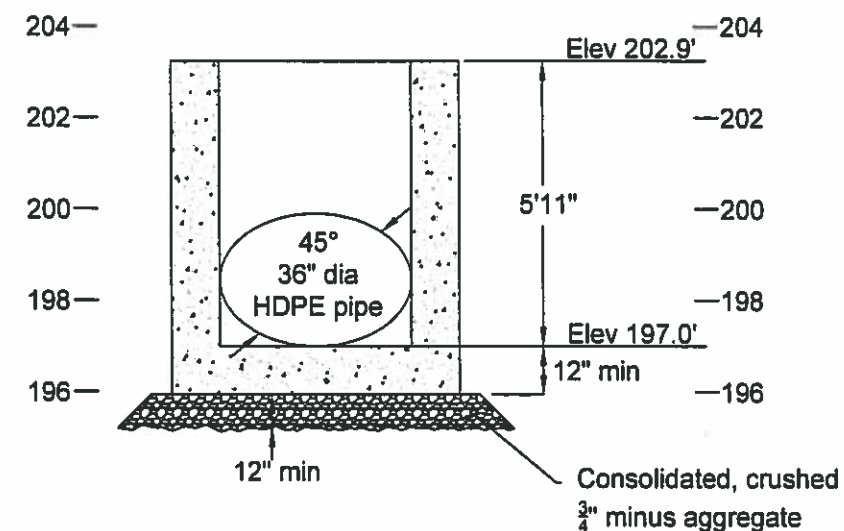
Scale: 1" = 4'

Bevel all exposed
corners 1".



CROSS SECTION ON 36" CONDUIT-INLET STRUCTURE CL

Scale: 1" = 4'



CROSS SECTION A-A

Scale: 1" = 4'



EXPIRATION DATE: 6/30/2021

SIGNED: 8/20/2020

DESIGNED BY: L. Hardy
DRAWN BY: J. Zime

SCHMITZ FARM DAM & RESERVOIR
THOMAS BUCHHOLZ OWNER OPERATOR
36" CONDUIT INLET STRUCTURE

CLACKAMAS COUNTY, OREGON
H & R Engineering LLC
SALEM, OREGON

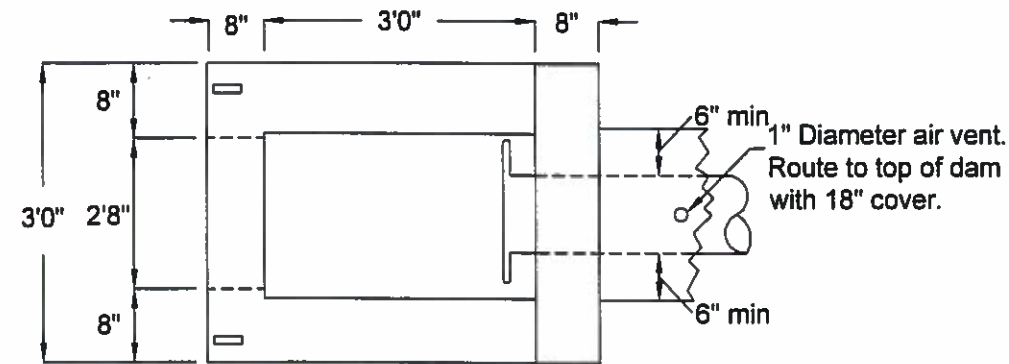
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Sheet 7 of 12

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10" Inlet structure concrete shall be 4000 psi at 28 days.

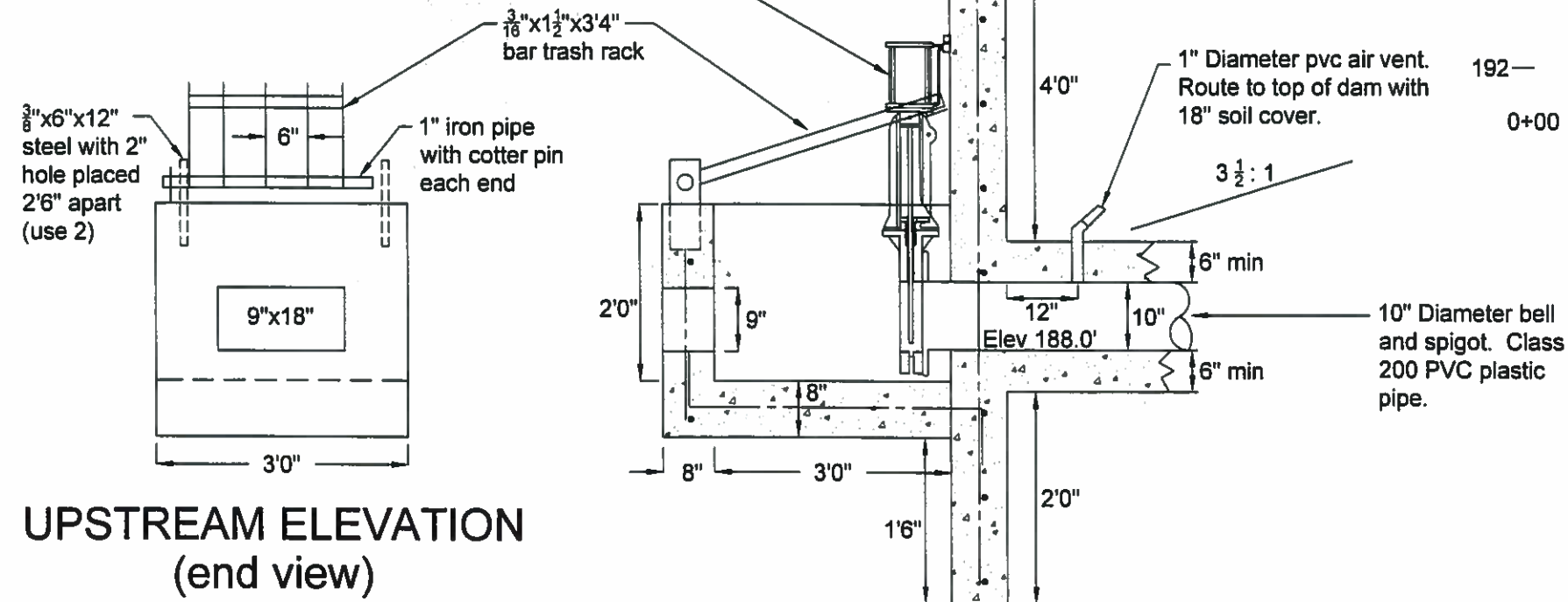


10" CONDUIT INLET STRUCTURE PLAN VIEW

Scale: 1" = 2'

Reinforce Inlet Structure
concrete with #4 bars 12"
center to center both ways

Flange mounted, 10" diameter, stainless steel, resilient seated knife gate with hydraulic actuator, Ferguson model FNW 6800B10 or equal.



