

TRUCKEE DONNER LAND TRUST

SPECIFICATIONS

for

LAKE VAN NORDEN SPILLWAY MODIFICATIONS

Prepared by:



November 2015

**TRUCKEE DONNER LAND TRUST
LAKE VAN NORDEN DAM SPILLWAY MODIFICATIONS**

TABLE OF CONTENTS

1	GENERAL	1
1.1	SCOPE OF WORK	1
1.2	DESIGN DRAWINGS	1
1.3	AS BUILT DRAWINGS	1
1.4	QUANTITIES	1
1.5	WATER POLLUTION CONTROL	1
1.6	Inspection by the Division of Safety of Dams (dSOD)	2
2	EARTHWORK	3
2.1	SITE ACCESS AND STAGING	3
2.2	CLEARING AND GRUBBING	3
2.3	Diversion	3
	2.3.1 General	3
	2.3.2 Execution	3
2.4	EXCAVATION	3
	2.4.1 General	3
	2.4.2 Over Excavation	4
2.5	OFF-HAUL	4
2.6	COMPACTION	4
	2.6.1 General	4
	2.6.2 Laboratory Density Determination	4
	2.6.3 Moisture Conditioning	4
	2.6.4 Compaction Requirements	5
	2.6.5 Quality Assurance	5
3	RIPRAP	6
3.1	GENERAL	6
3.2	MATERIAL QUALITY	6
3.3	ROCK SIZE	6
3.4	PLACEMENT	6
3.5	QUALITY ASSURANCE	6

4	CONCRETE	7
4.1	GENERAL CONCRETE REQUIREMENTS	7
4.2	COLD WEATHER SPECIFICATIONS ACI 306-R.....	7
4.3	NOMINAL MAXIMUM SIZE OF AGGREGATE.....	7
4.4	MIX PROPORTIONS.....	7
4.5	CONSISTENCY AND STRENGTH	7
4.6	ADMIXTURES	7
4.7	AIR ENTRAINING ADMIXTURE	8
4.8	FORMWORK.....	8
4.9	TOLERANCES.....	8
4.10	CONSTRUCTION JOINTS	8
4.11	DELIVERY AND PLACEMENT	8
4.12	FINISHES AND FINISHING	9
4.13	PROTECTION	9
4.14	CURING.....	9
5	REINFORCING STEEL	10
5.1	GENERAL	10
5.2	DETAIL DRAWINGS.....	10
5.3	PLACEMENT DIMENSIONS.....	10
5.4	COVER.....	10
5.5	SPLICES	10

1 GENERAL

1.1 SCOPE OF WORK

This work includes the following:

- Lowering of the existing spillway invert by 4.5 feet with 0.5 foot x 3 footswale, sawcut and remove existing shotcrete/concrete in the spillway channel, lowering of the spillway section, and construction of the new spillway channel and apron as shown on the design drawings.
- Riprap placement in the existing scour basin for scour protection.

1.2 DESIGN DRAWINGS

Design drawing(s) are provided on an ARCH D sheet (24-inch x 36-inch) in Appendix A of these specifications.

1.3 AS BUILT DRAWINGS

Contractor shall submit “As Built” drawings, any calculations, and procedures to the Engineer upon completion of construction. Drawings shall be either ANSI B (11 inch x 17 inch) or ARCH D (24 inch x 36 inch), or as directed by the Engineer.

1.4 ESTIMATED QUANTITIES*

Item	Quantity	Unit
Existing Concrete/Shotcrete Removal	126	cy
Spoil Material	995	cy
New Concrete	223	cy
Riprap	377/816	cy/tons

*Actual quantities to be determined by the contractor

1.5 WATER POLLUTION CONTROL

Contractor shall prepare and submit a Storm Water Pollution Prevention Plan (SWPPP) for approval by the Engineer within 10 days prior to mobilization. The SWPPP shall meet the requirements of the State Water Resources Control Board *National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 2012-0006-DWQ, NPDES NO. CAS000002* (Construction General Permit [CGP]), and any subsequent amendments that may come into effect during the project duration. The CGP covers any “construction or demolition activity, including, but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land

disturbance of equal to or greater than one acre". The contractor is responsible for obtaining coverage under the CGP and is required to file all Permit Registration Documents (PRDs) including: Notice of Intent (NOI), SWPPP, Risk Assessment, site map, annual fee, and signed certification statement. The contractor is responsible for implementation of all applicable elements of the CGP and approved SWPPP.

1.6 INSPECTION BY THE DIVISION OF SAFETY OF DAMS (DSOD)

Representatives from DSOD will periodically inspect the work in progress during construction, including the materials being incorporated into the works, as well as the test results and documentation associated with the project. Prior to placement of the formwork and steel for the concrete structure, the foundation under the concrete structure must be first approved by DSOD. Prior to placement of concrete, the placement of the steel reinforcement, concrete cylinder tests, and all items pertaining to the quality and placement of concrete must first be inspected and approved by DSOD.

The contractor must allow DSOD representatives access to all locations within the project boundaries. All communications with DSOD pertaining to the project must be coordinated through the Owner's engineer or designated representative.

A minimum 72-hour notice from the Owner's representative is required to schedule a DSOD inspection. Therefore, the contractor must cooperate with the Owner's representative by giving at least 72-hour (business days') notice of any inspection requiring DSOD involvement.

2 EARTHWORK

2.1 SITE ACCESS AND STAGING

Contractor shall provide site access, which may require traffic plates and fill placement as necessary to safely access the site. Access locations and staging areas are shown on the design drawing.

2.2 CLEARING AND GRUBBING

The Contractor shall clear vegetation and deleterious material where required for access and construction under these specifications. All vegetation shall be stockpiled or hauled off-site as directed by Engineer. All vegetation outside of clearing limits shall be preserved and protected. Clearing adjacent to cut or fill sections or proposed spillway improvements shall be limited to a distance of 3 feet outside of the structure lines or the slope lines.

2.3 DIVERSION

Contractor shall divert water through existing outfall pipe to lower the lake level to a depth of 2 feet below the bottom of the upstream apron.

2.3.1 General

The Contractor shall furnish, install, maintain, and operate all necessary pumping and other equipment and materials for diversion of flow through the existing outfall pipe. The lake level shall be lowered to the extent that the work can be performed as specified. Particular care shall be exercised to protect concrete from hydrostatic pressure, scour, and leaching until concrete is sufficiently cured to withstand these forces.

2.3.2 Execution

Where excavations extend below the reservoir pool and the scour pond level, the reservoir pool elevation shall be lowered in advance of excavation work. The flow of diverted water shall be managed to prevent the loss of fines from the embankment and to maintain stability of the excavations.

2.4 EXCAVATION

2.4.1 General

Excavate to lines, grades, and dimensions shown on the drawings. Remove existing concrete and/or shotcrete to limits shown on drawings. Removal of existing concrete shall be accomplished using equipment that minimized disturbance to the underlying subgrade (e.g., smooth blade). Excess excavated materials shall be managed in accordance with Section 2.5 Off-Haul. High strength concrete from previous repair shall be removed to new subgrade elevation.

Specifications for Lake Van Norden Spillway Modifications

Remove all concrete to lines and grades shown on plans. The contractor shall mark areas of concrete removal with marking paint prior to demolition. Engineer will mark areas of concrete previously placed in 2011 and 2012. These areas have concrete with compressive strengths of 4,000 pounds per square inch (psi) or higher. Contractor should be prepared to remove this concrete to a minimum depth of 6 inches below the invert elevation of the spillway.

Prepared subgrade shall be scarified to a minimum depth of 6 inches below finish grade elevation, then moisture conditioned and compacted in accordance with Section 2.6 Compaction to the lines, grades, and elevations shown on the drawings, or as directed by the Engineer. Prepared subgrade shall be free of loose material and standing water.

