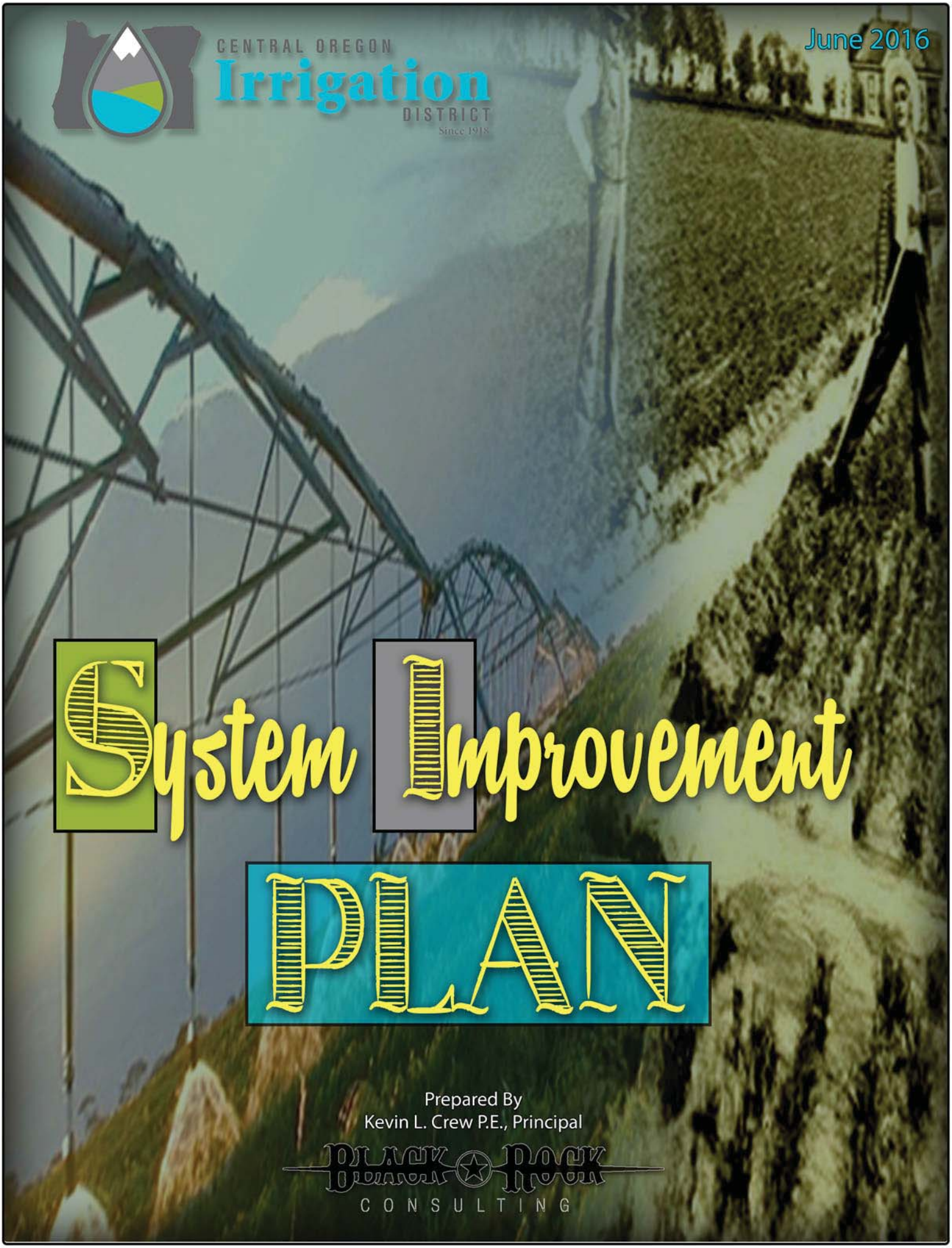
# Preliminary Investigative Report for the Central Oregon Irrigation District Irrigation Modernization Project: Appendix

Submitted to National Resources Conservation Service

June 29, 2017


CENTRAL OREGON
Irrigation
DISTRICT
Since 1918
June 2016
System Improvement
PLAN
Prepared By
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BLACK ROCK
CONSULTING

# Table of Contents

**Executive Summary** ..... **1**

**Section 1 (System Summary At-A-Glance)** ..... **2**

Figure 1.0.1 At-A-Glance System Improvement Plan ..... 3
Figure 1.0.2 At-A-Glance Phasing Table Pilot Butte Canal ..... 4
Figure 1.0.3 At-A-Glance Phasing Table Central Oregon Canal ..... 4

**Section 2 (Project Description and Overview)** ..... **5**

2.0 Authorization ..... 6
2.1 Purpose ..... 6
2.2 Scope of Services ..... 6
2.3 Goals and Objectives – District Meeting(s) ..... 9

**Section 3 (Existing System)** ..... **10**

3.0 Existing System Description ..... 12
Figure 3.0.1 COID Schematic ..... 14
Figure 3.0.2 COID Delivery and Gauging Station Map ..... 15
3.1 Study Canal Piping – 5 cfs ..... 16
3.2 Water Supply and Certificates ..... 16
3.3 On-Farm Water Demand Analysis - Acreage and Duty ..... 18
3.4 System Loss Assessment ..... 18
Figure 3.4.1 Central Oregon Canal Loss Estimate from Doppler Boat Data ..... 20
Figure 3.4.2 Pilot Butte Canal Loss Estimate from Doppler Boat Data ..... 20
Figure 3.4.3 Central Oregon Canal Total Piped Conservation Estimate ..... 21
Figure 3.4.4 Pilot Butte Canal Total Piped Conservation Estimate ..... 21

**Section 4 (System Improvement)** ..... **22**

4.0 System Improvement Alternatives and Approach ..... 23
4.1 Approach to the Central Oregon Canal ..... 23
4.2 Approach to the Pilot Butte Canal ..... 24
4.3 Pipe and Valve Materials ..... 25
4.4 Pressurization and Pressure Reduction Approach ..... 25
4.5 Elevation Data ..... 26
4.6 Future Delivery Flexibility ..... 27
4.7 Hydraulic Modeling ..... 27
4.8 Cost Estimating by Phase ..... 30

**Section 5 (Central Oregon Main Canal Improvement Phases)** ..... **35**

Figure 5.0.1 Phase 1 Area Map ..... 36
Figure 5.0.2 Phase 1 Main Canal Profile ..... 37
Figure 5.0.3 Phase 1 Cost Estimate ..... 38
Figure 5.1.1 Phase 2 Area Map ..... 40
Figure 5.1.2 Phase 2 Main Canal Profile ..... 41
Figure 5.1.3 Phase 2 Cost Estimate ..... 42
Figure 5.2.1 Phase 3 Area Map ..... 44

Figure 5.2.2 Phase 3 Main Canal Profile ..... 45
Figure 5.2.3 Phase 3 Cost Estimate ..... 46
Figure 5.3.1 Phase 4 Area Map ..... 48
Figure 5.3.2 Phase 4 Main Canal Profile ..... 49
Figure 5.3.3 Phase 4 Cost Estimate ..... 50
Figure 5.4.1 Phase 5 Area Map ..... 51
Figure 5.4.2 Phase 5 Main Canal Profile ..... 52
Figure 5.4.3 Phase 5 Cost Estimate ..... 53
Figure 5.5.1 Phase 6 Area Map ..... 54
Figure 5.5.2 Phase 6 Main Canal Profile ..... 55
Figure 5.5.3 Phase 6 Cost Estimate ..... 56
Figure 5.6.1 Phase 7 Area Map ..... 57
Figure 5.6.2 Phase 7 Main Canal Profile ..... 58
Figure 5.6.3 Phase 7 Cost Estimate ..... 59
Figure 5.7.1 Phase 8 Area Map ..... 61
Figure 5.7.2 Phase 8 Main Canal Profile ..... 62
Figure 5.7.3 Phase 8 Cost Estimate ..... 63
Figure 5.8.1 Phase 9 Area Map ..... 65
Figure 5.8.2 Phase 9 Main Canal Profile ..... 66
Figure 5.8.3 Phase 9 Cost Estimate ..... 67
Figure 5.9.1 Phase 10 Area Map ..... 69
Figure 5.9.2 Phase 10 Main Canal Profile ..... 70
Figure 5.9.3 Phase 10 Cost Estimate ..... 71

**Section 6 (Pilot Butte Main Canal Improvement Phases) ..... 72**

Figure 6.0.1 Phase 1 Area Map ..... 73
Figure 6.0.2 Phase 1 Main Canal Profile ..... 74
Figure 6.0.3 Phase 1 Cost Estimate ..... 75
Figure 6.1.1 Phase 2 Area Map ..... 76
Figure 6.1.2 Phase 2 Main Canal Profile ..... 77
Figure 6.1.3 Phase 2 Cost Estimate ..... 78
Figure 6.2.1 Phase 3 Area Map ..... 79
Figure 6.2.2 Phase 3 Main Canal Profile ..... 80
Figure 6.2.3 Phase 3 Cost Estimate ..... 81
Figure 6.3.1 Phase 4 Area Map ..... 83
Figure 6.3.2 Phase 4 Main Canal Profile ..... 84
Figure 6.3.3 Phase 4 Cost Estimate ..... 85
Figure 6.4.1 Phase 5 Area Map ..... 86
Figure 6.4.2 Phase 5 Main Canal Profile ..... 87
Figure 6.4.3 Phase 5 Cost Estimate ..... 88
Figure 6.5.1 Phase 6 Area Map ..... 89
Figure 6.5.2 Phase 6 Main Canal Profile ..... 90
Figure 6.5.3 Phase 6 Cost Estimate ..... 91
Figure 6.6.1 Phase 7 Area Map ..... 94
Figure 6.6.2 Phase 7 Main Canal Profile ..... 95
Figure 6.6.3 Phase 7 Cost Estimate ..... 96

**Appendix A (Tabulated Seepage Loss Data)** ..... **98**
**Appendix B (EPANET Hydraulic Models)** ..... **103**
COC Main Canal ..... 104
PBC Main Canal w/ 50cfs NUID Option ..... 117
PBC Main Canal w/ 200cfs NUID Option ..... 129
**Appendix C (Pipe Budget Estimates from Vendors)** ..... **141**

## Executive Summary

This study was funded by the Central Oregon Irrigation District. The purpose of this System Improvement Plan (SIP) was to develop a well-considered evaluation of the District's primary and secondary (i.e. main canals and primary laterals convey flow rates as low as 5 CFS peak flow) canal systems, a mitigation plan for the seepage losses, and consideration of resulting pressurized deliveries. System piping was the primary method proposed for such mitigation.

On January 6, 2016, a meeting was held with District staff to confirm approach on the SIP. It was determined that both 50 CFS and 200 CFS North Unit Irrigation District delivery scenarios should be included through the Pilot Butte Canal, that 7 GPM/Acre should be used for total system piping design, and that piped phases should be developed in approximate $25MM to $30MM cost increments.

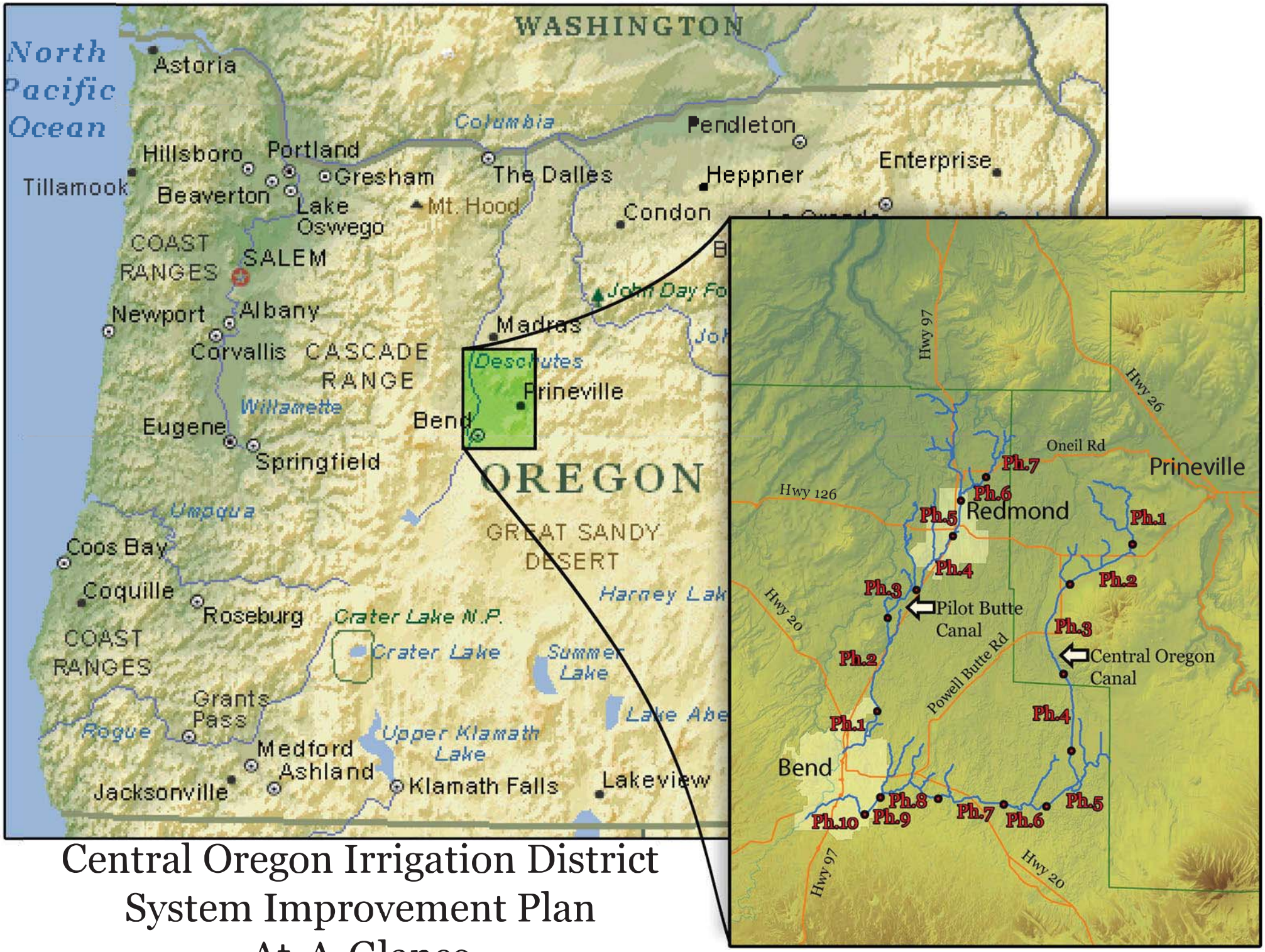
The District's approximate 42,666 acres are served by two primary canals, the Central Oregon Canal and the Pilot Butte Canal. These canals were evaluated for seepage loss using state-of-the-art measurement equipment and it was found that approximately 125 CFS in the Pilot Butte Canal and 55 CFS in the Central Oregon Canal were being lost at the time of measurements. It was also determined that approximately 156 CFS might be conserved in the Pilot Butte Canal network and 99 CFS in the Central Oregon Canal network if the system were completely piped (assuming certificated peak flows of 7.62 GPM/Acre delivered).

The District chose to consider pressurization to patron deliveries a priority and superior to hydropower generation optimization. The approach for system modeling included sustaining pressures at a minimum of approximately 40 PSI. EPANET modeling software was used to develop two separate models for the primary canal systems down to flow rates of 5 CFS. Given the approximate 700-FT of elevation differential in each of the two systems, a number of pressure reducing valves were necessary to step pressures down in each system. Piping was sized to entirely pipe each system down to 5 CFS in flow rate.

Pipe manufacturers and vendors were contacted to provide budgetary pipe cost information for pipe delivered to Central Oregon. This information was used to develop reconnaissance-level cost estimates to design and construct the entire Pilot Butte Canal and the entire Central Oregon Canal down to 5 CFS flow rates in the lateral systems. These cost estimates were evaluated and broken into phased construction elements. An At-A-Glance Map and summary tables are provided below indicating the summary results of this System Improvement Plan.

# Section 1

*System Summary At-A-Glance*




# Central Oregon Irrigation District System Improvement Plan At-A-Glance

*Figure 1.0.1*

*Figure 1.0.2*

| AT-A-GLANCE PHASING TABLE<br>PILOT BUTTE CANAL | | | |
|---|---|---|---|
| PHASE | ESTIMATED CONSERVATION | MILES OF CANAL PIPED | ESTIMATED COST |
| 1 | TBD | 5.75 | $27,140,966 |
| 2 | TBD | 8.91 | $28,699,448 |
| 3 | TBD | 15.23 | $30,381,606 |
| 4 | TBD | 8.96 | $23,516,216 |
| 5 | TBD | 7.88 | $33,285,710 |
| 6 | TBD | 18.30 | $25,068,026 |
| 7 | TBD | 8.81 | $15,034,397 |

*Figure 1.0.3*

| AT-A-GLANCE PHASING TABLE<br>CENTRAL OREGON CANAL | | | |
|---|---|---|---|
| PHASE | ESTIMATED CONSERVATION | MILES OF CANAL PIPED | ESTIMATED COST |
| 1 | TBD | 10.84 | $16,913,502 |
| 2 | TBD | 12.92 | $30,415,122 |
| 3 | TBD | 6.01 | $25,296,243 |
| 4 | TBD | 5.59 | $27,914,928 |
| 5 | TBD | 13.49 | $32,241,838 |
| 6 | TBD | 7.46 | $21,476,997 |
| 7 | TBD | 6.96 | $28,092,126 |
| 8 | TBD | 7.23 | $21,381,153 |
| 9 | TBD | 9.93 | $24,929,530 |
| 10 | TBD | 3.99 | $26,457,287 |

# Section 2

*Project Description and Overview*

## *2.0* **Authorization**

This study was funded by the Central Oregon Irrigation District and authorized July, 2015 through a Consultant Services Agreement.

## *2.1* **Purpose**

The Central Oregon Irrigation District was largely developed over 100-years ago to provide irrigation water to patented lands in the Central Oregon Region. The district currently serves approximately 42,666 acres of irrigated lands located from Bend, Oregon, northerly as far as the Crooked River and easterly as far as Powell Butte. The District also conveys water to the Lone Pine Irrigation District located on the north side of the Crooked River easterly of Terrebonne, Oregon.

The District operates and maintains over 400-Miles of main and lateral canals combined. The volcanic nature of the Central Oregon geology presents fractured basalt, cinder and varied substrates that results in a propensity for seepage losses in many areas of the COI Canal system.

The purpose of this System Improvement Plan (SIP) is to develop a well-considered evaluation of the District's primary and secondary (i.e. main canals and primary laterals convey flow rates as low as 5 CFS peak flow) canal systems, a mitigation plan for the seepage losses, and consideration of resulting pressurized deliveries. System piping is to be the primary method proposed for such mitigation.

The plan will become a key element of the District's planning documents and is expected to become the basis for future phased construction of the District's conveyance system.

## *2.2* **Scope of Services**

Based upon the Agreement with the Central Oregon Irrigation District, Black Rock Consulting (hereinafter "BRC") was employed to provide the following services and deliverables in conjunction with this plan:

Kickoff Meeting –

> BRC will meet with District staff and management to confirm approach to the study. BRC will develop and present the meeting agenda. At this meeting BRC will request available aerial and other District mapping (including extracted mapping from GIS Direct), will request plans and other documents for major system elements that may affect system hydraulic modeling, will request a copy of the District Water Conservation Plan, and will request water diversion

and water right information, will request any topographic information for the canal system, and associated operational input from the District.

BRC will discuss seepage loss information from the District and will discuss the development of a seepage loss measurement plan that may be implemented by the District to support the services by BRC.

BRC will inquire about energy dissipation approach preferences of the District (i.e hydroelectric power generation and pressurized delivery preferences) and will also discuss the potential for a summary approach document to be presented to the District Board of Directors prior to commencing substantive work on the study.

BRC will document the meeting minutes and distribute to attendees for review and comment prior to publishing a final version.

Review of Materials -

BRC will review materials obtained form the District following the kick-off meeting to insure that required materials for moving the study forward have been obtained or may be readily supplemented during the study to develop the deliverables indicated below. Should data gaps been found a plan will be developed by BRC to describe such data gaps and BRC will coordinate with the District to try to obtain such data.

Coordination -

BRC will coordinate with the COI staff and Board of Directors at various project milestones to confirm that the System Improvement Plan continues to be developed in accordance with the direction of COI. BRC will present summary updates to the COI Board of Directors at SIP concept level, at 75% preparation level and at Final.

Seepage Loss Study -

BRC will coordinate the development of seepage loss study with COI staff. The seepage loss study will identify a program of seepage loss measurements for the COI system to support loss assumptions to be used in the SIP and to assist with water conservation estimates and system implementation phasing development.

Review of Provided Flow Data -

BRC will provide a thorough review of provided diversion data (Central Oregon and Pilot Butte Canals, Primary Laterals, Etc.) and on-farm delivery rates (per water right certificates) to insure a clear understanding of delivery

approach. BRC will coordinate with the District to insure rates to be used in system evaluation and modeling are as directed by the District.

COI SIP Base Map Development -

In conjunction with COI mapping staff, BRC and COI will develop an SIP primary and secondary canal and lateral system base map. The base map will be populated with the COI primary and secondary canal system in its existing state.

COI SIP Improvement Map Development -

In conjunction with COI mapping staff, BRC and COI will develop a proposed primary and secondary system piping overlay on the base map. To the extent possible, existing mapping obtained as described above will be used for this purpose. This map may include an aerial underlay as available and as practical to manage file size.

COI SIP Hydraulic Model -

BRC will confirm approach regarding system pressurization with COI. Following the agreed approach discussed above with COI, BRC will then develop a spreadsheet indicating average and peak flows in the primary and secondary canal elements. BRC will then model the primary and secondary system elements (i.e. primary and secondary system canals and laterals) with hydraulic modeling software selected as appropriate for the application (eg. EPANET, WSPGW, KYPIPE, WaterCAD). Flow assumptions will be based upon existing diversion data, water right information, and seepage loss assumptions developed from the seepage loss evaluation identified above. From iterations of model runs, BRC will develop reconnaissance-level system elements including piping, pressure reducing elements; i.e. prv stations, hydroelectric power plant locations, primary system valving points, etc. Pipe materials and diameters will be determined during this analysis.

COI SIP Phasing Approach -

In conjunction with the system model and upon review with COI, BRC will develop a system construction phasing approach that will allow for incremental development/design and construction of the system.

COI SIP Conservation Table -

BRC will develop a table indicating water conservation estimates by SIP implementation phase.

Final SIP Mapping -

In conjunction with COI staff, BRC and COI will develop a final SIP map indicating primary and secondary canal system elements, proposed construction phasing, and pressure regulating and/or reconnaissance-level hydroelectric power sites.

Reconnaissance-Level Cost Estimate -

BRC will coordinate with material vendors and will develop reconnaissance-level cost estimating for the proposed piping system and pressure regulation identified for the District.

SIP Reporting -

BRC will compile the results of the SIP study into this System Improvement Plan draft report for review and comment by COI. Comments received will be incorporated as appropriate into a Final SIP Report. The report will include mapping, and will summarize all findings for elements identified above.

## *2.3* Goals and Objectives – District Meeting(s)

As indicated in the scope, Black Rock Consulting met with the District Board of Directors at its meeting in October, 2015 to provide a program overview and update. Black Rock Consulting indicated that key project parameters needed to be addressed by the District to establish the approach for the SIP. The Board assigned two members to meet at a later date to address these parameters.

A meeting was held on January 6, 2016 to address the SIP parameters necessary for Black Rock Consulting to move forward with the study. The meeting was attended by:

District staff
Craig Horrell, District Manager
Paul Kasberger and Terry Blackwell, District Board Members
Phillip Fine, North Unit Irrigation District Vice-Chairman
Mike Britton, North Unit Irrigation District Manager
Kevin L. Crew, Black Rock Consulting

Key agenda items addressed were as summarized below:

1) Should NUID flows be included in the modeling for the Pilot Butte Canal system?

   *Yes. There should be a scenario for 50 CFS of NUID flow to the NUID interconnection near the Crooked River (i.e. minimal flow expectation to*

*NUID similar to existing conditions), and a 200 CFS scenario emulating a significant conveyance to NUID.*

2) Given the seepage loss and urbanization characteristics of the Pilot Butte Canal and the Central Oregon Canal, should these systems be construction phased as if they would be developed from the top down or from the bottom up?

   *The Pilot Butte Canal should be phased from the top down and the Central Oregon Canal should be phased from the bottom up. This is based upon the expectation, based upon previously reported information, that the Pilot Butte Canal system losses are more significant at the upper extremities of the system.*

3) Given that water rights would dictate a delivery of 7.62 GPM/Acre for peak delivery flow rate to the District's irrigated properties, what flow rate should be used in the model for peak flow rates?

   *The model should use 7 GPM/Acre for normal delivery modeling at 5 FT/S velocities or less in system elements per NRCS guidelines. It must also be confirmed that two additional conditions will work within the proposed systems: Peak certificate flow rate of 7.62 GPM/Acre and uncommon high flow rate of 9 GPM/Acre with allowance for velocities to exceed 5 FT/S under these conditions. This would insure that the system will operate satisfactorily under future scenarios if additional irrigated lands were attributed to either canal system (i.e. Pilot Butte or the Central Oregon Canal), and to address climate change scenarios.*

4) Black Rock Consulting indicated that it planned to break the major canal piping projects (i.e. Pilot Butte Canal and Central Oregon Canal and associated laterals down to 5 CFS) into project phases. What estimated project cost size should phases be established at and do all agree with phasing?

   *The group agreed with project phasing and set the approximate cost range for each phase at approximately $25MM-$30MM. Discussion also addressed the need for future project implementation flexibility in the event and likelihood that funds would not necessarily match the phasing cost estimate. Black Rock Consulting indicated that for SIP purposes, it is necessary to establish a baseline cost per phase but certainly the phase sizes could change once financing is established.*

# Section 3

*Existing System*

## *3.0* Existing System Description (Refer to Figures 3.0.1 and 3.0.2 below)

Please refer to Figures 1 and 2 below regarding the existing District Delivery System. Figure 1 is provided to indicate the District service territory boundary, measurement points and the primary canal systems. Figure 2 is provided to indicate similar information on a relief map and provide more detail for the individual laterals stemming from the Pilot Butte Canal and the Central Oregon Canal.

The Central Oregon Irrigation District stores water in its one storage source, Crane Prairie Reservoir, with an approximate 55,330 Acre-FT storage capacity. It is located at approximately: NE ¼ NE ¼ Section 17, T 21 S., R 8 E, W.M. From this reservoir, the District releases water during the irrigation season (April 1-October 31) that is conveyed via the Deschutes River system downstream to the two primary points of diversion of the District. The Central Oregon Canal point of delivery is located south of Bend, Oregon along the Deschutes River at approximately: T18 S., R 11 E, SW 1/4 NE 1/4 Section 13, W.M. The Pilot Butte Canal is the second diversion point and is located at approximately: 17 S. 12 E. SE 1/4 NE 1/4 Section 29, W.M. The Pilot Butte Canal diversion is located adjacent to Division Street in Bend, Oregon and relies upon the North Canal Dam to regulate water for this diversion.

As indicated on Figures 1 and 2, the Central Oregon Canal (COC) conveys water generally in an open channel system, with the exception of the Brasada Siphon pipe, from Bend easterly to Alfalfa and then northerly to the Powell Butte area. Ultimately, the approximate 46-Mile long primary canal terminates at the Crooked River. There are approximately 43-Miles of laterals carrying flow down to approximately 5 CFS on the Central Oregon Canal for a combined SIP piping total of approximately 89-Miles evaluated. The COC drops approximately 673-FT from the head-end of the canal just below the siphon power project intake and at the canal head-gates to the COC-83 delivery near the Crooked River.

The Pilot Butte Canal (PBC) conveys water generally in an open channel system with the exception of the Juniper Ridge Phase I pipeline and piped segments through Redmond, Oregon. The diversion into the canal is located in Bend, Oregon near Division Street, the canal passes through the Bend urban area and then moves north through the Juniper Ridge Phase I piped project and hydroelectric power plant and on north through Redmond to its terminus at the Crooked River. At this location, delivery is made to the Lone Pine Irrigation District and to the North Unit Irrigation District. The Pilot Butte Canal is approximately 26-Miles in length and the associated laterals carrying flows down to 5-CFS were measured to be approximately 52-Miles for a combined SIP piping total of approximately 78-Miles evaluated. The PBC drops approximately 647-FT from the state gauge location at its upper end to the Lone Pine Irrigation District delivery near the Crooked River.

In addition to the primary canal system, the District has several direct deliveries

from the Deschutes River as indicated on Figure 1 in boxes 1-13. Evaluation of these direct deliveries was not a part of this SIP study.

Patron turnouts from the two District primary canals and from laterals are typically gate regulated and weir measured. The District regulates flows to each system lateral and patron turnout via its ditch-rider staff.

