Water Preserve Areas Feasibility Study
Selected Plan
acme design region (Acme B Impoundment)

Levee, Canals, Earth and Sitework
Submission to EN-C
Original Submission: 9 March 2001

1. Cost estimates are needed for design features associated with the Acme B Impoundment within the Water Preserve Areas (WPA) Feasibility Study. This cost estimate will be used as the Selected Plan in the study.

2. The point of contact for this request is Mr. Keith Jones, at extension 1127. Let me know if I can be of more assistance.

Attachments Provided:

1. Spreadsheet Analysis Report – 1 page
2. Geotechnical Data and Assumptions – 3 pages
3. 8 1/2″ x 11″ Layout Drawings – 2 pages
   - Site Layout (levees.dgn) – shows design
   - Alignments/Locations (levees.dgn) – shows levee and canal centerlines, distances and areas used for calculation, and cross section location
4. Cross Section Profiles – 1 page
5. Acme Design Region Scope – 2 pages
   - Contains a comprehensive list of design and cost feature

Water Preserve Areas Feasibility Study
Levees and Canals Summary of Material Quantities
Acme B Impoundment

Excavated Materials		Gross Volume cu-yds	Rock Volume cu-yds	Overburden Volume cu-yds	InRoads Volume cu-yds
Conveyance or Seepage Canals		0	0	0	
Intake and Discharge Basins		1049159	0	1049159	
Totals		**1049159**	**0**	**1049159**	
Amount reusable=	**70%**	**734411**	**0**	**734411**	
Amount spoil=	**30%**	**314748**	**0**	**314748**	
Quality Construction Material Required					
Fill Material Requirements		**733513**			
Revetment - 12" Bedding Stone		**0**			
Revetment - 18" Rip Rap		**0**			
Fill Minus Excavated Material		**-899**			

Excavation Requirements

Rock at Elevation = **-31.0** ft-NGVD and below

Conveyance or Seepage Canals	Length feet	Inside Slope 1V on ?H	Outside Slope 1V on ?H	Bottom Width feet	Average Ground ft-NGVD	Canal Invert ft-NGVD	Canal Cut Depth feet	Cross Section Area sqft	Gross Volume cu-yds	Rock Volume cu-yds	Overburden Volume cu-yds
							0.0	0	0	0	0
Total	**0**								**0**	**0**	**0**

Intake and Discharge Basins	Area sqft	Area Acres	Average Ground ft-NGVD	Invert ft-NGVD	Cut Depth feet	Gross Volume cu-yds	Rock Volume cu-yds	Overburden Volume cu-yds
S-531 Intake	19560	0.4	15.8	5.0	10.8	7824	0	7824
S-531 Discharge	83690	1.9	15.8	10.0	5.8	17978	0	17978
S-532B Intake	76520	1.8	15.8	10.0	5.8	16438	0	16438
S-532B Discharge	10930	0.3	15.8	10.0	5.8	2348	0	2348
Spillway Discharge	12875	0.3	15.8	10.0	5.8	2766	0	2766
Excavation Borrow - North	1175000	27.0	15.8	10.0	5.8	252407	0	252407
Excavation Borrow - East	1175000	27.0	15.8	10.0	5.8	252407	0	252407
Excavation Borrow - South	1175000	27.0	15.8	10.0	5.8	252407	0	252407
Excavation Borrow - West	1175000	27.0	15.8	10.0	5.8	252407	0	252407
Totals		**112.1**				**1049159**	**0**	**1049159**

Fill Material Requirements

Levees	Length feet	Inside Slope 1V on ?H	Outside Slope 1V on ?H	Top Width feet	Average Ground ft-NGVD	Top of Levee ft-NGVD	Levee Height feet	Cross Section Area sqft	Gross Volume cu-yds	InRoads Length cu-yds	InRoads Volume cu-yds
Impoundment L-506											
Northern Boundary	4975	3.0	3.0	12.0	15.8	32.0	16.2	982	180891		
Eastern Boundary	5005	3.0	3.0	12.0	15.8	32.0	16.2	982	181982		
Southern Boundary	5110	3.0	3.0	12.0	15.8	32.0	16.2	982	185800		
Western Boundary	5025	3.0	3.0	12.0	15.8	32.0	16.2	982	182709		
Impoundment Totals	**20115**								**731381**		
Southern Boundary Barrier - East	60	3.0	3.0	12.0	5.0	15.8	10.8	480	1066		
Southern Boundary Barrier - West	60	3.0	3.0	12.0	5.0	15.8	10.8	480	1066		
Barrier Totals	**120**								**2131**		
Totals	**20235**								**733513**		