2.4.2 Over Excavation

If at any time, during the excavation, the foundation material is excavated beyond the lines required, the over excavation shall be filled with suitable materials approved by the Engineer and compacted in accordance with Section 2.6 Compaction.

2.5 OFF-HAUL

Approximately 98 cubic yards of existing shotcrete/concrete shall be transported and disposed offsite at the nearest permitted landfill or other approved facility. Weigh tickets, waste manifests, and disposal receipts shall be provided to the Engineer. Contractor shall remove excess soil from the jobsite.

2.6 COMPACTION

2.6.1 General

Compaction of earth materials is required for the spillway foundation, slopes, and related structures. The subgrade shall be scarified to a minimum depth of 6 inches and moisture conditioned and compacted. Engineered fill shall be placed in 6-inch thick loose lifts, moisture conditioned and compacted as specified in this Section.

2.6.2 Laboratory Density Determination

Bulk samples shall be collected of each earthen material proposed for engineered fill and laboratory tested for moisture and density in conformance with American Society for Testing and Materials (ASTM) D1557.

2.6.3 Moisture Conditioning

The soil shall be uniformly moisture conditioned to within approximately -1 to +3 percentage points of the ASTM D1557 optimum moisture content prior to and during compaction operations.

2.6.4 Compaction Requirements

The scarified and moisture conditioned subgrade soil shall be compacted to achieve a minimum relative compaction of 95 percent based on ASTM D1556 maximum dry density.

2.6.5 Quality Assurance

The moisture content, density, and relative percent compaction should be verified in the field by a representative of Holdrege & Kull (H&K). Densities shall be verified by sand cone test method ASTM D1556, at a minimum of 4 locations as directed by the Engineer. The earthwork contractor shall assist the field representative by excavating test pads with onsite earth moving equipment.

3 RIPRAP

3.1 GENERAL

The riprap shall be placed to the prescribed outlines and thickness shown on the drawings, or as directed by the Engineer.

3.2 MATERIAL QUALITY

The riprap shall consist of hard, dense, durable, and angular rock. Neither the breadth nor thickness of any single rock shall be less than one-third its length.

3.3 ROCK SIZE

The rock size shall be approximately 3.5 feet in diameter (2 to 4 tons) and uniformly graded. Rocks used for chinking shall be a minimum of 12 inches in diameter.

3.4 PLACEMENT

Riprap rocks shall be individually placed by an excavator with a thumb attachment. All rocks shall have a minimum of three points of contact. Angular, dense, 12 inch diameter rock may be used for chinking as necessary to obtain three points of contact.

3.5 QUALITY ASSURANCE

Riprap placement shall be observed by H&K for quality and compliance with placement specifications.

4 CONCRETE

The contractor shall furnish or procure all materials and labor required for constructing all concrete structures, including the concrete trapezoidal spillway channel, aprons, and spillway channel transitions.

4.1 GENERAL CONCRETE REQUIREMENTS

Concrete shall be composed of cementitious materials, sand, coarse aggregate, water, and admixtures and air entrainment as specified for cold weather placement, all well mixed and brought to the proper consistency to meet strength and placement requirements.

4.2 COLD WEATHER SPECIFICATIONS ACI 306-R

If concrete is to be placed during cold weather, where cold weather is defined as when air temperature has fallen to, or is expected to fall below 40 degrees Fahrenheit (°F) or 4° Celcius (C) during the protection period. The protection period is defined by American Concrete Institute (ACI) 306-R as: the time required to prevent concrete from being affected by exposure to cold weather. The ACI 306-R *Guide to Cold Weather Concreting* shall prevail.

4.3 NOMINAL MAXIMUM SIZE OF AGGREGATE

The coarse aggregate nominal maximum size shall be ¾-inch.

4.4 MIX PROPORTIONS

Contractor shall submit a concrete mix design to the Engineer for approval. New mix designs shall be furnished in advance of pours with sufficient time to allow for preliminary testing.

4.5 CONSISTENCY AND STRENGTH

The slump of the concrete at placement shall not exceed 3 inches, or as directed by the Engineer. The concrete shall have a minimum 28-day compressive strength of 4,000 psi.

4.6 ADMIXTURES

The contractor shall furnish air-entraining and admixtures for use in concrete. Admixtures shall be of uniform consistency and quality, and strength of solution. Admixtures shall be batched separately in liquid form in dispensers capable of measuring at one time the full quantity required for each batch. The Contractor shall notify the Engineer in writing of the manufacturer(s) and brand name(s), including ASTM designation and type of all admixtures to be used.

4.7 AIR ENTRAINING ADMIXTURE

Air entrainment shall conform to ASTM C260. Concrete shall contain a sufficient amount of air-entraining agent to produce 6 percent (+/-2 percent) total air by volume of concrete for ¾-inch maximum aggregate size. Tests for air content will be performed by H&K in accordance with ASTM C231 or ASTM C173. Tests shall be made for each 100 cubic yards placed or for each pour.

4.8 FORMWORK

Forms shall be used where necessary to confine the concrete and shape to the required lines. Forms shall be true to line and grade and sufficiently rigid to withstand applied loads. No oil or hazardous material shall be used on the form boards.

4.9 TOLERANCES

Concrete shall be placed evenly with no vertical differential greater than 1 inch in 20 feet.

4.10 CONSTRUCTION JOINTS

The contractor shall use Sika Greenstreak Waterstop 643 or approved equivalent at construction/cold joints. No. 3 dowels with a 6 inch embed shall be placed at connections between the existing shotcrete/concrete and the new spillway construction.

4.11 DELIVERY AND PLACEMENT

All formwork, embedded items, and preparation of surfaces shall be completed and approved by the Engineer prior to concrete placement. The Contractor shall supply concrete placement checkout cards and delivery tickets satisfactory to the Engineer. All concrete shall be placed in the presence of the Engineer or its representative.

Concrete shall be deposited as near as possible to its final position and shall not be permitted to flow in such a manner that the lateral movement will cause segregation of the coarse aggregate from the concrete mass. Concrete shall be placed to conform with lines and grades shown on the drawing.

All concrete, except for concrete placed on unformed slopes, shall be placed in approximately horizontal layers which shall not exceed 20 inches, or as directed by the Engineer. Concrete comprising each unit of work shall be placed in a continuous lift.

Concrete shall be thoroughly consolidated into place by use of an approved immersion-type vibrator, supplemented by hand spading, rodding, and tamping, as necessary. The duration of vibration shall be limited to the minimum required to produce satisfactory consolidation without segregation. During concrete placement, the contractor must provide a backup vibrator in the event of malfunction or equipment failure.

4.12 FINISHES AND FINISHING

The finished surface for both formed and unformed surfaces shall be equivalent in evenness, smoothness, and freedom from rock pockets and surface voids to that obtainable by the effective use of a long-handled steel trowel. Concrete finish shall then be broomed. Defective concrete shall be removed and repaired as directed by the Engineer.

4.13 PROTECTION

The Contractor shall protect all concrete against damage until final acceptance by the Engineer.

4.14 CURING

The Contractor shall furnish all material and perform all work required for curing concrete. All concrete shall be moist cured for a period of no less than 14 days after being placed, unless cold weather conditions (ACI 306-R) prevail. Curing method must be approved by the Engineer.

5 REINFORCING STEEL

5.1 GENERAL

The Contractor shall furnish all reinforcing steel required for completion of the work. The Contractor shall provide mill certifications from the manufacturer. The Contractor shall notify the Engineer in writing of the manufacturer(s) and brand name(s), including ASTM designation and type of reinforcing bars.

Reinforcing steel shall be deformed bars conforming to ASTM A615, epoxy-coated No. 5, Grade 60 steel.

Bars shall be free from dust, oil, paint, or other debris that would reduce the bond. Reinforcing steel shall be stored above ground to prevent surfaces from contamination.