*Figure 3.0.1*

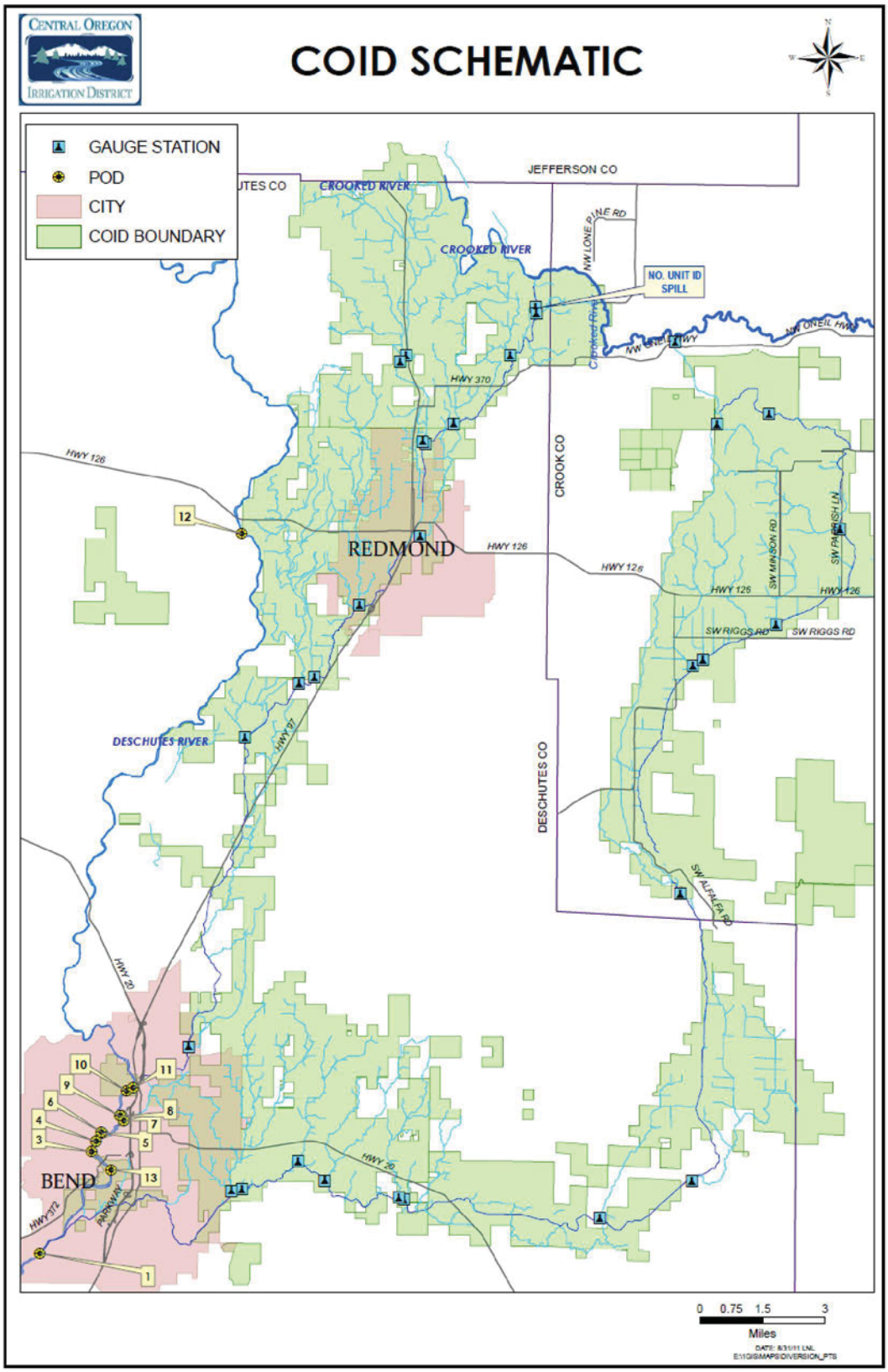
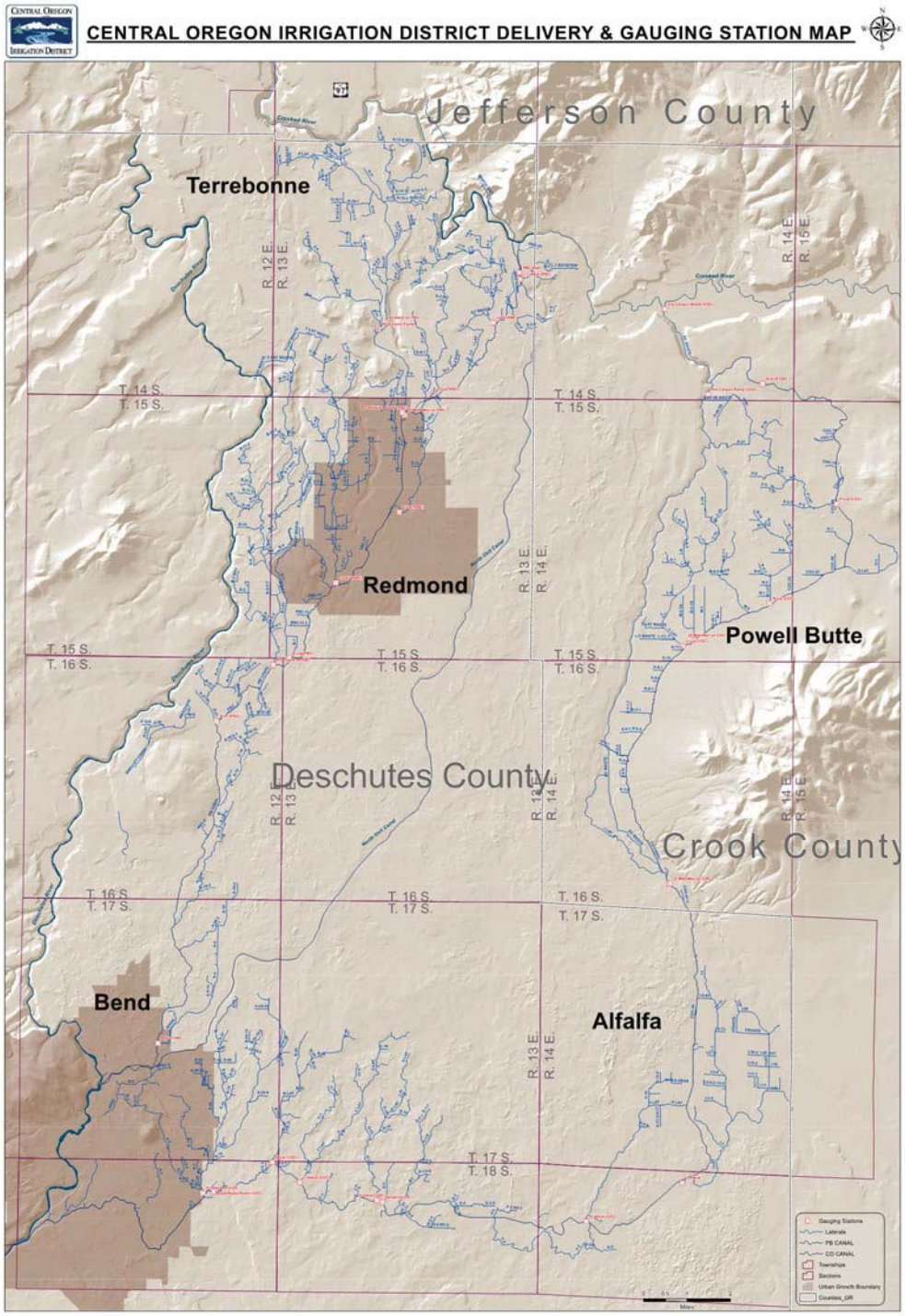

COID SCHEMATIC
CENTRAL OREGON IRRIGATION DISTRICT
GAUGE STATION
POD
CITY
COID BOUNDARY
JEFFERSON CO
CROOKED RIVER
NW LONE PINE RD
NO. UNIT ID SPILL
NW ONEIL HWY
HWY 370
CROOK CO
HWY 126
REDMOND
SW MINSON RD
SW PARRISH LN
SW RIGGS RD
DESCHUTES RIVER
HWY 97
DESCHUTES CO
SW ALFALFA RD
HWY 20
BEND
HWY 372
PARKWAY
HWY 20
0 0.75 1.5 3
Miles

*Figure 3.0.2*


CENTRAL OREGON IRRIGATION DISTRICT DELIVERY & GAUGING STATION MAP
Jefferson County
Terrebonne
Redmond
Powell Butte
Deschutes County
Crook County
Bend
Alfalfa
R. 12 E.
R. 13 E.
R. 14 E.
R. 15 E.
T. 14 S.
T. 15 S.
T. 15 S.
T. 16 S.
T. 16 S.
T. 17 S.
T. 17 S.
T. 18 S.

## *3.1* Study Canal Piping – 5 CFS

As provided in the scope of work for the project, the purpose of this SIP (considered Phase 1 of 2 by the District) was to evaluate the "backbone" of the Central Oregon Irrigation District's delivery system. Whereas Black Rock Consulting was originally scoped to evaluate canal improvements down to 10 CFS flow rates, it chose to evaluate down to 5 CFS flow rates to better assess a majority of the system.

At the time of preparation of this Plan, Black Rock Consulting was contracted by Farmers Conservation Alliance of Oregon to develop Phase 2 of the District's SIP by evaluating the District's system from 5 CFS to the interface with private laterals or to the patron property turnout whichever applies. This Phase 2 Plan is anticipated to follow the completion of this Phase 1 Plan in 2017 upon completion of Lidar data acquisition for the District.

## *3.2* Water Supply and Certificates

The Central Oregon Irrigation District operates based upon a variety of water rights for storage at Crane Prairie, hydroelectric power generation, diversion points and its primary canal and direct diversions from the Deschutes River. Complete water rights are not included in this SIP but may be obtained from the Oregon Water Resources Department and viewed in the District's Water Management and Conservation Plan on file with the Oregon Water Resources Department. It should be noted that the District's water right change from time to time with conservation activities, hydroelectric power development, transfers and other water right activities. For the purposes of this SIP, the primary goal is to evaluate the modernizing of the District's canal system, therefore information regarding the State of Oregon water right certificate dedicated to the delivery system is provided below.

*Certificate 83571*:

Source - Deschutes River, a tributary to the Columbia River

Priority - October 31, 1900 for 978.297 cfs and December 2, 1907 for 392.080 cfs

Use - Primary source for entire District

Irrigation - 43,439.51 acres

Pond Maintenance – 210.81 acres/equivalent

Industrial – 87.10 acres/equivalent

Dust Abatement – 2.80 acres

Municipal – 805.457 acres/equivalent

Quasi-Municipal – 65.37 acres/equivalent

Mining – 16.0 acres/equivalent

Domestic and Livestock

Rate 1350.071 cfs

Duty - Main Canal POD's at 9.91 AF per acre (45% transmission loss in the canal system as allowed by Decree March 24, 1933

Duty - Direct River Diversions at 5.45 AF per acre (0% transmission loss)

QUANTITY FOR CANAL DIVERSIONS FROM SOURCE

| | |
|---|---|
| Season 1: April 1 - April 30 and Oct. 1 - Oct. 31: | 1 CFS to 80.0 Acres |
| Season 2: May 1- May 14 and Sept. 15-Sept. 30: | 1 CFS to 60.0 Acres |
| Season 3: May 15- Sept. 14: | 1 CFS to 32.4 Acres |

QUANTITY FOR DIRECT DIVERSIONS FROM SOURCE

| | |
|---|---|
| Season 1: April 1 - April 30 and Oct. 1 - Oct. 31: | 1 CFS to 145.45 Acres |
| Season 2: May 1- May 14 and Sept. 15-Sept. 30: | 1 CFS to 109.09 Acres |
| Season 3: May 15- Sept. 14: | 1 CFS to 58.91 Acres |

For the purposes of this SIP, the most critical elements of this certificate are the duty and the rates allowable for "Canal Diversions from the Source". As indicated in the duty criteria, above, there is currently an allowance of 45% for transmission losses within the canal system. This loss accounts for evapotranspiration, seepage and other losses within the large District canal conveyance systems as water is conveyed in open excavated canals that cross a variety of rocky and soil substrates. Clearly, with a difference allowed of 9.91 AF diverted per acre and 5.45 AF delivered to the patron per acre, there is significant system loss assumed by the certificate. The piping evaluated to improve the open canal system in the Central Oregon Irrigation District will mitigate system losses. The extent of mitigation is further discussed in the System Loss Assessment section of this SIP.

In terms of quantities allowed for diversion into the District canals, the peak allowable is indicated above at 1 CFS per 32.4 Acres. This equates to approximately 13.9 GPM/Acre. After multiplying this flow rate by 55%, the on-farm delivery flow rate is determined at approximately 7.62 GPM/Acre. Therefore, given a "tight" system with little or no losses, the diversion flow rate may clearly be reduced

significantly. It should also be noted that at the beginning and the end of the irrigation season the allowable low flow rate for diversion from the Deschutes River is 1 CFS per 80.0 Acres (or 5.61 GPM/Acre) and to each farm is 3.08 GPM/ Acre (after reducing by 45%). This is important to the SIP simply to note that system improvements should include provisions to not only accommodate peak system flow rates but to accommodate lower system flow rates that can create sedimentation issues if not properly accounted for.

### *3.3* On-Farm Water Demand Analysis - Acreage and Duty

As indicated above, the current allowable diversion during peak irrigation season is 9.91 AF/Acre with an assumption after losses of 5.45 AF/Acre on-farm. The rate during peak season is 7.62 GPM/Acre after reducing the diversion rate by the certificated transmission losses.

For the purposes of this SIP, and based upon District input as indicated above, a target SIP design delivery flow rate to on-farm was established at 7 GPM/Acre. It should be noted that this SIP design flow rate is not intended to change the certificated on-farm peak flow rate of 7.62 GPM/Acre. The reason for using 7 GPM/Acre versus 7.62 GPM/Acre is based upon the assumption that all acreages within the District may not be irrigating at peak flow rates at the same moment. Typically, farming operations cycle between farms and farmers i.e. with alfalfa and hay cuttings slightly staggered and other crop patterns requiring slightly differing irrigation cycles. The approximate 10% reduction from peak flow accounts for this and is used to try to keep the pipe sizing for the SIP as close to the actual need as possible. As indicated above, pipe modeling for this SIP was based upon 7 GPM. Acre and 5 FT/S of maximal velocity in the proposed pipelines. Should temporary flow peaks exceed 7 GPM/Acre and approach the 7.62 GPM/ Acre water right, slightly exceeding the 5 FT/S will not be an issue and the pipe models were evaluated to an extreme value of 9 GPM/ Acre to insure that the system would still function properly and to insure future flexibility to the District.

### *3.4* System Loss Assessment

Black Rock Consulting worked with the District to coordinate a seepage loss study performed by District staff under Black Rock Consulting/Kevin L. Crew, P.E. direction. Due to time limitations, the study focused on measurements within the two primary District canals (Pilot Butte Canal and Central Oregon Canal).

In a joint funding agreement with the Energy Trust of Oregon, the District purchased a floating measurement device: Sontek RiverSurveyor S5, 2.4 GHz Telemetry / External Power / SonTek DGPS Module for remote data collection, SonTek Hydroboard II, and 2 on-site training days. This device was purchased as an identical device to that owned and operated by the Oregon State Water Resources Department, and was the second floating device that the District had purchased and

operated. Xylem/Sontek performed the initial calibration of the device following the same protocol that is recognized by the USGS.

District staff and Black Rock Consulting attended the training session provided by Xylem in July, 2015. This served as a refresher for COI field staff as they had operated their existing "Doppler boat" for approximately 8 years preceding this purchase. Generally, the new Sontek RiverSurveyor S5 is a sophisticated water measurement device that is capable of accurately measuring channel depth, bed movement, and highly incremented flow velocity to provide an accurate assessment of overall canal flow rate when properly deployed in a properly selected channel section (i.e. laminar flow, straight flow lines, etc.).

The Pilot Butte Canal and the Central Oregon Canal were measured at the end of the irrigation season in 2015 and at the beginning of the irrigation season in 2016, respectively, following United States Geological Survey and United States Bureau of Reclamation "Discharge Measurements at Gauging Stations – Chapter 8 of Book 3, Section A, Techniques and Methods 3-A8".

Tabular results for the primary canals are provided in Appendix A to this SIP. As indicated above the programming for this loss assessment was developed and overseen by Kevin L. Crew, P.E. The tabular results provided in the tables (Appendix A) indicate raw field results based upon chosen canal sections and doppler-boat data gathering protocol (per USGS). Upon review of the collected and tabulated data, Mr. Crew evaluated the data on a global review, considering field measurement error and post processed results. Based upon this analysis, adjustments were made to neglect certain measurement points and to neglect certain "gains". It was assumed that no gains exist in the system. Where anomalies were found such as significant gains, a discussion with field staff indicated that the site selection at those particular locations was not satisfactory. Once the data was fully evaluated, Mr. Crew developed the following summary tables indicating the results of the Pilot Butte Canal and Central Oregon Canal loss study.

*Figure 3.4.1*

| CENTRAL OREGON CANAL LOSS ESTIMATE FROM DOPPLER BOAT DATA | | | | | | | |
|---|---|---|---|---|---|---|---|
| LOCATION | DATE | MILE STA. | FLOW MEAS. (CFS) | DELIVERIES (CFS) | SEG. LOSS (CFS) | CUM LOSS (CFS) | NOTE |
| Pt. 1 | 5/6/16 | 1.5 | 349 | | | | |
| | | | | 0.41 | | | |
| Pt. 2 | 5/6/16 | 4.75 | 343 | | 5.59 | 5.59 | |
| | | | | 35.35 | | | |
| Pt. 3 | 5/6/16 | 7.75 | 307 | | 0.65 | 6.24 | |
| Pt. 3 | 5/10/16 | 7.75 | 300.5 | | 6.50 | 12.74 | |
| | | | | 36.78 | | | |
| Pt. 4 | 5/10/16 | 11.1 | 265 | | -1.28 | | Negl. Gain |
| | | | | 27.72 | | | |
| Pt. 5 | 5/10/16 | 13 | 241.8 | | -4.52 | | Negl. Gain |
| Pt. 5 | 5/11/16 | 13 | 239.1 | | | | |
| | | | | 7.28 | | | |
| Pt. 6 | 5/11/16 | 15 | 231.1 | | 0.72 | 13.46 | |
| | | | | 21.15 | | | |
| Pt. 7 | 5/11/16 | 18.5 | 193.1 | | 16.85 | 30.31 | |
| Pt. 7 | 5/12/16 | 18.5 | 204 | | | | |
| | | | | 45.37 | | | |
| Pt. 8 | 5/12/16 | 22.75 | 151.4 | | 7.23 | 37.54 | |
| | | | | 0.51 | | | |
| Pt. 9 | 5/12/16 | 25.25 | 147.7 | | 3.19 | 40.73 | |
| | | | | 10.69 | | | |
| Pt. 10 | 5/12/16 | 31.5 | 125 | | 12.01 | 52.74 | |
| Pt. 10 | 5/18/16 | 31.5 | 159.19 | | | | |
| | | | | 21.23 | | | |
| Pt. 11 | 5/18/16 | 34.5 | 135.47 | | 2.49 | 55.23 | |
| | | | | | TOTAL= | **55.23** | CFS |

*Figure 3.4.2*

| PILOT BUTTE CANAL LOSS ESTIMATE FROM DOPPLER BOAT DATA | | | | | | | |
|---|---|---|---|---|---|---|---|
| LOCATION | DATE | MILE STA. | FLOW MEAS. (CFS) | DELIVERIES (CFS) | SEG. LOSS (CFS) | CUM LOSS (CFS) | NOTE |
| State Gauge | 9/2/15 | 0 | 457.07 | | | | |
| Pt. 1 | 9/2/15 | 0.5 | 453.7 | | 3.37 | 3.37 | |
| Pt. 2 | 9/2/15 | 0.75 | 501.1 | | | | Deleted - Poor Site |
| Pt. 3 | 9/2/15 | 2 | 442.3 | | 11.4 | 14.77 | |
| | | | | 7.25 | | | |
| Pt. 4 | 9/2/15 | 3 | 425.5 | | 9.55 | 24.32 | |
| State Gauge | 9/3/15 | 0 | 446.4 | | | | |
| Pt. 5 | 9/3/15 | 6.5 | 395.4 | | 19.43 | 43.75 | |
| Pt. 6 | 9/3/15 | 7.5 | 368.9 | | | | |
| State Gauge | 9/10/15 | 0 | 404.8 | | | | |
| Pt. 5 Check | 9/10/15 | 6.5 | 360.9 | | | | |
| Pt. 6 Check | 9/10/15 | 7.5 | 346.4 | | 20.5 | 64.25 | Use Average of 5/6 |
| | | | | 18.04 | | | |
| Pt. 7 | 9/10/15 | 8.75 | 349.1 | | -20.74 | | Deleted - Gain |
| | | | | 0.51 | | | |
| Pt. 8 | 9/10/15 | 10.75 | 321.4 | | 6.45 | 70.7 | Pt. 6 to 8 |
| | | | | 16.71 | | | |
| Pt. 9 | 9/10/15 | 12.25 | 309.77 | | -5.08 | | Deleted - Gain |
| | | | | 66.4 | | | |
| Pt. 10 | 9/10/15 | 15.8 | 211.8 | | | | |
| State Gauge | 9/11/15 | 0 | 394 | | | | |
| Pt. 10 Check | 9/11/15 | 15.8 | 196.5 | | 33.82 | 104.52 | Use Average of 9/10 |
| Pt. 11 | 9/11/15 | 16.5 | 197.3 | | | | Negl. Gain |
| Pt. 12 | 9/11/15 | 17.4 | 197.4 | | | 104.52 | Negl. Gain |
| Pt. 13 (6) | 5/25/16 | 19 | 191.9 | | | | |
| | | | | 62.86 | | | |
| Pt. 14 (7) | 5/25/16 | 20.35 | 121.92 | | 7.12 | 111.64 | |
| Pt. 14 (7) | 5/26/16 | 20.35 | 106.68 | | | | |
| | | | | 16 | | | |
| Pt. 15 (8) | 5/26/16 | 21.35 | 91.06 | | -0.38 | | Negl. Gain |
| | | | | 0.11 | | | |
| Pt. 16 (9) | 5/26/16 | 22.15 | 91.06 | | -0.11 | | Negl. Gain |
| | | | | 6.86 | | | |
| Pt. 17 (10) | 5/26/16 | 23.35 | 86.9 | | -2.7 | | Negl. Gain |
| | | | | 17.36 | | | |
| Pt. 18 (11) | 5/26/16 | 24.65 | 61.49 | | 8.05 | 119.69 | |
| Pt. 18 (11) | 5/27/16 | 24.65 | 59.89 | | | | |
| | | | | 33.3 | | | |
| Lone Pine Ga. | 5/27/16 | | 20.96 | | 5.63 | 125.32 | |
| | | | | | TOTAL= | **125.32** | CFS |

The data indicates that based upon the particular days that measuring was performed, loss in the Central Oregon Canal was approximately 55 CFS and in the Pilot Butte Canal was 125 CFS. This was based upon measuring approximately 36 miles of the Central Oregon Canal and approximately 26 miles of the Pilot Butte Canal. Given that the historic flow rate diversions in to each canal are similar, it is clear that the Pilot Butte Canal has a higher seepage loss propensity than does the Central Oregon Canal. Within the first 6.5 miles of the Pilot Butte Canal approximate 44 CFS was estimated to have leaked from the canal. For this reason, piping the upper extremities of the Pilot Butte Canal is a priority of the District, as is piping both the Central Oregon Canal and the Pilot Butte Canal out of the City of Bend urban areas where the introduction of debris into the canal is increased as well as the risk to the public is greater than rural settings.

A seepage loss assessment program (LAP) funded by the Farmers Conservation Alliance, the Energy Trust of Oregon and supported by the Oregon State University and the Oregon Water Resources Department is underway at the time of development of this SIP. The program intends to perform measurements in 7 of the 8 Central Oregon irrigation districts to inform the Districts of current system losses and to enhance SIP development for these Districts. In COI, the LAP will focus on lateral losses and that information will contribute to a total picture of losses within the District. The LAP will be complete in October, 2016. Once complete, the data from this program will be used to assess SIP phase by phase losses within COI.

Total piped system loss estimates were also developed. Delivery acreages as assessed for the Central Oregon Canal and the Pilot Butte Canal were used to estimate the fully piped system flow rates at the peak certificate rate (7.62 GPM/ Acre) and at the hydraulically modeled rate of 7 GPM/Acre. Flow diversion data for the COC and PB canals were evaluated to determine the peak diverted flow rate over the last decade. These peaks were compared to the peak piped flow rates to estimate potential conservation based upon a completely piped hydraulic delivery system (including all laterals and private laterals down to the individual patron turnouts). The results of these loss estimates are tabulated below.

*Figure 3.4.3*

| ***CENTRAL OREGON CANAL TOTAL PIPED CONSERVATION ESTIMATE*** | | | | | |
|---|---|---|---|---|---|
| Diverted Acreage | Flow Rate at 7.62 GPM/Acre (CFS) | COC Max Diversion 2006-2016 (CFS) | Estimated Cons. At 7.62 GPM/ Acre (CFS) | Flow Rate at 7 GPM/Acre (CFS) | Estimated Cons. At 7.0 GPM/ Acre (CFS) |
| 24,795 | 421 | 520 | 99 | 387 | 133 |

*Figure 3.4.4*

| ***PILOT BUTTE CANAL TOTAL PIPED CONSERVATION ESTIMATE*** | | | | | |
|---|---|---|---|---|---|
| Diverted Acreage | Flow Rate at 7.62 GPM/Acre (CFS) | PBC Max Diversion 2006-2016 (CFS) | Estimated Cons. At 7.62 GPM/ Acre (CFS) | Flow Rate at 7 GPM/Acre (CFS) | Estimated Cons. At 7.0 GPM/ Acre (CFS) |
| 17,338 | 294 | 450* | 156 | 270 | 180 |
| * Lone Pine Peak Diversion = Appx. 59.6 CFS. PBC Max Diversion is Reduced by This Flow Rate | | | | | |

# Section 4

*System Improvement*

## *4.0* System Improvement Alternatives and Approach

This SIP was funded directly by the District with the intent that the backbone irrigation transmission and delivery system of the District be evaluated for improvement. Consistent with its Scope of Services and the subsequent goals and direction provided by the District, Black Rock Consulting focused its services directly on the backbone system with the intent of establishing phased plans to improve it.

There are two primary alternatives for the mitigation of seepage losses. The first is canal lining and the second is canal piping. Within each of these alternatives there are a variety of material choices. Canal lining involves the installation of an impervious system to cover the canal bottom and banks. Materials typically employed include geomembranes, rubber liners, shotcrete or similar materials. Canal lining does not provide pressurization of the irrigation system and it also increases canal velocities, thus increasing risk to people. Black Rock Consulting has performed 50-year life-cycle evaluations of lining versus piping alternatives to the District and has not including these in this Plan. In summary, over a 50-year life cycle, it was found that canal lining may be less expensive to implement in its first installation cycle than piping, however canal lining requires significant maintenance and replacement cycles that ultimately cause it to exceed the cost of piping over time. Also, given the significant elevation differential across the District and the desire of the District to provide pressurized deliveries to its patrons and significantly reduce pumping electricity effects on the utility grid, piping was chosen as the District's preferred choice for canal water loss mitigation.

## *4.1* Approach to the Central Oregon Canal

Per the District SIP planning meeting held in January, 2016, the selected approach to the Central Oregon Canal was to phase it into approximate $25MM to $30MM construction elements.

Black Rock Consulting commenced the process of hydraulic modeling for the Central Oregon Canal by receiving the "Weir Books" from the District in electronic form. The Weir Books indicate all of the deliveries, laterals and major check weir structure locations throughout each of the primary canal systems, including associated acreage. The books are maintained and updated by District office and field staff. This data was reduced to critical and key hydraulic model information and then provided to the District for further assessment and input. The District reviewed the reduced spreadsheets and provided the distance between system turnouts. The District also populated the spreadsheet with elevation information that is discussed further below.

Once the spreadsheet for the Central Oregon Canal was completed, it was used to develop the hydraulic model in EPANET as described further below. The completed model was developed to maintain pressures as directed by the District and utilized pressure reducing valve stations to modulate pressures as required across the significant elevation differential and flow rates of the system. The system was evaluated as a completely closed system, I.e. fully piped and pressurized to its extremities (down to the 5 CFS flow rate in the system and laterals). No through-flow was included at the tail of the COC main canal or laterals except for the direct pass-through of flows to irrigate the properties downstream of the 5 CFS cutoff. The completed model was calibrated and pipes were sized based upon selected pipe manufacturer information and a peak velocity of 5 FT/S for proposed piping at 7 GPM/Acre throughout the system.

Once this process was completed, the system was evaluated for cost as further detailed below. The project was then technically evaluated for appropriate phase separation points based upon pressure reducing locations or simply where phased elements approached $30MM. It should be noted that it is anticipated that modifications to phase boundaries and associated costs as the project elements are constructed due to actual funding levels may be necessary. Details for the Phases of the Central Oregon Canal are provided in the latter portion of this Plan.

## *4.2* Approach to the Pilot Butte Canal

Per the District SIP planning meeting held in January, 2016, the selected approach to the Pilot Butte Canal was to phase it into approximate $25MM to $30MM construction elements.

Similar to the COC, Black Rock Consulting commenced the process of hydraulic modeling for the Pilot Butte Canal by receiving the "Weir Books" from the District in electronic form. The Weir Books indicate all of the deliveries, laterals and major check weir structure locations throughout each of the primary canal systems, including associated acreage. The books are maintained and updated by District office and field staff. This data was reduced to critical and key hydraulic model information and then provided to the District for further assessment and input. The District reviewed the reduced spreadsheets and provided the distance between system turnouts. The District also populated the spreadsheet with elevation information that is discussed further below.

Once the spreadsheet for the Pilot Butte Canal was completed, it was used to develop the hydraulic model in EPANET as described further below. The completed model was developed to maintain pressures as directed by the District and utilized pressure reducing valve stations to modulate pressures as required across the significant elevation differential and flow rates of the system. The system was evaluated as a completely closed system, I.e. fully piped and pressurized to its extremities (down to the 5 CFS flow rate in the system and laterals).

Through-flow at the tail end of the system was provided to the Lone Pine Irrigation District delivery and to the North Unit Irrigation District. For NUID, two alteranives were evaluated at 50 CFS delivered and at 200 CFS delivered. The 200 CFS delivery to NUID was considered as the primary alternative. No through-flow was included at the tail of the PBC laterals except for the direct pass-through of flows to irrigate the properties downstream of the 5 CFS cutoff. The completed model was calibrated and pipes were sized based upon selected pipe manufacturer information and a peak velocity of 5 FT/S for proposed piping at 7 GPM/Acre throughout the system for each of the alternatives evaluated (i.e. 50 CFS and 200 CFS to NUID).

Once this process was completed, the system was evaluated for cost as further detailed below. The project was then technically evaluated for appropriate phase separation points based upon pressure reducing locations or simply where phased elements approached $30MM. It should be noted that it is anticipated that modifications to phase boundaries and associated costs, as the project elements are constructed due to actual funding levels, may be necessary. Details for the Phases of the Central Oregon Canal are provided in the latter portion of this Plan.

## *4.3* Pipe and Valve Materials

Pipe materials selections were made by Kevin L. Crew, P.E., based upon 29 years of experience with large diameter piping systems including 20 years of experience in Central Oregon. From the hydraulic model, both static and dynamic pressures were evaluated throughout the system to select appropriate pipe material options. For large diameter pressure-rated pipe (i.e. pipe in excess of 63-inches in diameter), the economical options were steel and fiberglass. For pipe up to 63-inches in diameter, high density polyethylene was selected due to its outstanding abrasion resistance, longevity, and ability to be pulled into canal curve alignments. Costs for each of these material options were obtained from large, reputable vendors that are active in bidding to Central Oregon projects.

Valves for pressure reducing stations were technically assessed and narrowed down to plunger valves and Cla-Val valves. Both use internal energy dissipation within the valve to accomplish the needed pressure-sustaining function downstream of the valves. Cla-Val valves use a control tubing and a diaphragm/bonnet arrangement to adjust pressures within the pressure reducing apparatus. No power is necessary for the operation of a Cla-Val. For the purposes of this study, Cla-Val E-90-01 pressure reducing valves were assumed.

## *4.4* Pressurization and Pressure Reduction Approach

As directed by the District, patron pressurization was given a priority in SIP analysis. A minimum target pressure of 45 PSI was selected for all portions of the

COC and PB where patron deliveries exist. Clearly, this was not possible in the upper extremities of the systems where gravity delivery from the Deschutes River and pipe elevation differential from the diversion point had not achieved this target pressure.

Typically, static system pressure was allowed to increase to 100 PSI in the hydraulic model and then a pressure reducing valve station was added to the system to reduce pressure to approximately 45 PSI. From that 45 PSI point, the pressure was allowed to increase to 100 PSI again and then reduced again through a subsequent PRV station and so on. This approach was expected to provide pressurized water to patron turnouts in the 45 PSI to 100 PSI range.

Pressure reducing valve stations will be assessed further for hydroelectric power production potential under a separate study expected to be completed in 2016.

Pressurization of the District deliveries is considered a high priority of the District and considered superior to revenue potential from hydroelectric power generation. Pressurization of the District system is anticipated to increase the use of sprinkler systems versus flood irrigation systems over time and to significantly reduce pumping energy costs to patrons and associated demand on the public utility grid. An on-farm analysis is under way at the District and will be finalized in the Fall, 2016. This analysis will inventory and quantify the type of irrigation practices that are being performed on District acreage. From this analysis, a better understanding of potential for on-farm water conservation and pumping reduction will be obtained. This work will be supported by the Energy Trust of Oregon.

### *4.5* Elevation Data

Elevation data for use in modeling was obtained through survey-grade GPS technology by personnel walking the canal and obtaining the data. Additionally, the Central Oregon Canal and the Pilot Butte Canal were flown with Phodar technology in 2016. This data was reduced, profiled and compared to the previously gathered GPS data.

The complete elevation data set was supplemented in 2016 by additional data acquisition by survey-grade GPS technology where elevations required verification or where no elevation information had previously been obtained or generated on laterals.

Units for the elevation information were reported and used in the following systems:

- Horizontal Projection: Oregon State Plane (ORSP) South Zone. International Feet
- Horizontal Datum: NAD83(2011)(Epoch2010.00)
- Vertical Datum: NAVD88 using Geoid12A

## *4.6* **Future Delivery Flexibility**

The District has requested system flexibility to insure that, within reason, system changes, added and subtracted irrigated acreage, effects of climate change, effects of changes in cropping patterns and similar system demands may be addressed in this SIP. It was determined, given that 7 GPM/Acre was the chosen peak delivery flow rate, that using 9 GPM/Acre as an upper flow limit for system flexibility purposes was appropriate. This upper flow limit was modeled to determine the associated maximal system velocities under this scenario. It was determined through modeling at 9 GPM/Acre delivered to on-farm that:

- PBC with 50 CFS to NUID: No major issues. Velocities slightly increased to just over 6 FT/S
- PBC with 200 CFS to NUID: Velocities in existing Juniper Ridge piping increased to approximately 10 FT/S. Other velocities increased to 8 FT/S and lower.
- COC: Velocities increased slightly to about 6 FT/S in general. Velocities in the Brasada Siphon Pipe increased to about 14 FT/S.

