

# Memorandum

September 10, 2021

To: Chelan County Floodplain Administrator  
Chris Young – Chelan County Building Official

From: David Rice, P.E. – Anchor QEA, LLC

cc: Kevin Haydon – Washington Water Trust  
Tim Walsh – Cascade Orchards Irrigation District

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**Re: Summary of Cascade Orchards Irrigation Intake System Floodplain Analysis**

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This memorandum has been prepared to document the floodplain evaluation completed for the Cascade Orchards Irrigation Company (COIC) intake and pumping facilities, which will be constructed within the 100-year floodplain of Icicle Creek as part of an improvement project that will replace the existing COIC delivery system. As part of the project, the COIC surface water diversion, which is currently located at the mouth of Icicle Canyon at River Mile (RM) 4.5, will be replaced with intake and pumping facilities located downstream on left bank of Icicle Creek, at RM 1.9, closer to the confluence of the Wenatchee River and Icicle Creek. The gravity-fed ditch and lateral system will be completely replaced by a pressurized network of delivery pipelines. The project will conserve water and will restore flows to a portion of Icicle Creek where additional flows are needed in the late summer to provide habitat and passage for fish listed under the endangered species act (ESA). This memorandum is provided to support the application for a Floodplain Development Permit for the project, which will require review by Chelan County's Floodplain Administrator

## Project Overview

Icicle Creek is a major tributary to the Wenatchee River and provides habitat for ESA-listed fish species, including Chinook salmon, bull trout, and steelhead. The primary out-of-stream water uses in the Icicle Creek Subbasin include irrigation, fish rearing at LNFH, and municipal use. Out-of-stream water use has reduced flows in lower Icicle Creek and impacted passage and habitat conditions for ESA-listed species. Improving instream flows in lower Icicle Creek is one of the primary goals of resource managers and stakeholders in the Icicle Creek Subbasin.

COIC operates a network of open ditches and pipelines that deliver water for irrigation to properties west of Icicle Creek and south of the Wenatchee River near Leavenworth, Washington. These facilities are supplied through a surface water diversion on the left bank of Icicle Creek at RM 4.5, which is shared with Leavenworth National Fish Hatchery (LNFH). The lower portion of Icicle Creek, downstream of the existing COIC surface water diversion, has experienced frequent low streamflow problems, especially in the late summer through the reach near LNFH. The project will allow flows currently diverted from Icicle Creek to pass through a reach that has been identified as flow deficient

in the late summer. The additional flows will enhance stream flows that support critical habitat for fish and wildlife, including improving passage for ESA-listed fish species. The project will also improve the efficiency and operation of the COIC delivery system.

The present-day COIC irrigation system delivers their 11.9-cubic-feet-per-second (cfs) water right via approximately 2 miles of mostly unlined ditch following Icicle Creek Road to the northwest of Icicle Creek and discharges excess water to the Wenatchee River just upstream from its confluence with Icicle Creek. The COIC improvement project will replace the existing delivery system and address existing streamflow issues and other challenges by shifting the point of diversion from a gravity diversion on Icicle Creek to a new intake and pumping facilities located closer to the confluence of Icicle Creek and the Wenatchee River. The new facilities will supply a completely closed, pressurized delivery system that will replace the existing open ditch delivery system.

## **Intake and Pumping Facilities**

The project will construct intake and pumping facilities on the left bank of Icicle Creek at approximately RM 1.9, on Chelan County Parcel No. 241713510251 north of the east end of Shore Street near Leavenworth, Washington. A site plan and profile of the facilities is included as Attachment A to this memorandum. The intake and pumping facilities will include the following key components that will be constructed within the 100-year floodplain of Icicle Creek:

- **Intake Fish Exclusion Screen** – A self-cleaning cone screen with a hydraulic brush will be installed in the thalweg of Icicle Creek to keep fish out of the intake pipeline. The screen will have a 66-inch diameter base and will be 18 inches in height. It will be mounted on the top of a 60-inch pre-cast concrete manhole that will be buried in the bottom of the creek.
- **Intake Pipeline** – A 24-inch HDPE pipeline will extend from the manhole through the left bank of Icicle Creek to a control manhole buried at the top of the bank. The 24-inch pipe will be completely buried under the creek channel and will convey water from the creek to the control manhole on the bank and from the control manhole to a settling basin to be constructed in the center of Parcel No. 241713510251.
- **Control Manhole** – A manhole will be installed a few feet upland of the top of the left bank of Icicle Creek. A gate installed in the manhole will control flow through the intake pipeline.
- **Settling Basin** – Water will flow from the intake pipeline into a settling basin constructed landward of the intake facilities in the middle of Parcel No. 241713510251, which is being acquired by COIC for the intake and pumping facilities. The settling basin will extend from a few inches above the existing ground surface to a depth approximately 25 feet below the ground surface. The depth is required to capture flows that match the water surface elevation in Icicle Creek under low flow conditions and provide some volume at the bottom for sediment to settle out before pumping.