Revetment	12" Bedding Stone Length feet	Width feet	Area acres	Depth feet	Gross Volume cu-yds	Rip Rap Length feet	Width feet	Area acres	Depth feet	Gross Volume cu-yds
Impoundment L-506										
			0.0		0			0.0		0
Totals	**0**		**0.0**		**0**	**0**		**0.0**		**0**

[***]Geotechnical Data and Assumptions to Use for Feasibility Level Cost Estimates (Amended 3/08/01)

Design Region: ACME (Acme B Impoundment)

Compaction Factor for Sandy Overburden:
Answer: 0.85

Swell Factor for Sandy Overburden:
Answer: 1.10

Compaction Factor for Rock:
Answer: 0.85

Swell Factor for Rock:
Answer: 1.30

Material Makeup of Levee Embankment:

Answer: Material may be utilized from the sand and gravel overburden excavated for the seepage canals/Fish refugia. A majority of the material will be excavated from inside the impoundment. It is estimated that overburden exists from ground surface to elevation –31 feet NGVD. From -31 to elevation –100 feet NGVD soft limestone bedrock will be encountered with intermittent Sand lenses.

Special Levee Construction Design Criteria:
Foundation Treatment:
Answer: Remove top 18 inches of overburden for levee width. In addition, assume 1% of levee length requires removal of 36 inches of overburden.

Seepage Control
Answer: Construct a soil-cemement-bentonite/polymer liner across the entire impoundment which is approximately 600 acres. The soil-cement-bentonite/polymer liner will be 1 foot thick and shall be mixed in place with conventional scrapers, graders or other similar equipment. Approximately 1 Million cubic yards of soil would require excavation and mixing. Following mixing in-place, the material must be compacted. Compaction requirements will be to 95% maximum dry density based upon standard proctor

[***] Assumptions based upon limited subsurface information and prior projects, as of 3/8/01

compaction tests or a nuclear density meter. It is assumed that the overburden has at least 10% by weight of fines. The mix design would require 95% soil, 5% cement by weight, and a very small percentage of bentonite or polymer. Further information on this type of product can be found at http://www.renolith.com/pond.html

Slope Protection:

Answer: Utilize the soil-cement mixture above to line the whole inside slope to 1 foot above the full pool elevation at elevation 26.2 feet NGVD. Grass downstream slopes similar to other WPA impoundments.

Where the material will come from?

Answer: Material will be obtained from onsite excavation of embankment soils and of scraping for liner construction.

Excavation Procedure/Technique and/or Blasting Requirements (at this location only):

Answer: Conventional excavation equipment is required. Blasting is not anticipated at this time.

Other Considerations:

-- When constructing the levee, the Contractor will be required to utilize 12 inch lifts which then will be compacted down to 10 to 11 inches. Compaction requirements will be to 98% maximum dry density based upon standard proctor compaction tests or a nuclear density meter. Also, control of excessive moisture shall be the responsibility of the Contractor.

Assume overburden soils have a unit weight of 115 pcf while limestone has unit weight of 145 pcf for hauling purposes.

Percentage of Usable Excavated Overburden Soil Material:

Answer: Assume 70% of the material can be reused. The remaining 30% should be disposed of onsite or at an approved disposal area. Using excess unsuitable material to build wind breaks, boat ramps or to flatten interior slopes is recommended also. The distribution of overburden soil versus rock is detailed above in red.

Percentage of Usable Excavated Rock Material:

Answer: Rock is not anticipated to be utilized for the project.

Geotechnical Instrumentation:

NOTE: This instrumentation is required for monitoring and operational safety of project features within the design region.