If the District chose to increase flow rates and velocities to 9 GPM/Acre in the COC and planned to do so annually, it would be recommended that the Brasada Siphon pipe be scheduled for replacement with a 90-IN diameter pipe. The existing "Redmond Re-Route" pipe and the Juniper Ridge Phase I pipe may also be considered for upsizing if the District chose to increase flow rates in the Pilot Butte Canal to 9 GPM/Acre for extended periods of time. If this was an uncommon occurrence, it would be recommended that these pipes be scheduled for annual inspections for abrasion wear of paint and inspection of welds at angled fittings.

No other issues were noted with respect to increasing system velocities to 9 GPM/Acre should the District choose to do so.

## *4.7* **Hydraulic Modeling**

EPANET –

EPANET was used to model the District's proposed piped network. EPANET is a free-ware product that is maintained by the EPA. The Natural Resources Conservation Service technical offices in Oregon use EPANET exclusively for hydraulic modeling. For these reasons, EPANET was selected as the modeling software of choice for this SIP.

EPANET modeling capabilities go beyond steady-state hydraulic modeling. The software is capable of chemical transport analysis and varying flow modeling. A description of some of its capabilities follows:

EPANET is a computer program that performs extended period simulation of hydraulic and water quality behavior within pressurized pipe networks. A network consists of pipes, nodes (pipe junctions), pumps, valves and storage tanks or reservoirs. EPANET tracks the flow of water in each pipe, the pressure at each node, the height of water in each tank, and the concentration of a chemical species throughout the network during a simulation period comprised of multiple time steps. In addition to chemical species, water age and source tracing can also be simulated.

EPANET is designed to be a research tool for improving our understanding of the movement and fate of drinking water constituents within distribution systems. It can be used for many different kinds of applications in distribution systems analysis. Sampling program design, hydraulic model calibration, chlorine residual analysis, and consumer exposure assessment are some examples. EPANET can help assess alternative management strategies for improving water quality throughout a system. These can include:

- altering source utilization within multiple source systems,
- altering pumping and tank filling/emptying schedules,
- use of satellite treatment, such as re-chlorination at storage tanks,
- targeted pipe cleaning and replacement.

Running under Windows, EPANET provides an integrated environment for editing network input data, running hydraulic and water quality simulations, and viewing the results in a variety of formats. These include color-coded network maps, data tables, time series graphs, and contour plots.

Hydraulic Modeling Capabilities -

Full-featured and accurate hydraulic modeling is a prerequisite for doing effective water quality modeling. EPANET contains a state-of-the-art hydraulic analysis engine that includes the following capabilities:

- places no limit on the size of the network that can be analyzed
- computes friction headloss using the Hazen-Williams, Darcy-Weisbach, or Chezy-Manning formulas
- includes minor head losses for bends, fittings, etc.
- models constant or variable speed pumps
- computes pumping energy and cost
- models various types of valves including shutoff, check, pressure regulating, and flow control valves

- allows storage tanks to have any shape (i.e., diameter can vary with height)
- considers multiple demand categories at nodes, each with its own pattern of time variation
- models pressure-dependent flow issuing from emitters (sprinkler heads)
- can base system operation on both simple tank level or timer controls and on complex rule-based controls.

Velocity Criteria –

As stated above, the maximal velocity criteria was set at 5 FT/S for on-farm deliveries at 7 GPM/Acre. The peak evaluated flow rate was 9 GPM/Acre for future system flexibility and was allowed to increase beyond 5 FT/S in modeling as indicated above.

Elevations –

As indicated above, elevation data was derived from three sources of collection in the horizontal and vertical datum system indicated.

Stationing –

Stationing for the system elements was derived from the District's GIS database and the GPS data gathered for the system. Stationing was established by the District in miles and converted in modeling to feet for introduction into the model's standard feet format. Primary canals were stationed from the top down with stations provided by the District at all patron delivery points, private laterals, pumped deliveries, and laterals. Laterals were stationed from the top down with stations provide by the District at all patron delivery points, private laterals, sub-laterals, and pumped deliveries.

Pressure Reduction –

Pressure reducing stations were entered into the model as PRVs (Pressure Reducing Valves). These valves are a programmed element in EPANET. The diameter of the valve and the downstream pressure set-point are entered to establish the downstream system pressure to be held by the PRV.

Pipe Diameter Selection –

Pipe diameter selections were derived iteratively in the hydraulic model with the first iteration being a rough estimate, The second iteration utilized actual pipe diameters for steel and high density polyethylene pipe material at the

appropriate dimension ratio and pressure rating for each model "link" (pipe). Generally, the third iteration adjusted all pipes in the system to a range of 4 FT/S to 5 FT/S at the peak system flow rates based upon 7 GPM/ Acre.

Pipe Pressure Rating Selection –

Steel pipe pressure ratings were assumed to be 100 PSI, minimum given experience with standard steel pipe wall thicknesses and associated AWWA transportation and pressure rating design criteria. HDPE solid-wall pipes (PE4710 resin) were sized from HDPE pipe sizing tables for the expected static pressure for each pipe segment.

Models for the Central Oregon Canal and the Pilot Butte Canal are included in Appendix B of this SIP.

### *4.8* Cost Estimating by Phase

Pipe Estimates –

Pipe material estimates were provided by reputable vendors that routinely supply pipe materials to Central Oregon projects. Pipe material budgetary estimates are provided in Appendix C for reference.

PRV Station Estimates –

As indicated above, pressure reducing valves selected for use in this SIP were Cla-Val brand pilot operated, hydraulic pressure reducing valves. VAG plunger valves were also evaluated. It is recommended that pressure reducing valves be thoroughly evaluated in design and if used in hydroelectric power applications, alternative valves may also be considered. Cla-Val cost estimates were provided by GC Systems of Washington State.

Where phase boundaries were not coincident with permanent PRV locations, it was assumed that valves would be purchased and set for the temporary pressure reduction condition (i.e. to atmosphere) until the subsequent phase was constructed. At that time, the pressure reducing valves would be relocated to the new phase boundary and installed in their permanent location. The cost estimate reflected this planned use of purchase, temporary installation, relocation and permanent installation of valves.

Turnouts –

For the purposes of this SIP, patron turnouts were assumed to be converted to pressurized delivery systems. A standard pressurized irrigation delivery turnout was assumed to include an appropriately sized tee from the mainline or lateral, a pressure relief valve, a gear-actuated plug valve (or gate or

possibly butterfly valve in smaller turnout situations), a magnetic meter, a combination air and vacuum relief valve and associated hardware and spool pipe segments. Based upon experience with similar installations at irrigation districts in Central Oregon, the cost of installation of a turnout was set at an estimated average cost of $10,000 per installation.

Construction –

Contractor procurement may come in several forms in Oregon. Design-Bid-Build is a conventional process wherein the survey and design is developed first and then a traditional competitive bid is held to obtain the lowest-cost responsive and responsible bidding contractor. In this process, typically the design engineering firm will serve as the inspection/construction management firm during the course of construction. Given the magnitude of the project phases and for the purposes of this SIP, a Construction Manager General Contractor (CMGC) model was assumed. In this contractor procurement method, design would precede obtaining the contractor, however the contractor would include construction management in its delivery of the constructed project. An estimated contractor fee structure of 12% of the project value was assumed for this construction delivery method.

Engineering, Construction Management –

Engineering and Owner's Representative/Inspection services typically range as high as 10%-12% of construction value. For the purposes of this SIP, and assuming that project phases are constructed sequentially and annually, it was assumed that a total fee of 6% for survey, engineering design and inspection/owner's representative services would suffice. This was based upon the experience of Black Rock Consulting on similar larger projects deployed in Central Oregon including the District's Juniper Ridge Hydroelectric Power Project.

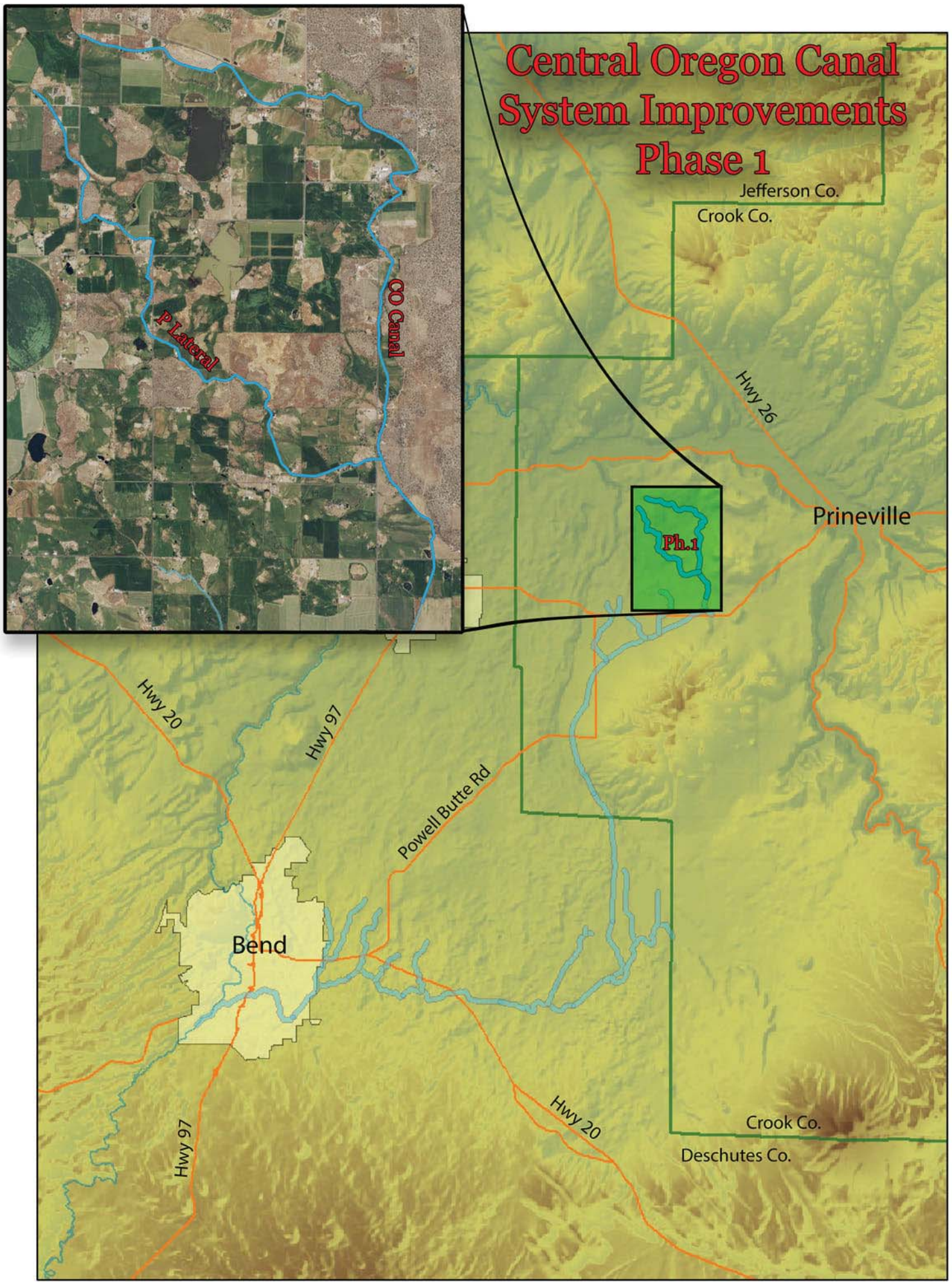
Contingency –

The contingency percentage was carefully considered. The Association for the Advancement of Cost Engineering (AACE) is a nationally recognized organization that has developed an accepted system of contingency ranges based upon project specificity level "Class". There are 5 project Classes starting from Class 5 with only conceptual project definition to Class 1 where a project has been completely developed and bid. This SIP was considered to fall within the Class 4 definition. The AACE Class 4 project specificity level (i.e. a project at 1%-15% definition) carries an anticipated contingency range from -15% to -30% on the low end of the range to +20% to +50% on the high end of the range. We selected a contingency value of +20% that is on the low end of the high contingency range provided by AACE. It should be noted that the phased cost estimate is based largely upon the cost of pipe materials.

Budgetary pricing for steel pipe was found to be very competitive at the time of development of this SIP. For construction that is completed soon after the development of this SIP, the cost estimates should remain robust. For work lagging several years beyond the development of this SIP, the risk of cost change is greater. For this reason, it is recommended that every 2 years a cost evaluation be performed to update the phased construction cost estimates.

# Section 5

*Central Oregon Main Canal Improvement Phases*


Central Oregon Canal System Improvements Phase 1
Jefferson Co.
Crook Co.
Hwy 26
Prineville
Ph.1
P Lateral
CO Canal
Hwy 20
Hwy 97
Powell Butte Rd
Bend
Hwy 97
Hwy 20
Crook Co.
Deschutes Co.

# Central Oregon Canal
# Phase 1 Profile

# PHASE 1 - CENTRAL OREGON CANAL

Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

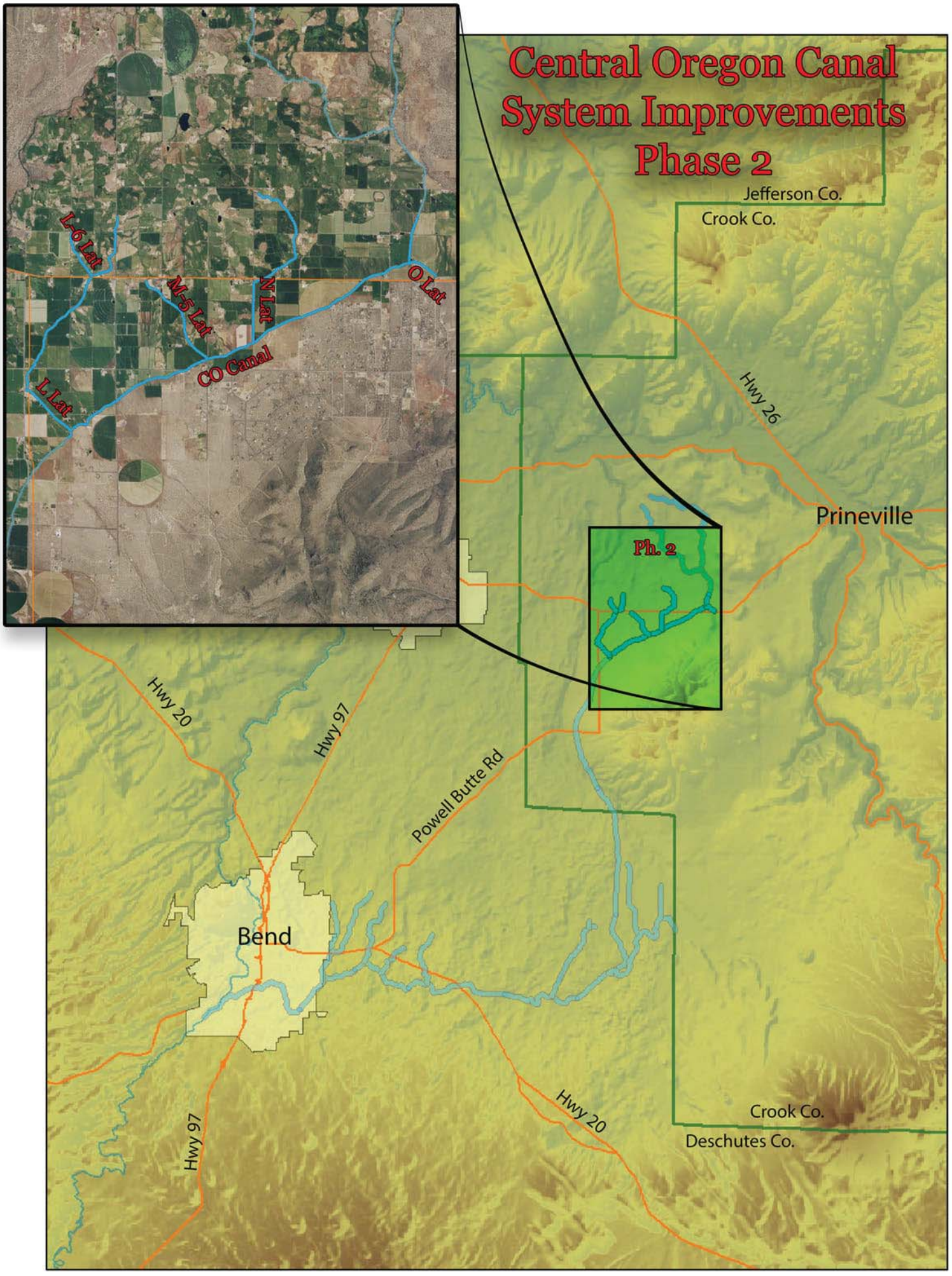
| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | COC-65 | O-7 | 32.5 | 54 | 11 | LF | $356 | $3,762 |
| PIPE | O-7 | COC-65-1 | 32.5 | 54 | 1,668 | LF | $356 | $594,376 |
| PIPE | COC-65-1 | COC-65-2 | 32.5 | 54 | 2,228 | LF | $356 | $793,755 |
| PIPE | COC-65-2 | P | 32.5 | 54 | 1,969 | LF | $356 | $701,589 |
| PIPE | P | COC-66 | 32.5 | 42 | 461 | LF | $211 | $97,245 |
| PIPE | COC-66 | P-1 | 26 | 36 | 2,767 | LF | $192 | $530,978 |
| PIPE | P-1 | P-2 | 26 | 36 | 380 | LF | $192 | $72,959 |
| PIPE | P-2 | P-3 | 26 | 36 | 2,661 | LF | $192 | $510,712 |
| PIPE | P-3 | P-4 | 21 | 36 | 1,885 | LF | $232 | $437,484 |
| PIPE | P-4 | P-6 | 21 | 36 | 787 | LF | $232 | $182,591 |
| PIPE | P-6 | P-7 | 21 | 34 | 871 | LF | $203 | $177,006 |
| PIPE | P-7 | P-7-0 | 21 | 34 | 539 | LF | $203 | $109,422 |
| PIPE | P-7-0 | P-7-1 | 21 | 34 | 248 | LF | $203 | $50,420 |
| PIPE | P-7-1 | P-8 | 21 | 32 | 16 | LF | $177 | $2,797 |
| PIPE | P-8 | P-10 | 21 | 32 | 1,610 | LF | $177 | $284,408 |
| PIPE | P-10 | P-12 | 21 | 32 | 1,030 | LF | $177 | $181,835 |
| PIPE | P-12 | P-13-1 | 19 | 30 | 1,901 | LF | $200 | $380,704 |
| PIPE | P-13-1 | P-14 | 19 | 30 | 174 | LF | $200 | $34,898 |
| PIPE | P-14 | P-16 | 19 | 28 | 1,589 | LF | $176 | $279,562 |
| PIPE | P-16 | P-18 | 19 | 28 | 322 | LF | $176 | $56,655 |
| PIPE | P-18 | P-21/22 | 19 | 28 | 1,357 | LF | $176 | $238,696 |
| PIPE | P-21/22 | P-20 | 19 | 28 | 180 | LF | $176 | $31,578 |
| PIPE | P-20 | P-20-0 | 19 | 20 | 3,373 | LF | $89 | $299,593 |
| PIPE | P-20-0 | P-20-0-1 | 19 | 20 | 945 | LF | $89 | $83,955 |
| PIPE | P-20-0-1 | P-20-1 | 19 | 18 | 1,278 | LF | $62 | $79,107 |
| PIPE | P-20-1 | P-20-2 | 19 | 18 | 391 | LF | $62 | $24,190 |
| PIPE | P-20-2 | COC-67 | 32.5 | 42 | 248 | LF | $211 | $52,316 |
| PIPE | COC-67 | COC-67-1 | 32.5 | 42 | 1,595 | LF | $211 | $336,159 |
| PIPE | COC-67-1 | COC-68 | 32.5 | 42 | 74 | LF | $211 | $15,584 |
| PIPE | COC-68 | COC-70 | 32.5 | 42 | 143 | LF | $211 | $30,054 |
| PIPE | COC-70 | COC-70-1 | 26 | 42 | 2,350 | LF | $256 | $601,086 |
| PIPE | COC-70-1 | COC-71 | 21 | 36 | 3,601 | LF | $232 | $835,754 |
| PIPE | COC-71 | COC-72 | 21 | 36 | 216 | LF | $232 | $50,243 |
| PIPE | COC-72 | COC-73 | 21 | 36 | 644 | LF | $232 | $149,504 |
| PIPE | COC-73 | COC-75-0 | 21 | 36 | 628 | LF | $232 | $145,828 |
| PIPE | COC-75-0 | COC-75-0-2 | 21 | 36 | 385 | LF | $232 | $89,458 |
| PIPE | COC-75-0-2 | COC-75-0-3 | 21 | 36 | 143 | LF | $232 | $33,087 |
| PIPE | COC-75-0-3 | COC-75-1 | 21 | 36 | 1,505 | LF | $232 | $349,252 |
| PIPE | COC-75-1 | COC-75-3 | 21 | 36 | 3,791 | LF | $232 | $879,870 |
| PIPE | COC-75-3 | COC-76 | 21 | 34 | 586 | LF | $203 | $119,077 |
| PIPE | COC-76 | COC-76-1 | 21 | 32 | 1,478 | LF | $177 | $261,096 |
| PIPE | COC-76-1 | COC-77 | 21 | 32 | 111 | LF | $177 | $19,582 |

# PHASE 1 - CENTRAL OREGON CANAL

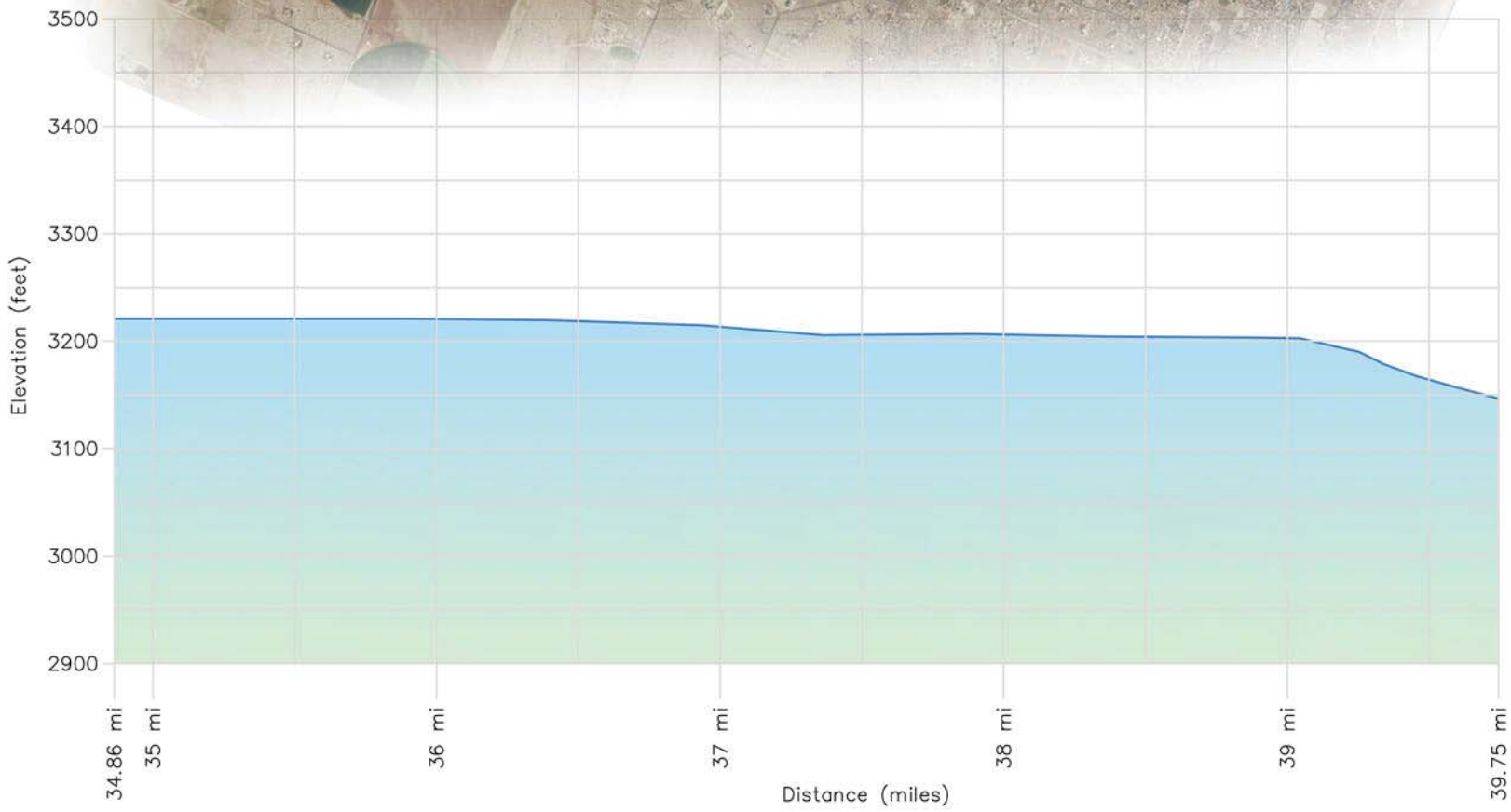
Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | COC-77 | COC-78-1 | 21 | 30 | 1,753 | LF | $156 | $273,330 |
| PIPE | COC-78-1 | COC-78-2 | 21 | 30 | 1,494 | LF | $156 | $232,989 |
| PIPE | COC-78-2 | COC-79 | 21 | 30 | 32 | LF | $156 | $4,940 |
| PIPE | COC-79 | COC-79-1 | 21 | 30 | 359 | LF | $156 | $55,983 |
| PIPE | COC-79-1 | COC-80 | 21 | 28 | 2,534 | LF | $137 | $348,439 |
| PIPE | COC-80 | COC-81 | 21 | 26 | 845 | LF | $120 | $101,024 |
| PIPE | COC-81 | COC-81-1 | 21 | 26 | 544 | LF | $120 | $65,034 |
| PIPE | COC-81-1 | COC-82 | 21 | 24 | 1,558 | LF | $99 | $154,595 |
| TURNOUT | | | | | 50 | EA | $10,000 | $500,000 |
| | SUBTOTAL | | | | | | | $11,944,563 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $716,674 |
| | CMGC | | | | | 12% | | $1,433,348 |
| | CONTINGENCY | | | | | 20% | | $2,818,917 |
| | **TOTAL** | | | | | | | **$16,913,502** |


Central Oregon Canal System Improvements Phase 2
L-6 Lat
M-5 Lat
N Lat
O Lat
L Lat
CO Canal
Jefferson Co.
Crook Co.
Hwy 26
Prineville
Ph. 2
Hwy 20
Hwy 97
Powell Butte Rd
Bend
Hwy 97
Hwy 20
Crook Co.
Deschutes Co.

# Central Oregon Canal
# Phase 2 Profile



# PHASE 2 - CENTRAL OREGON CANAL

Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

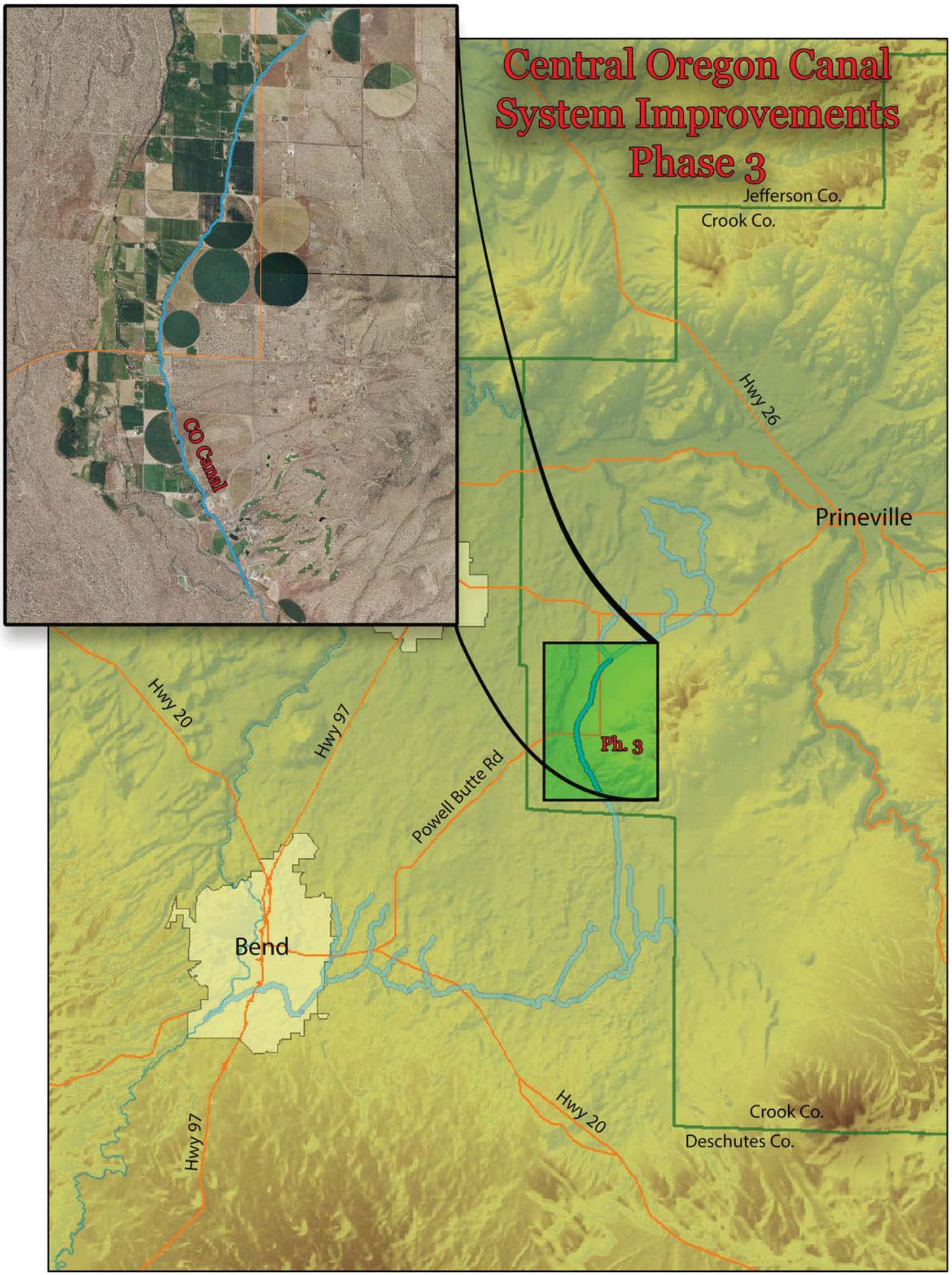
| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | K-10-2 | K-11-2 | 100 PSI | 84 | 1,721 | LF | $502 | $864,083 |
| PIPE | K-11-2 | L | 100 PSI | 84 | 523 | LF | $502 | $262,405 |
| PIPE | L | L-1 | 21 | 42 | 1,973 | LF | $310 | $611,040 |
| PIPE | L-1 | L-2 | 21 | 42 | 5 | LF | $310 | $1,635 |
| PIPE | L-2 | L-4 | 21 | 42 | 5 | LF | $310 | $1,635 |
| PIPE | L-4 | L-7/L-7-0 | 21 | 42 | 3,360 | LF | $310 | $1,040,518 |
| PIPE | L-7/L-7-0 | L-7-1 | 32.5 | 36 | 74 | LF | $162 | $11,947 |
| PIPE | L-7-1 | L-7-2 | 32.5 | 36 | 301 | LF | $162 | $48,642 |
| PIPE | L-7-2 | L-8 | 32.5 | 34 | 2,793 | LF | $138 | $386,347 |
| PIPE | L-8 | L-8-1 | 32.5 | 34 | 11 | LF | $138 | $1,461 |
| PIPE | L-8-1 | L-8-2 | 32.5 | 34 | 5 | LF | $138 | $730 |
| PIPE | L-8-2 | L-8-2-1 | 32.5 | 34 | 1,019 | LF | $138 | $140,955 |
| PIPE | L-8-2-1 | L-8-2-2 | 32.5 | 34 | 781 | LF | $138 | $108,090 |
| PIPE | L-8-2-2 | L-8-3 | 32.5 | 32 | 243 | LF | $120 | $29,077 |
| PIPE | L-8-3 | L-8-3-1 | 32.5 | 32 | 502 | LF | $120 | $60,051 |
| PIPE | L-8-3-1 | L-8-4 | 32.5 | 32 | 21 | LF | $120 | $2,528 |
| PIPE | L-8-4 | L-9 | 26 | 32 | 586 | LF | $150 | $87,682 |
| PIPE | L-9 | L-6 | 26 | 32 | 407 | LF | $150 | $60,824 |
| PIPE | L-6 | L-6-1 | 26 | 24 | 1,661 | LF | $82 | $135,993 |
| PIPE | L-6-1 | L-6-2 | 26 | 24 | 11 | LF | $82 | $864 |
| PIPE | L-6-2 | L-6-4 | 26 | 16 | 1,679 | LF | $38 | $64,193 |
| PIPE | L-6-4 | L-10 | 26 | 24 | 1,917 | LF | $82 | $156,904 |
| PIPE | L-10 | L-11 | 26 | 24 | 465 | LF | $82 | $38,037 |
| PIPE | L-11 | L-12 | 26 | 20 | 1,151 | LF | $58 | $66,352 |
| PIPE | L-12 | L-13 | 26 | 20 | 945 | LF | $58 | $54,481 |
| PIPE | L-13 | COC-43 | 100 PSI | 72 | 26 | LF | $426 | $11,246 |
| PIPE | COC-43 | COC-43-1 | 100 PSI | 72 | 1,647 | LF | $426 | $701,775 |
| PIPE | COC-43-1 | COC-44 | 100 PSI | 72 | 63 | LF | $426 | $26,991 |
| PIPE | COC-44 | M-2 | 100 PSI | 72 | 5 | LF | $426 | $2,249 |
| PIPE | M-2 | M-3 | 100 PSI | 72 | 1,526 | LF | $426 | $650,042 |
| PIPE | M-3 | COC-46 | 100 PSI | 72 | 829 | LF | $426 | $353,137 |
| PIPE | COC-46 | COC-46-1 | 100 PSI | 72 | 829 | LF | $426 | $353,137 |
| PIPE | COC-46-1 | COC-47 | 100 PSI | 72 | 21 | LF | $426 | $8,997 |
| PIPE | COC-47 | M-4 | 100 PSI | 72 | 602 | LF | $426 | $256,418 |
| PIPE | M-4 | COC-47-1 | 100 PSI | 72 | 787 | LF | $426 | $335,143 |
| PIPE | COC-47-1 | COC-48 | 100 PSI | 72 | 1,637 | LF | $426 | $697,277 |
| PIPE | COC-48 | COC-48-1 | 100 PSI | 72 | 502 | LF | $426 | $213,682 |
| PIPE | COC-48-1 | COC-49 | 100 PSI | 72 | 739 | LF | $426 | $314,899 |
| PIPE | COC-49 | M-5 | 100 PSI | 72 | 5 | LF | $426 | $2,249 |
| PIPE | M-5 | M-5-1 | 21 | 20 | 2,896 | LF | $69 | $201,088 |
| PIPE | M-5-1 | M-5-3 | 17 | 18 | 1,616 | LF | $69 | $111,327 |
| PIPE | M-5-3 | M-5-4 | 17 | 18 | 1,156 | LF | $69 | $79,675 |