5.2 DETAIL DRAWINGS

Reinforcement detail drawings are to be prepared by the Contractor. The Contractor shall prepare and submit reinforcement detail drawings for all structures to the Engineer for approval. The Contractor's reinforcement detail drawings shall be prepared following the recommendations established by the *ACI Manual of Engineering and Placing Drawings for Reinforced Concrete Structures* (ACI-318 R-80).

5.3 PLACEMENT DIMENSIONS

Reinforcing bars shall be placed 18 inches on center in each direction.

5.4 COVER

For hydraulic structures 3 inches of concrete cover shall be provided, unless otherwise shown on the drawings. Reinforcing steel shall sit on 4-3/8-inch dobies, so that the reinforcing steel doesn't sag under weight of a person standing on it. Dobbies to support the rebar must be pre-fabricated specifically for concrete construction to the dimensions specified; not made of rock, wood, broken, concrete chunks, or stakes.

5.5 SPLICES

All splices in steel reinforcement shall provide an overlap of 24 bar diameters, or as directed by the Engineer.

APPENDIX A

LAKE VAN NORDEN SPILLWAY MODIFICATION DESIGN DRAWING

ENGINEER'S QUANTITIES (NOT FOR BID):

EXISTING CONCRETE REMOVAL:
 4" THICK
 AREA = 6,437 SF
 APPROX. VOLUME = 3,425 CU. FT. = 126 CY
 EXISTING 4,000 PSI CONCRETE = 20 CY
TOTAL = 98 CY

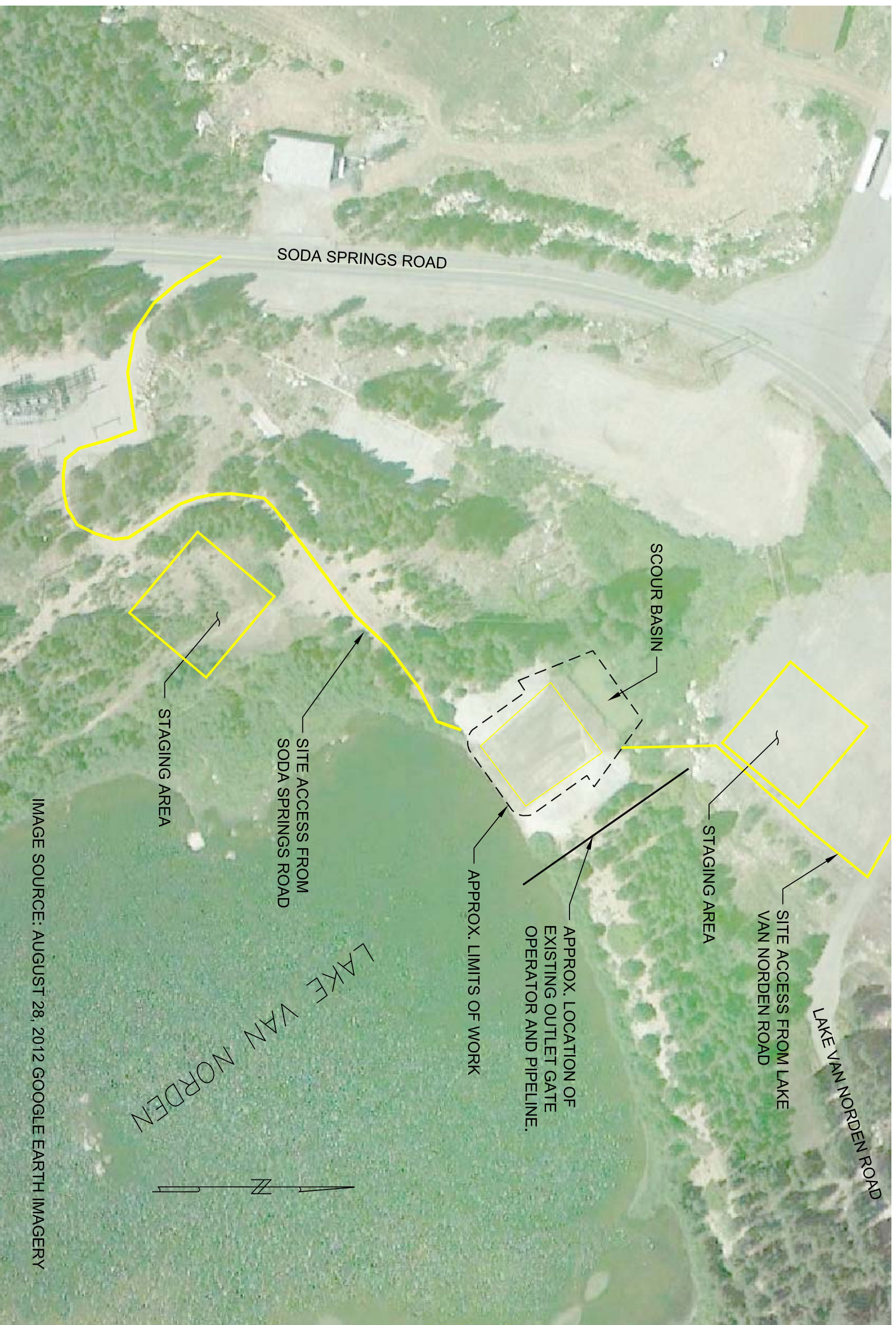
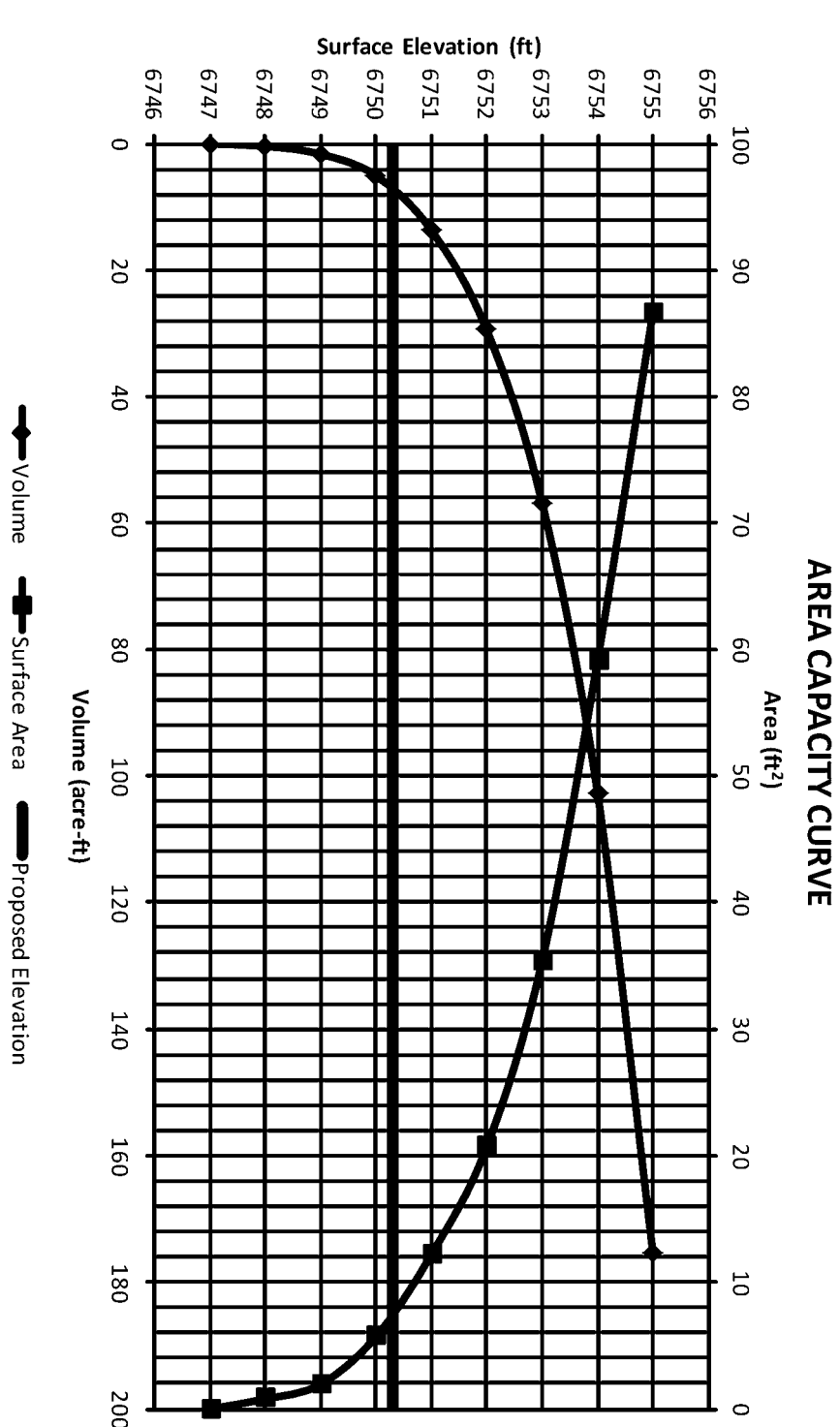
SPOIL:
 V1 (BOTTOM):
 APPROX. AREA = 95.4 FT X 48 FT = 4,579 SF
 EXCAVATION DEPTH = 4.5 FT.
 V1 = 20,606 CU. FT. = 763 CY

