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December 8, 1986

TO: File

FROM: Tom Munson, Reclamation Hydrologist *TM*

RE: Drainage Channel Calculations for Western States Minerals Corporation, J. B. King Mine, INA/015/002, File #3, Emery County, Utah

Synopsis of Correspondence

September 4, 1986, Phil Ralphs and Tom Munson visited the J.B. King Mine site and observed severe erosion in three areas; the mine refuse pile area, the main ephemeral channel, and the feeder ditch channel. On October 3, 1986, Tom Munson and John Whitehead met with Mike O'Donnell of Western States Minerals to discuss the concerns noted on site in September. October 28, 1986, Tom Munson, Kathy Mutz and Phil Ralphs met at the J. B. King site with Mr. O'Donnell to further discuss the areas of concern. A follow up letter to Mr. O'Donnell dated November 3, 1986 documents the site visit and a telephone conversation with him on October 31, 1986 requested a written submittal to address these concerns by November 21, 1986.

The submittal addressing these concerns was received by the Division on November 24, 1986. Review of the November 24, 1986 submittal reveals it does not provide complete and adequate information necessary to demonstrate channel capacity, riprap sizing, and filter blanket requirements capable of safely passing the 100-year, 24-hour precipitation event. The plan also does not adequately address methods to control erosion in the area between the refuse pile and the ephemeral channel.

Recommendations

The following directives regarding the erosion problems found at the J. B. King reclaimed mine site should be required of Western States Minerals.

Intercept Ditch

An intercept ditch is needed at the base of the highwall to route flows to the main ephemeral channel from the drainage area above the portal bench area to prevent erosion in area between the refuse pile and the ephemeral channel. A triangular channel is suggested, with 2.0:1 sideslopes and 2.0 feet deep. Riprap gradation for this channel is as follows.

D100	8"
D 85	6.5"
D 50	4.0"
D 20	2.0"
D 10	1.3"

This channel would run from the end of the refuse pile to its interception with the main ephemeral channel at a 3 percent slope towards the main ephemeral channel (see attached map). The entire 2.0 foot channel depth will be riprapped. A 9-inch deep, 2-inch minus gravel filter blanket shall be placed under the graded riprap. The depth of the riprap will be 8 inches deep. The channel depth will be in addition to the depth of the riprap or the filter blanket. If a trapezoidal channel configuration is preferred, the Division would calculate the appropriate channel dimensions for the operator at his request.

Main Ephemeral Channel

The following channel parameters are needed for the main ephemeral channel. A trapezoidal ditch with a 6-foot bottom width, 1.7 foot depth and 2:1 sideslopes would be acceptable to the Division. The riprap gradation is as follows:

D100	18.7"
D 85	16.0"
D 50	15.0"
D 20	7.5"
D 10	5.0"

A 15-foot apron at the transition zone between the steep slope section and the mild slope below station 8+00 using the same riprap gradation is necessary. The entire 1.7 foot channel depth will be riprapped and any regraded slope above the height of the

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riprapped portion of the channel will be brought back to a 3.0:1 sideslope or less to prevent erosion. A 9-inch deep, 2-inch minus gravel filter blanket will be placed under the graded riprap. The depth of the riprap will be 1.7 feet deep. The channel depth will be in addition to the depth of the riprap or the filter blanket.

Feeder Ditch Channel

The following channel parameters for the feeder ditch channel are required. The channel will consist of a trapezoidal ditch with a 3-foot bottom width, 1.4 foot depth, and 2.0:1 sideslopes. The riprap gradation is as follows:

D100	19.6"
D 85	18.0"
D 50	15.6"
D 20	7.8"
D 10	5.1"

A 15-foot apron at the transition zone between the steep slope section and the mild slope at the base of the feeder ditch using the same riprap gradation is needed. The entire 1.4 foot channel depth shall be riprapped and any slope above the height of the riprapped portion of the channel will be brought back to a 3.0:1 sideslope or less. A 9-inch deep, 2-inch minus gravel filter blanket will be placed under the graded riprap. The depth of the riprap will be 1.63 feet deep. The channel depth will be in addition to the depth of the riprap or the filter blanket. Extra care will be taken placing riprap where the bedrock outcrops to insure stability of the channel downstream of this point.