- **Pump Station** – The settling basin will convey water to a wet well that will be the same depth as the settling basin and constructed below a pump station building. The pump station will consist of a 16-foot by 22-foot timber frame building that will house four vertical turbine pumps, discharge pipe and fittings, valves, and controls.

## **Floodplain Analysis**

The 100-year floodplain and floodway were mapped by overlaying an image of FEMA FIRM Panel 5300150787 B with the site plan and rotating and scaling it to match the location of the site plan, as shown on the drawings provided in Attachment A. The mapping confirms that the intake screen will be constructed within the Icicle Creek regulatory floodway, as represented on the Flood Insurance Rate Map (FIRM) for the area (FIRM Panel 5300150787 B), which was obtained from the Federal Emergency Management Agency (FEMA) floodplain mapping web site. The settling basin and pump station will be constructed outside the Icicle Floodway, but within the 100-year floodplain (Flood Zone AE) shown on FEMA FIRM Panel 5300150787 B.

Anchor QEA discussed requirements for constructing facilities within the floodplain with Christina Wollman of Pertee, the County's floodplain review consultant. Based on that discussion and subsequent analysis and emails, the base flood (100-year flood) elevation at the pump station location was identified as 1115.8 feet, based on the National Geodetic Vertical Datum of 1929 (NGVD 29). At the project site, that elevation is equal to an elevation of 1,119.7 feet relative to the North American Vertical Datum of 1988 (NAVD 88), which is the vertical datum used for the design of the intake and pumping facilities.

Based on these elevations, the finished floor of the pump station and top of the walls around the settling basin have been set at an elevation of 1,119.7 feet NAVD 88. The County's floodplain reviewer indicated that the County Code will require that all structures constructed within the floodplain be waterproofed to an elevation equal to the base flood elevation plus 12 inches. To accommodate this requirement, the pump station building will include reinforced concrete stem walls that will extend up to an elevation of 1,120.7 feet NAVD 88. The main doors to the facility will also be waterproofed up to an elevation of at least 1,120.7 feet NAVD 88.

## **No Rise Requirements**

The County's floodplain consultant also indicated that the County Code requires that construction within the floodway, which is the portion of a stream or river channel that provides conveyance capacity for peak flows, result in no increase in base flood elevation. These requirements are outlined in Section 3.20.200 – Regulatory Floodways in the Chelan County Code. The only construction that is occurring within the regulatory floodway will be installation of the intake screen. The screen will occupy a small area at the bottom of the thalweg of icicle Creek and is designed to be mostly porous. The screen will not cause a measurable rise in the base flood elevation.

In addition, the project has been designed so that the dimensions, shape, and grades of the creek channel will be restored to existing conditions following construction of the intake screen and intake pipeline. Streambed boulders, gravels, and other materials will be excavated and stockpiled at the top of the stream bank during construction of the se facilities. Materials will then be placed, including streambed boulders and cobbles, to the same grades and elevations as the existing stream channel. This work will result in no measurable change to the base flood elevation in the creek.