V2 (XSIDE SLOPES):
 APPROX. AREA = 2 X 24.6 SF = 49.2 SF
 LENGTH = 95.4 FT
 V2 = 4,693 CU. FT. = 174 CY

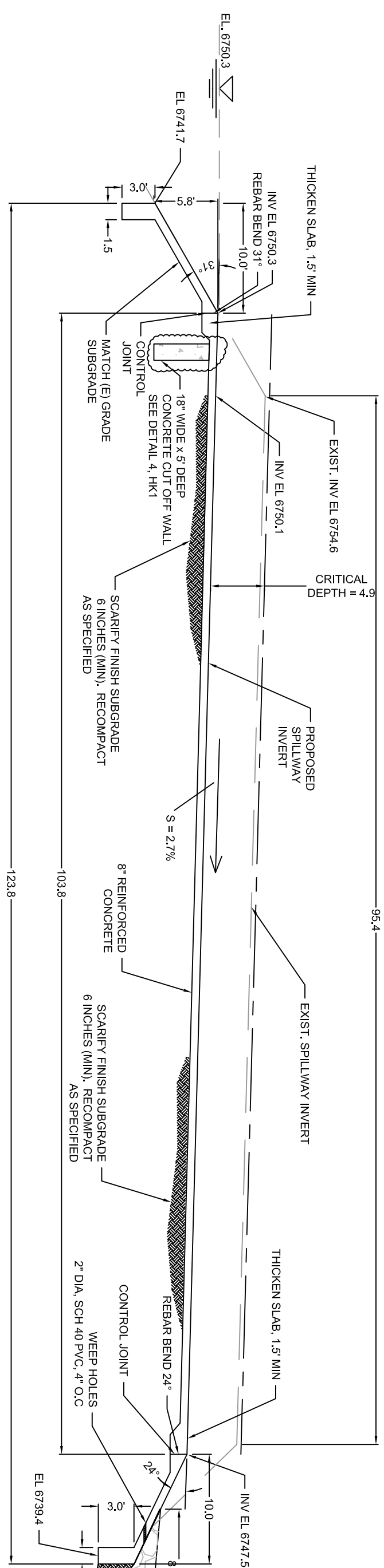
V3 (2XAPRON):
 APPROX. AREA = 17 SF + 15.7 SF = 32.7 SF
 LENGTH = 48 FT
 V3 = 1,570 CU. FT. = 58 CY
TOTAL SPOIL VOLUME = 995 CY

CONCRETE:
 2 X APRON: 2(11.5 FT. X 48 FT. X .67 FT. THICK) + 2(1.5 FT. X 3 FT. X 48 FT.) = 1,172 CU. FT.
 2 X SIDE SLOPES: 2(11 FT. X 103.8 FT. X 0.67 FT. THICK) = 1,530 CU. FT.
 BOTTOM: 4,944 SQ. FT. X 0.67" THICK = 3,312 CU. FT.
TOTAL = 6014 CU. FT. = 223 CY

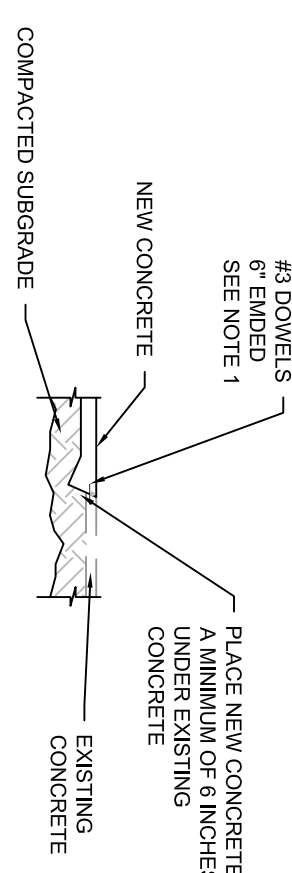
PIPERAP:
 2,915 SF(3.5) = 10,202 CU. FT. = 377 CY
 ASSUME 160 PCF
 (10,207 CU. FT. X 160 PCF)/2000 LB = **816 TONS TOTAL**