UPSTREAM ELEVATION
(end view)

Scale: 1" = 2'

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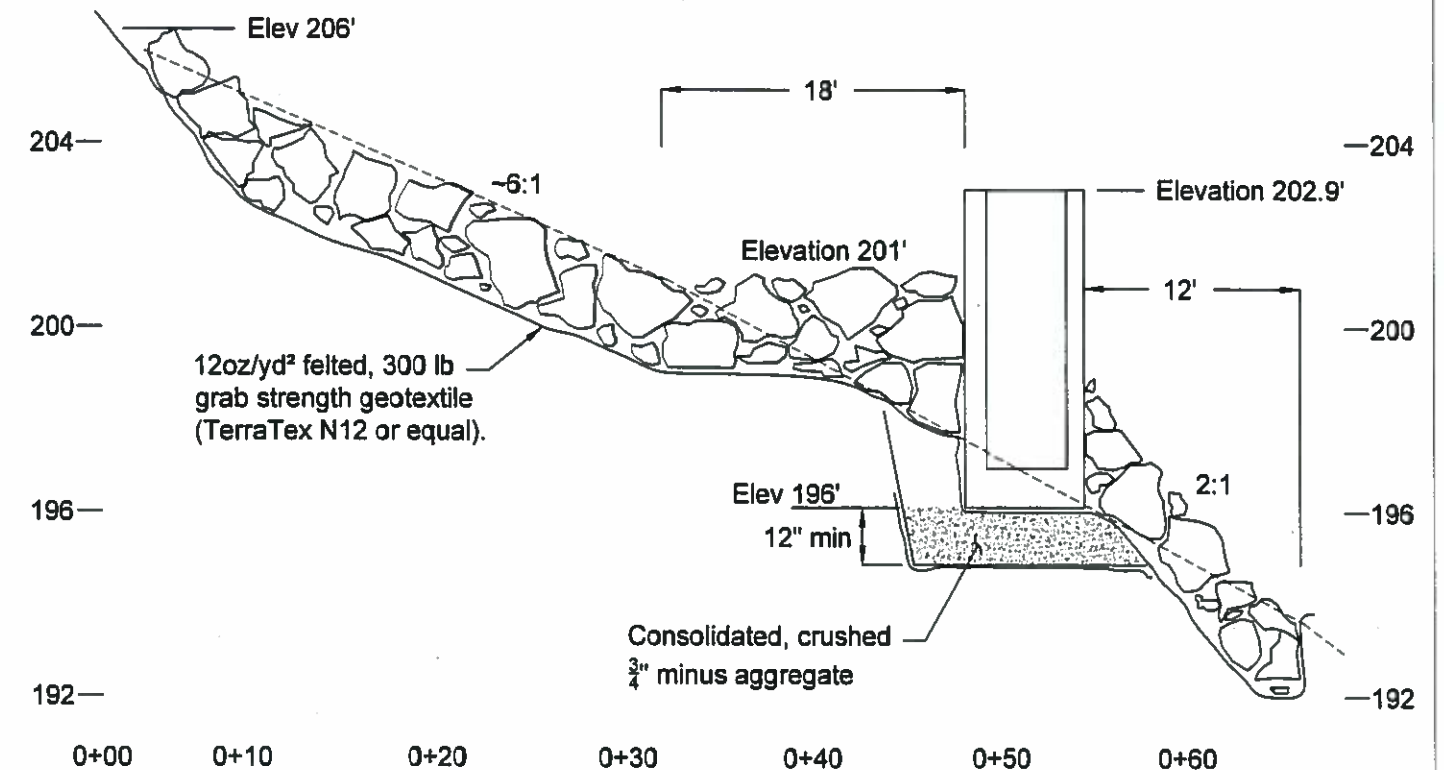
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INLET STRUCTURE ON 10" CONDUIT @

Scale: 1" = 2'

ROCK RIPRAP GRADATION

<u>Design %</u>	<u>Range</u>
D ₁₀₀	16" - 24"
D ₇₅	14" - 20"
D ₅₀	12" - 17"
D ₃₀	10" - 14"
D ₅	6" - 8"



36" CONDUIT INLET STRUCTURE RIPRAP CROSS SECTION

Vert. Scale: 1" = 4'
 Horiz. Scale: 1" = 10'