# PHASE 2 - CENTRAL OREGON CANAL

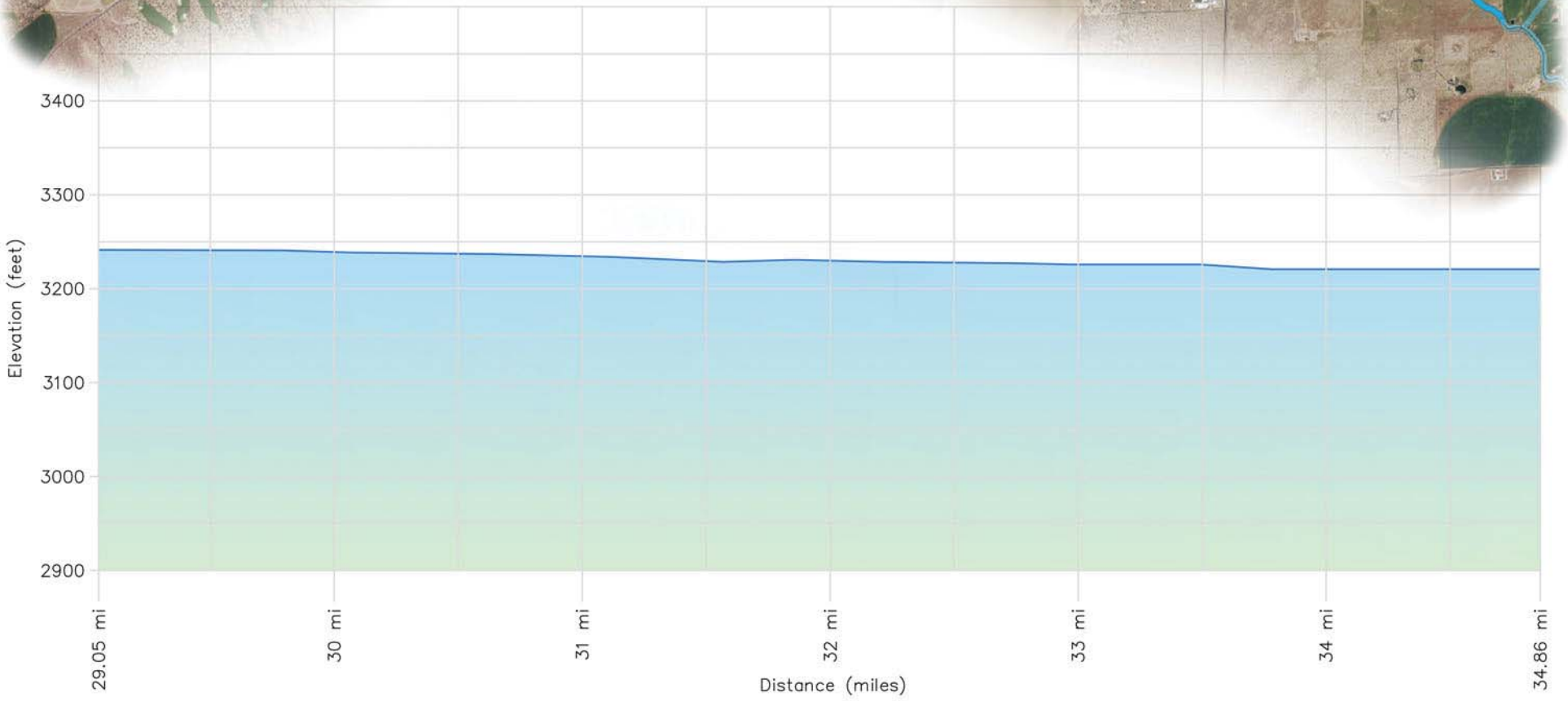
Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | M-5-4 | M-5-4-0 | 17 | 16 | 32 | LF | $53 | $1,691 |
| PIPE | M-5-4-0 | M-5-4-1/M-5-5 | 17 | 16 | 729 | LF | $53 | $38,894 |
| PIPE | M-5-4-1/M-5-5 | COC-50-0 | 100 PSI | 66 | 1,030 | LF | $312 | $321,004 |
| PIPE | COC-50-0 | COC-50-1 | 100 PSI | 66 | 1,426 | LF | $312 | $444,217 |
| PIPE | COC-50-1 | COC-50-2 | 100 PSI | 66 | 16 | LF | $312 | $4,936 |
| PIPE | COC-50-2 | N | 100 PSI | 66 | 1,389 | LF | $312 | $432,700 |
| PIPE | N | N-1 | 21 | 30 | 1,077 | LF | $156 | $167,950 |
| PIPE | N-1 | N-2 | 21 | 30 | 1,336 | LF | $156 | $208,291 |
| PIPE | N-2 | N-3 | 19 | 28 | 1,067 | LF | $176 | $187,613 |
| PIPE | N-3 | N-6 | 26 | 24 | 4,251 | LF | $82 | $348,037 |
| PIPE | N-6 | N-7 | 26 | 24 | 1,035 | LF | $82 | $84,719 |
| PIPE | N-7 | N-9 | 26 | 18 | 2,661 | LF | $47 | $124,157 |
| PIPE | N-9 | COC-51 | 21 | 63 | 5 | LF | $767 | $4,052 |
| PIPE | COC-51 | COC-52 | 21 | 63 | 1,911 | LF | $767 | $1,466,818 |
| PIPE | COC-52 | COC-52-1 | 21 | 63 | 1,140 | LF | $767 | $875,228 |
| PIPE | COC-52-1 | COC-53 | 21 | 63 | 58 | LF | $767 | $44,572 |
| PIPE | COC-53 | COC-54 | 21 | 63 | 21 | LF | $767 | $16,208 |
| PIPE | COC-54 | COC-55 | 21 | 63 | 1,331 | LF | $767 | $1,021,100 |
| PIPE | COC-55 | COC-56-1 | 21 | 63 | 1,547 | LF | $767 | $1,187,231 |
| PIPE | COC-56-1 | COC-56-2 | 21 | 63 | 1,294 | LF | $767 | $992,736 |
| PIPE | COC-56-2 | COC-58 | 21 | 63 | 211 | LF | $767 | $162,079 |
| PIPE | COC-58 | COC-58-1 | 21 | 63 | 190 | LF | $767 | $145,871 |
| PIPE | COC-58-1 | COC-58-2 | 21 | 63 | 987 | LF | $767 | $757,721 |
| PIPE | COC-58-2 | COC-59 | 21 | 63 | 449 | LF | $767 | $344,419 |
| PIPE | COC-59 | COC-60 | 21 | 63 | 69 | LF | $767 | $52,676 |
| PIPE | COC-60 | O | 21 | 63 | 1,098 | LF | $767 | $842,812 |
| PIPE | O | O-1 | 21 | 20 | 386 | LF | $69 | $26,776 |
| PIPE | O-1 | O-2 | 21 | 18 | 1,800 | LF | $56 | $101,504 |
| PIPE | O-2 | COC-63 | 21 | 54 | 1,679 | LF | $519 | $870,958 |
| PIPE | COC-63 | COC-65 | 19 | 54 | 931 | LF | $566 | $526,828 |
| TURNOUT | | | | | 72 | EA | $10,000 | $720,000 |
| PRV STA. | COC-65 | PRV Station | 19 | 54 | 1 | EA | $400,000 | $400,000 |
| | SUBTOTAL | | | | | | | $21,479,606 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $1,288,776 |
| | CMGC | | | | | 12% | | $2,577,553 |
| | CONTINGENCY | | | | | 20% | | $5,069,187 |
| | **TOTAL** | | | | | | | **$30,415,122** |


Central Oregon Canal System Improvements Phase 3
Jefferson Co.
Crook Co.
Hwy 26
Prineville
CO Canal
Ph. 3
Hwy 20
Hwy 97
Powell Butte Rd
Bend
Hwy 97
Hwy 20
Crook Co.
Deschutes Co.

# Central Oregon Canal Phase 3 Profile



# PHASE 3 - CENTRAL OREGON CANAL

Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

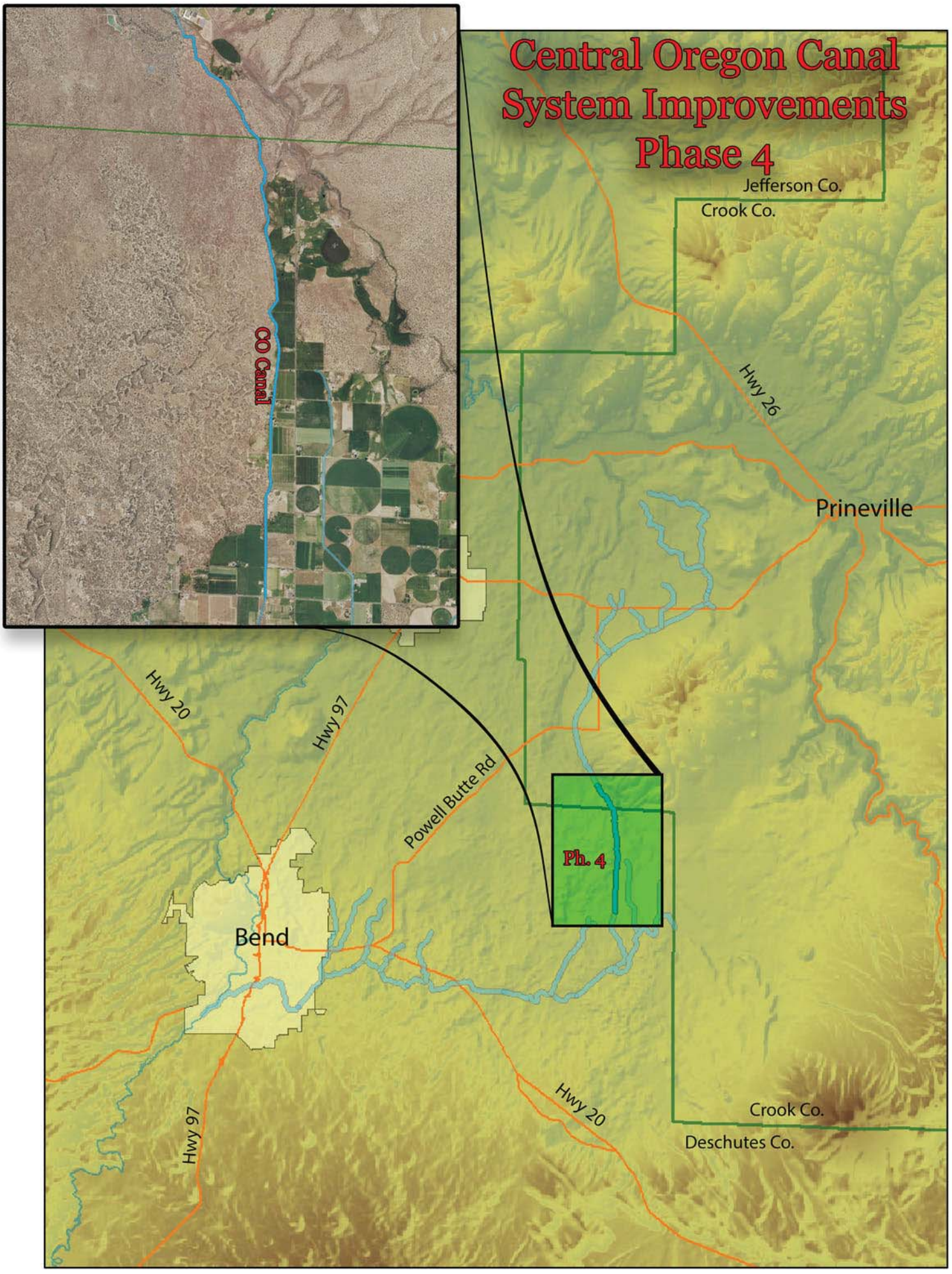
| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | COC-41-4 | J | 100 PSI | 90 | 2,798 | LF | $636 | $1,780,342 |
| PIPE | J | Begin Siphon | 100 PSI | 90 | 219 | LF | $636 | $139,557 |
| PIPE | Begin Siphon | K-0 | 100 PSI | 60 | 1,460 | LF | Exist. | Existing |
| PIPE | K-0 | End Siphon | 100 PSI | 60 | 2,490 | LF | Exist. | Existing |
| PIPE | End Siphon | K-1 | 100 PSI | 90 | 440 | LF | $636 | $279,979 |
| PIPE | K-1 | K-2-1 | 100 PSI | 90 | 1,727 | LF | $636 | $1,098,437 |
| PIPE | K-2-1 | K-3-1 | 100 PSI | 90 | 861 | LF | $636 | $547,539 |
| PIPE | K-3-1 | K-3-2 | 100 PSI | 90 | 1,679 | LF | $636 | $1,068,205 |
| PIPE | K-3-2 | K-3-4 | 100 PSI | 90 | 1,600 | LF | $636 | $1,017,818 |
| PIPE | K-3-4 | K-3-5 | 100 PSI | 90 | 486 | LF | $636 | $309,041 |
| PIPE | K-3-5 | K-3-6 | 100 PSI | 90 | 11 | LF | $636 | $6,718 |
| PIPE | K-3-6 | K-4 | 100 PSI | 90 | 1,162 | LF | $636 | $739,010 |
| PIPE | K-4 | K-4-0 | 100 PSI | 90 | 21 | LF | $636 | $13,437 |
| PIPE | K-4-0 | K-4-1 | 100 PSI | 90 | 781 | LF | $636 | $497,152 |
| PIPE | K-4-1 | K-4-1-1 | 100 PSI | 90 | 100 | LF | $636 | $63,824 |
| PIPE | K-4-1-1 | K-4-3 | 100 PSI | 90 | 21 | LF | $636 | $13,437 |
| PIPE | K-4-3 | K-4-4 | 100 PSI | 90 | 1,521 | LF | $636 | $967,431 |
| PIPE | K-4-4 | K-5 | 100 PSI | 90 | 5 | LF | $636 | $3,359 |
| PIPE | K-5 | K-5-0 | 100 PSI | 90 | 16 | LF | $636 | $10,077 |
| PIPE | K-5-0 | K-5-1 | 100 PSI | 90 | 1,024 | LF | $636 | $651,672 |
| PIPE | K-5-1 | K-5-2 | 100 PSI | 90 | 42 | LF | $636 | $26,873 |
| PIPE | K-5-2 | K-5-3 | 100 PSI | 90 | 1,130 | LF | $636 | $718,855 |
| PIPE | K-5-3 | K-5-4 | 100 PSI | 90 | 380 | LF | $636 | $241,858 |
| PIPE | K-5-4 | K-5-6 | 100 PSI | 90 | 1,658 | LF | $636 | $1,054,769 |
| PIPE | K-5-6 | K-6-1 | 100 PSI | 90 | 201 | LF | $636 | $127,647 |
| PIPE | K-6-1 | K-6-4 | 100 PSI | 90 | 2,623 | LF | $636 | $1,668,600 |
| PIPE | K-6-4 | K-7-1 | 100 PSI | 90 | 180 | LF | $636 | $114,211 |
| PIPE | K-7-1 | K-7-2 | 100 PSI | 90 | 1,167 | LF | $636 | $742,369 |
| PIPE | K-7-2 | K-7-3 | 100 PSI | 90 | 164 | LF | $636 | $104,133 |
| PIPE | K-7-3 | K-7-4 | 100 PSI | 90 | 338 | LF | $636 | $214,985 |
| PIPE | K-7-4 | K-7-5 | 100 PSI | 90 | 966 | LF | $636 | $614,722 |
| PIPE | K-7-5 | K-8-1 | 100 PSI | 90 | 69 | LF | $636 | $43,669 |
| PIPE | K-8-1 | K-8-2 | 100 PSI | 90 | 11 | LF | $636 | $6,718 |
| PIPE | K-8-2 | K-8-4 | 100 PSI | 90 | 1,299 | LF | $636 | $826,347 |
| PIPE | K-8-4 | K-8-5 | 100 PSI | 90 | 16 | LF | $636 | $10,077 |
| PIPE | K-8-5 | K-9-1 | 100 PSI | 90 | 1,394 | LF | $636 | $886,812 |
| PIPE | K-9-1 | K-9-2 | 100 PSI | 90 | 11 | LF | $636 | $6,718 |
| PIPE | K-9-2 | K-9-4 | 100 PSI | 84 | 591 | LF | $502 | $296,863 |
| PIPE | K-9-4 | K-10 | 100 PSI | 84 | 908 | LF | $502 | $455,896 |
| PIPE | K-10 | K-10-2 | 100 PSI | 84 | 190 | LF | $502 | $95,420 |
| TURNOUT | | | | | 40 | EA | $10,000 | $400,000 |
| | SUBTOTAL | | | | | | | $17,864,578 |

# PHASE 3 - CENTRAL OREGON CANAL

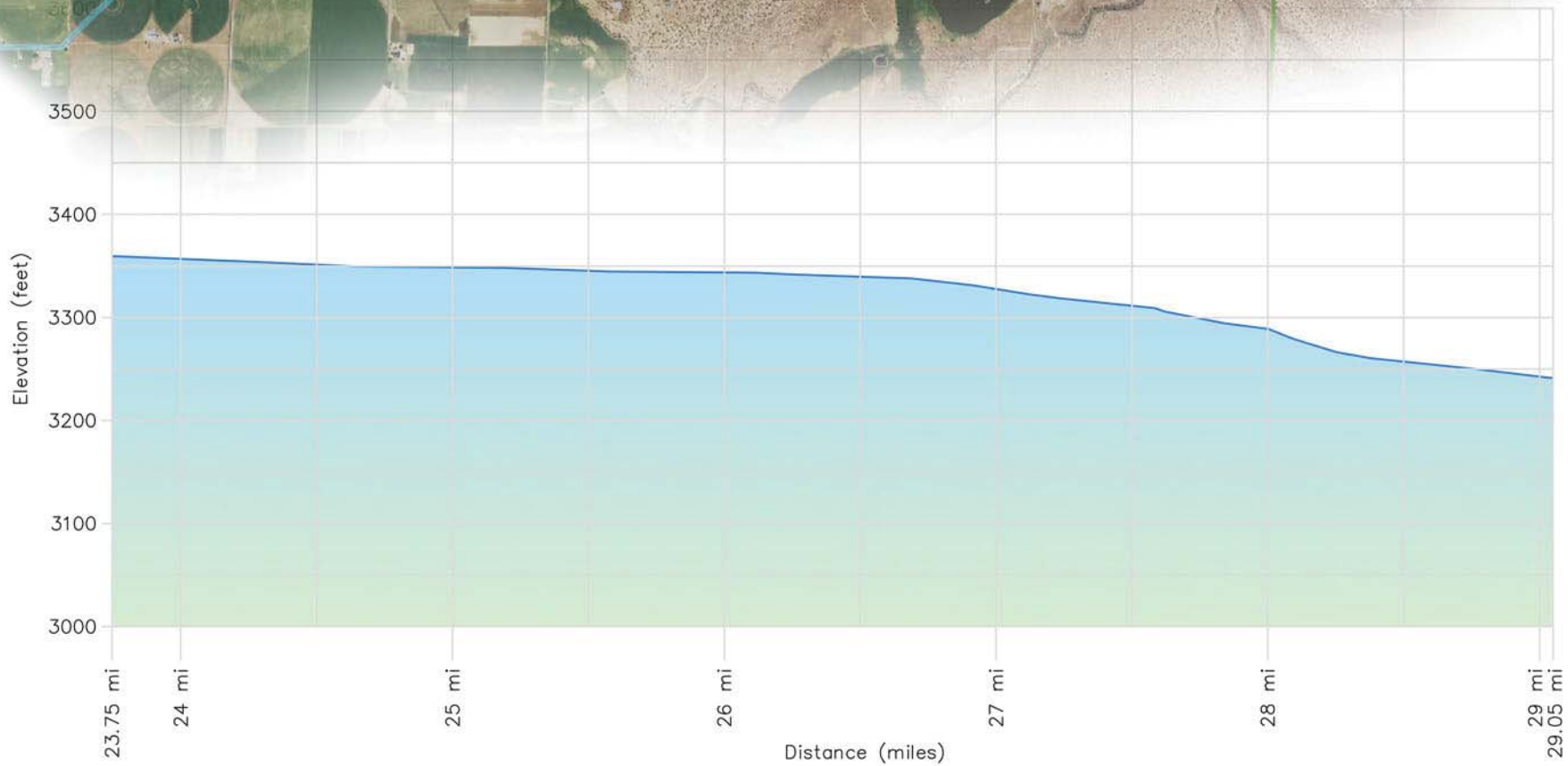
Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $1,071,875 |
| | CMGC | | | | | 12% | | $2,143,749 |
| | CONTINGENCY | | | | | 20% | | $4,216,040 |
| | **TOTAL** | | | | | | | **$25,296,243** |


Central Oregon Canal System Improvements Phase 4
Jefferson Co.
Crook Co.
CO Canal
Hwy 26
Prineville
Hwy 20
Hwy 97
Powell Butte Rd
Ph. 4
Bend
Hwy 20
Crook Co.
Deschutes Co.
Hwy 97

# Central Oregon Canal Phase 4 Profile

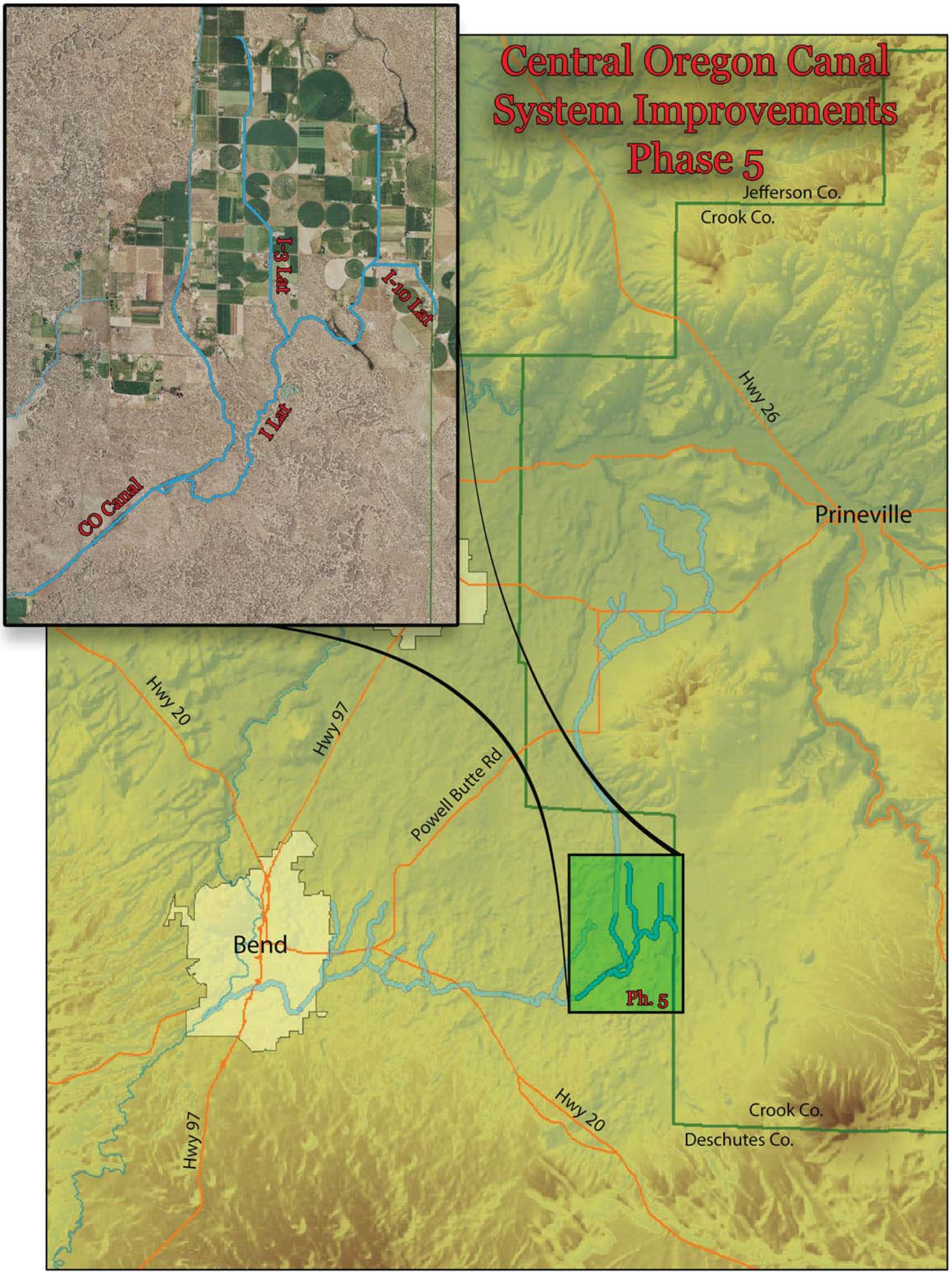


# PHASE 4 - CENTRAL OREGON CANAL

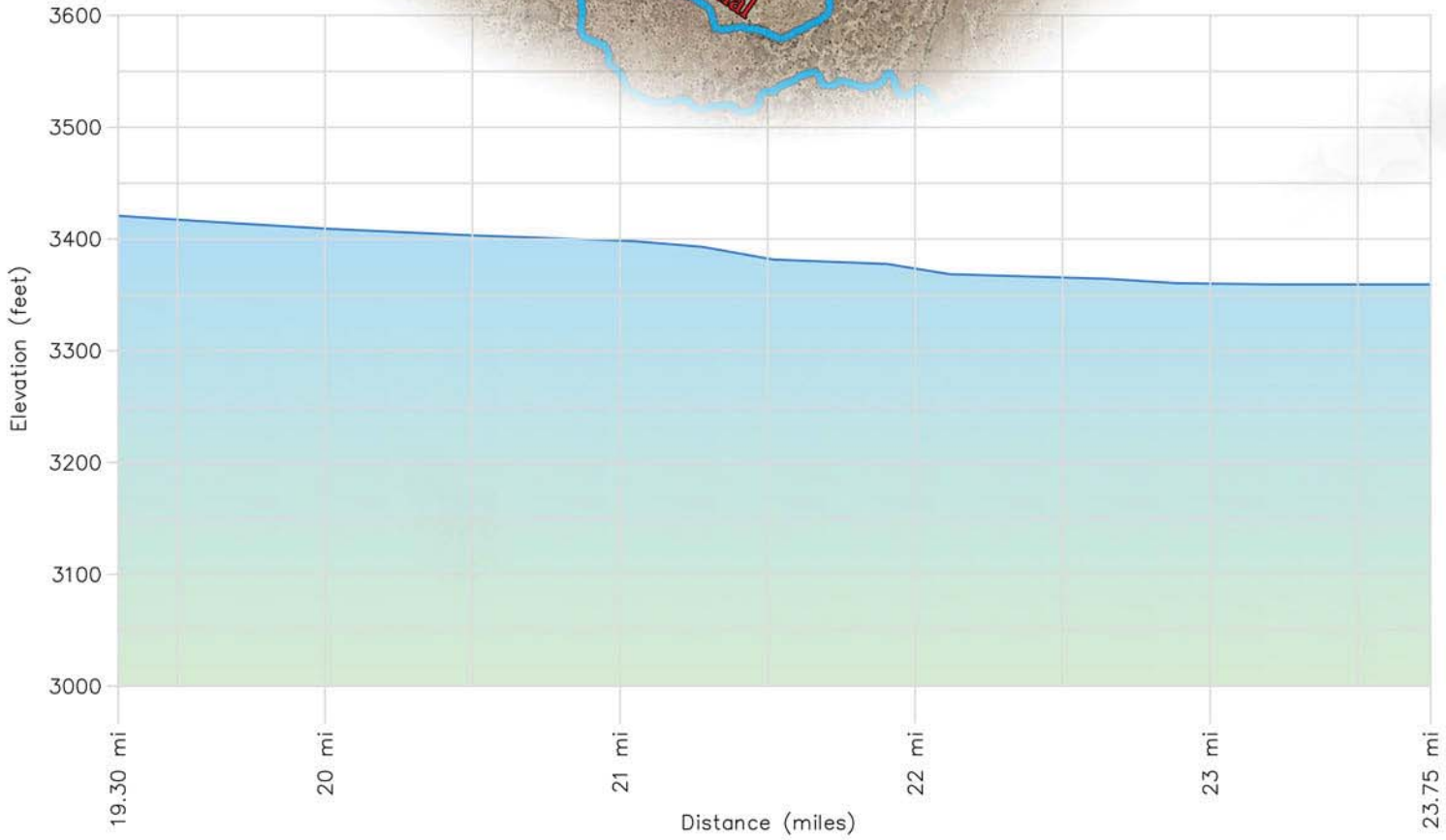
Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | COC-35-1 | COC-35-2 | 100 PSI | 96 | 4,335 | LF | $636 | $2,757,851 |
| PIPE | COC-35-2 | COC-37 | 100 PSI | 96 | 222 | LF | $636 | $141,084 |
| PIPE | COC-37 | COC-36 | 100 PSI | 96 | 1,135 | LF | $636 | $722,221 |
| PIPE | COC-36 | COC-37-1 | 100 PSI | 96 | 2,603 | LF | $636 | $1,656,054 |
| PIPE | COC-37-1 | COC-38-1 | 100 PSI | 96 | 808 | LF | $636 | $513,948 |
| PIPE | COC-38-1 | COC-38-2 | 100 PSI | 96 | 1,589 | LF | $636 | $1,011,100 |
| PIPE | COC-38-2 | COC-38-3 | 100 PSI | 96 | 1,690 | LF | $636 | $1,074,930 |
| PIPE | COC-38-3 | COC-38-4 | 100 PSI | 96 | 243 | LF | $636 | $154,558 |
| PIPE | COC-38-4 | COC-38-5/COC-38- | 100 PSI | 96 | 185 | LF | $636 | $117,570 |
| PIPE | COC-38-5/COC-38- | COC-39 | 100 PSI | 96 | 16 | LF | $636 | $10,077 |
| PIPE | COC-39 | COC-41-1 | 100 PSI | 96 | 6,954 | LF | $636 | $4,423,982 |
| PIPE | COC-41-1 | COC-41-2 | 100 PSI | 96 | 306 | LF | $636 | $194,830 |
| PIPE | COC-41-2 | PRV Station | 100 PSI | 96 | 9,440 | LF | $636 | $6,005,728 |
| PRV STA. | | PRV Station | 100 PSI | 96 | 1 | EA | $800,000 | $800,000 |
| TURNOUT | | | | | 13 | EA | $10,000 | $130,000 |
| | SUBTOTAL | | | | | | | $19,713,932 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $1,182,836 |
| | CMGC | | | | | 12% | | $2,365,671.87 |
| | CONTINGENCY | | | | | 20% | | $4,652,488 |
| | **TOTAL** | | | | | | | **$27,914,928** |


Central Oregon Canal System Improvements Phase 5
Jefferson Co.
Crook Co.
I-8 Lat
I-10 Lat
I Lat
CO Canal
Hwy 26
Prineville
Hwy 20
Hwy 97
Powell Butte Rd
Bend
Ph. 5
Hwy 20
Hwy 97
Crook Co.
Deschutes Co.