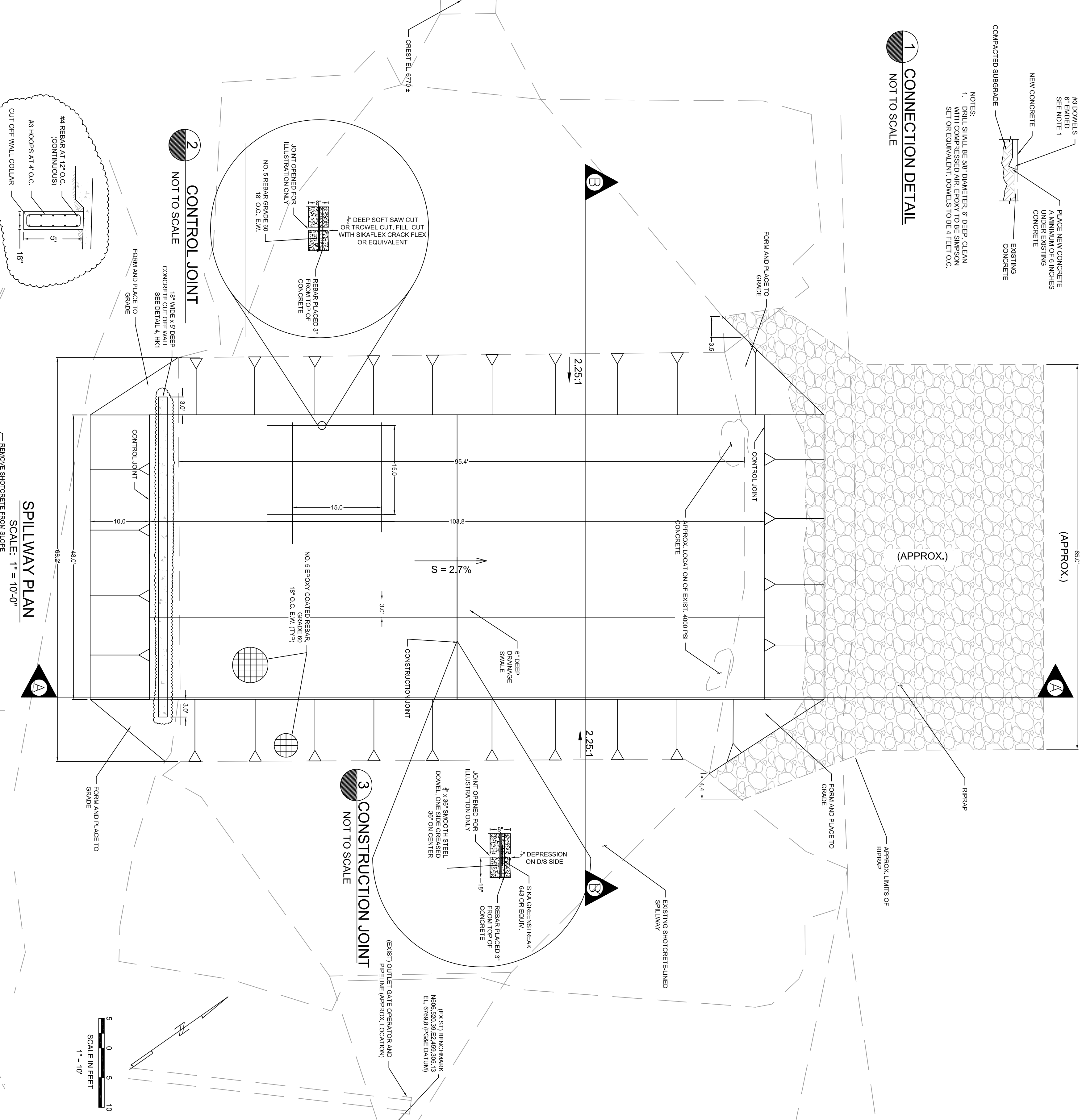
SITE ACCESS AND STAGING
 NOT TO SCALE



A PROFILE
 SCALE: 1" = 10'-0"



1 CONNECTION DETAIL
 NOT TO SCALE



4 CUT OFF WALL COLLAR
 SCALE: 1" = 5'-0"

2 CONTROL JOINT
 NOT TO SCALE

3 CONSTRUCTION JOINT
 NOT TO SCALE

SPILLWAY PLAN
 SCALE: 1" = 10'-0"

B CROSS SECTION
 SCALE: 1" = 10'-0"

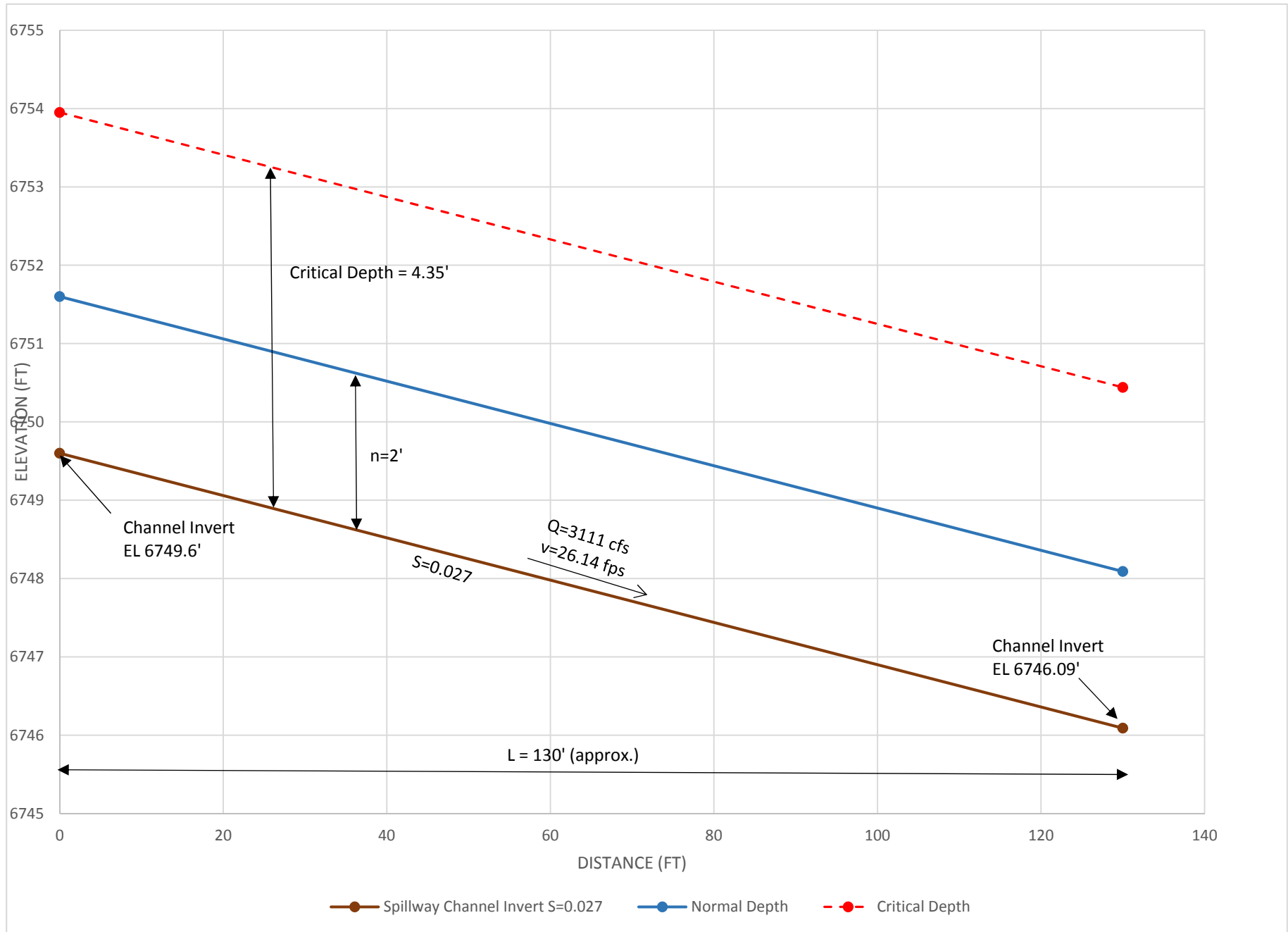
NO.	REVISIONS	DATE	DESIGNED BY:	CRK
1	CONCRETE COLLAR	02/05/16	DRAWN BY:	HJC/MED
2	SHOTCRETE REMOVAL	02/18/16	DATE:	FEBRUARY 2016
			DRAWING NAME:	SPILLWAY DESIGN
			PROJECT No.:	4003A-01

HK HOLDREGE & KULL
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 NEVADA CITY, CA 95959
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SPILLWAY MODIFICATIONS - 4.5 FOOT DROP
 LAKE VAN NORDEN
 NEVADA COUNTY, CALIFORNIA