## **Conclusions**

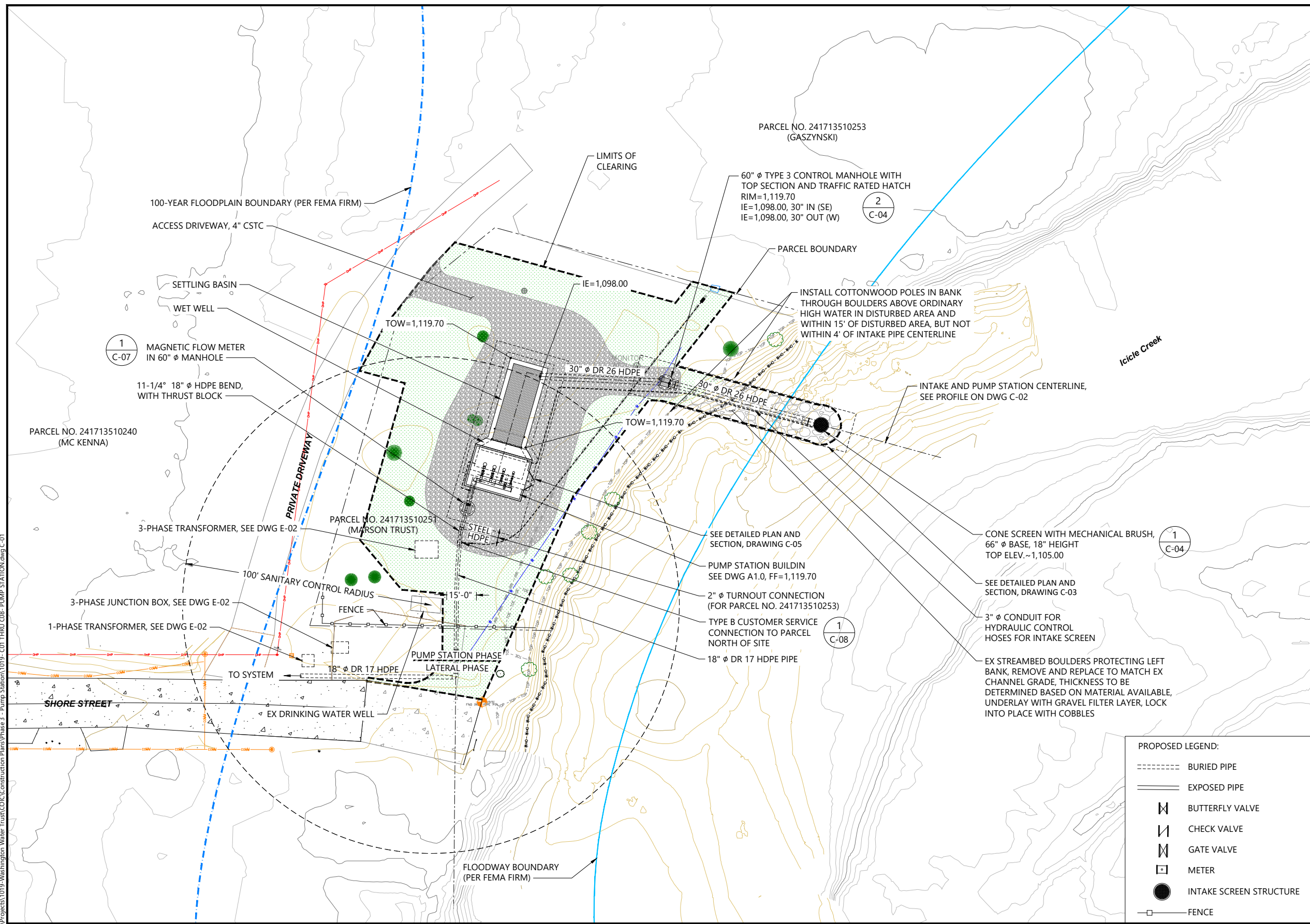
Based on our evaluation of the project, we believe that the construction of intake and pumping facilities for the project will comply with the County's floodplain development requirements. The intake screen, which is the only component that will be constructed within the regulatory floodway, will not result in an increase in the base flood elevation. The pump station and settling basin facilities, which will also be constructed within the 100-year floodplain, have been designed to be waterproof to an elevation of at least 1,120.7 feet NAVD 88, which is 12 inches higher than the base flood elevation at the pump station of 1,119.7 feet NAVD 88 (1,115. 8 feet NGVD 29).

We appreciate the opportunity to provide this information on behalf of our client, Washington Water Trust, and the project townner, COIC. Please contact us with any questions or comments.