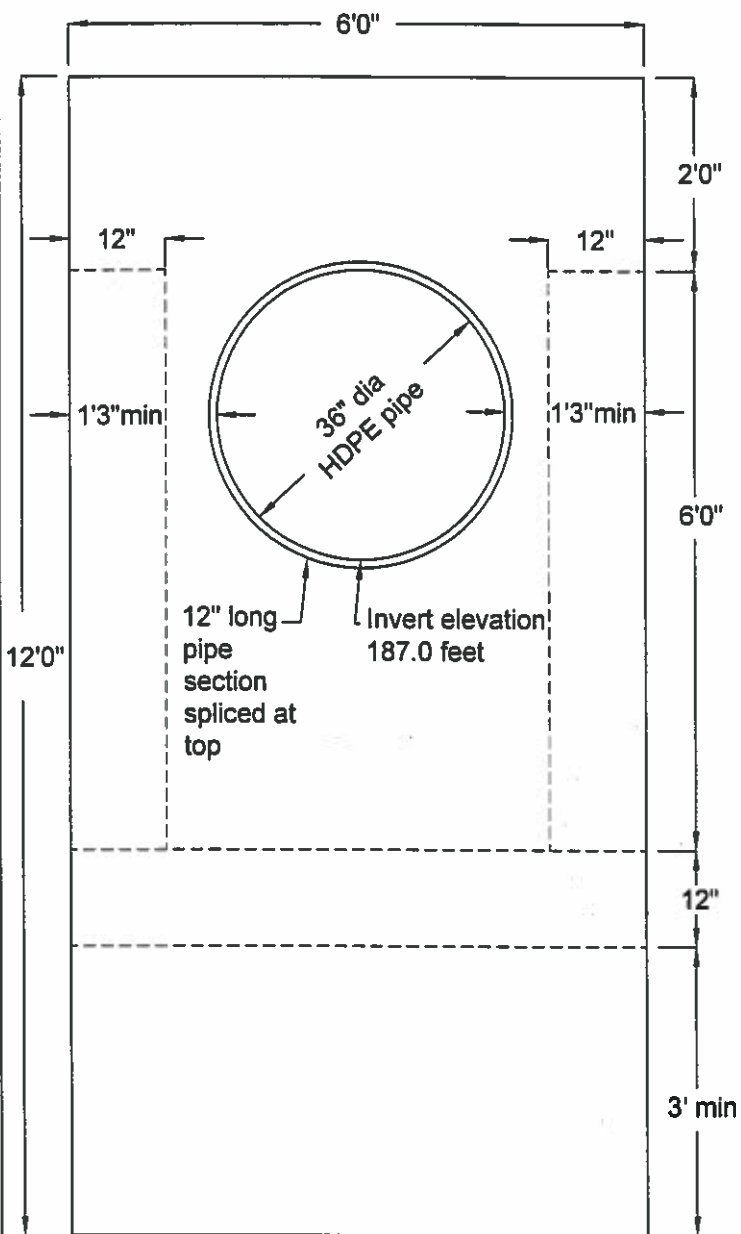
SIGNED: 8 / 22 / 2020

EXPIRATION DATE: 6/30/2021

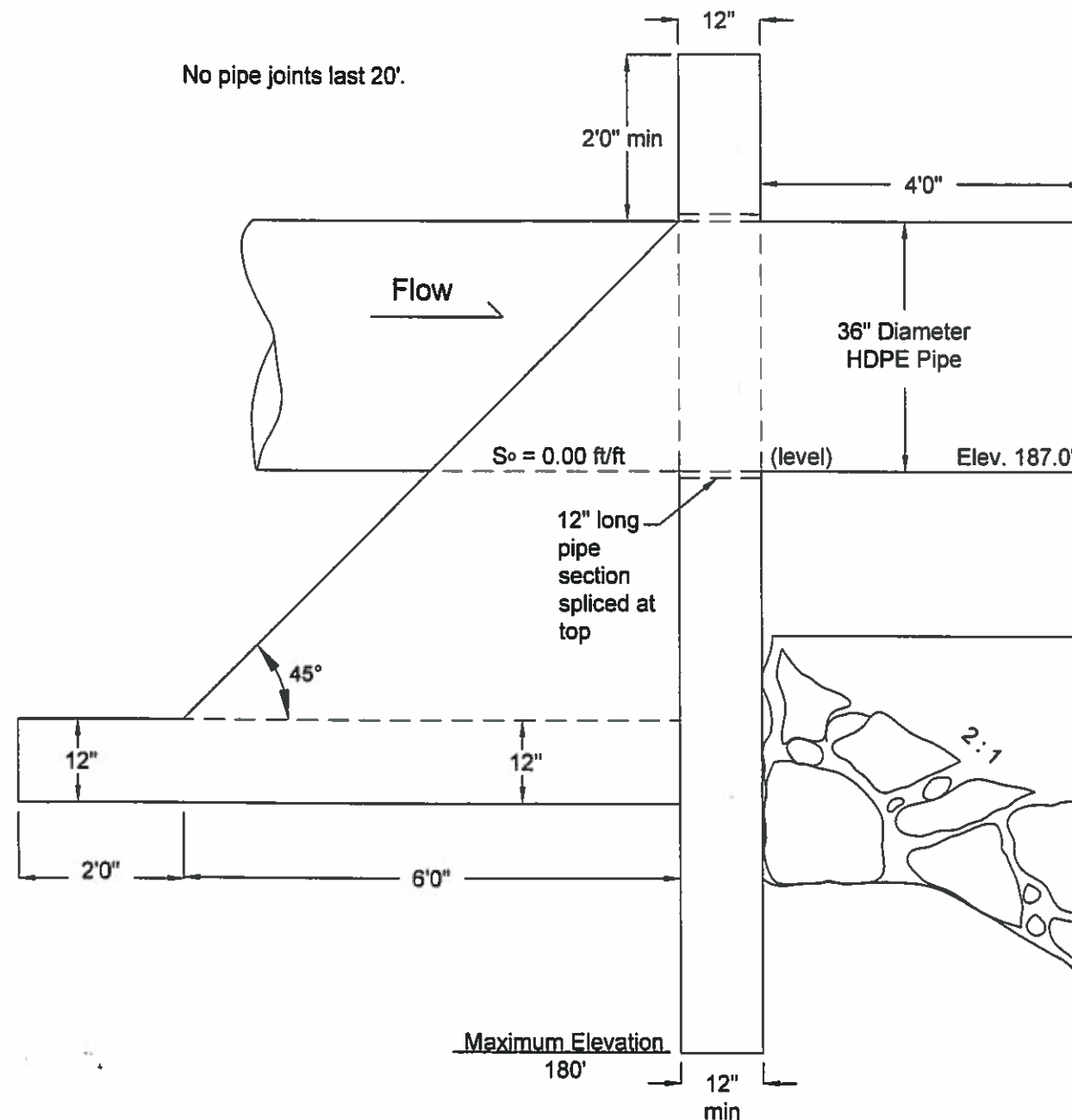
DESIGNED BY: L. Hardy
DRAWN BY: J. Zimel