# Central Oregon Canal
# Phase 5 Profile

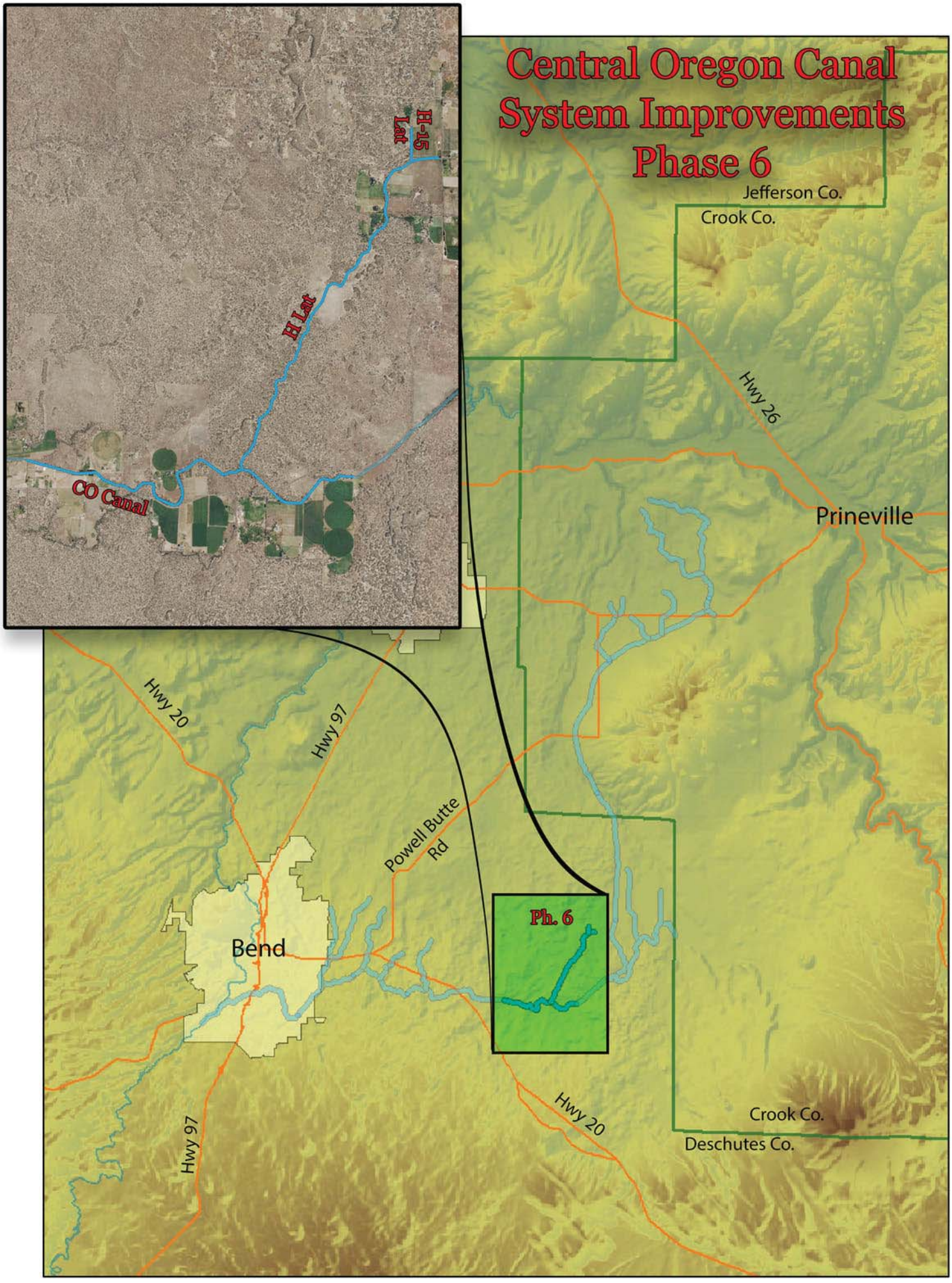


# PHASE 5 - CENTRAL OREGON CANAL

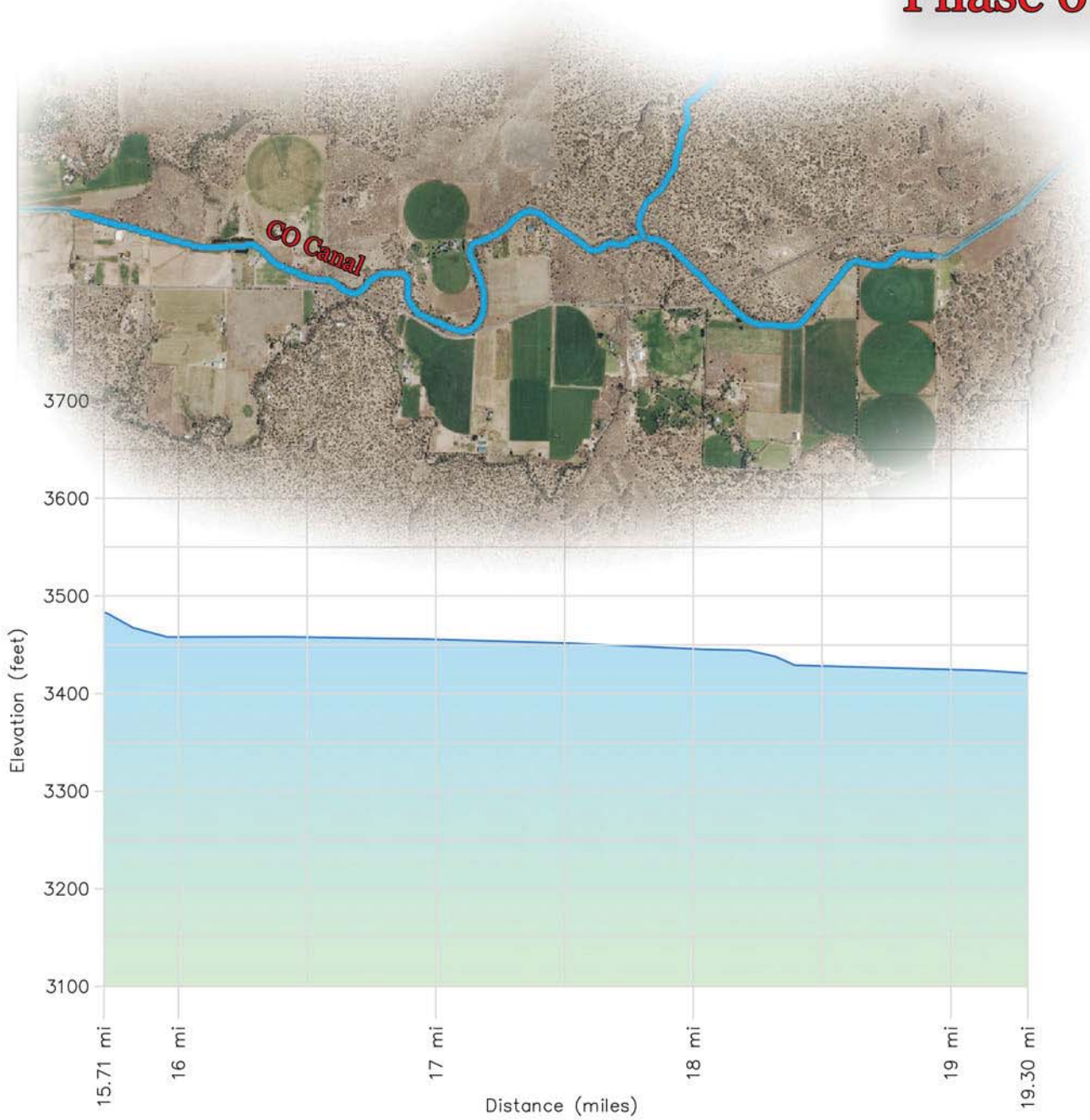
Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | COC-35 | I | 100 PSI | 102 | 8,342 | LF | $684 | $5,702,865 |
| PIPE | I | I-1 | 26 | 48 | 10,835 | LF | $328 | $3,557,147 |
| PIPE | I-1 | I-2 | 26 | 48 | 1,325 | LF | $328 | $435,080 |
| PIPE | I-2 | I-3 | 26 | 48 | 2,783 | LF | $328 | $913,495 |
| PIPE | I-3 | I-3-1 | 21 | 30 | 1,642 | LF | $156 | $256,018 |
| PIPE | I-3-1 | I-3-2 | 21 | 30 | 327 | LF | $156 | $51,044 |
| PIPE | I-3-2 | I-3-3 | 21 | 30 | 2,265 | LF | $156 | $353,189 |
| PIPE | I-3-3 | I-3-4 | 21 | 28 | 269 | LF | $137 | $37,022 |
| PIPE | I-3-4 | I-3-6 | 21 | 28 | 11 | LF | $137 | $1,452 |
| PIPE | I-3-6 | I-3-7 | 21 | 28 | 1,341 | LF | $137 | $184,383 |
| PIPE | I-3-7 | I-3-8 | 21 | 28 | 11 | LF | $137 | $1,452 |
| PIPE | I-3-8 | I-3-9 | 21 | 24 | 2,883 | LF | $99 | $286,132 |
| PIPE | I-3-9 | I-3-10 | 21 | 24 | 0 | LF | $99 | $5 |
| PIPE | I-3-10 | I-3-11 | 21 | 24 | 1,653 | LF | $99 | $164,029 |
| PIPE | I-3-11 | I-3-12 | 21 | 20 | 1,294 | LF | $69 | $89,833 |
| PIPE | I-3-12 | I-3-14 | 21 | 18 | 2,841 | LF | $56 | $160,144 |
| PIPE | I-3-14 | I-3-15 | 21 | 18 | 11 | LF | $56 | $596 |
| PIPE | I-3-15 | I-3-16 | 21 | 16 | 760 | LF | $46 | $34,920 |
| PIPE | I-3-16 | I-3-17 | 21 | 16 | 766 | LF | $46 | $35,162 |
| PIPE | I-3-17 | I-4 | 21 | 36 | 2,841 | LF | $232 | $659,292 |
| PIPE | I-4 | I-5 | 21 | 36 | 1,484 | LF | $232 | $344,350 |
| PIPE | I-5 | I-7 | 21 | 36 | 4,097 | LF | $232 | $950,946 |
| PIPE | I-7 | I-8 | 21 | 36 | 16 | LF | $232 | $3,676 |
| PIPE | I-8 | I-10 | 21 | 36 | 755 | LF | $232 | $175,239 |
| PIPE | I-10 | I-10-1 | 21 | 20 | 776 | LF | $69 | $53,900 |
| PIPE | I-10-1 | I-10-2 | 21 | 20 | 2,582 | LF | $69 | $179,299 |
| PIPE | I-10-2 | I-10-3 | 21 | 18 | 407 | LF | $56 | $22,920 |
| PIPE | I-10-3 | I-10-4 | 21 | 18 | 1,045 | LF | $56 | $58,938 |
| PIPE | I-10-4 | I-11 | 21 | 32 | 407 | LF | $177 | $71,803 |
| PIPE | I-11 | I-14 | 21 | 28 | 1,436 | LF | $137 | $197,449 |
| PIPE | I-14 | I-15 | 21 | 28 | 1,199 | LF | $137 | $164,783 |
| PIPE | I-15 | I-17 | 21 | 24 | 11 | LF | $99 | $1,050 |
| PIPE | I-17 | I-18 | 21 | 24 | 11 | LF | $99 | $1,048 |
| PIPE | I-18 | I-19 | 21 | 24 | 1,246 | LF | $99 | $123,676 |
| PIPE | I-19 | I-20 | 21 | 24 | 63 | LF | $99 | $6,290 |
| PIPE | I-20 | I-22 | 21 | 24 | 5 | LF | $99 | $524 |
| PIPE | I-22 | I-23 | 21 | 20 | 1,262 | LF | $69 | $87,633 |
| PIPE | I-23 | I-25 | 21 | 20 | 11 | LF | $69 | $736 |
| PIPE | I-25 | I-26 | 21 | 20 | 1,331 | LF | $69 | $92,399 |
| PIPE | I-Lat | COC-35-1 | 100 PSI | 96 | 10,861 | LF | $636 | $6,909,743 |
| TURNOUT | | | | | 40 | EA | $10,000 | $400,000 |
| | SUBTOTAL | | | | | | | $22,769,659 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $1,366,180 |
| | CMGC | | | | | 12% | | $2,732,359 |
| | CONTINGENCY | | | | | 20% | | $5,373,640 |
| | **TOTAL** | | | | | | | **$32,241,838** |


Central Oregon Canal System Improvements Phase 6
H-15 Lat
H Lat
CO Canal
Jefferson Co.
Crook Co.
Hwy 26
Prineville
Hwy 20
Hwy 97
Powell Butte Rd
Ph. 6
Bend
Hwy 97
Hwy 20
Crook Co.
Deschutes Co.

# Central Oregon Canal
# Phase 6 Profile

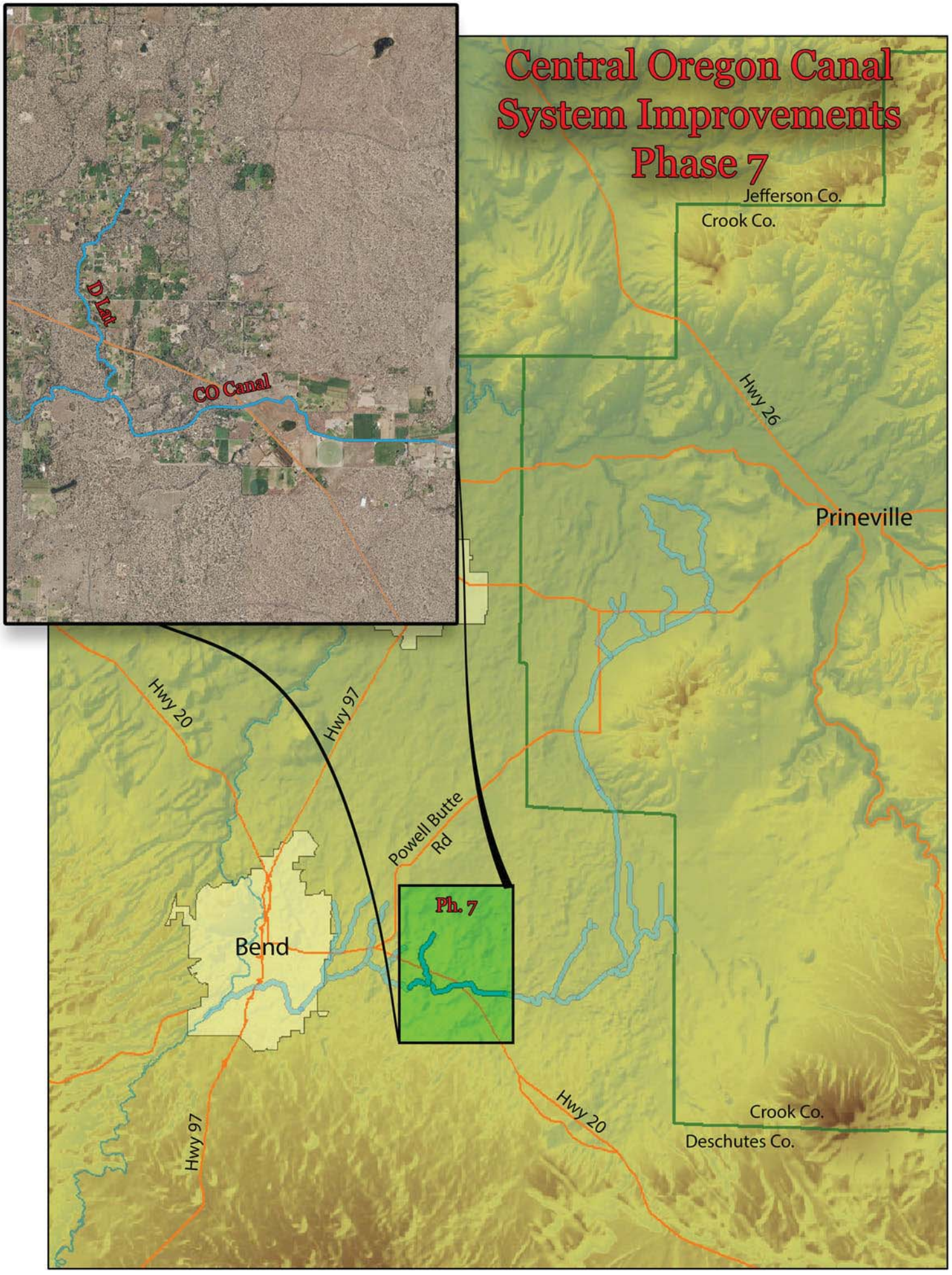


# PHASE 6 - CENTRAL OREGON CANAL

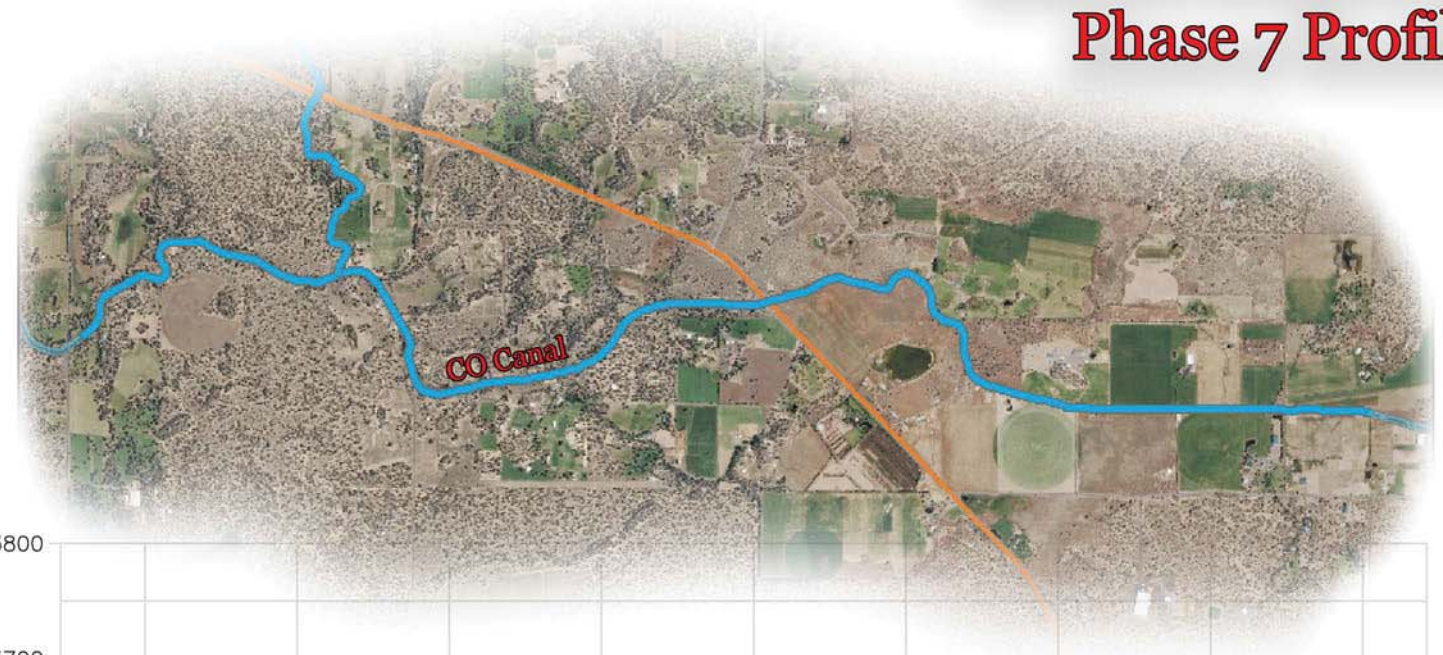
Central Oregon Irrigation District

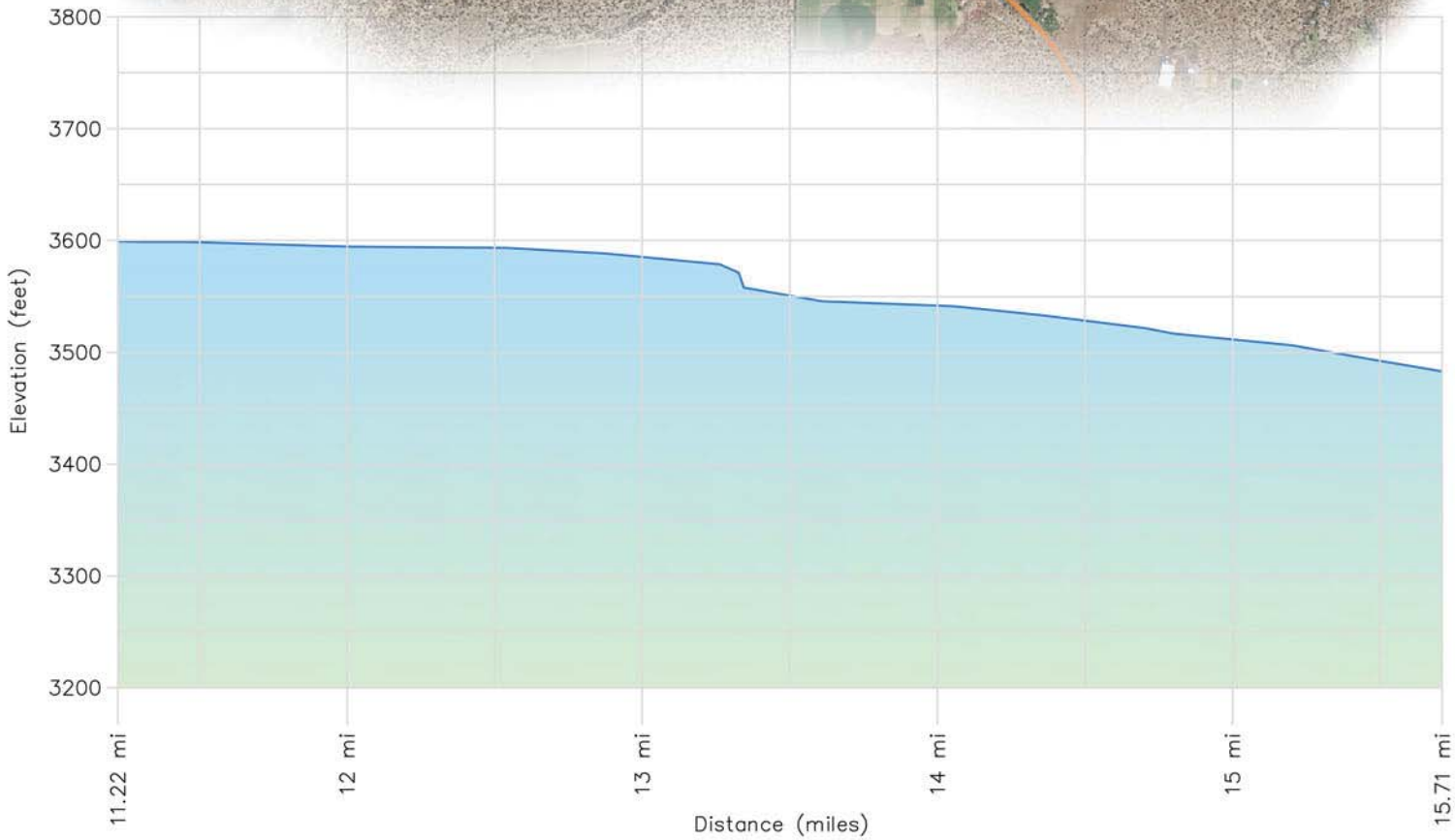
Reconnaissance-Level Construction Cost Estimate 4/1/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | COC-28 | COC-29 | 100 PSI | 108 | 2,820 | LF | $723 | $2,039,424 |
| PIPE | COC-29 | COC-30 | 100 PSI | 108 | 396 | LF | $723 | $286,387 |
| PIPE | COC-30 | COC-31-1 | 100 PSI | 108 | 1,389 | LF | $723 | $1,004,264 |
| PIPE | COC-31-1 | COC-31-2 | 100 PSI | 108 | 164 | LF | $723 | $118,373 |
| PIPE | COC-31-2 | COC-32 | 100 PSI | 108 | 4,425 | LF | $723 | $3,199,900 |
| PIPE | COC-32 | COC-33 | 100 PSI | 108 | 132 | LF | $723 | $95,462 |
| PIPE | COC-33 | H | 100 PSI | 108 | 3,485 | LF | $723 | $2,520,207 |
| PIPE | H | H-5 | 26 | 24 | 12,418 | LF | $82 | $1,016,579 |
| PIPE | H-5 | H-6 | 26 | 24 | 650 | LF | $82 | $53,173 |
| PIPE | H-6 | H-7 | 26 | 24 | 755 | LF | $82 | $61,811 |
| PIPE | H-7 | H-8-0/H-8-1 | 26 | 24 | 491 | LF | $82 | $40,183 |
| PIPE | H-8-0/H-8-1 | H-9-0/H-9-1 | 26 | 24 | 328 | LF | $82 | $26,880 |
| PIPE | H-9-0/H-9-1 | H-11 | 26 | 24 | 602 | LF | $82 | $49,283 |
| PIPE | H-11 | H-15 | 26 | 24 | 2,381 | LF | $82 | $194,941 |
| PIPE | H-15 | H-15-2 | 26 | 16 | 1,531 | LF | $38 | $58,519 |
| PIPE | H-15-2 | H-16 | 26 | 16 | 1,257 | LF | $38 | $48,044 |
| PIPE | H-16 | H-17 | 26 | 16 | 127 | LF | $38 | $4,845 |
| PIPE | H-17 | H-2 | 100 PSI | 102 | 644 | LF | $684 | $440,416 |
| PIPE | H-2 | COC-33-1 | 100 PSI | 102 | 1,526 | LF | $684 | $1,043,146 |
| PIPE | COC-33-1 | COC-34 | 100 PSI | 102 | 1,093 | LF | $684 | $747,147 |
| PIPE | COC-34 | COC-35 | 100 PSI | 102 | 2,792 | LF | $684 | $1,908,386 |
| TURNOUT | | | | | 21 | EA | $10,000 | $210,000 |
| | SUBTOTAL | | | | | | | $15,167,371 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $910,042 |
| | CMGC | | | | | 12% | | $1,820,085 |
| | CONTINGENCY | | | | | 20% | | $3,579,500 |
| | **TOTAL** | | | | | | | **$21,476,997** |


Central Oregon Canal System Improvements Phase 7
Jefferson Co.
Crook Co.
D Lat
CO Canal
Hwy 26
Prineville
Hwy 20
Hwy 97
Powell Butte Rd
Ph. 7
Bend
Hwy 97
Hwy 20
Crook Co.
Deschutes Co.