General Directives

Filter cloth should not be used under riprap unless it is covered by a 9-inch deep, 2-inch minus gravel filter blanket to prevent tearing of the cloth prior to placement of the riprap. The placement of the gravel filter blanket would be considered more than adequate to provide adequate riprap stability.

djh
cc: K. Mutz
P. Ralphs
J. Whitehead
9486R/6

INPUT PARAMETERS TO
DEFINE
CHANNEL CHARACTERISTICS

I. Intercept Channel for Area D

Assumptions for Proposed Channel

1. 3% Slope
2. Flows along base of highwall to intercept main ephemeral channel.
3. Drainage area = 7.0 acres
4. Hydraulic length = 625.0 feet
5. Permissible velocity for fine sand (U.S. Army Office [1970]) = 2 F.P.S.

Assumptions for Peak Flow

1. Drainage area = 7.0 acres
2. Hydraulic length = 546.0 feet
3. Land slope = 35%
4. 100-year, 24-hour precipitation = 2.3 inches
5. Storm distribution = SCS Type II
6. CN = 90
Peak flow = 9.62

II. Eroded Area of Main Channel

Assumptions for Proposed Channel

1. 20% slope
2. Area of channel between sections 5+50 and 8+00
3. Drainage area = 41.2 acres
4. Permissible velocity for fine sand (U.S. Army Office [1970]) = 2 F.P.S.

Assumptions for Peak Flow

1. Drainage area = 41.2 acres
2. Hydraulic length = 2530.0 feet
3. Average land slope = 12%
4. 100-year, 24-hour precipitation = 2.3 inches
5. Storm distribution = SCS Type II
6. CN = 90

Peak flow = 54.29 cfs

III. Feeder Ditch

Assumptions for Proposed Channel

1. 20% slope
2. Area of channel restoration = A 0 + 00 to A 4 + 00
3. Drainage area = 9.39 ac.
4. Permissible velocity for fine sand (U.S. Army Office [1970]) = 2 F.P.S.