SCHMITZ FARM DAM & RESERVOIR
THOMAS BUCHHOLZ OWNER OPERATOR
10" CONDUIT INLET STRUCTURE AND 36" CONDUIT
INLET STRUCTURE ROCK RIPRAP
CLACKAMAS COUNTY, OREGON
H & R Engineering LLC
SALEM, OREGON

AUGUST 2020
Sheet 9 of 12



**DOWNSTREAM ELEVATION
36" OUTLET STRUCTURE**
Scale: 1" = 2'



30+ days after completion,
load with rock riprap

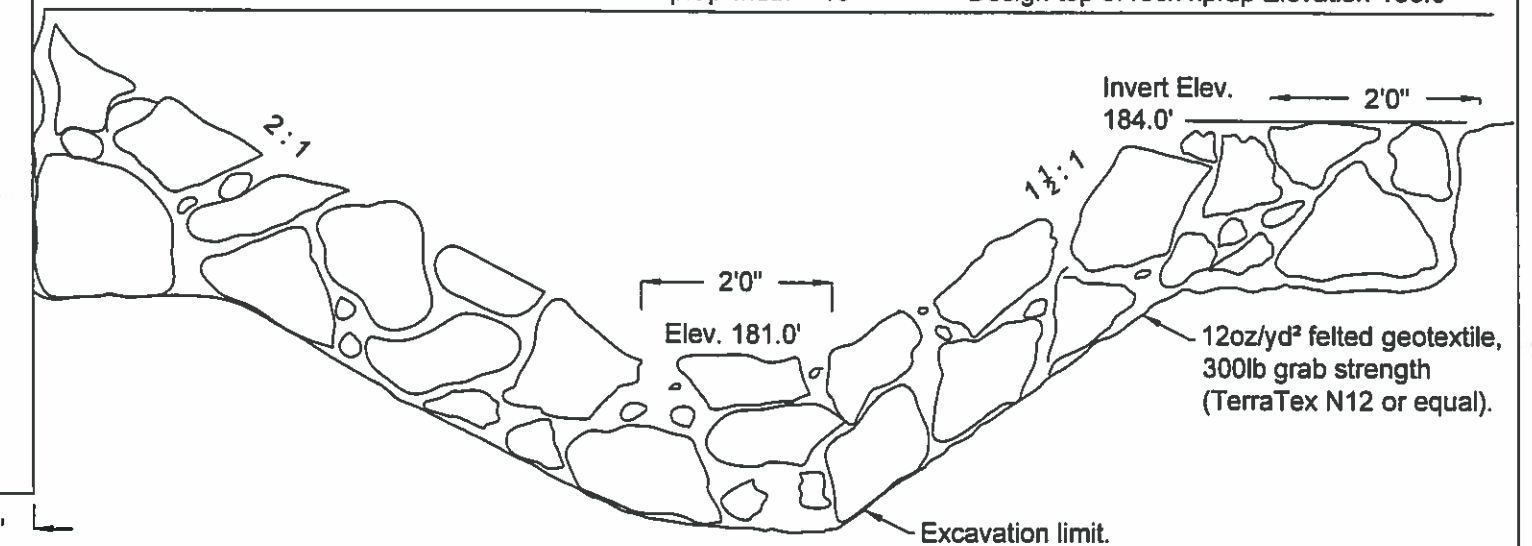
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ROCK RIPRAP
Use angular, hard, durable quarry
rock conforming to the following:

ROCK RIPRAP GRADATION

Design %	Range
D ₁₀₀	16" - 24"
D ₇₅	14" - 20"
D ₅₀	12" - 17"
D ₃₀	10" - 14"
D ₅	6" - 8"

Effective riprap width = 16' Design top of rock riprap Elevation 185.0'



36" OUTLET STRUCTURE SIDE VIEW
Scale: 1" = 2'



EXPIRATION DATE: 6/30/2021

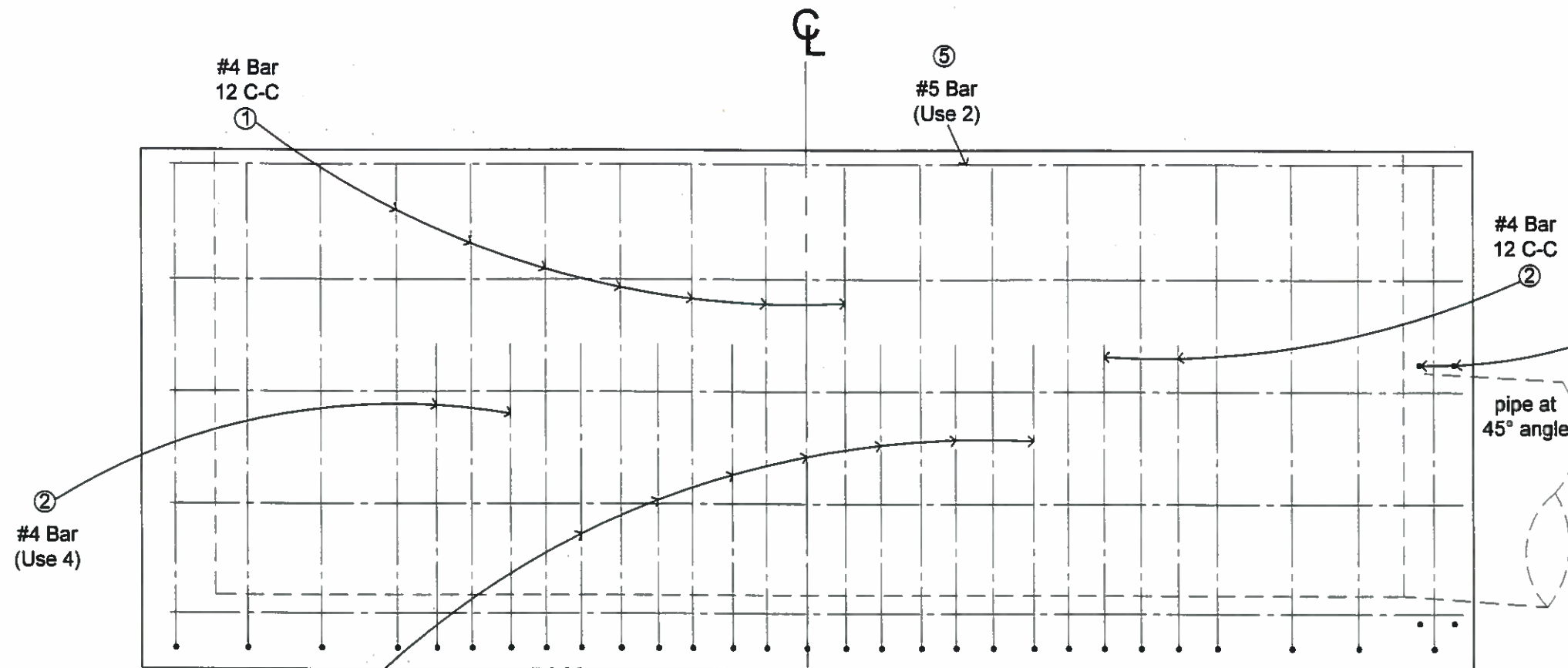
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SCHMITZ FARM DAM & RESERVOIR
THOMAS BUCHHOLZ OWNER OPERATOR
36" CONDUIT OUTLET STRUCTURE