## **Attachment A**

### **Intake and Pumping Facilities Site Plan and Profile**

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May 08, 2021 2:41pm drice



- LEGEND:**
- EXISTING CONTOURS (1' AND 5' FROM LIDAR)
  - EXISTING CONTOURS (1' AND 5' FROM SURVEY)
  - SURVEYED PARCEL BOUNDARY
  - ORDINARY HIGH WATER MARK
  - DECIDUOUS TREE
  - CONIFER TREE
  - POWER POLE
  - POLE ANCHOR
  - OVERHEAD POWER
  - TELEPHONE PEDESTAL
  - FIBRE OPTIC PEDESTAL
  - IRRIGATION VALVE
  - IRRIGATION LINE
  - DOMESTIC WATER
  - TOP OF SLOPE
  - TOE OF SLOPE
  - ASPHALT SURFACE
  - GRAVEL SURFACE
  - GRASS AREA
  - ROCK
  - CLEARING LIMITS
  - FENCE
  - FEMA 100-YEAR FLOOD PLAIN BOUNDARY
  - FLOODWAY BOUNDARY (PER FEMA FIRM)
  - BORING LOCATION

- PROPOSED LEGEND:**
- BURIED PIPE
  - EXPOSED PIPE
  - BUTTERFLY VALVE
  - CHECK VALVE
  - GATE VALVE
  - METER
  - INTAKE SCREEN STRUCTURE
  - FENCE



- NOTES:**
- HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83, U.S. FEET.
  - VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

**60% DESIGN - NOT FOR CONSTRUCTION**

ONE INCH  
AT FULL SIZE IF NOT ONE  
INCH SCALE ACCORDINGLY



**CASCADE ORCHARD IRRIGATION COMPANY**

REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION

DESIGNED BY: D. RICE  
 DRAWN BY: B. HURRY  
 CHECKED BY: D. RICE  
 APPROVED BY: R. MONTGOMERY  
 SCALE: AS NOTED  
 DATE: MARCH 2021

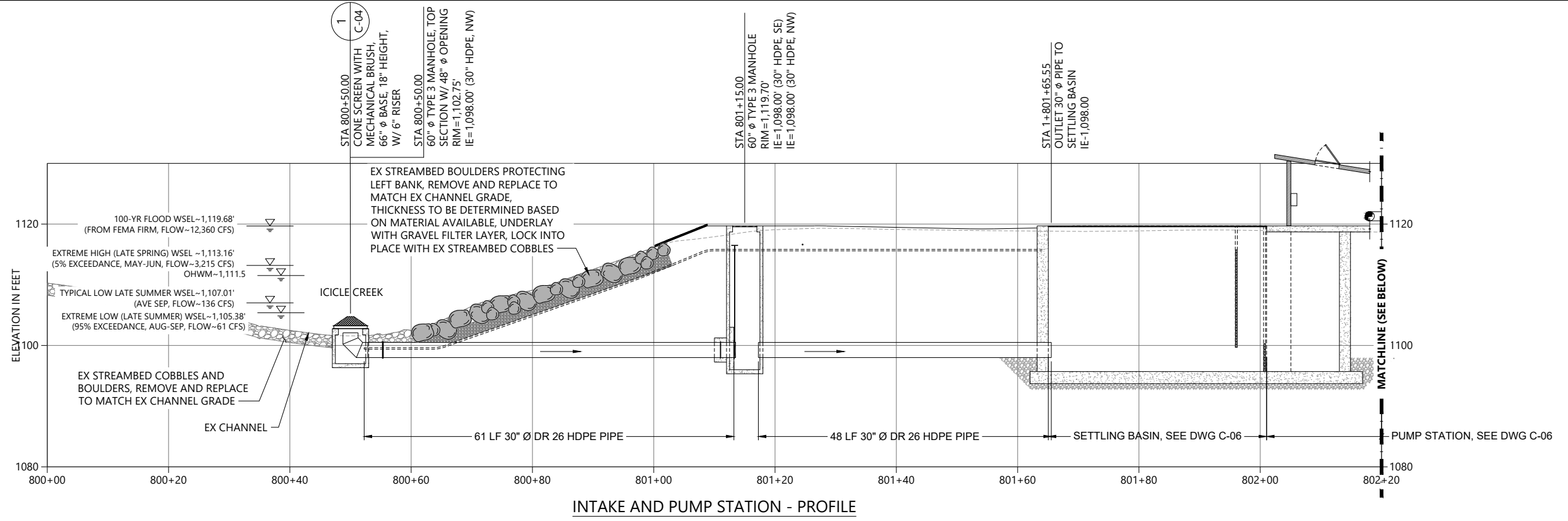
**CASCADE ORCHARD IRRIGATION COMPANY  
 IMPROVEMENT PROJECT  
 PHASE 3: INTAKE AND PUMPING FACILITIES**