# Central Oregon Canal
# Phase 7 Profile



# PHASE 7 - CENTRAL OREGON CANAL

Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

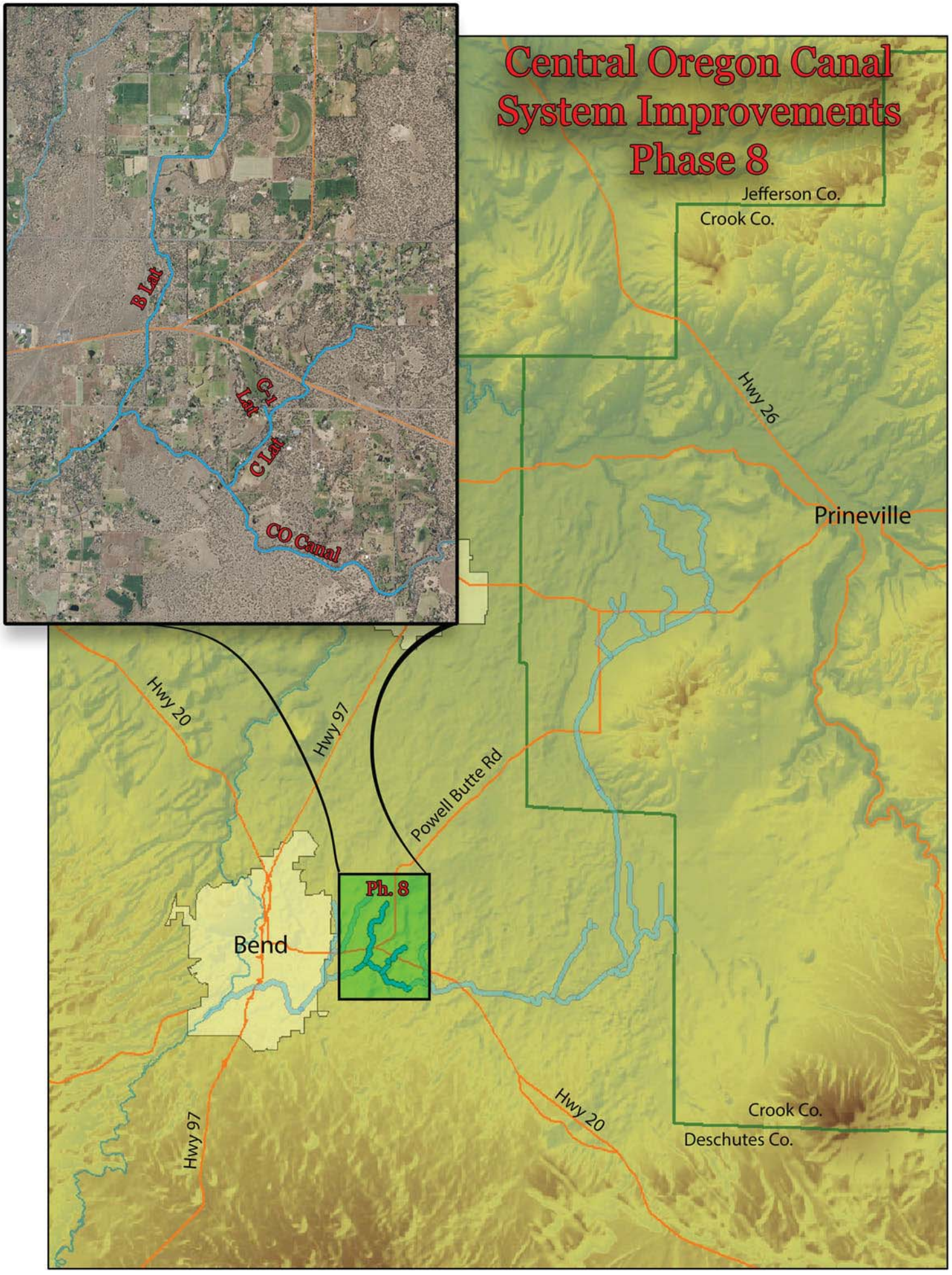
| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | COC-18-2 | C-4 | 100 PSI | 114 | 1,573 | LF | $851 | $1,338,683 |
| PIPE | C-4 | C-5 | 100 PSI | 114 | 1,008 | LF | $851 | $858,015 |
| PIPE | C-5 | COC-20 | 100 PSI | 114 | 2,313 | LF | $851 | $1,967,594 |
| PIPE | COC-20 | D | 100 PSI | 114 | 169 | LF | $851 | $143,751 |
| PIPE | D | D-0 | 32.5 | 24 | 1,440 | LF | $66 | $94,309 |
| PIPE | D-0 | D-0-1 | 26 | 24 | 301 | LF | $82 | $24,638 |
| PIPE | D-0-1 | D-0-1-1 | 26 | 24 | 465 | LF | $82 | $38,037 |
| PIPE | D-0-1-1 | D-2 | 26 | 24 | 206 | LF | $82 | $16,857 |
| PIPE | D-2 | D-2-1 | 26 | 24 | 686 | LF | $82 | $56,191 |
| PIPE | D-2-1 | D-5 | 26 | 24 | 734 | LF | $82 | $60,082 |
| PIPE | D-5 | D-6 | 26 | 24 | 602 | LF | $82 | $49,276 |
| PIPE | D-6 | D-6-1 | 26 | 20 | 79 | LF | $58 | $4,559 |
| PIPE | D-6-1 | D-7/D-8 | 26 | 20 | 1,077 | LF | $58 | $62,003 |
| PIPE | D-7/D-8 | D-8-1 | 26 | 20 | 2,714 | LF | $58 | $156,225 |
| PIPE | D-8-1 | D-8-2 | 21 | 20 | 148 | LF | $69 | $10,293 |
| PIPE | D-8-2 | D-8-3 | 21 | 20 | 349 | LF | $69 | $24,211 |
| PIPE | D-8-3 | D-12 | 19 | 20 | 539 | LF | $89 | $47,849 |
| PIPE | D-12 | D-13 | 19 | 18 | 1,573 | LF | $62 | $97,413 |
| PIPE | D-13 | D-13-0 | 19 | 18 | 222 | LF | $62 | $13,729 |
| PIPE | D-13-0 | D-15-1-0 | 19 | 16 | 1,109 | LF | $57 | $62,869 |
| PIPE | D-15-1-0 | D-15-1 | 17 | 16 | 338 | LF | $53 | $18,038 |
| PIPE | D-15-1 | D-17 | 17 | 16 | 502 | LF | $53 | $26,775 |
| PIPE | D-17 | D-16 | 17 | 16 | 21 | LF | $53 | $1,127 |
| PIPE | D-16 | COC-21 | 100 PSI | 108 | 53 | LF | $723 | $38,207 |
| PIPE | COC-21 | D-3/COC-21/COC- | 100 PSI | 108 | 428 | LF | $723 | $309,305 |
| PIPE | D-3/COC-21/COC- | COC-22-1 | 100 PSI | 108 | 1,420 | LF | $723 | $1,027,175 |
| PIPE | COC-22-1 | COC-22-2 | 100 PSI | 108 | 444 | LF | $723 | $320,754 |
| PIPE | COC-22-2 | D-1 | 100 PSI | 108 | 1,162 | LF | $723 | $840,069 |
| PIPE | D-1 | COC-22-3 | 100 PSI | 108 | 312 | LF | $723 | $225,291 |
| PIPE | COC-22-3 | D-4 | 100 PSI | 108 | 644 | LF | $723 | $465,857 |
| PIPE | D-4 | COC-23 | 100 PSI | 108 | 190 | LF | $723 | $137,466 |
| PIPE | COC-23 | COC-23-0 | 100 PSI | 108 | 4,731 | LF | $723 | $3,421,372 |
| PIPE | COC-23-0 | COC-23-1/COC-23- | 100 PSI | 108 | 1,373 | LF | $723 | $992,809 |
| PIPE | COC-23-1/COC-23- | COC-24 | 100 PSI | 108 | 845 | LF | $723 | $610,959 |
| PIPE | COC-24 | E-2 | 100 PSI | 108 | 32 | LF | $723 | $22,911 |
| PIPE | E-2 | COC-25 | 100 PSI | 108 | 1,309 | LF | $723 | $946,987 |
| PIPE | COC-25 | COC-26 | 100 PSI | 108 | 1,404 | LF | $723 | $1,015,720 |

# PHASE 7 - CENTRAL OREGON CANAL

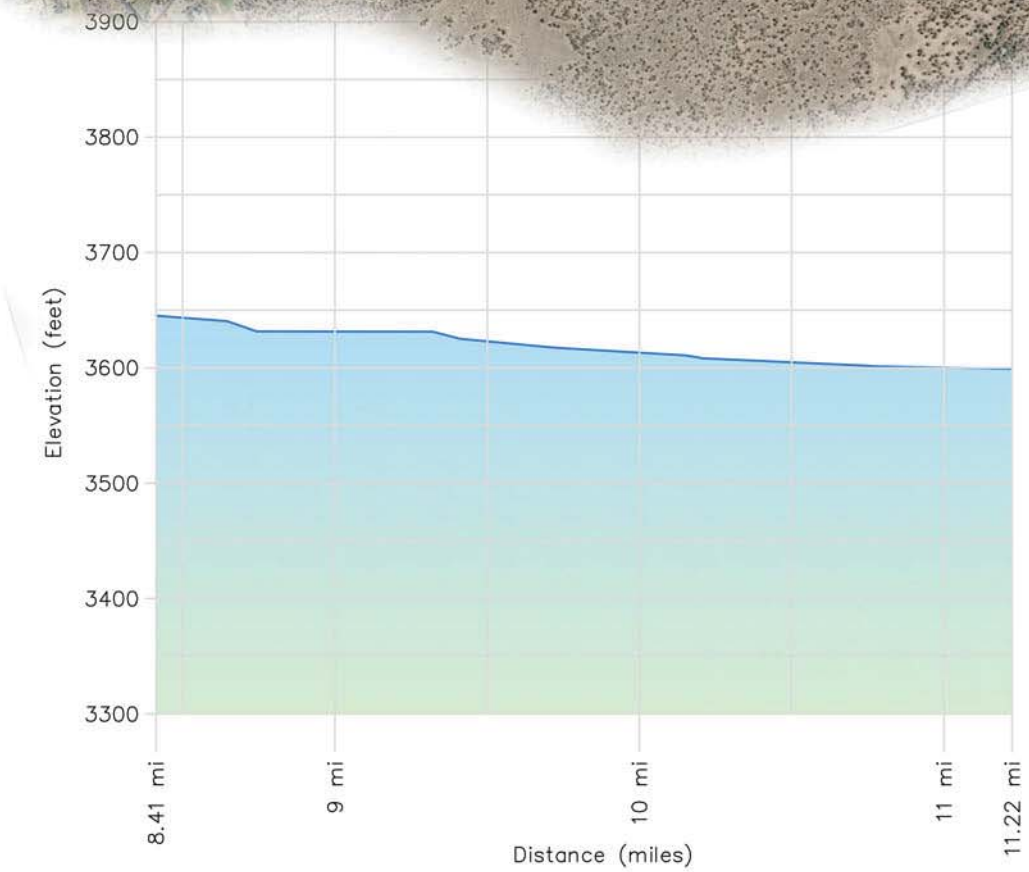
Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | COC-26 | COC-26-1 | 100 PSI | 108 | 2,751 | LF | $723 | $1,989,436 |
| PIPE | COC-26-1 | F-1 | 100 PSI | 108 | 11 | LF | $723 | $7,651 |
| PIPE | F-1 | COC-27 | 100 PSI | 108 | 21 | LF | $723 | $15,397 |
| PIPE | COC-27 | PRV Station | 100 PSI | 108 | 1,478 | LF | $723 | $1,069,179 |
| PRV STA. | | PRV Station | | | 1 | EA | $800,000 | $800,000 |
| TURNOUT | | | | | 41 | EA | $10,000 | $410,000 |
| | SUBTOTAL | | | | | | | $19,839,072 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $1,190,344 |
| | CMGC | | | | | 12% | | $2,380,689 |
| | CONTINGENCY | | | | | 20% | | $4,682,021 |
| | **TOTAL** | | | | | | | **$28,092,126** |


Central Oregon Canal
System Improvements
Phase 8
Jefferson Co.
Crook Co.
B Lat
C-1
Lat
C Lat
CO Canal
Hwy 26
Prineville
Hwy 20
Hwy 97
Powell Butte Rd
Ph. 8
Bend
Hwy 20
Crook Co.
Deschutes Co.
Hwy 97

# Central Oregon Canal
# Phase 8 Profile



# PHASE 8 - CENTRAL OREGON CANAL

Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

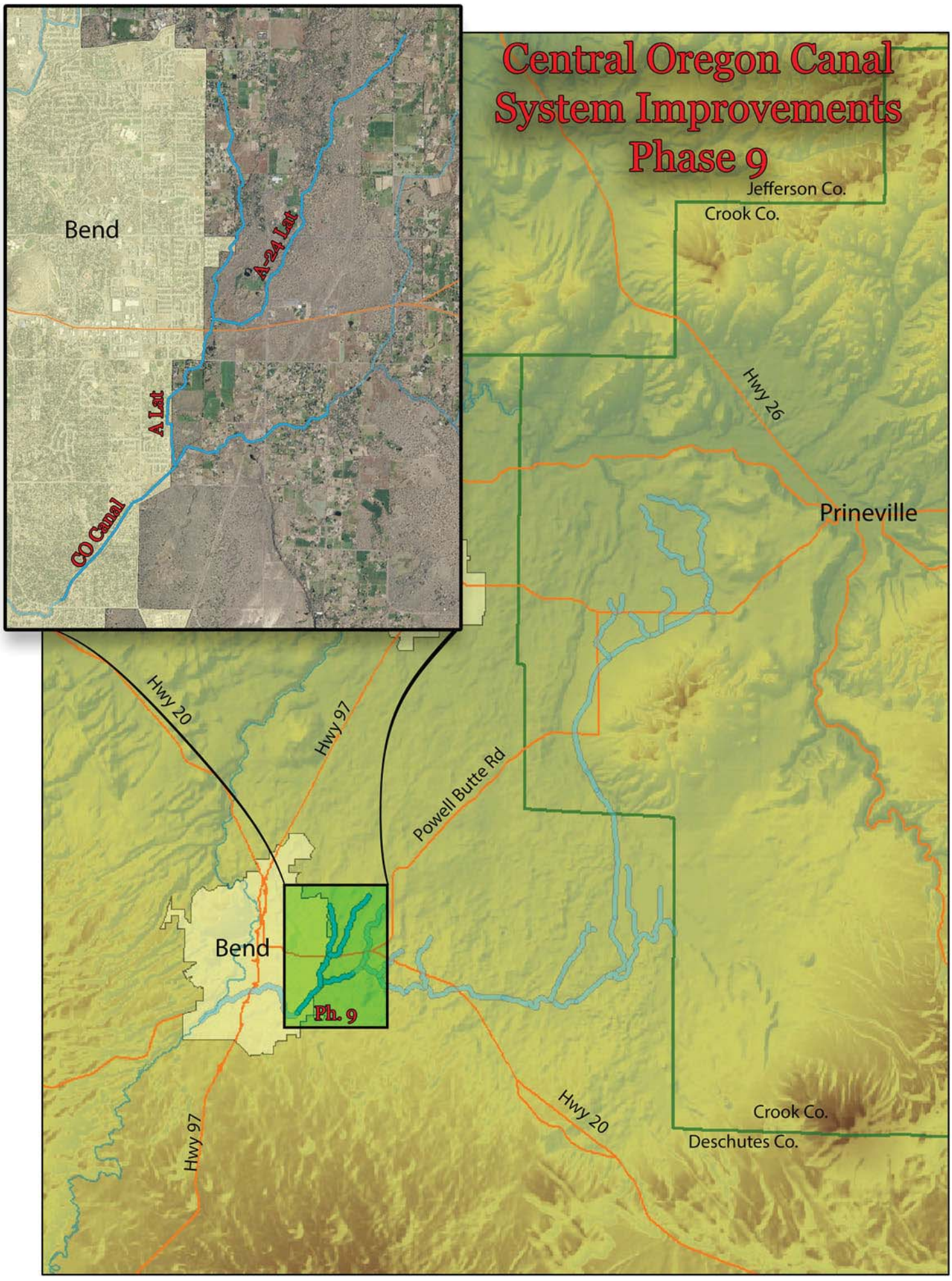
| Feature | Location | | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | COC-10 | COC-10-1 | 100 PSI | 114 | 486 | LF | $851 | $413,285 |
| PIPE | COC-10-1 | COC-11 | 100 PSI | 114 | 480 | LF | $851 | $408,792 |
| PIPE | COC-11 | COC-12 | 100 PSI | 114 | 259 | LF | $851 | $220,119 |
| PIPE | COC-12 | COC-13 | 100 PSI | 114 | 174 | LF | $851 | $148,243 |
| PIPE | COC-13 | B | 100 PSI | 114 | 1,109 | LF | $851 | $943,367 |
| PIPE | B | B-2 | 32.5 | 26 | 327 | LF | $84 | $27,425 |
| PIPE | B-2 | B-3 | 32.5 | 26 | 343 | LF | $84 | $28,819 |
| PIPE | B-3 | B-4 | 32.5 | 26 | 322 | LF | $84 | $27,045 |
| PIPE | B-4 | B-5 | 32.5 | 26 | 549 | LF | $84 | $46,110 |
| PIPE | B-5 | B-6 | 32.5 | 26 | 253 | LF | $84 | $21,281 |
| PIPE | B-6 | B-7 | 32.5 | 26 | 48 | LF | $84 | $3,990 |
| PIPE | B-7 | B-8 | 26 | 26 | 2,265 | LF | $100 | $225,490 |
| PIPE | B-8 | B-9 | 26 | 26 | 100 | LF | $100 | $9,987 |
| PIPE | B-9 | B-10/B-11 | 26 | 26 | 803 | LF | $100 | $79,894 |
| PIPE | B-10/B-11 | B-12 | 26 | 26 | 306 | LF | $100 | $30,486 |
| PIPE | B-12 | B-13 | 21 | 26 | 1,077 | LF | $120 | $128,805 |
| PIPE | B-13 | B-14/B-15-0 | 21 | 26 | 11 | LF | $120 | $1,263 |
| PIPE | B-14/B-15-0 | B-16 | 21 | 26 | 116 | LF | $120 | $13,892 |
| PIPE | B-16 | B-17 | 21 | 26 | 502 | LF | $120 | $59,983 |
| PIPE | B-17 | B-18 | 21 | 24 | 375 | LF | $99 | $37,208 |
| PIPE | B-18 | B-18-1 | 21 | 24 | 312 | LF | $99 | $30,919 |
| PIPE | B-18-1 | B-19 | 21 | 24 | 702 | LF | $99 | $69,699 |
| PIPE | B-19 | B-20 | 21 | 24 | 576 | LF | $99 | $57,122 |
| PIPE | B-20 | B-21 | 21 | 24 | 496 | LF | $99 | $49,261 |
| PIPE | B-21 | B-21-1 | 21 | 24 | 185 | LF | $99 | $18,342 |
| PIPE | B-21-1 | B-22 | 19 | 24 | 1,579 | LF | $128 | $201,448 |
| PIPE | B-22 | B-23 | 19 | 24 | 713 | LF | $128 | $90,955 |
| PIPE | B-23 | B-24 | 19 | 24 | 16 | LF | $128 | $2,021 |
| PIPE | B-24 | B-26,27,28,29(SUB | 19 | 24 | 1,041 | LF | $128 | $132,770 |
| PIPE | B-26,27,28,29(SUB | B-25 | 19 | 18 | 1,108 | LF | $62 | $68,626 |
| PIPE | B-25 | B-30 | 19 | 18 | 338 | LF | $62 | $20,921 |
| PIPE | B-30 | B-32 | 19 | 16 | 470 | LF | $57 | $26,644 |
| PIPE | B-32 | B-31/B-31-0 | 19 | 16 | 21 | LF | $57 | $1,198 |
| PIPE | B-31/B-31-0 | B-1,B-1-0,B-1-1(SU | 100 PSI | 114 | 692 | LF | $851 | $588,481 |
| PIPE | B-1,B-1-0,B-1-1(SU | COC-14-1 | 100 PSI | 114 | 2,999 | LF | $851 | $2,551,583 |
| PIPE | COC-14-1 | COC-15 | 100 PSI | 114 | 882 | LF | $851 | $750,201 |
| PIPE | COC-15 | C | 100 PSI | 114 | 16 | LF | $851 | $13,485 |

# PHASE 8 - CENTRAL OREGON CANAL

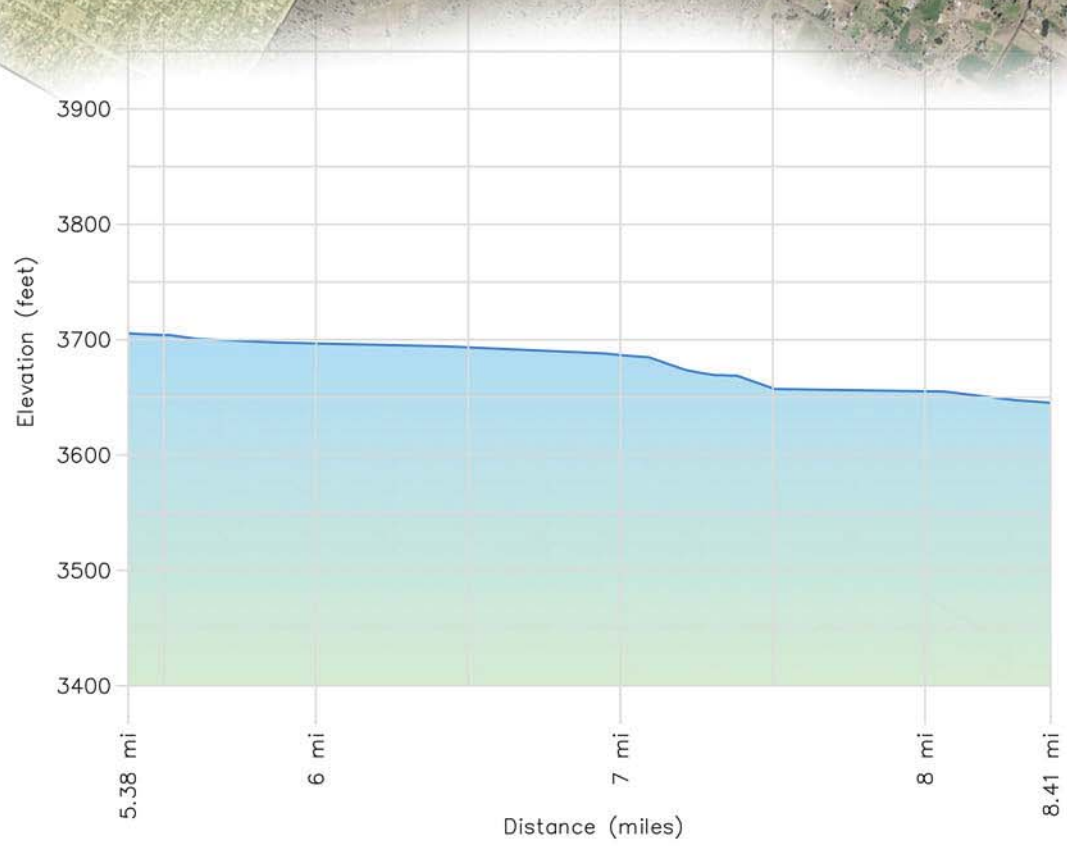
Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

| Feature | Location | | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | C | C-0 | 32.5 | 24 | 850 | LF | $67 | $57,266 |
| PIPE | C-0 | C-0-1 | 32.5 | 24 | 655 | LF | $67 | $44,123 |
| PIPE | C-0-1 | C-0-2 | 32.5 | 24 | 803 | LF | $67 | $54,087 |
| PIPE | C-0-2 | C-0-3 | 26 | 24 | 206 | LF | $82 | $16,857 |
| PIPE | C-0-3 | C-1 | 26 | 16 | 422 | LF | $38 | $16,137 |
| PIPE | C-1 | C-1-0 | 26 | 24 | 95 | LF | $82 | $7,780 |
| PIPE | C-1-0 | C-1-1 | 26 | 16 | 116 | LF | $38 | $4,441 |
| PIPE | C-1-1 | C-6 | 26 | 16 | 1,431 | LF | $38 | $54,706 |
| PIPE | C-6 | C-6-1 | 26 | 16 | 1,114 | LF | $38 | $42,594 |
| PIPE | C-6-1 | C-7 | 26 | 16 | 348 | LF | $38 | $13,323 |
| PIPE | C-7 | C-7-2 | 26 | 16 | 243 | LF | $38 | $9,286 |
| PIPE | C-7-2 | C-8 | 26 | 16 | 1,552 | LF | $38 | $59,349 |
| PIPE | C-8 | C-9 | 26 | 16 | 95 | LF | $38 | $3,634 |
| PIPE | C-9 | C-10 | 21 | 16 | 465 | LF | $46 | $21,341 |
| PIPE | C-10 | COC-16 | 100 PSI | 114 | 253 | LF | $851 | $215,627 |
| PIPE | COC-16 | C-3 | 100 PSI | 114 | 3,849 | LF | $851 | $3,274,831 |
| PIPE | C-3 | COC-18 | 100 PSI | 114 | 1,510 | LF | $851 | $1,284,776 |
| PIPE | COC-18 | COC-18-0 | 100 PSI | 114 | 1,695 | LF | $851 | $1,442,004 |
| PIPE | COC-18-0 | COC-18-2 | 100 PSI | 114 | 433 | LF | $851 | $368,362 |
| TURNOUT | | | | | 56 | EA | $10,000 | $560,000 |
| | SUBTOTAL | | | | | | | $15,099,684 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $905,981 |
| | CMGC | | | | | 12% | | $1,811,962 |
| | CONTINGENCY | | | | | 20% | | $3,563,525 |
| | **TOTAL** | | | | | | | **$21,381,153** |


Central Oregon Canal System Improvements Phase 9
Bend
A-24 Lat
A Lat
CO Canal
Jefferson Co.
Crook Co.
Hwy 26
Prineville
Hwy 20
Hwy 97
Powell Butte Rd
Bend
Ph. 9
Hwy 97
Hwy 20
Crook Co.
Deschutes Co.

# Central Oregon Canal
# Phase 9 Profile



# PHASE 9 - CENTRAL OREGON CANAL

Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

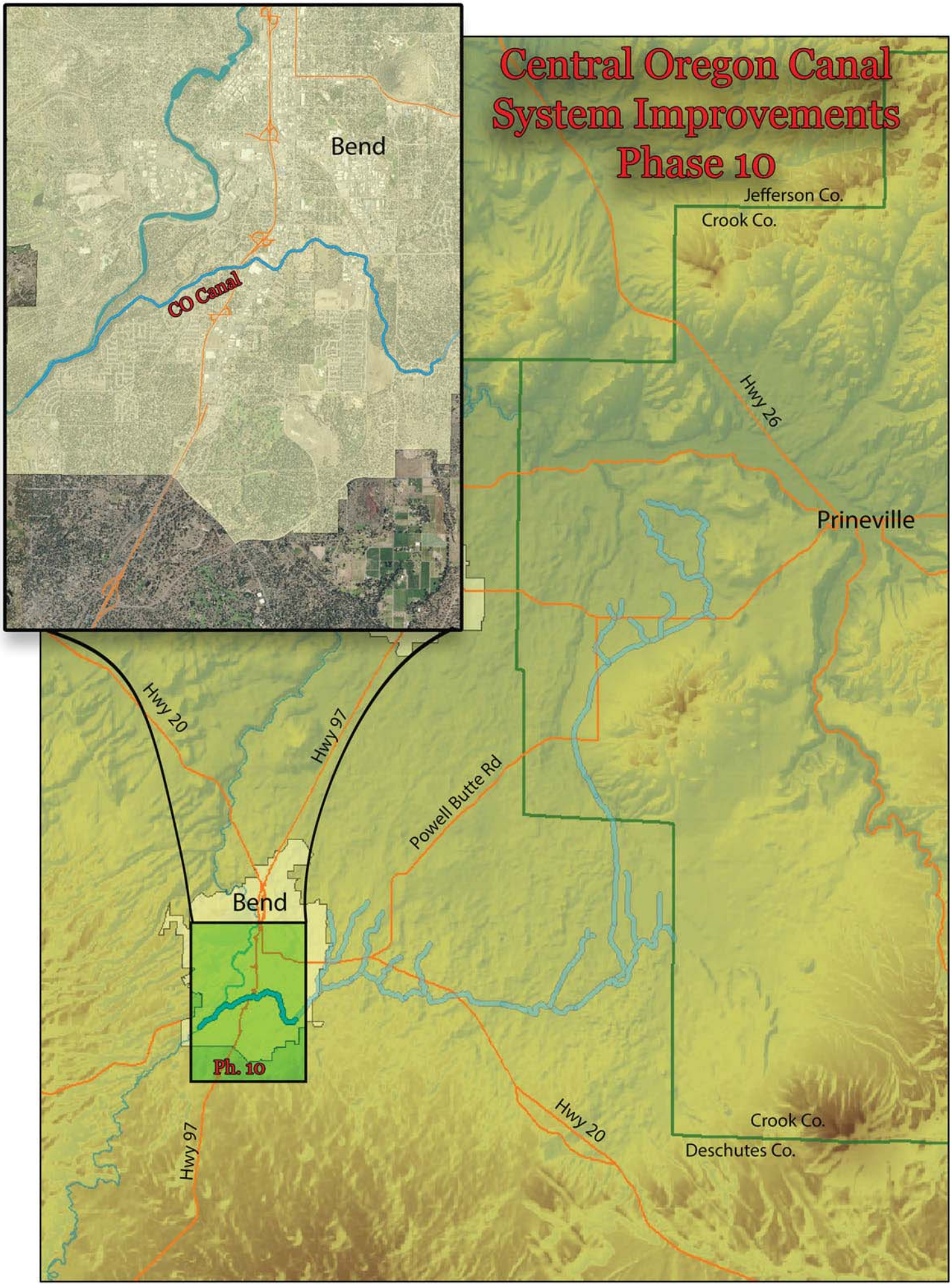
| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | COC-1 | COC-1-1 | 100 PSI | 120 | 1,067 | LF | $884 | $942,626 |
| PIPE | COC-1-1 | COC-2-1 | 100 PSI | 120 | 2,878 | LF | $884 | $2,543,223 |
| PIPE | COC-2-1 | COC-3-0 | 100 PSI | 120 | 1,959 | LF | $884 | $1,731,258 |
| PIPE | COC-3-0 | COC-3-3 | 100 PSI | 120 | 1,621 | LF | $884 | $1,432,604 |
| PIPE | COC-3-3 | A | 100 PSI | 120 | 42 | LF | $884 | $37,332 |
| PIPE | A | A-2 | 32.5 | 34 | 935 | LF | $138 | $129,269 |
| PIPE | A-2 | A-6 | 32.5 | 34 | 1,948 | LF | $138 | $269,494 |
| PIPE | A-6 | A-7/8 | 32.5 | 34 | 90 | LF | $138 | $12,416 |
| PIPE | A-7/8 | A-9 | 32.5 | 34 | 21 | LF | $138 | $2,921 |
| PIPE | A-9 | A-10 | 32.5 | 32 | 797 | LF | $120 | $95,449 |
| PIPE | A-10 | A-11 | 32.5 | 32 | 845 | LF | $120 | $101,140 |
| PIPE | A-11 | A-15/A-12/A-13 | 32.5 | 32 | 74 | LF | $120 | $8,856 |
| PIPE | A-15/A-12/A-13 | A-17 | 32.5 | 32 | 391 | LF | $120 | $46,776 |
| PIPE | A-17 | A-18 | 32.5 | 32 | 312 | LF | $120 | $37,295 |
| PIPE | A-18 | A-20 | 32.5 | 32 | 158 | LF | $120 | $18,966 |
| PIPE | A-20 | A-21 | 32.5 | 32 | 74 | LF | $120 | $8,856 |
| PIPE | A-21 | A-23 | 32.5 | 32 | 998 | LF | $120 | $119,469 |
| PIPE | A-23 | A-23-1 | 32.5 | 32 | 581 | LF | $120 | $69,532 |
| PIPE | A-23-1 | A-24 | 32.5 | 32 | 95 | LF | $120 | $11,378 |
| PIPE | A-24 | A-24-2 | 32.5 | 24 | 1,545 | LF | $67 | $104,112 |
| PIPE | A-24-2 | A-24-1 | 32.5 | 24 | 5 | LF | $67 | $337 |
| PIPE | A-24-1 | A-24-3 | 32.5 | 24 | 1,864 | LF | $67 | $125,608 |
| PIPE | A-24-3 | A-24-4 | 32.5 | 24 | 106 | LF | $67 | $7,119 |
| PIPE | A-24-4 | A-24-2(REPLACE) | 32.5 | 24 | 634 | LF | $67 | $42,700 |
| PIPE | A-24-2(REPLACE) | A-24-5 | 32.5 | 24 | 232 | LF | $67 | $15,657 |
| PIPE | A-24-5 | A-24-6 | 26 | 24 | 1,684 | LF | $82 | $137,885 |
| PIPE | A-24-6 | A-24-7 | 26 | 24 | 1,104 | LF | $82 | $90,339 |
| PIPE | A-24-7 | A-24-8 | 21 | 24 | 1,948 | LF | $99 | $193,375 |
| PIPE | A-24-8 | A-24-9-1 | 21 | 24 | 2,508 | LF | $99 | $248,924 |
| PIPE | A-24-9-1 | A-24-9-2 | 19 | 24 | 681 | LF | $128 | $86,912 |
| PIPE | A-24-9-2 | A-24-9-3 | 19 | 24 | 121 | LF | $128 | $15,496 |
| PIPE | A-24-9-3 | A-24-9-4 | 19 | 24 | 1,051 | LF | $128 | $134,074 |
| PIPE | A-24-9-4 | A-24-10 | 19 | 20 | 227 | LF | $89 | $20,168 |
| PIPE | A-24-10 | A-24-11 | 19 | 20 | 1,024 | LF | $89 | $90,990 |
| PIPE | A-24-11 | A-24-12 | 19 | 20 | 5 | LF | $89 | $469 |
| PIPE | A-24-12 | A-24-13 | 19 | 20 | 264 | LF | $89 | $23,451 |
| PIPE | A-24-13 | A-24-14 | 19 | 20 | 1,114 | LF | $89 | $98,964 |