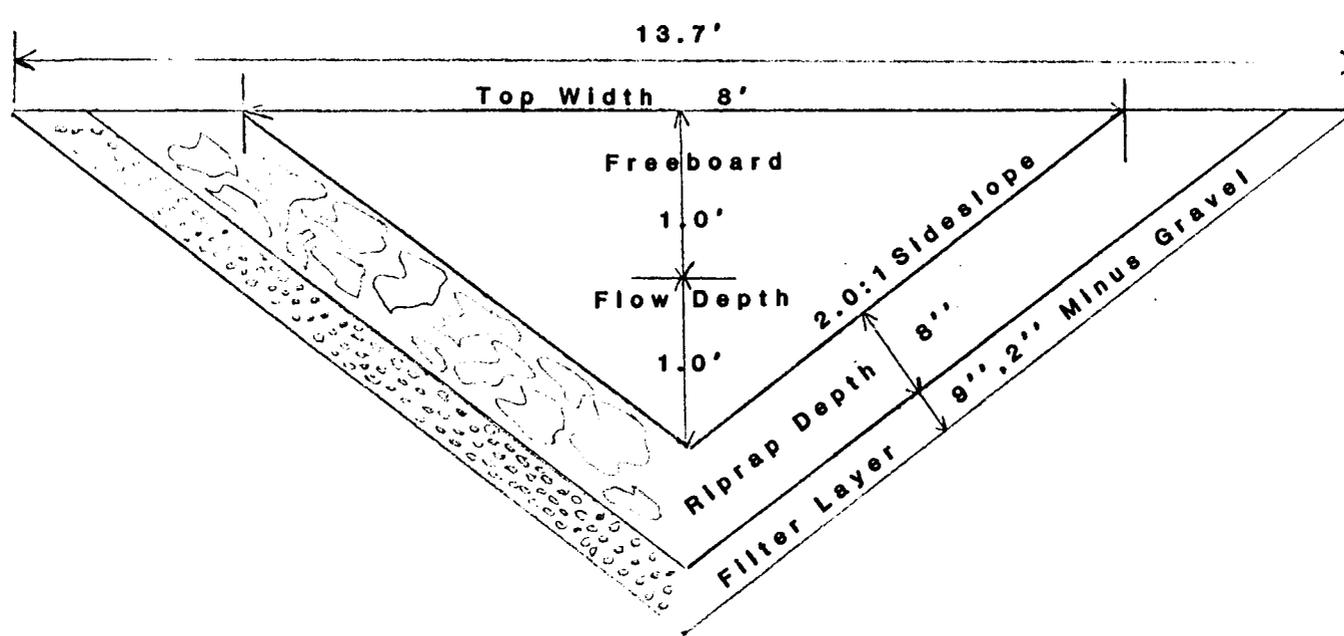
Assumptions for Peak Flow

1. Drainage area = 9.39 ac.
2. Hydraulic length = 1442.0 feet
3. Average land slope = 14%
4. 100-year, 24-hour precipitation = 2.3 inches
5. Storm distribution = SCS Type II
6. CN = 90