HK1

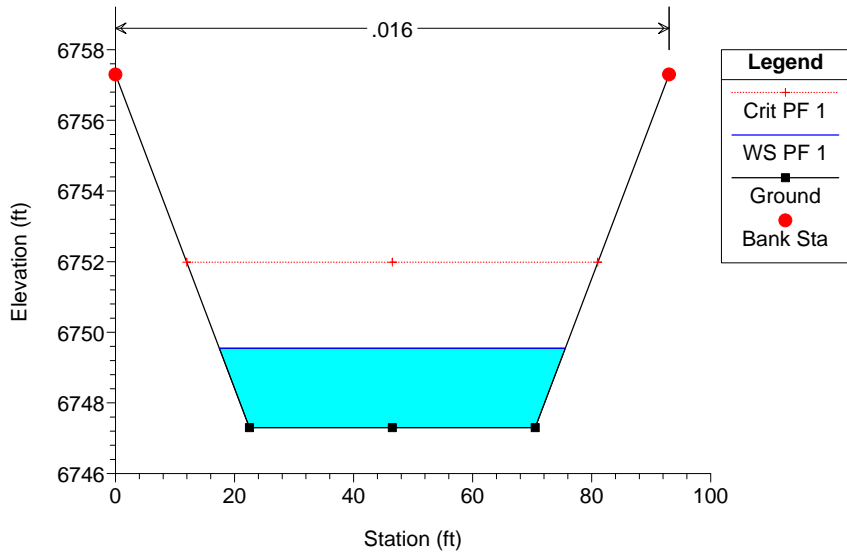
APPENDIX B
HYDRAULIC CALCULATIONS



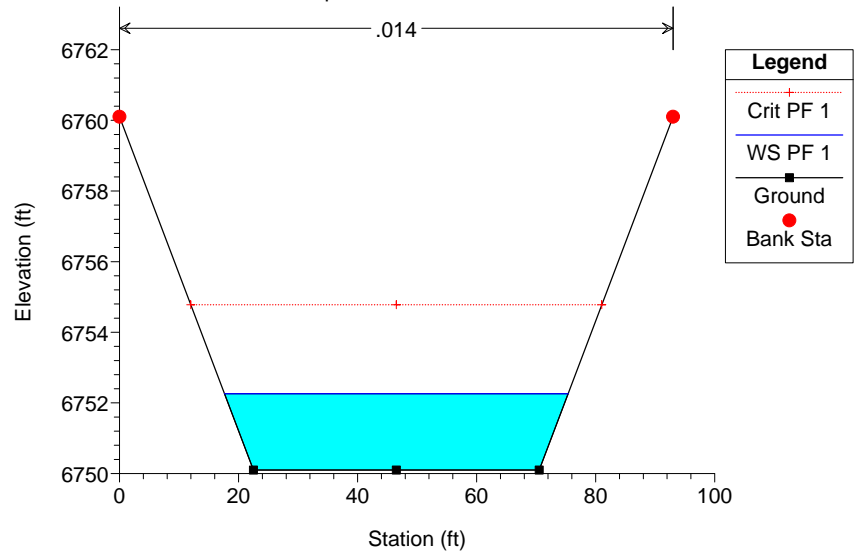
HEC-RAS Plan: S=0.27; Q=100yr River: Spillway Channel Reach: 1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	103.4	PF 1	3111.00	6750.10	6752.26	6754.78	6763.77	0.027014	27.22	114.30	57.73	3.41
1	94.*	PF 1	3111.00	6749.85	6752.02	6754.53	6763.46	0.034987	27.14	114.61	57.75	3.40
1	84.6*	PF 1	3111.00	6749.59	6751.77	6754.27	6763.10	0.034456	27.01	115.17	57.80	3.37
1	75.2*	PF 1	3111.00	6749.34	6751.53	6754.02	6762.74	0.033885	26.87	115.79	57.85	3.35
1	65.8*	PF 1	3111.00	6749.08	6751.28	6753.75	6762.39	0.033426	26.75	116.30	57.89	3.33
1	56.4*	PF 1	3111.00	6748.83	6751.04	6753.51	6762.04	0.032926	26.62	116.87	57.93	3.30
1	47.*	PF 1	3111.00	6748.57	6750.78	6753.25	6761.71	0.032557	26.52	117.29	57.96	3.29
1	37.5999*	PF 1	3111.00	6748.32	6750.54	6753.00	6761.38	0.032145	26.41	117.77	58.00	3.27
1	28.2*	PF 1	3111.00	6748.06	6750.29	6752.74	6761.06	0.031835	26.33	118.14	58.03	3.25
1	18.8*	PF 1	3111.00	6747.81	6750.05	6752.49	6760.73	0.031459	26.23	118.60	58.06	3.23
1	9.39999*	PF 1	3111.00	6747.55	6749.79	6752.22	6760.42	0.031203	26.16	118.91	58.09	3.22
1	0	PF 1	3111.00	6747.30	6749.55	6751.98	6760.11	0.030881	26.08	119.31	58.12	3.21

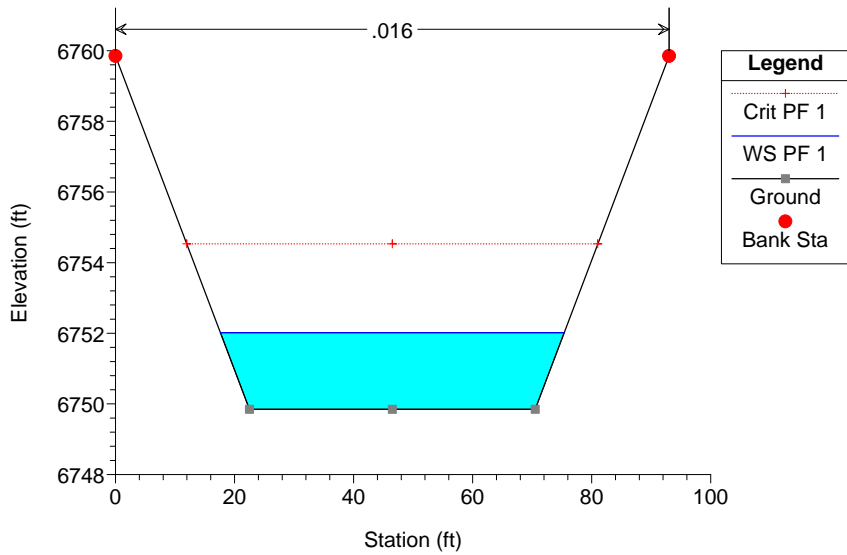
4003A-01 Spillway Plan: S=.027-4.5ft 8/22/2014
downstream invert



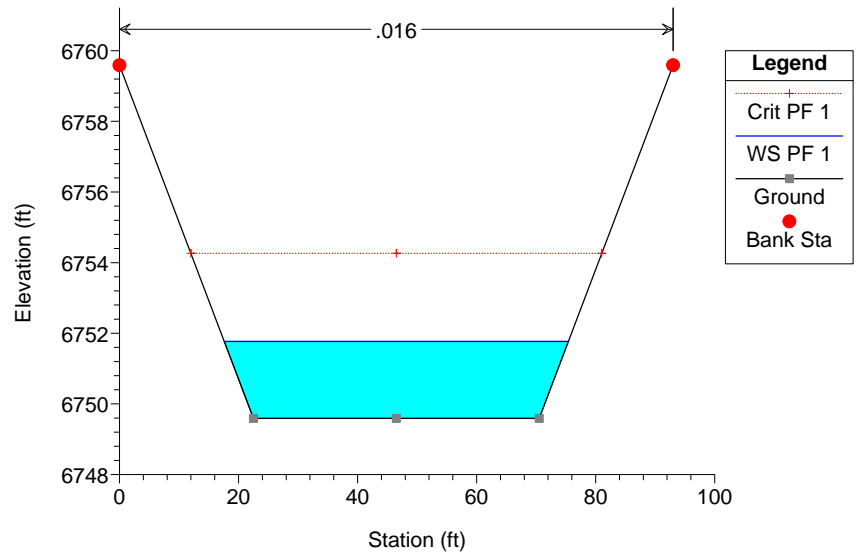
4003A-01 Spillway Plan: S=.027-4.5ft 8/22/2014
upstream invert EL 6749.6