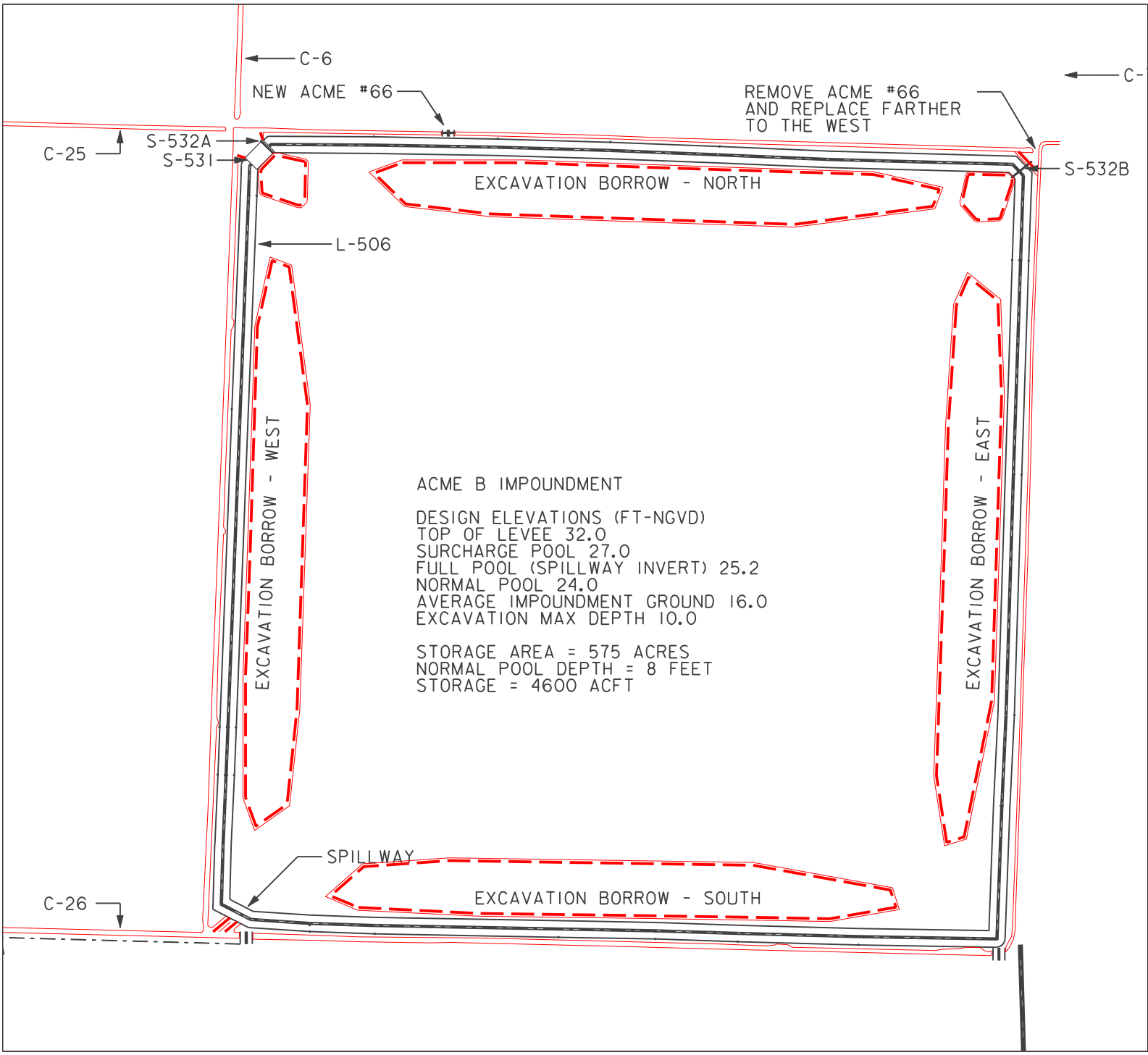
1. Shallow Depth Piezometers (∓ 5.0 feet from natural grade)
   Answer: Assume 4 shallow piezometers.

2. Medium Depth Piezometers (greater than 5.0 and less than 50 feet from natural grade) Answer: Assume 10 medium depth piezometers.