Peak flow = 12.47 cfs

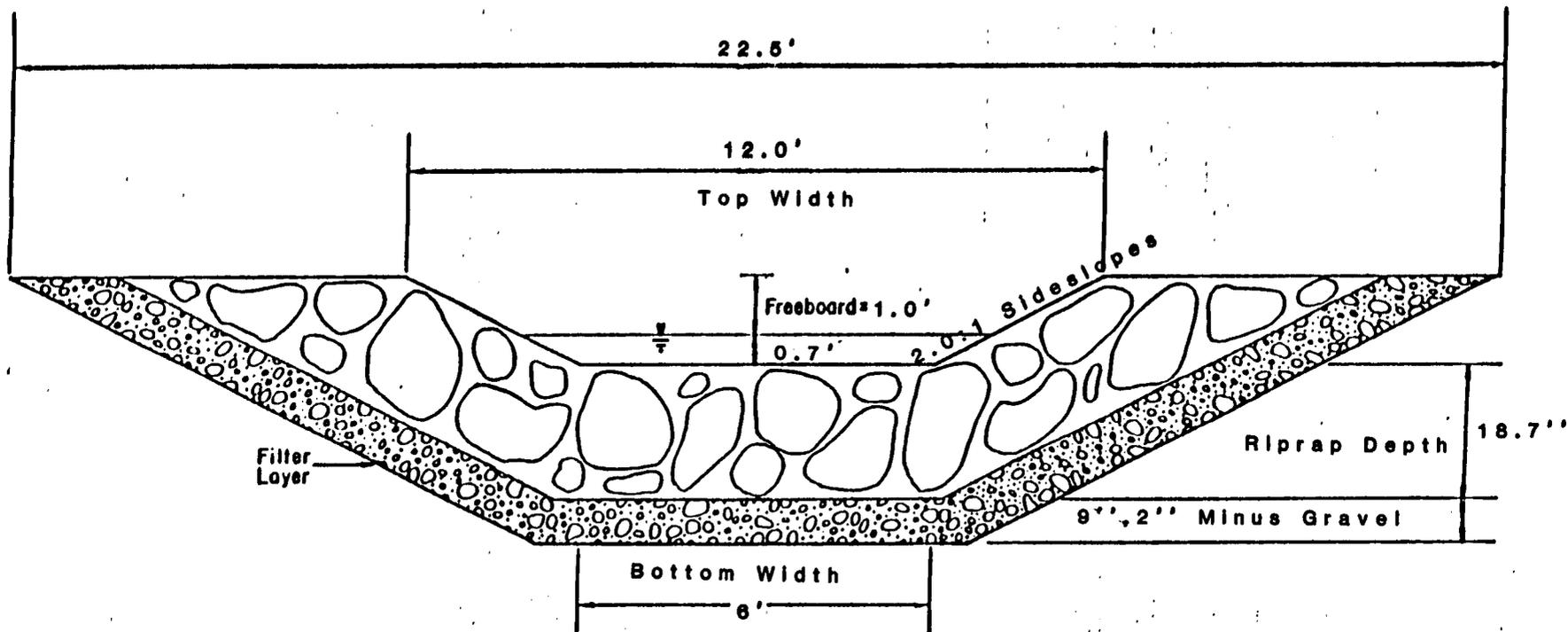
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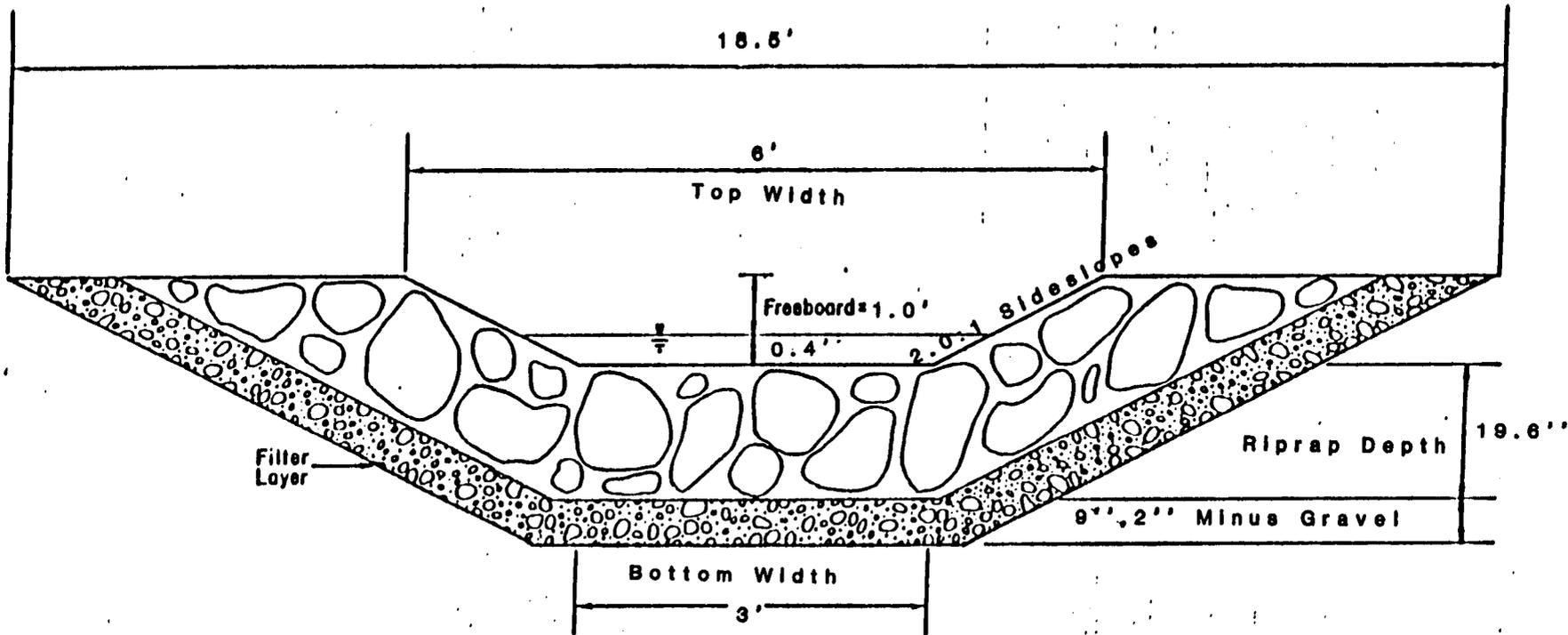
Typical channel dimensions