CLACKAMAS COUNTY, OREGON
H & R Engineering LLC
SALEM, OREGON

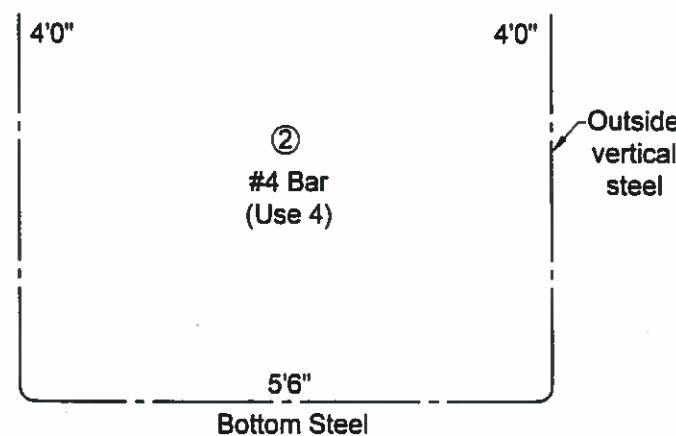
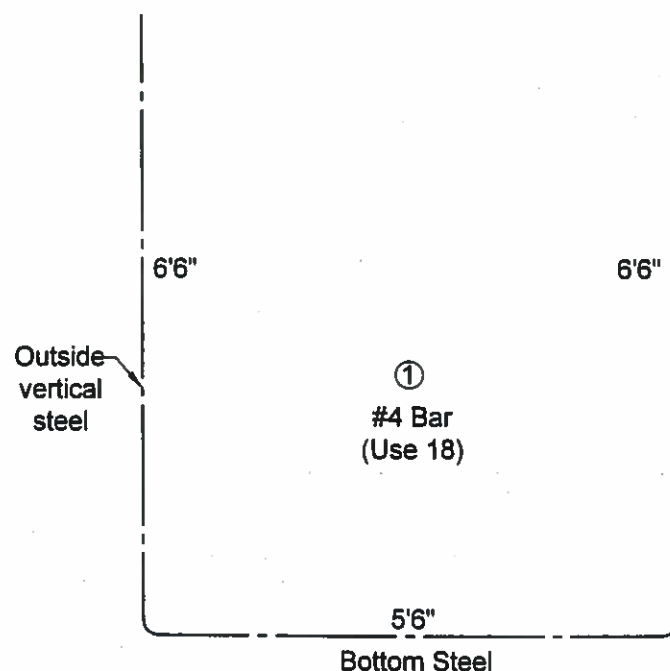
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Sheet 8 of 12



36" CONDUIT INLET STRUCTURE SIDEWALL OUTSIDE CURTAIN

Scale: 1" = 2'

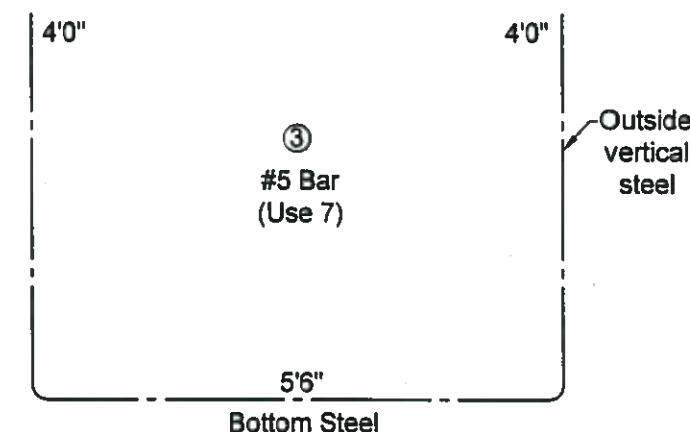


- ⑤ Outside & inside horizontal sidewall steel is #5 top bar and three #4 bars spaced 18" center to center.
End wall steel is #4 18" center to center both ways.
Upper and bottom longitudinal floor steel is #4 bar 18" C-C.
Upper transverse floor steel is #4 bar spaced 12" center to center
- ④ Sidewall vertical inside steel is #4 bar 12" C-C

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USE 60,000 psi, DOUBLE CURTAIN,
REINFORCING STEEL IN ALL CONCRETE,
EXCEPT 10" INLET STRUCTURE WHICH IS
SINGLE CURTAIN

BEVEL ALL EXPOSED CONCRETE
CORNERS 2".