3. Deep Depth Piezometers (greater than 50 feet from natural grade) Answer: Assume 10 medium depth piezometers.

4. Inclinometers – Answer: Assume 1 inclinometer is required.

5. Others



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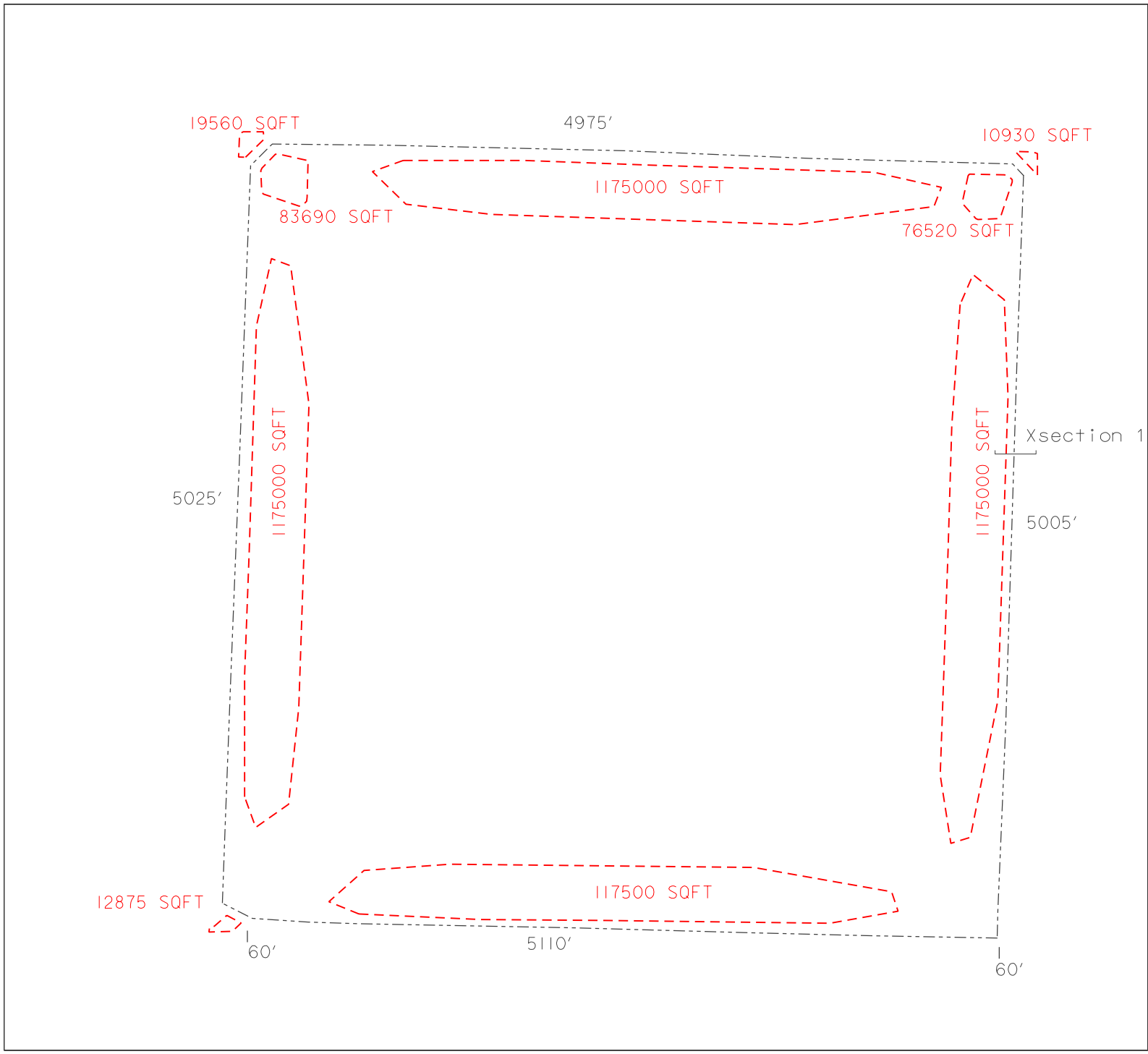