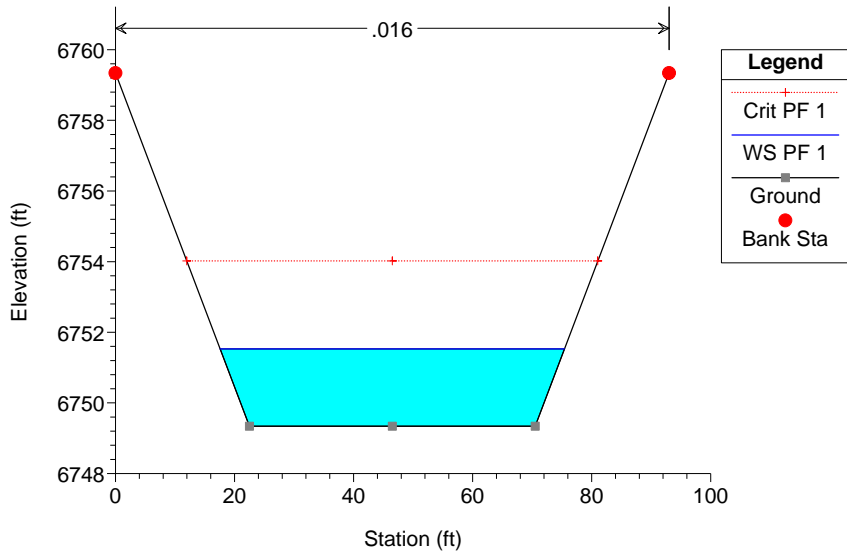
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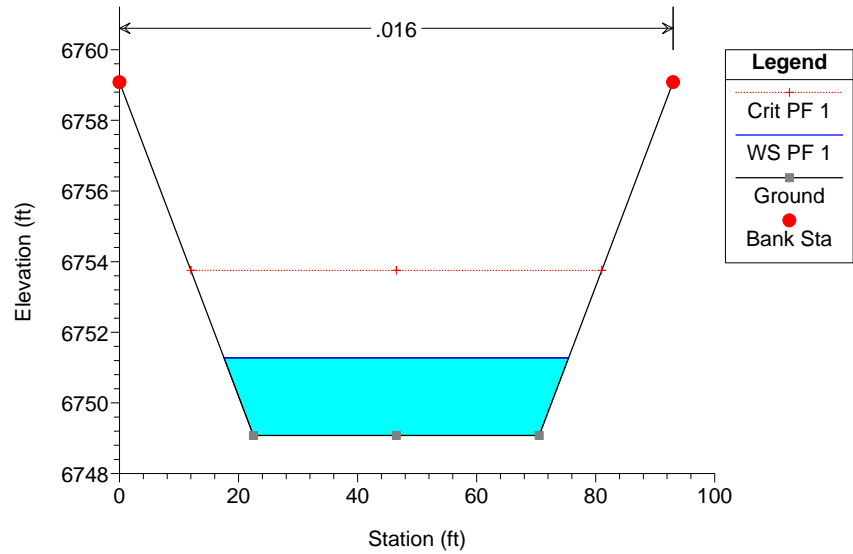
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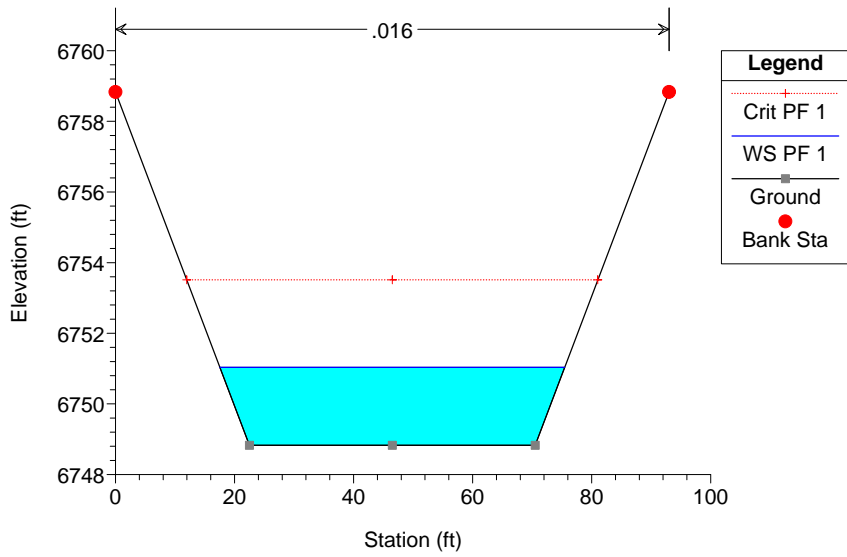
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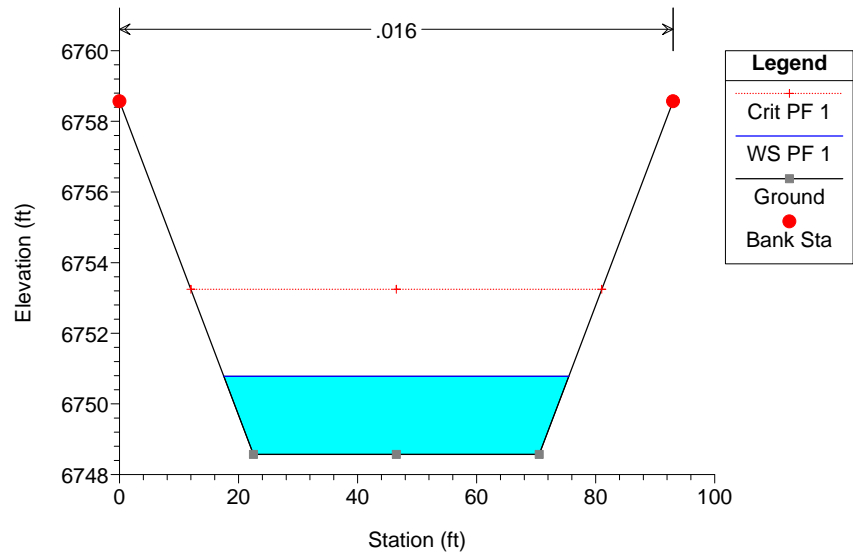
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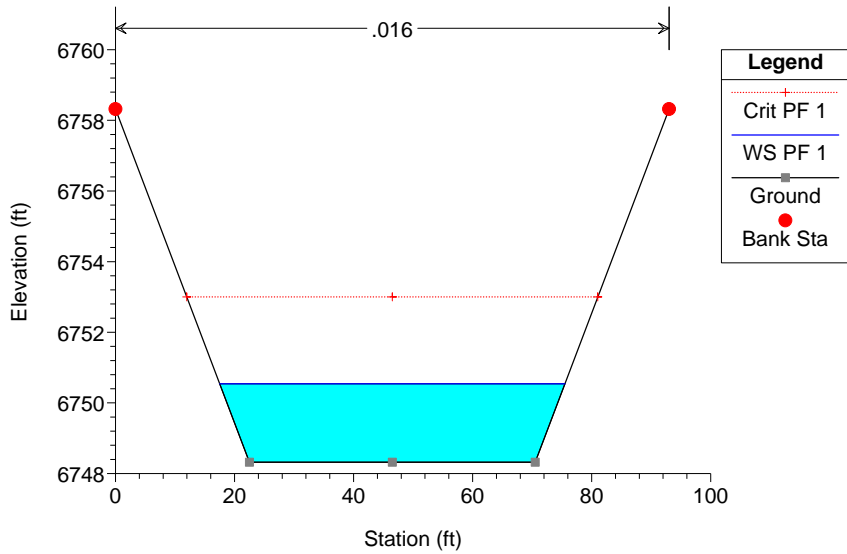
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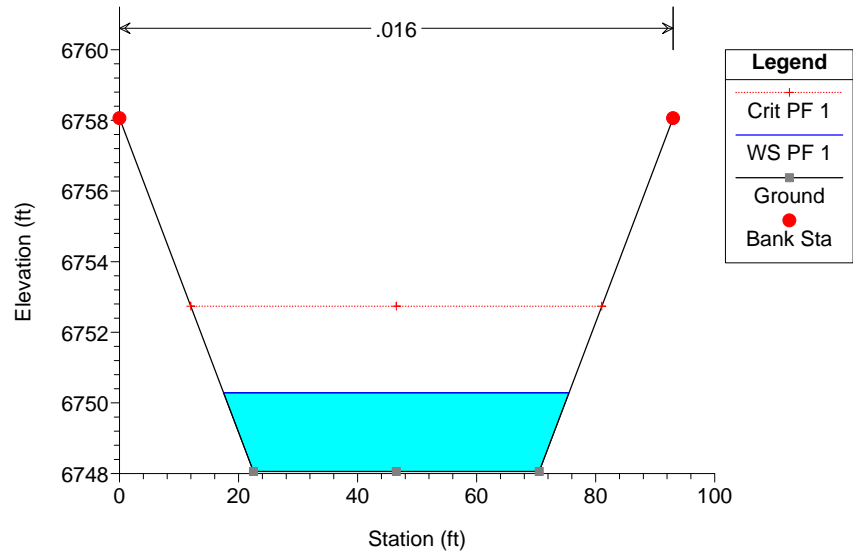
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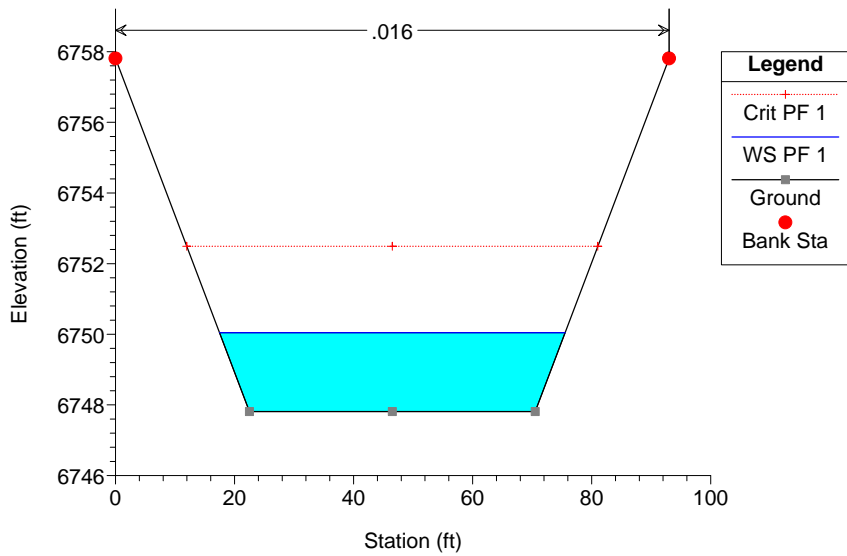
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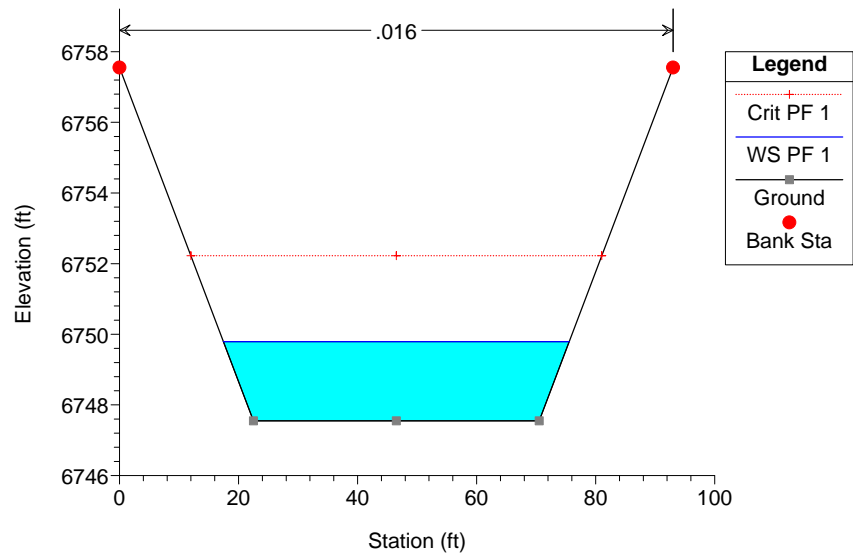
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4003A-01 Spillway Plan: S=.027-4.5ft 8/22/2014