**INTAKE AND PUMP STATION - SITE PLAN**

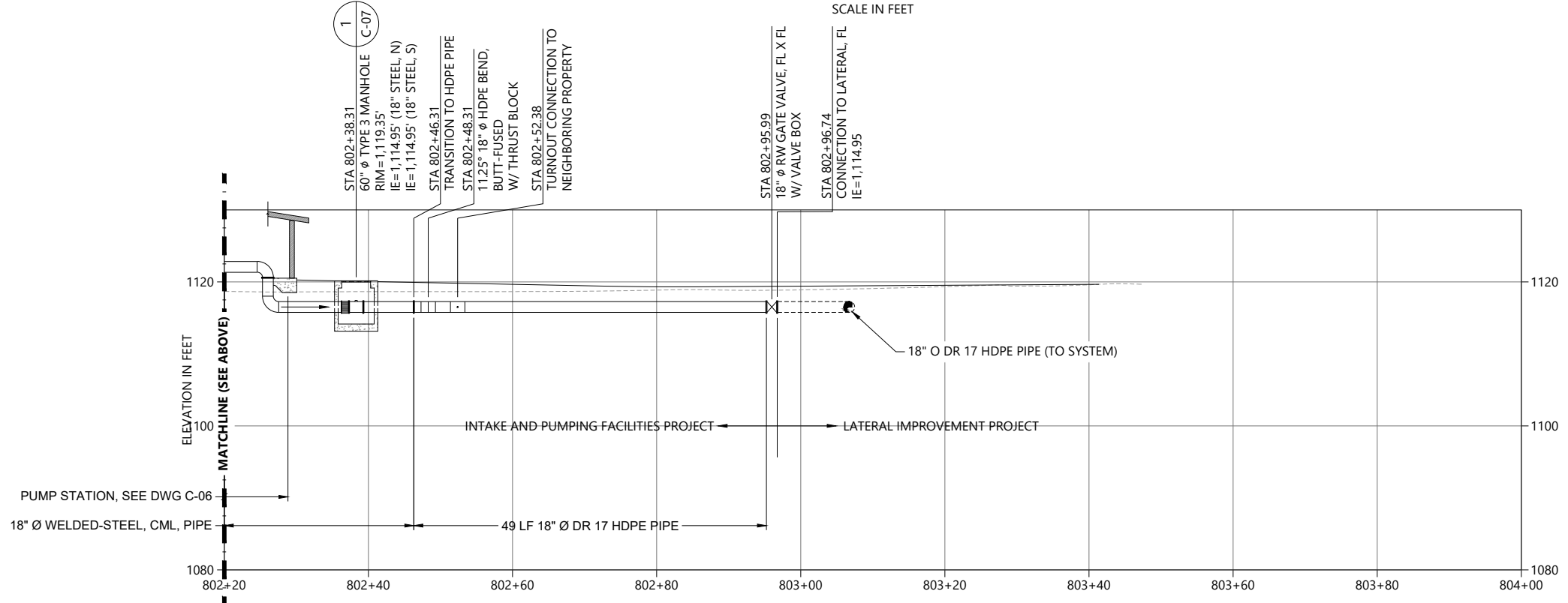
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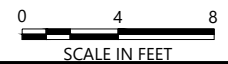
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INTAKE AND PUMP STATION - PROFILE



INTAKE AND PUMP STATION - PROFILE (CONT.)



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CASCADE ORCHARD IRRIGATION COMPANY