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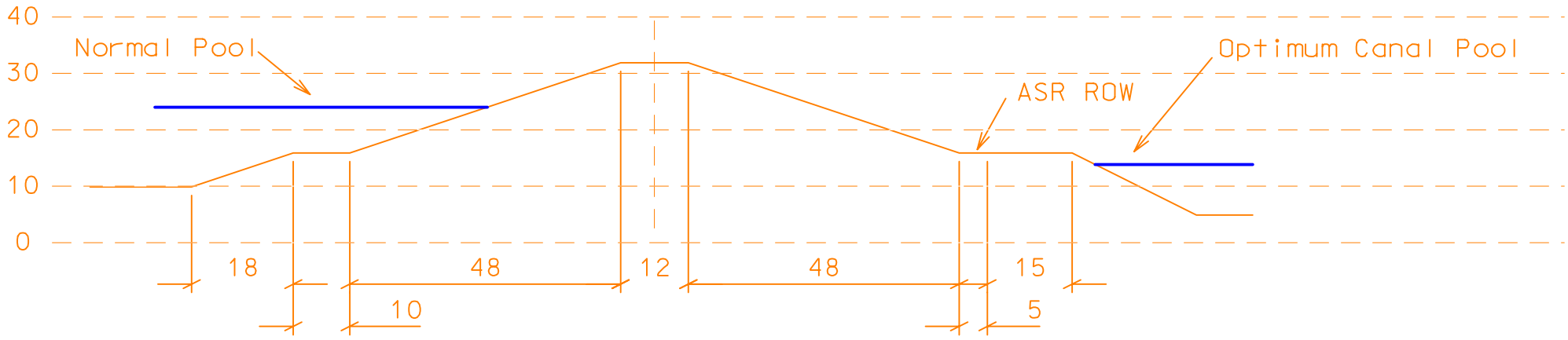
Xsection 1 of Acme Impoundment
Eastern Levee of Acme Impoundment
Looking North



Design Elevations (ft-NGVD)
Top of Levee 32.0
Surcharge Pool 27.0
Full Pool (Spillway Invert) 25.2
Normal Pool 24.0
Average Impoundment Ground 16.0
Average Local Ground 15.0
Seepage or Conveyance Optimum 13.0-14.0
Excavation Max Depth 10.0
Bottom of Seepage or Conveyance 5.0

Preliminary Design Slopes
Outside Levee Slope = 1V:3H
Inside Levee Slope = 1V:3H
Canal (Seepage or Conveyance) Slope = 1V:2H
Excavation Borrow Slope = 1V:3H

5' set aside for ASR ROW at
outside toe of impoundment levee

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Design Region: acme (Acme B Basin)

Design:
a) Design levees for 8′ deep impoundment. Consider future ASR systems retrofit in design. Plug C-26 on southern boundary.
b) Design gated culverts and a pump station for an 8′ deep impoundment.
c) Rebuild Acme Improvement District structure #66 approximately 3800 feet west of current location with an un-gated 72″ concrete culvert, 50′ length.
d) Construct a soil-cemement-bentonite/polymer liner across the entire impoundment which is approximately 600 acres. The soil-cement-bentonite/polymer liner will be 1 foot thick and shall be mixed in place with conventional scrapers, graders or other similar equipment.
e) Design levees for 4′ deep STA. Allow area for chemical treatment plant.
f) Design pump stations for inflow and discharge for STA.
g) Design seepage control and compartment water level control structures for STA.

Acme B Impoundment
Design Elevations (Ft-NGVD)
Top Of Levee 32.0
Surcharge Pool 27.0
Full Pool (Spillway Invert) 25.2
Normal Pool 24.0
Average Impoundment Ground 16.0
Excavation Max Depth 10.0

Storage Area = 575 Acres
Normal Pool Depth = 8 Feet
Storage = 4600 Acft

Pumps:
1. S-531 Impoundment inflow pump
2. S-533 STA inflow pump
3. S-534 STA discharge pump

Gated Culverts:
1. S-532 Impoundment discharge control structure
2. S-535 STA seepage control structures
3. S-536 STA compartment level control structures

Un-gated Culverts:
1. Acme #66 – Access to impoundment and features from the northern boundary.

Levees:
1. L-505 STA impoundment levee
2. L-505I STA internal compartment levee
3. L-506 Impoundment levee

Canals:
1. C-505 STA seepage canal along outside boundary
2. C-505I STA internal distribution canals

Facilities:
1. Chemical pre-treatment facility prior to flowing through STA marsh

Utilities:
1. Phone and electric

Issues:
1. Chemical treatment plant design can possibly be obtained from SFWMD.
2. Conveyance between impoundment and STA has been stated as being appropriate.
3. Basin flood protection levels dependant on a combination of several factors including basin removal rates, impoundment drawdown rates and allowable drawdown routes and times.