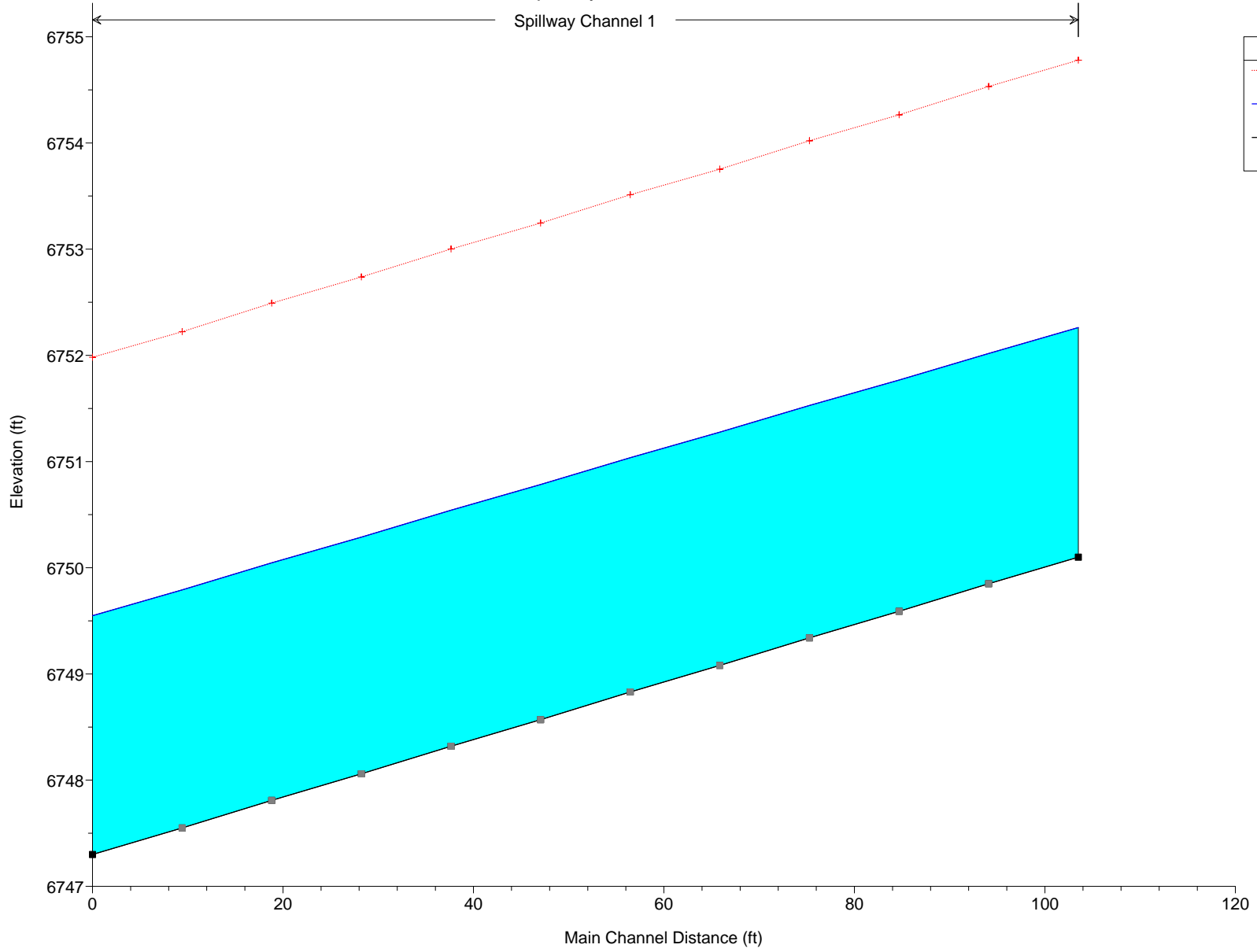


4003A-01 Spillway Plan: S=.027-4.5ft 8/22/2014



4003A-01 Spillway Plan: S=.027-4.5ft 8/22/2014

Spillway Channel 1



Legend	
Crit PF 1	Red dotted line with cross markers
WS PF 1	Blue solid line
Ground	Black solid line with square markers