EXPIRATION DATE: 6/30/2021

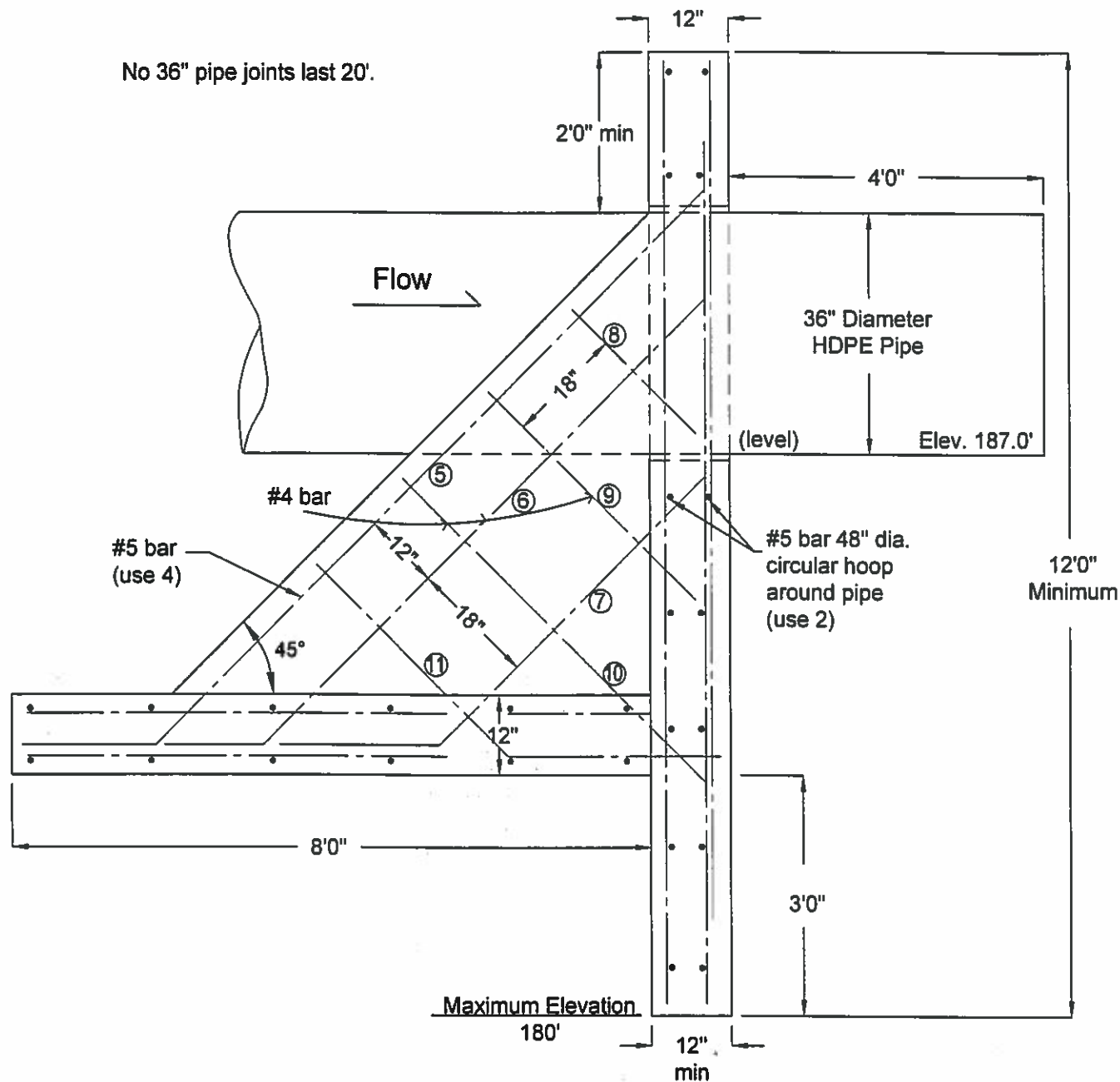
SIGNED: 8/22/2020

DESIGNED BY: L. Hardy
DRAWN BY: J. Zimel

SCHMITZ FARM DAM & RESERVOIR
THOMAS BUCHHOLZ OWNER OPERATOR
36" CONDUIT INLET STRUCTURE
CONCRETE REINFORCING STEEL DETAILS
CLACKAMAS COUNTY, OREGON
H & R Engineering LLC
SALEM, OREGON

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Sheet 10 of 12

No 36" pipe joints last 20'.