for intercept ditch

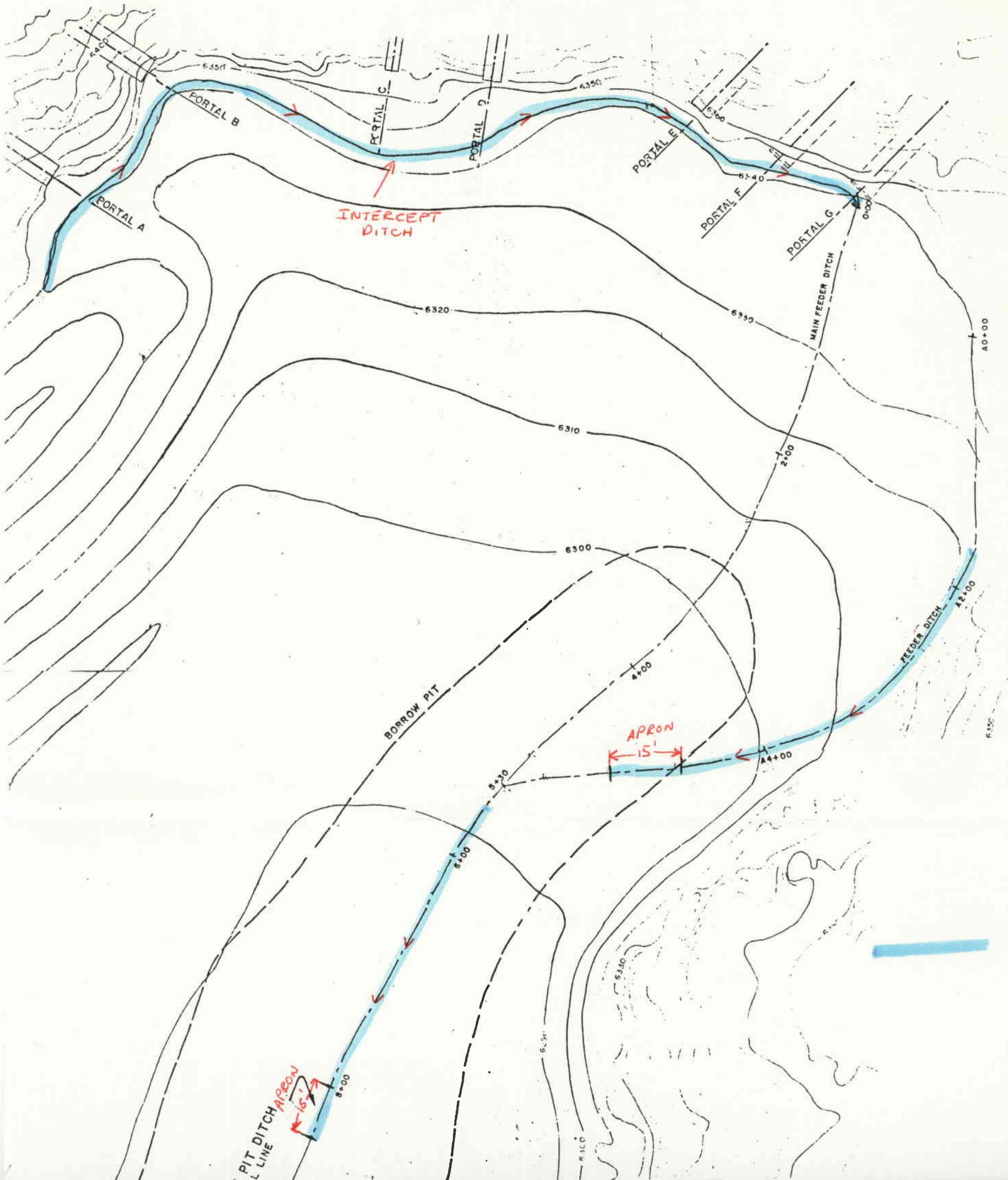


Typical channel dimensions

for main channel



Typical channel dimensions
 for feeder ditch



INTERCEPT
DITCH

APRON
15'

PIT DITCH APRON
15'

RIPRAPPED
PORTION
OF
DITCH