# PHASE 9 - CENTRAL OREGON CANAL

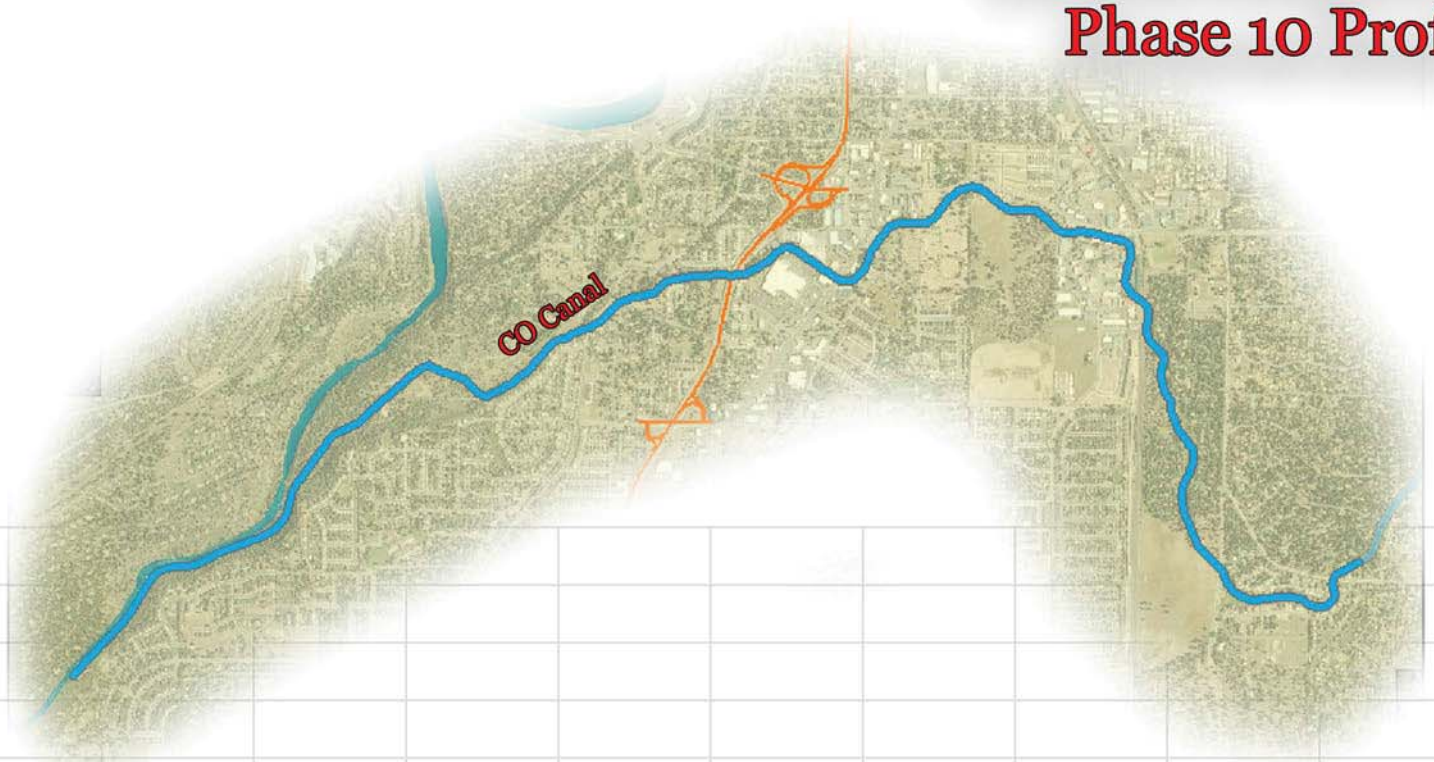
Central Oregon Irrigation District

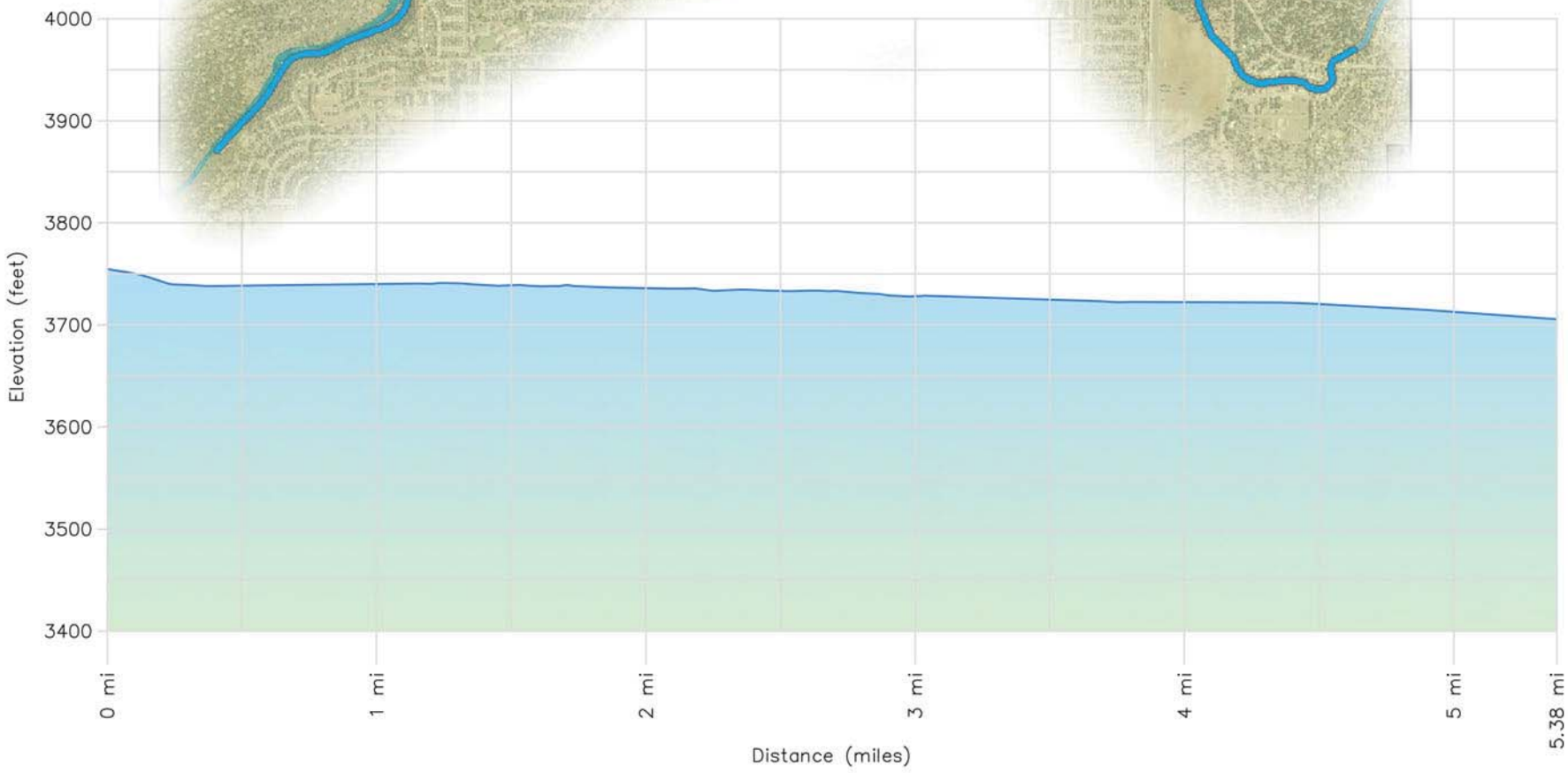
Reconnaissance-Level Construction Cost Estimate 4/1/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | A-24-14 | A-24-16/A-24-17 | 19 | 20 | 253 | LF | $89 | $22,513 |
| PIPE | A-24-16/A-24-17 | A-24-15 | 19 | 18 | 211 | LF | $62 | $13,076 |
| PIPE | A-24-15 | A-24-21 | 19 | 18 | 359 | LF | $62 | $22,229 |
| PIPE | A-24-21 | A-24-22 | 19 | 18 | 491 | LF | $62 | $30,401 |
| PIPE | A-24-22 | A-24-23 | 19 | 18 | 348 | LF | $62 | $21,575 |
| PIPE | A-24-23 | A-26 | 32.5 | 20 | 2,872 | LF | $47 | $135,795 |
| PIPE | A-26 | A-27 | 26 | 20 | 871 | LF | $47 | $41,191 |
| PIPE | A-27 | A-28 | 26 | 20 | 1,785 | LF | $58 | $102,877 |
| PIPE | A-28 | A-29 | 26 | 20 | 153 | LF | $58 | $8,827 |
| PIPE | A-29 | A-30 | 26 | 20 | 517 | LF | $58 | $29,828 |
| PIPE | A-30 | A-31/A-32 | 21 | 20 | 169 | LF | $69 | $11,733 |
| PIPE | A-31/A-32 | A-33 | 21 | 20 | 1,378 | LF | $69 | $95,699 |
| PIPE | A-33 | A-34 | 21 | 18 | 855 | LF | $56 | $48,222 |
| PIPE | A-34 | A-35 | 21 | 18 | 1,119 | LF | $56 | $63,105 |
| PIPE | A-35 | A-37/A-38 | 19 | 18 | 1,473 | LF | $62 | $91,202 |
| PIPE | A-37/A-38 | A-39 | 19 | 18 | 137 | LF | $62 | $8,499 |
| PIPE | A-39 | A-40 | 19 | 18 | 5 | LF | $62 | $327 |
| PIPE | A-40 | COC-6/COC-6-1 | 100 PSI | 114 | 1,093 | LF | $851 | $929,890 |
| PIPE | COC-6/COC-6-1 | COC-6-2,6-3,6-4/ | 100 PSI | 114 | 956 | LF | $851 | $813,093 |
| PIPE | COC-6-2,6-3,6-4/ | COC-7-1 | 100 PSI | 114 | 1,309 | LF | $851 | $1,114,072 |
| PIPE | COC-7-1 | COC-7-2 | 100 PSI | 114 | 1,056 | LF | $851 | $898,445 |
| PIPE | COC-7-2 | COC-7-3 | 100 PSI | 114 | 248 | LF | $851 | $211,135 |
| PIPE | COC-7-3 | COC-7-4 | 100 PSI | 114 | 755 | LF | $851 | $642,388 |
| PIPE | COC-7-4 | COC-8/COC-9 | 100 PSI | 114 | 428 | LF | $851 | $363,870 |
| PIPE | COC-8/COC-9 | COC-10 | 100 PSI | 114 | 2,598 | LF | $851 | $2,210,174 |
| TURNOUT | | | | | 62 | EA | $10,000 | $620,000 |
| | SUBTOTAL | | | | | | | $17,605,600 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $1,056,336 |
| | CMGC | | | | | 12% | | $2,112,672 |
| | CONTINGENCY | | | | | 20% | | $4,154,922 |
| | **TOTAL** | | | | | | | **$24,929,530** |


Central Oregon Canal System Improvements Phase 10
Bend
CO Canal
Jefferson Co.
Crook Co.
Hwy 26
Prineville
Hwy 20
Hwy 97
Powell Butte Rd
Bend
Ph. 10
Hwy 97
Hwy 20
Crook Co.
Deschutes Co.

# Central Oregon Canal
# Phase 10 Profile



# PHASE 10 - CENTRAL OREGON CANAL

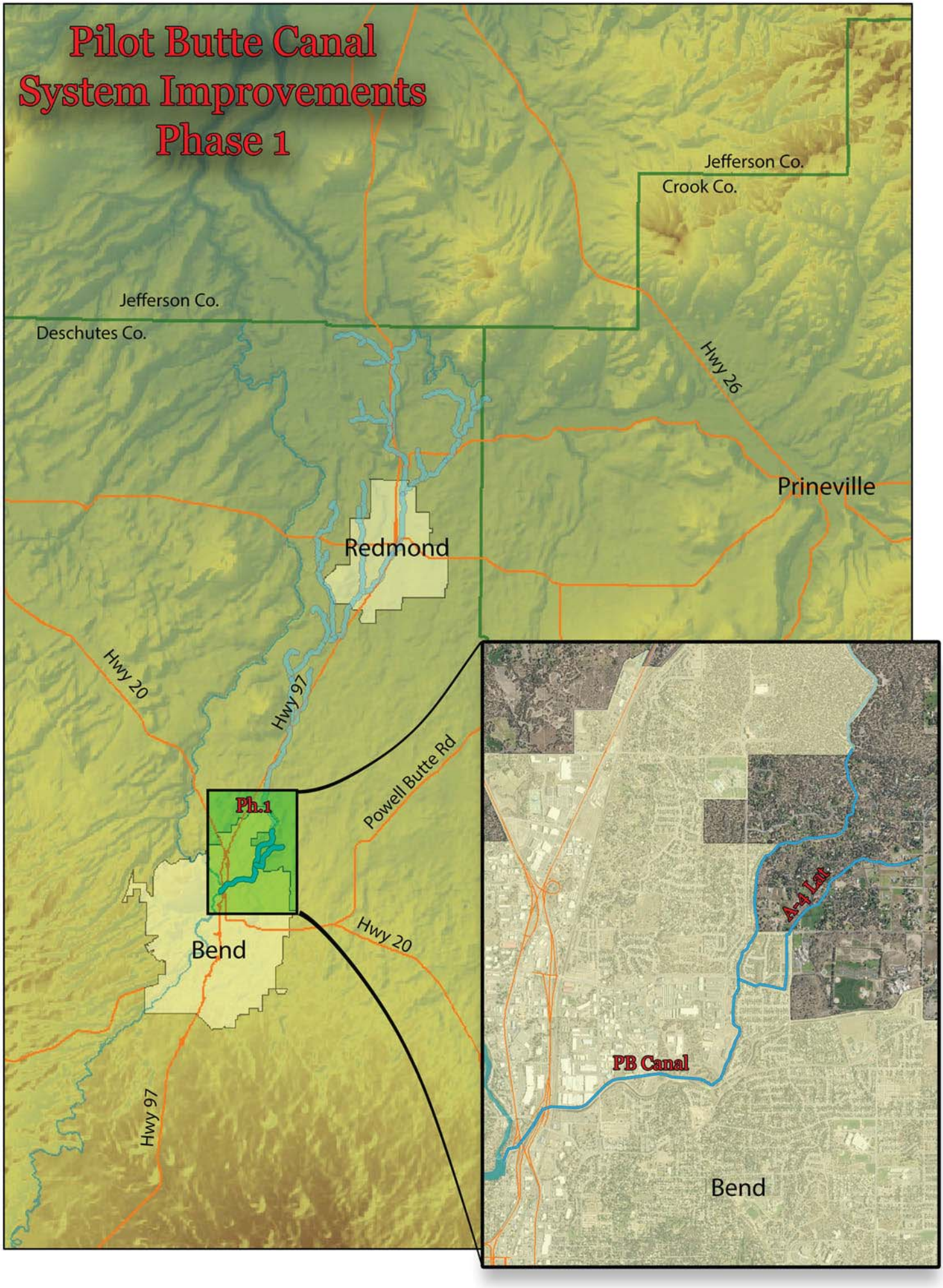
Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/1/2016

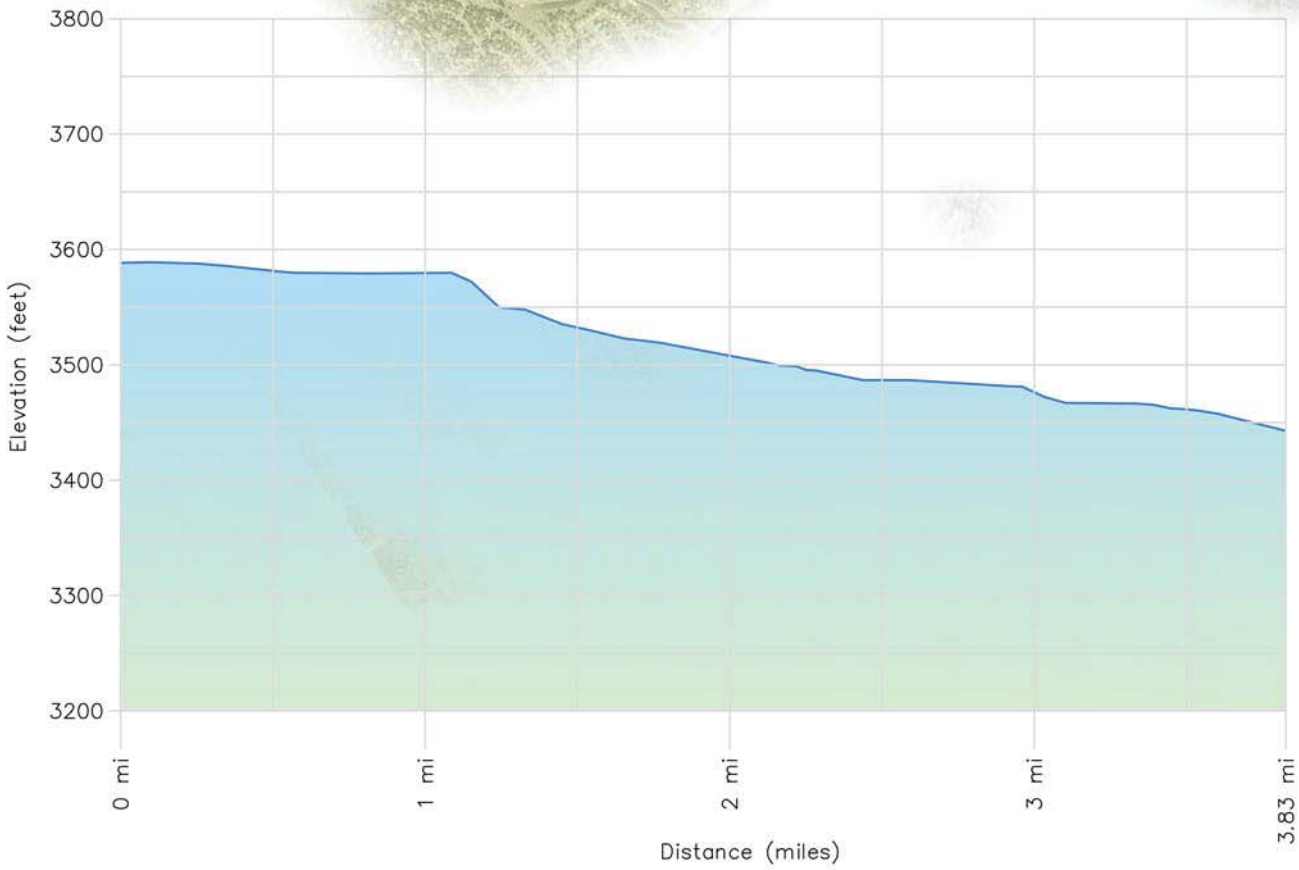
| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | Head-Gate | COC-03/COC-04 | 100 PSI | 120 | 2,055 | LF | $884 | $1,816,456 |
| PIPE | COC-03/COC-04 | COC-07 | 100 PSI | 120 | 3,040 | LF | $884 | $2,686,681 |
| PIPE | COC-07 | COC-08 | 100 PSI | 120 | 1,272 | LF | $884 | $1,124,017 |
| PIPE | COC-08 | COC-012 | 100 PSI | 120 | 3,258 | LF | $884 | $2,879,809 |
| PIPE | COC-012 | COC-014 | 100 PSI | 120 | 1,008 | LF | $884 | $891,295 |
| PIPE | COC-014 | A-1 | 100 PSI | 120 | 2,371 | LF | $884 | $2,095,242 |
| PIPE | A-1 | COC-1 | 100 PSI | 120 | 8,057 | LF | $884 | $7,121,024 |
| TURNOUT | | | | | 7 | EA | $10,000 | $70,000 |
| | SUBTOTAL | | | | | | | $18,684,525 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $1,121,071 |
| | CMGC | | | | | 12% | | $2,242,143 |
| | CONTINGENCY | | | | | 20% | | $4,409,548 |
| | **TOTAL** | | | | | | | **$26,457,287** |

# Section 6

*Pilot Butte Main Canal Improvement Phases*


Pilot Butte Canal
System Improvements
Phase 1
Jefferson Co.
Crook Co.
Jefferson Co.
Deschutes Co.
Hwy 26
Prineville
Redmond
Hwy 20
Hwy 97
Powell Butte Rd
Ph.1
Bend
Hwy 20
Hwy 97
A-4 Lat
PB Canal
Bend

# Pilot Butte Canal
# Phase 1 Profile

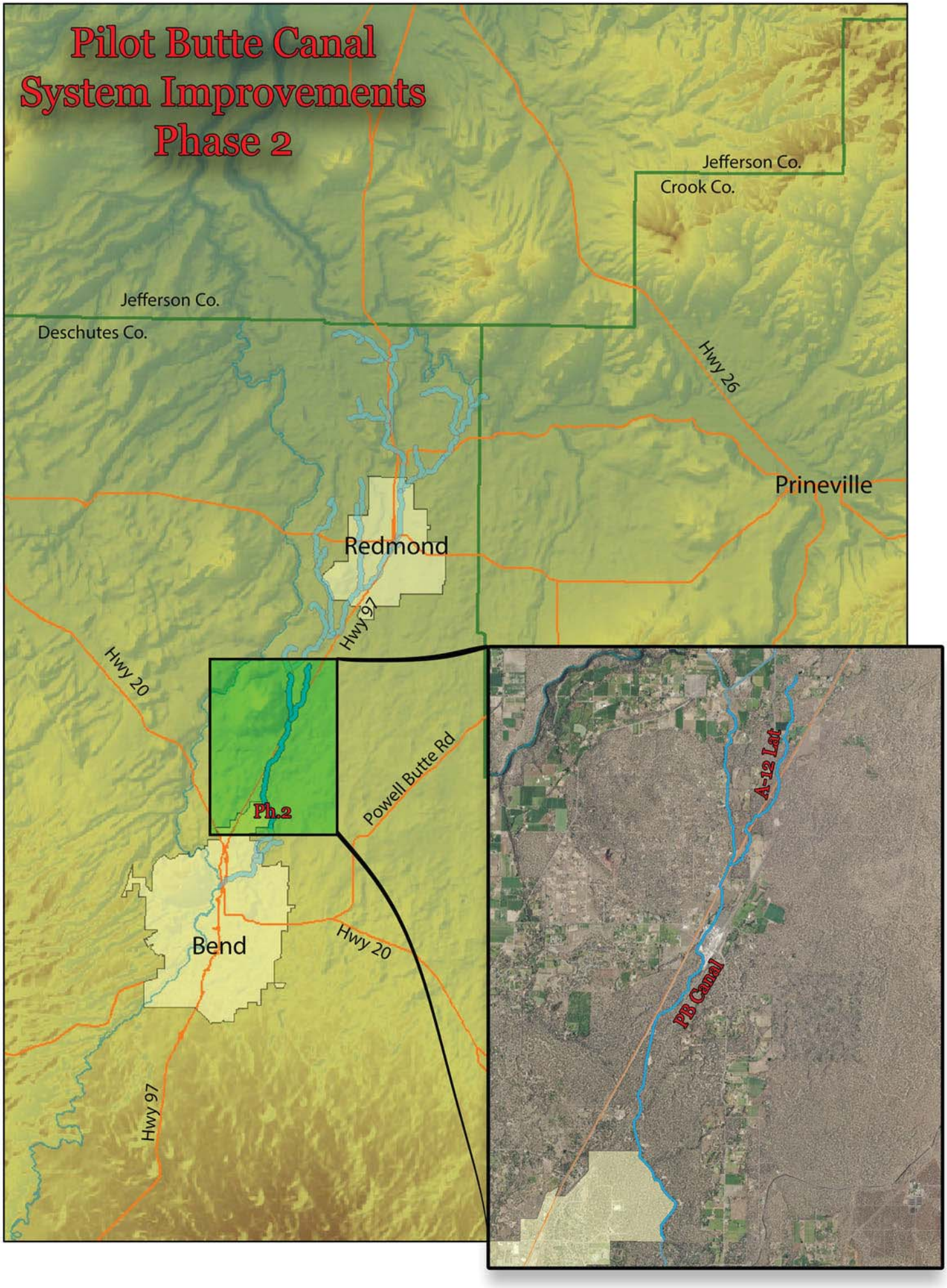


# PHASE 1 - PILOT BUTTE CANAL

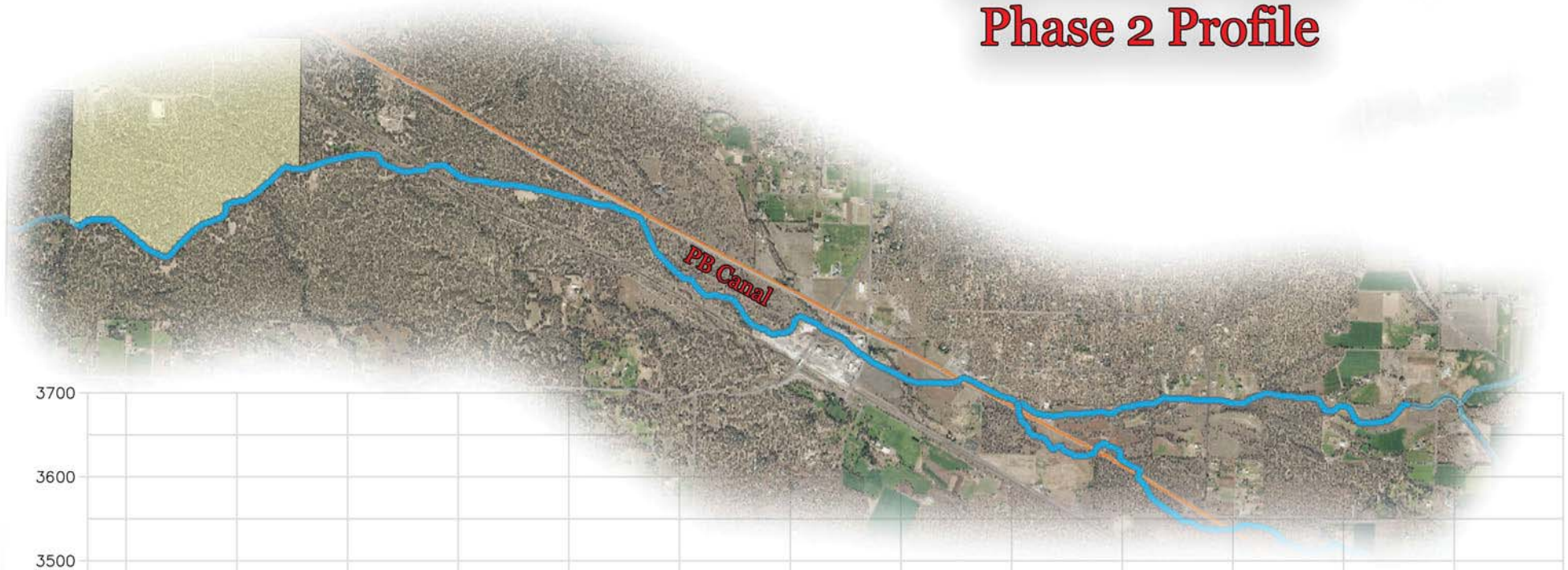
Central Oregon Irrigation District

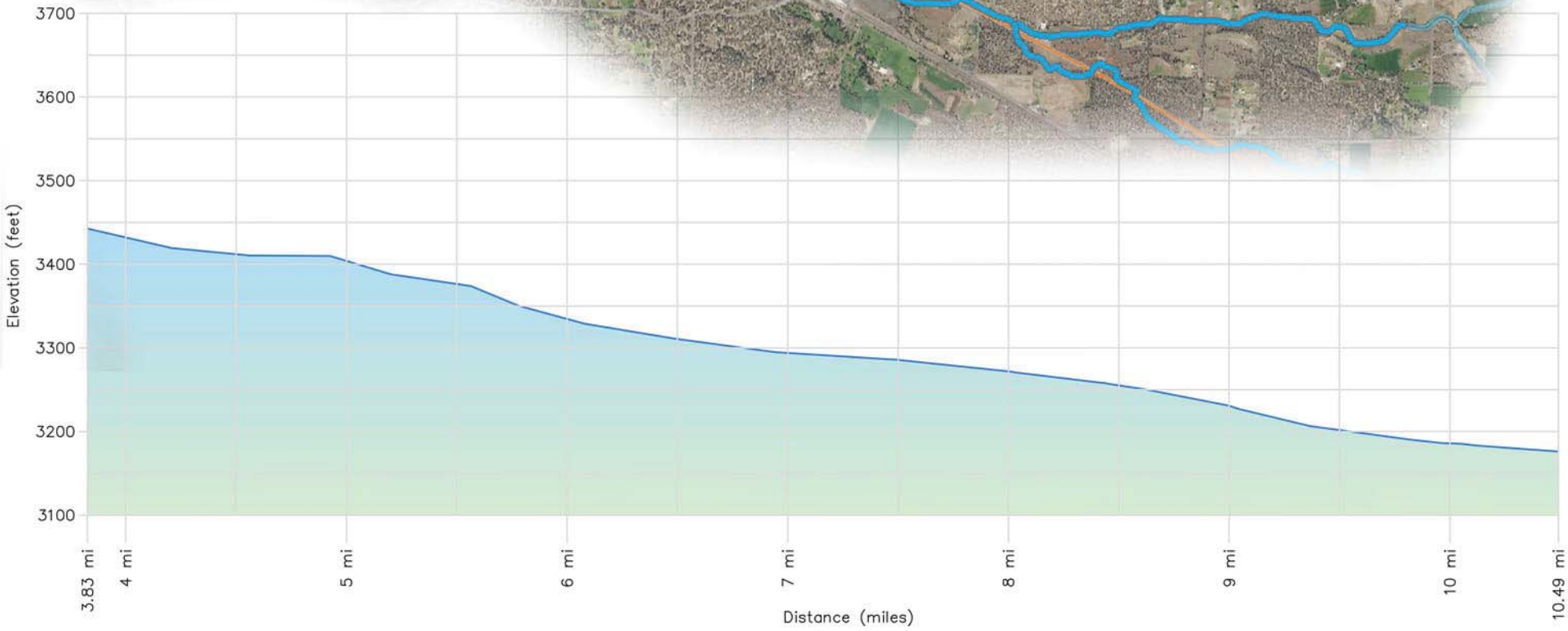
Reconnaissance-Level Construction Cost Estimate 4/17/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | PBC-STATE G | A-4 | 100 PSI | 120 | 10,988 | LF | $884 | $9,713,109 |
| PIPE | A-4 | A-4-2 | 32.5 | 18 | 5,238 | LF | $39 | $205,614 |
| PIPE | A-4-2 | A-4-7 | 32.5 | 18 | 1,220 | LF | $39 | $47,882 |
| PIPE | A-4-7 | A-4-7-1 | 32.5 | 16 | 2,899 | LF | $30 | $87,188 |
| PIPE | A-4-7-1 | A-4-8-2 | 32.5 | 16 | 259 | LF | $30 | $7,782 |
| PIPE | A-4-8-2 | A-4-9 | 32.5 | 16 | 137 | LF | $30 | $4,129 |
| PIPE | A-4-9 | A-4-10 | 32.5 | 16 | 370 | LF | $30 | $11,117 |
| PIPE | A-4-10 | PBC-3 | 100 PSI | 120 | 4,345 | LF | $884 | $3,840,500 |
| PIPE | PBC-3 | PBC-3-1 | 100 PSI | 120 | 2,202 | LF | $884 | $1,945,915 |
| PIPE | PBC-3-1 | PBC-3-1-1 | 100 PSI | 120 | 2,323 | LF | $884 | $2,053,244 |
| PIPE | PBC-3-1-1 | JR1/PRV STA | 100 PSI | 120 | 397 | LF | $884 | $350,869 |
| PRV STA. | | PRV STA. | | | 1 | EA | $800,000 | $800,000 |
| TURNOUT | | | | | 10 | EA | $10,000 | $100,000 |
| | SUBTOTAL | | | | | | | $19,167,349 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $1,150,041 |
| | CMGC | | | | | 12% | | $2,300,082 |
| | CONTINGENCY | | | | | 20% | | $4,523,494 |
| | **TOTAL** | | | | | | | **$27,140,966** |


Pilot Butte Canal
System Improvements
Phase 2
Jefferson Co.
Crook Co.
Jefferson Co.
Deschutes Co.
Hwy 26
Prineville
Redmond
Hwy 97
Hwy 20
Ph.2
Powell Butte Rd
Bend
Hwy 20
Hwy 97
A-12 Lat
PB Canal