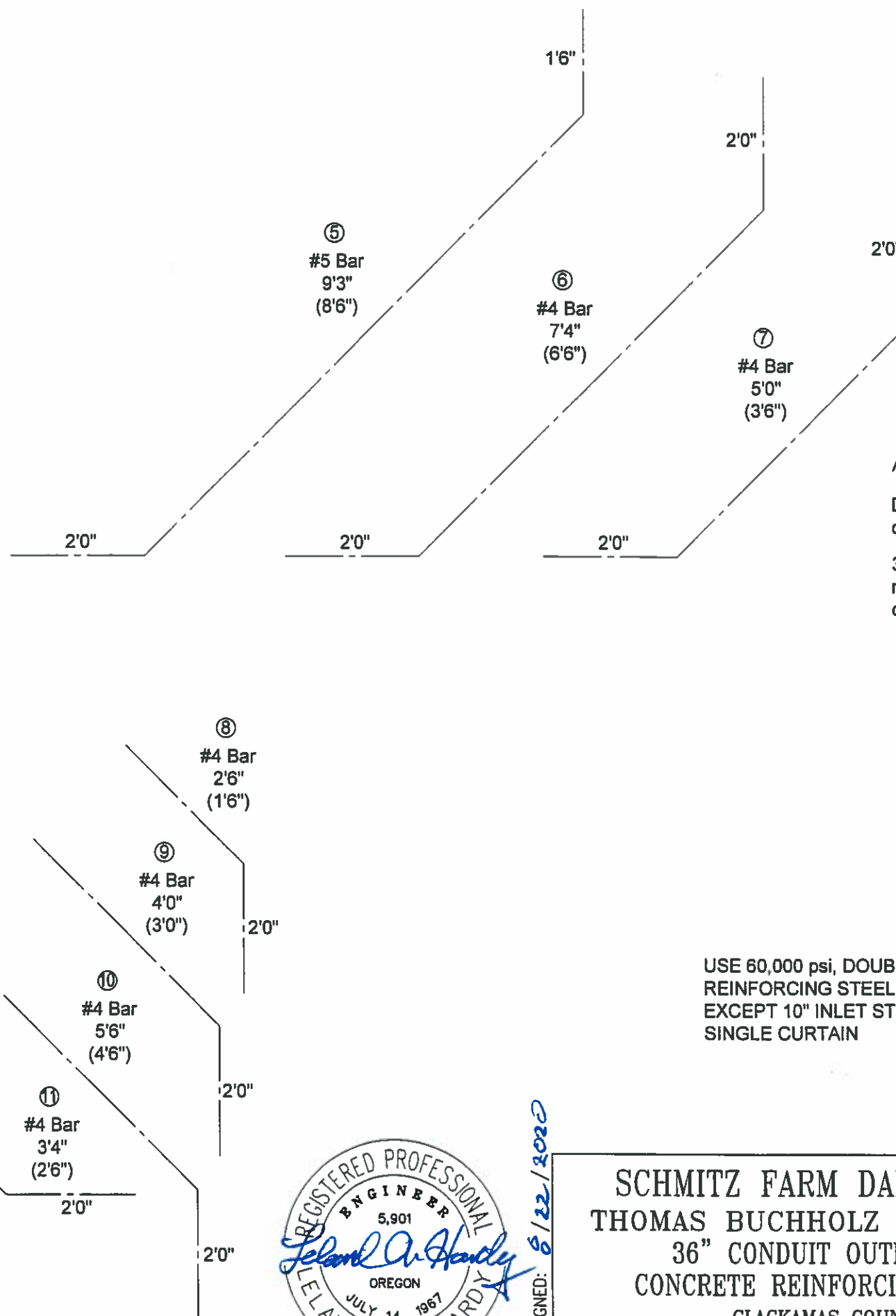
36" CONDUIT OUTLET STRUCTURE SIDEVIEW DOUBLE CURTAIN STEEL DETAIL

Scale: 1" = 2'

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All angles are 45°

Dimensions in () are inside
curtain rebar dimensions

36" Outlet structure steel rebar
not shown is #4 bar spaced 18"
center to center both ways

USE 60,000 psi, DOUBLE CURTAIN,
REINFORCING STEEL IN ALL CONCRETE,
EXCEPT 10" INLET STRUCTURE WHICH IS
SINGLE CURTAIN



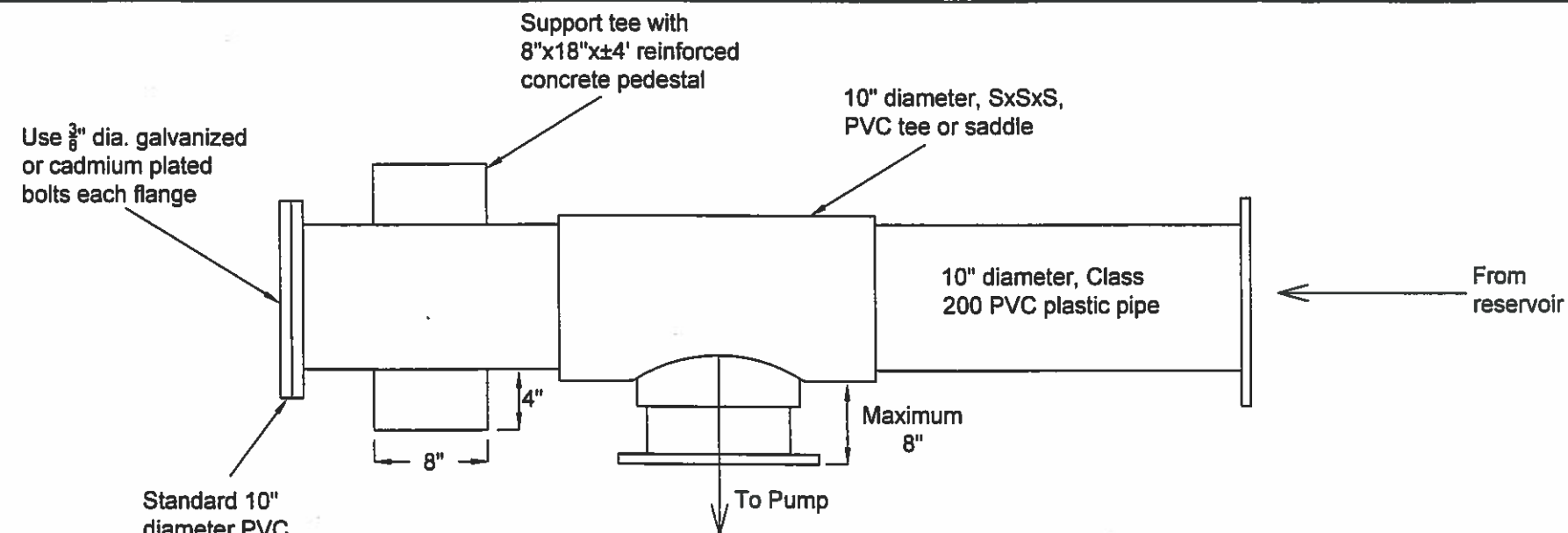
SIGNED: 6/22/2020

EXPIRATION DATE: 6/30/2021

DESIGNED BY: L. Hardy
DRAWN BY: J. Zimel

SCHMITZ FARM DAM & RESERVOIR
THOMAS BUCHHOLZ OWNER OPERATOR
36" CONDUIT OUTLET STRUCTURE
CONCRETE REINFORCING STEEL DETAILS
CLACKAMAS COUNTY, OREGON
H & R Engineering LLC
SALEM, OREGON