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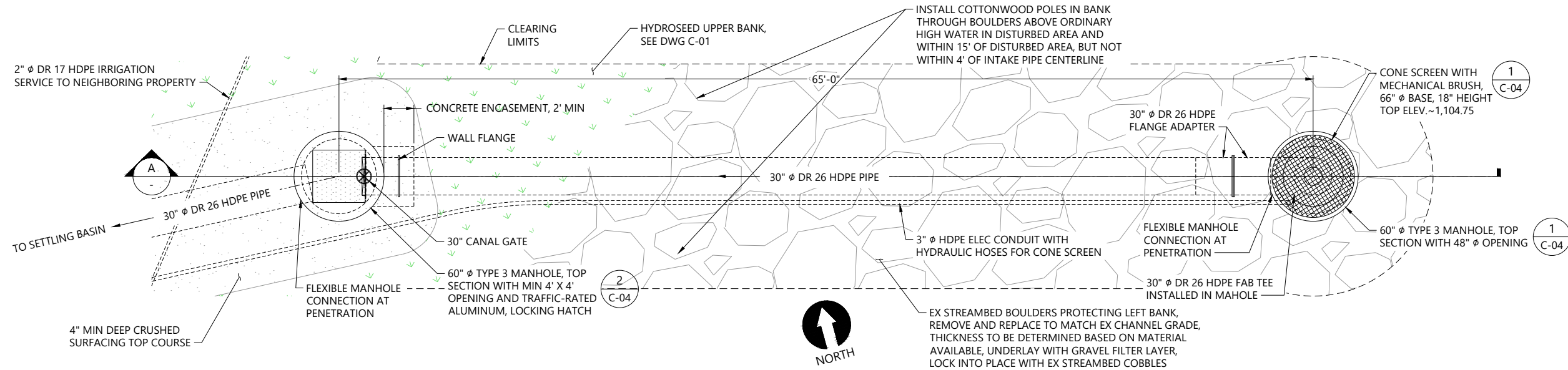
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 PHASE 3: INTAKE AND PUMPING FACILITIES**

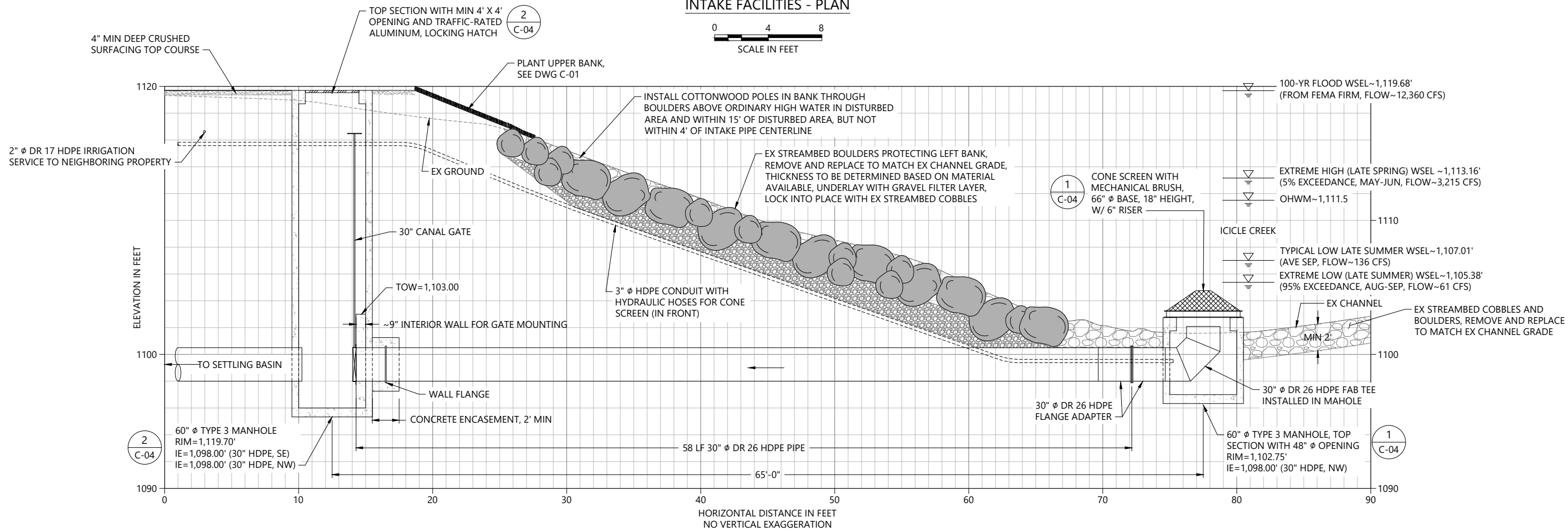
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**C-02**

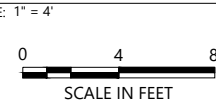
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INTAKE FACILITIES - PLAN



A INTAKE FACILITIES - SECTION



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**CASCADE ORCHARD IRRIGATION COMPANY  
 IMPROVEMENT PROJECT  
 PHASE 3: INTAKE AND PUMPING FACILITIES**

**INTAKE - EQUIPMENT PLAN AND SECTION**

**C-03**

SHEET NO. 14 OF 19

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