AUGUST 2020
Sheet 11 of 12

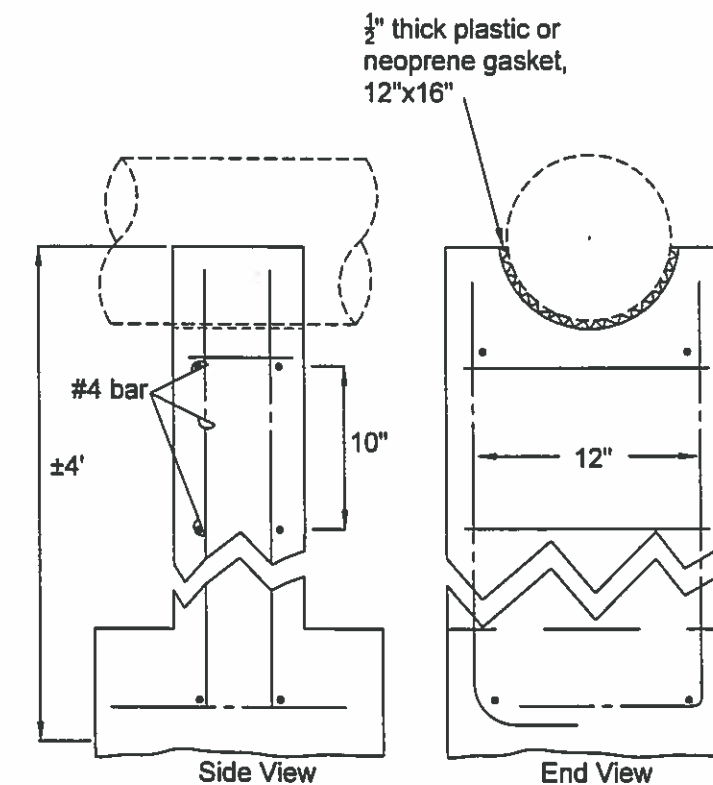
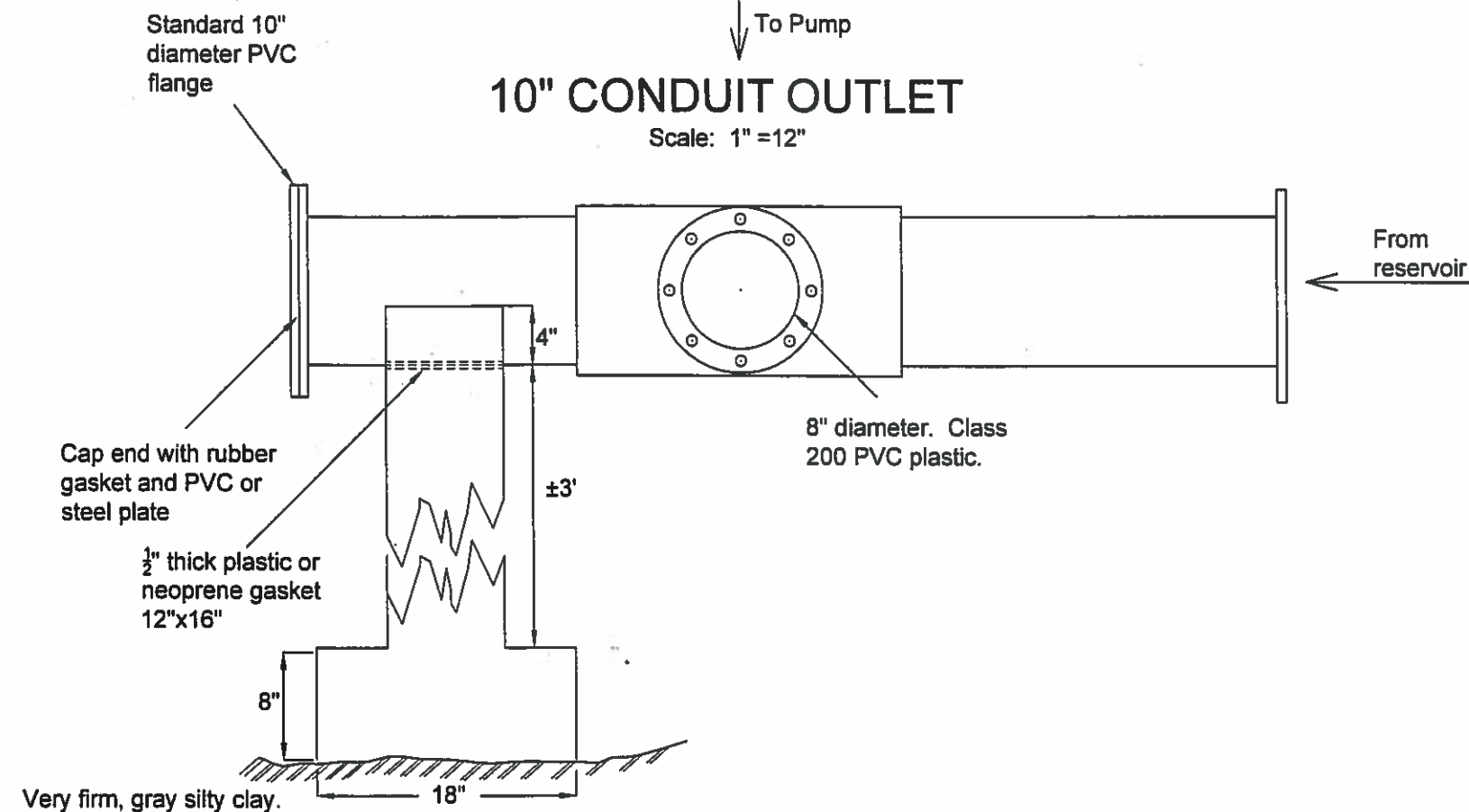


USE MINIMUM 12" LONG RUBBER HOSE OR DRESSER COUPLER IN PUMP SUCTION PIPE TO HELP LIMIT VIBRATION ON 10" DRAIN CONDUIT.

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10" CONDUIT OUTLET Elevation View

Scale: 1" = 12"

10" CONDUIT OUTLET Pedestal Steel Detail

Scale: 1" = 12"



SIGNED: 13/12/2020

SCHMITZ FARM DAM & RESERVOIR
THOMAS BUCHHOLZ OWNER OPERATOR
10" OUTLET TEE ASSEMBLY

CLACKAMAS COUNTY, OREGON
H & R Engineering LLC
SALEM, OREGON

EXPIRATION DATE: 6/30/2021

DESIGNED BY: L. Hardy
DRAWN BY: J. Zimel

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Sheet 12 of 12