# Pilot Butte Canal
# Phase 2 Profile



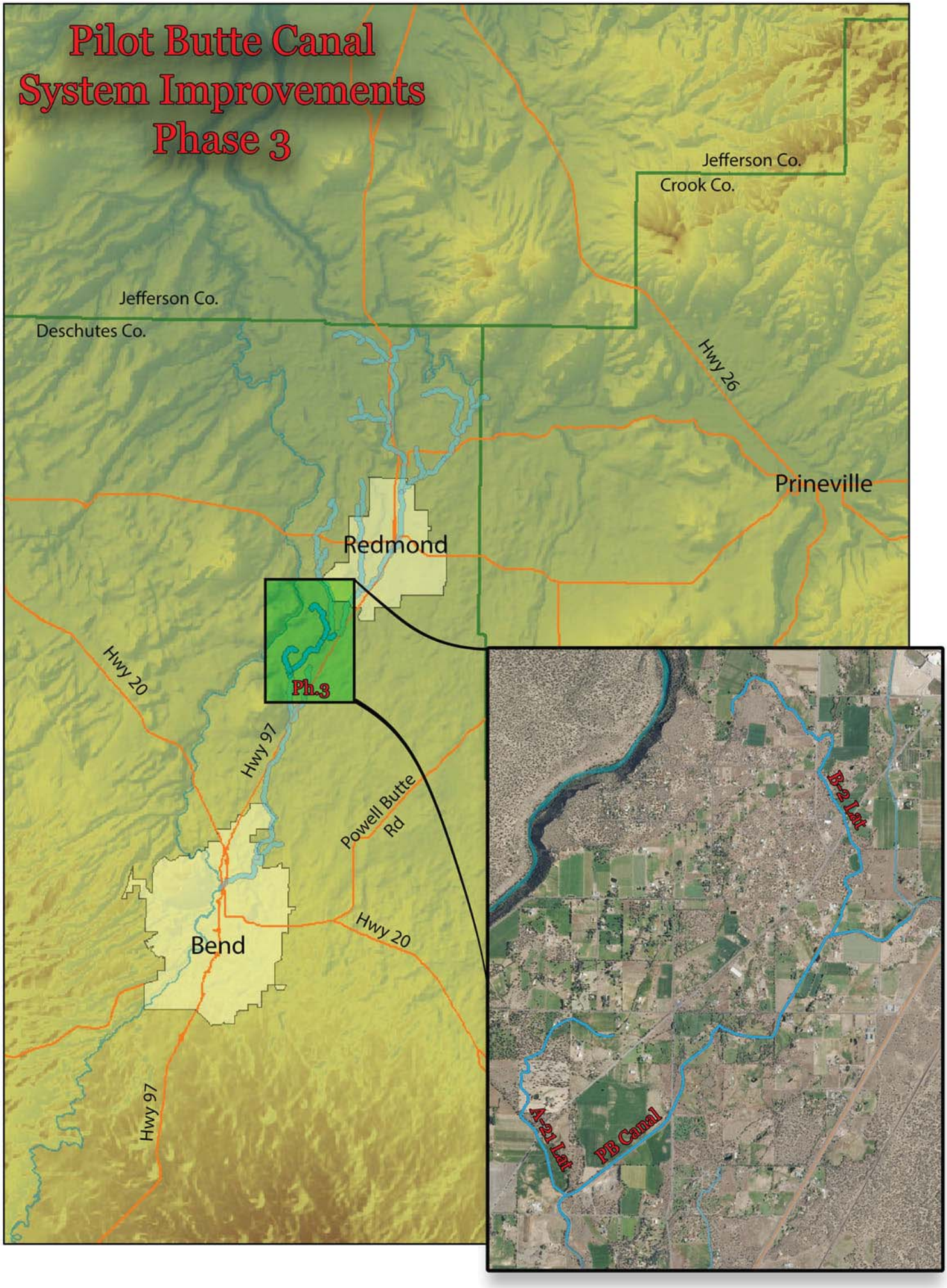



# PHASE 2 - PILOT BUTTE CANAL

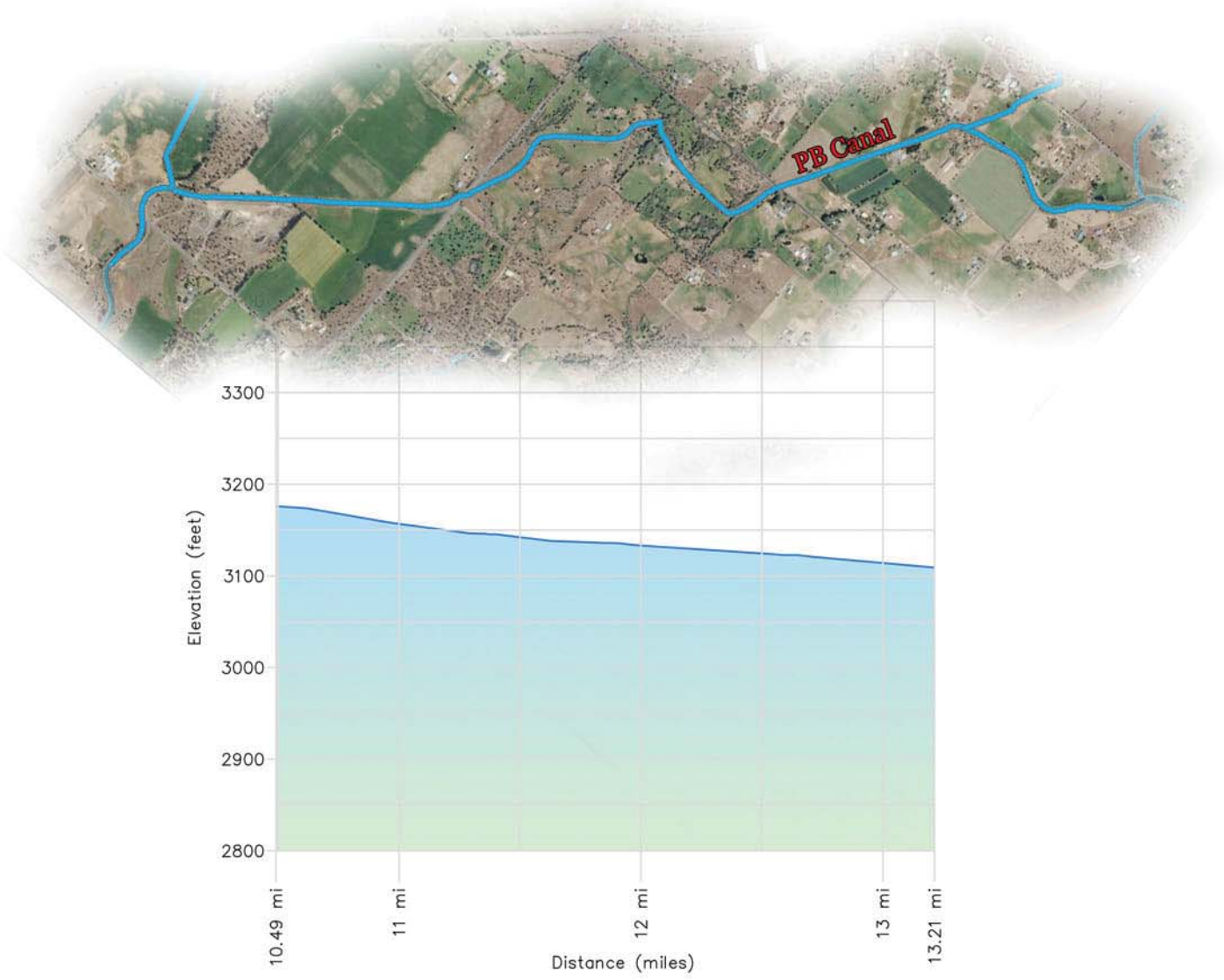
Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/17/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | JR1/PRV STA | A-10 | 100 PSI | 108 | 5,141 | LF | $0 | Existing |
| PIPE | A-10 | PBC-3-2 | 100 PSI | 108 | 2,028 | LF | $0 | Existing |
| PIPE | PBC-3-2 | A-12 | 100 PSI | 108 | 1,441 | LF | $0 | Existing |
| PIPE | A-12 | JR1 | 100 PSI | 108 | 1,000 | LF | $0 | Existing |
| PIPE | JR1 | PBC-4 | 100 PSI | 114 | 5,813 | LF | $851 | $4,946,727 |
| PIPE | PBC-4 | PBC-4-1/4-2 | 100 PSI | 114 | 1,331 | LF | $851 | $1,132,307 |
| PIPE | PBC-4-1/4-2 | A-16 | 100 PSI | 114 | 4,726 | LF | $851 | $4,021,486 |
| PIPE | A-16 | A-16-2 | 32.5 | 24 | 5,292 | LF | $67 | $355,198 |
| PIPE | A-16-2 | A-16-3 | 32.5 | 24 | 412 | LF | $67 | $27,644 |
| PIPE | A-16-3 | A-16-5 | 32.5 | 20 | 3,506 | LF | $47 | $165,749 |
| PIPE | A-16-5 | A-16-6/A-16- | 32.5 | 20 | 1,595 | LF | $47 | $75,386 |
| PIPE | A-16-6/A-16- | A-16-7 | 32.5 | 20 | 396 | LF | $47 | $18,722 |
| PIPE | A-16-7 | A-16-7-1 | 32.5 | 20 | 190 | LF | $47 | $8,986 |
| PIPE | A-16-7-1 | A-16-8-1/8-2 | 32.5 | 20 | 185 | LF | $47 | $8,737 |
| PIPE | A-16-8-1/8-2 | A-16-9-1 | 32.5 | 18 | 1,072 | LF | $39 | $42,078 |
| PIPE | A-16-9-1 | A-16-10-0 | 32.5 | 18 | 16 | LF | $39 | $622 |
| PIPE | A-16-10-0 | A-16-10-1 | 32.5 | 16 | 723 | LF | $30 | $21,757 |
| PIPE | A-16-10-1 | A-16-10-2 | 32.5 | 16 | 549 | LF | $30 | $16,516 |
| PIPE | A-16-10-2 | A-16-11 | 32.5 | 16 | 37 | LF | $30 | $1,112 |
| PIPE | A-16-11 | A-16-11-1 | 32.5 | 16 | 502 | LF | $30 | $15,087 |
| PIPE | A-16-11-1 | A-16-11-0 | 32.5 | 14 | 106 | LF | $24 | $2,563 |
| PIPE | A-16-11-0 | A-16-11-2 | 32.5 | 14 | 1,067 | LF | $24 | $25,889 |
| PIPE | A-16-11-2 | A-16-12 | 32.5 | 14 | 137 | LF | $24 | $3,332 |
| PIPE | A-16-12 | A-18 | 100 PSI | 114 | 3,189 | LF | $851 | $2,713,941 |
| PIPE | A-18 | PBC-4-2-1 | 100 PSI | 114 | 1,542 | LF | $851 | $1,312,038 |
| PIPE | PBC-4-2-1 | PBC-4-3 | 100 PSI | 114 | 892 | LF | $851 | $759,364 |
| PIPE | PBC-4-3 | PBC-5 | 100 PSI | 114 | 1,510 | LF | $851 | $1,285,078 |
| PIPE | PBC-5 | PBC-5-1 | 100 PSI | 114 | 2,629 | LF | $851 | $2,237,653 |
| TURNOUT | | | | | 27 | EA | $10,000 | $270,000 |
| PRV STA. | | Temp. PRV | 100 PSI | 114 | 1 | EA | $800,000 | $800,000 |
| | SUBTOTAL | | | | | | | $20,267,972 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $1,216,078 |
| | CMGC | | | | | 12% | | $2,432,157 |
| | CONTINGENCY | | | | | 20% | | $4,783,241 |
| | **TOTAL** | | | | | | | **$28,699,448** |


Pilot Butte Canal
System Improvements
Phase 3
Jefferson Co.
Crook Co.
Jefferson Co.
Deschutes Co.
Hwy 26
Prineville
Redmond
Ph.3
Hwy 20
Hwy 97
Powell Butte
Rd
Hwy 20
Bend
Hwy 97
B-2 Lat
A-21 Lat
PB Canal

# Pilot Butte Canal
# Phase 3 Profile



# PHASE 3 - PILOT BUTTE CANAL

Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/17/2016

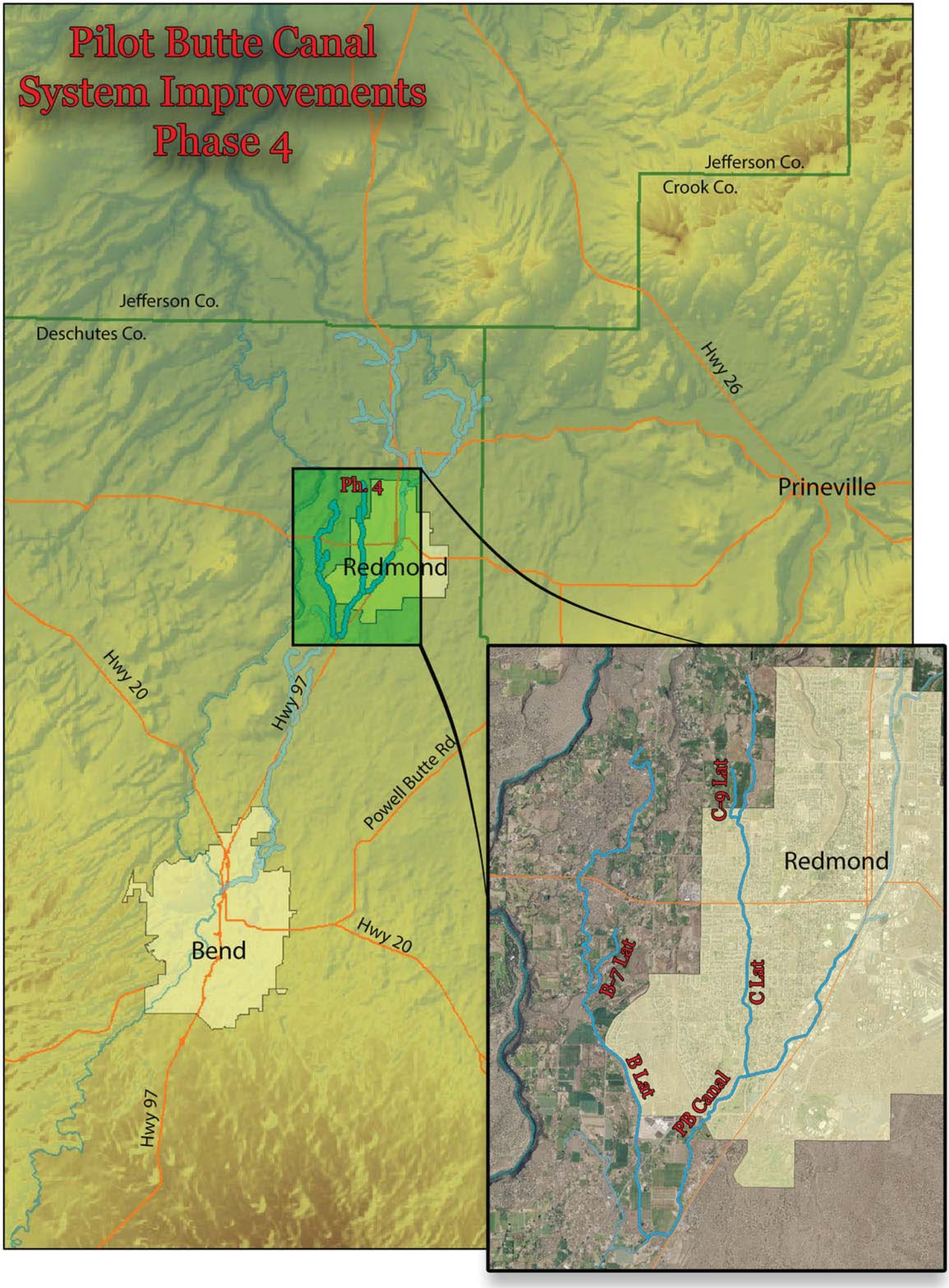
| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | PBC-5-1 | A-21/PBC-6/6 | 100 PSI | 114 | 1,361 | LF | $851 | $1,158,177 |
| PIPE | A-21/PBC-6/6 | PBC-6 | 32.5 | 24 | 2,071 | LF | $67 | $138,994 |
| PIPE | PBC-6 | A-21-1 | 32.5 | 24 | 898 | LF | $67 | $60,249 |
| PIPE | A-21-1 | A-21-2 | 32.5 | 24 | 5 | LF | $67 | $354 |
| PIPE | A-21-2 | A-21-4 | 32.5 | 24 | 787 | LF | $67 | $52,806 |
| PIPE | A-21-4 | A-21-5 | 32.5 | 24 | 686 | LF | $67 | $46,073 |
| PIPE | A-21-5 | A-21-6 | 32.5 | 24 | 444 | LF | $67 | $29,770 |
| PIPE | A-21-6 | A-21-7/A-21- | 32.5 | 24 | 1,985 | LF | $67 | $133,256 |
| PIPE | A-21-7/A-21- | A-21-7-1 | 32.5 | 20 | 227 | LF | $47 | $10,734 |
| PIPE | A-21-7-1 | A-21-7-2/A-2 | 32.5 | 20 | 702 | LF | $47 | $33,200 |
| PIPE | A-21-7-2/A-2 | A-21-10-1/10 | 32.5 | 20 | 21 | LF | $47 | $998 |
| PIPE | A-21-10-1/10 | A-21-9 | 32.5 | 18 | 16 | LF | $39 | $622 |
| PIPE | A-21-9 | A-21-9-0-2 | 32.5 | 16 | 634 | LF | $30 | $19,057 |
| PIPE | A-21-9-0-2 | A-21-9-1/A-2 | 32.5 | 16 | 618 | LF | $30 | $18,581 |
| PIPE | A-21-9-1/A-2 | PBC-7 | 100 PSI | 114 | 17 | LF | $851 | $14,569 |
| PIPE | PBC-7 | PBC-8 | 100 PSI | 114 | 5,961 | LF | $851 | $5,072,913 |
| PIPE | PBC-8 | PBC-8-1 | 100 PSI | 114 | 3,369 | LF | $851 | $2,866,713 |
| PIPE | PBC-8-1 | PBC-8-2 | 100 PSI | 114 | 238 | LF | $851 | $202,198 |
| PIPE | PBC-8-2 | PBC-8-3 | 100 PSI | 114 | 364 | LF | $851 | $310,036 |
| PIPE | PBC-8-3 | PBC-9 | 100 PSI | 114 | 264 | LF | $851 | $224,664 |
| PIPE | PBC-9 | B-2 | 100 PSI | 114 | 491 | LF | $851 | $417,875 |
| PIPE | B-2 | B-2-0 | 21 | 24 | 95 | LF | $99 | $9,443 |
| PIPE | B-2-0 | B-2-0-0 | 21 | 24 | 296 | LF | $99 | $29,379 |
| PIPE | B-2-0-0 | B-2-0-1 | 21 | 24 | 348 | LF | $99 | $34,625 |
| PIPE | B-2-0-1 | B-2-1 | 21 | 24 | 296 | LF | $99 | $29,379 |
| PIPE | B-2-1 | B-2-2 | 21 | 24 | 201 | LF | $99 | $19,936 |
| PIPE | B-2-2 | B-2-2-0 | 21 | 24 | 280 | LF | $99 | $27,805 |
| PIPE | B-2-2-0 | B-2-3 | 21 | 24 | 396 | LF | $99 | $39,347 |
| PIPE | B-2-3 | B-2-3-1 | 21 | 24 | 755 | LF | $99 | $75,021 |
| PIPE | B-2-3-1 | B-2-3-2 | 21 | 24 | 987 | LF | $99 | $98,104 |
| PIPE | B-2-3-2 | B-2-5 | 21 | 24 | 560 | LF | $99 | $55,610 |
| PIPE | B-2-5 | B-2-5-1 | 21 | 24 | 491 | LF | $99 | $48,790 |
| PIPE | B-2-5-1 | B-2-6 | 21 | 24 | 169 | LF | $99 | $16,788 |
| PIPE | B-2-6 | B-2-6-2/B-2-4 | 21 | 24 | 1,061 | LF | $99 | $105,449 |
| PIPE | B-2-6-2/B-2-4 | B-2-7 | 21 | 18 | 491 | LF | $56 | $27,577 |
| PIPE | B-2-7 | B-2-7-1 | 21 | 18 | 137 | LF | $56 | $7,710 |
| PIPE | B-2-7-1 | B-2-8 | 21 | 18 | 507 | LF | $56 | $28,466 |
| PIPE | B-2-8 | B-2-10 | 21 | 16 | 2,281 | LF | $44 | $100,508 |
| PIPE | B-2-10 | B-2-11 | 21 | 16 | 634 | LF | $44 | $27,919 |
| PIPE | B-2-11 | B | 100 PSI | 108 | 2,635 | LF | $723 | $1,904,903 |
| PIPE | B | B-0-1 | 21 | 36 | 11,183 | LF | $232 | $2,596,702 |
| PIPE | B-0-1 | B-0-3-1/ B-0- | 21 | 36 | 3,934 | LF | $232 | $913,382 |
| PIPE | B-0-3-1/ B-0- | PRV STA. | 21 | 36 | 1,972 | LF | $232 | $457,954 |
| PIPE | PRV STA. | B-4 | 32.5 | 34 | 2,075 | LF | $138 | $286,685 |
| PIPE | B-4 | B-4-1 | 32.5 | 34 | 285 | LF | $138 | $39,392 |
| PIPE | B-4-1 | B-6-1 | 32.5 | 34 | 729 | LF | $138 | $100,668 |
| PIPE | B-6-1 | B-5 | 32.5 | 34 | 692 | LF | $138 | $95,562 |

# PHASE 3 - PILOT BUTTE CANAL

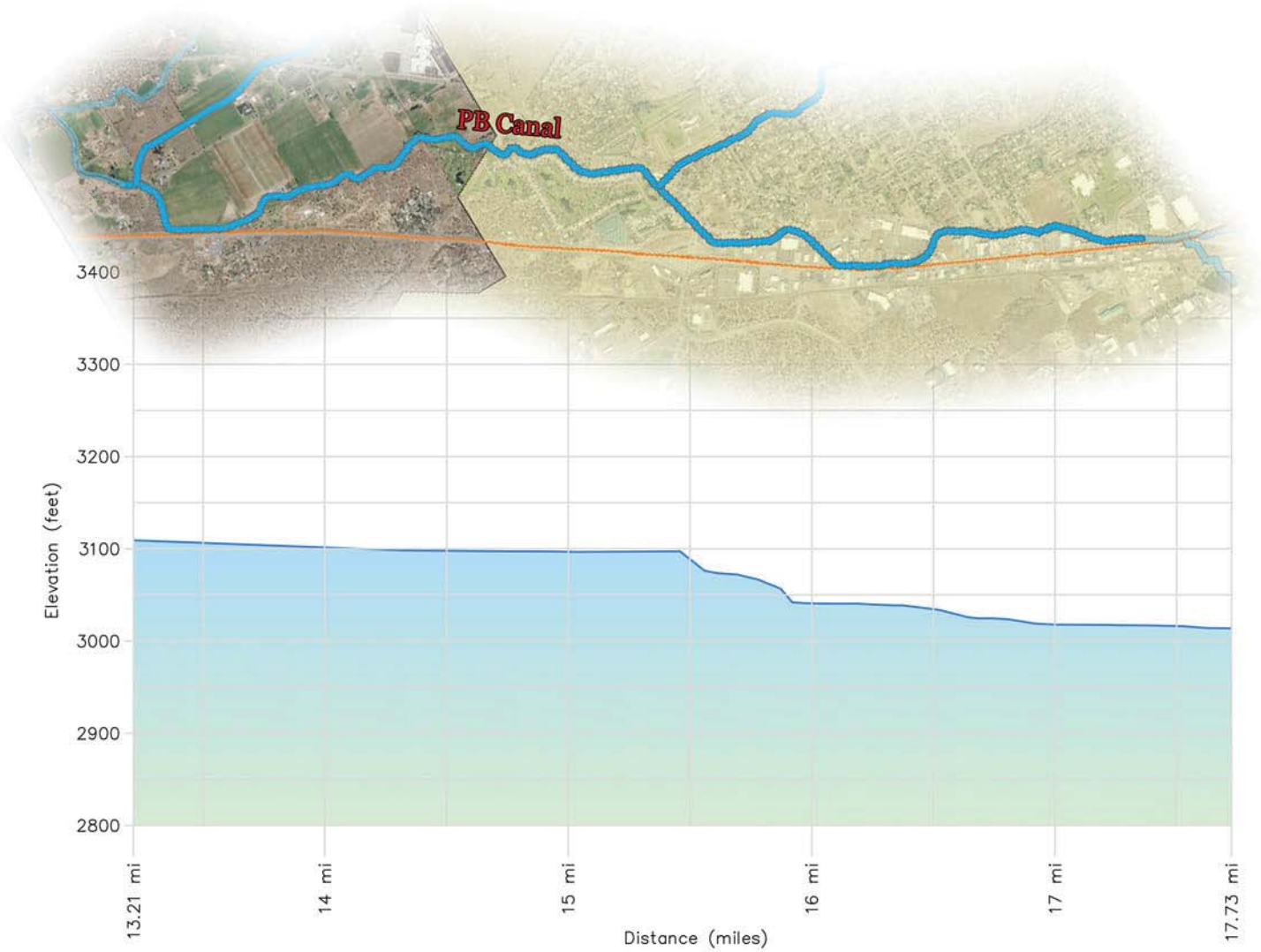
Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/17/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | B-5 | B-8-2 | 32.5 | 34 | 507 | LF | $138 | $70,030 |
| PIPE | B-8-2 | B-9 | 32.5 | 34 | 581 | LF | $138 | $80,243 |
| PIPE | B-9 | B-12 | 32.5 | 34 | 158 | LF | $138 | $21,884 |
| PIPE | B-12 | B-7 | 26 | 34 | 69 | LF | $216 | $14,847 |
| PIPE | B-7 | B-7-0 | 26 | 16 | 533 | LF | $36 | $19,424 |
| PIPE | B-7-0 | B-7-1 | 26 | 16 | 861 | LF | $36 | $31,347 |
| PIPE | B-7-1 | B-7-1-0 | 26 | 16 | 982 | LF | $36 | $35,770 |
| PIPE | B-7-1-0 | B-7-2 | 26 | 16 | 2,392 | LF | $36 | $87,118 |
| PIPE | B-7-2 | B-13/B-14 | 26 | 28 | 2,482 | LF | $114 | $282,083 |
| PIPE | B-13/B-14 | B-15-1/B-15- | 21 | 26 | 1,753 | LF | $119 | $209,435 |
| PIPE | B-15-1/B-15- | B-16 | 21 | 26 | 813 | LF | $119 | $97,148 |
| PIPE | B-16 | B-16-1 | 21 | 26 | 1,410 | LF | $119 | $168,431 |
| PIPE | B-16-1 | B-10 | 21 | 26 | 840 | LF | $119 | $100,302 |
| PIPE | B-10 | B-18 | 21 | 26 | 169 | LF | $119 | $20,186 |
| PIPE | B-18 | B-19 | 21 | 24 | 74 | LF | $99 | $7,345 |
| PIPE | B-19 | B-19-0 | 21 | 24 | 227 | LF | $99 | $22,559 |
| PIPE | B-19-0 | B-11 | 21 | 24 | 253 | LF | $99 | $25,182 |
| PIPE | B-11 | B-19-1 | 21 | 18 | 280 | LF | $56 | $15,716 |
| PIPE | B-19-1 | B-19-1-1 | 21 | 18 | 1,552 | LF | $56 | $87,178 |
| PIPE | B-19-1-1 | B-19-2 | 21 | 18 | 887 | LF | $56 | $49,816 |
| PIPE | B-19-2 | B-19-3 | 21 | 18 | 517 | LF | $56 | $29,059 |
| PIPE | B-19-3 | B-19-4 | 21 | 18 | 121 | LF | $56 | $6,820 |
| PIPE | B-19-4 | B-21 | 21 | 18 | 317 | LF | $56 | $17,791 |
| PIPE | B-21 | B-22 | 19 | 16 | 4,451 | LF | $49 | $217,402 |
| PIPE | B-22 | B-22-1 | 19 | 16 | 618 | LF | $49 | $30,173 |
| PIPE | B-22-1 | B-23 | 19 | 16 | 422 | | $49 | $20,631 |
| PIPE | B-23 | B-23-1 | 19 | 16 | 533 | | $49 | $26,047 |
| PIPE | B-23-1 | B-25 | 19 | 16 | 1,352 | | $49 | $66,020 |
| PIPE | B-25 | B-24-4 | 19 | 14 | 84 | | $37 | $3,118 |
| PIPE | B-24-4 | B-26 | 19 | 14 | 544 | | $37 | $20,073 |
| PIPE | B-26 | PBC-10/11/B- | 100 PSI | 108 | 5 | | $723 | $3,817 |
| TURNOUT | | | | | 78 | EA | $10,000 | $780,000.00 |
| PRV STA. | | Temp PRV | Relocated | | 1 | EA | $400,000 | $400,000.00 |
| PRV STA. | | B Lat PRV | | | 1 | EA | $400,000 | $400,000 |
| | SUBTOTAL | | | | | | | $21,455,936 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $1,287,356 |
| | CMGC | | | | | 12% | | $2,574,712 |
| | CONTINGENCY | | | | | 20% | | $5,063,601 |
| | **TOTAL** | | | | | | | **$30,381,606** |


Pilot Butte Canal
System Improvements
Phase 4
Jefferson Co.
Crook Co.
Jefferson Co.
Deschutes Co.
Hwy 26
Prineville
Ph. 4
Redmond
Hwy 20
Hwy 97
Powell Butte Rd
Bend
Hwy 20
Hwy 97
C-9 Lat
Redmond
B-7 Lat
C Lat
B Lat
PB Canal

# Pilot Butte Canal
# Phase 4 Profile

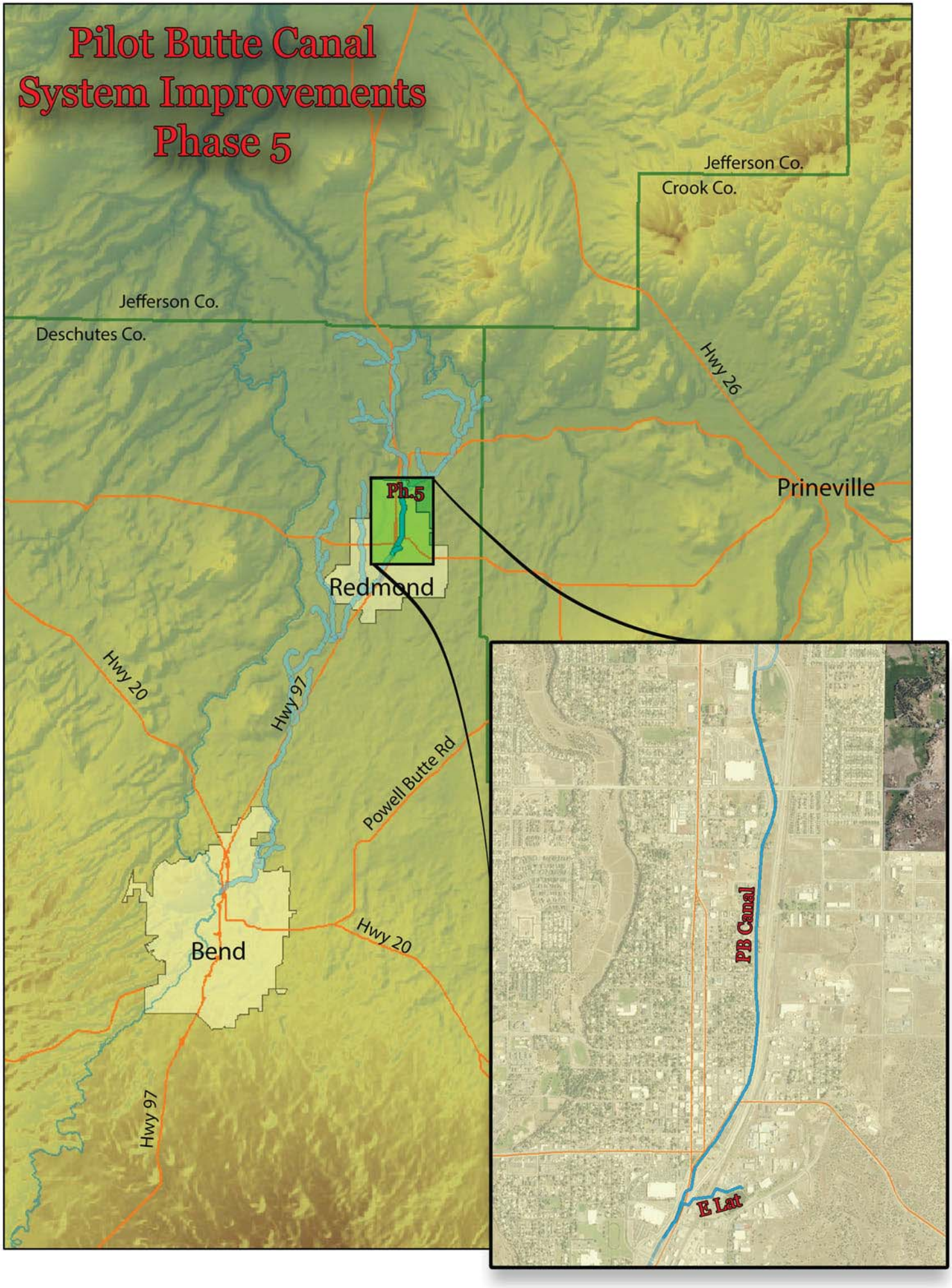


# PHASE 4 - PILOT BUTTE CANAL

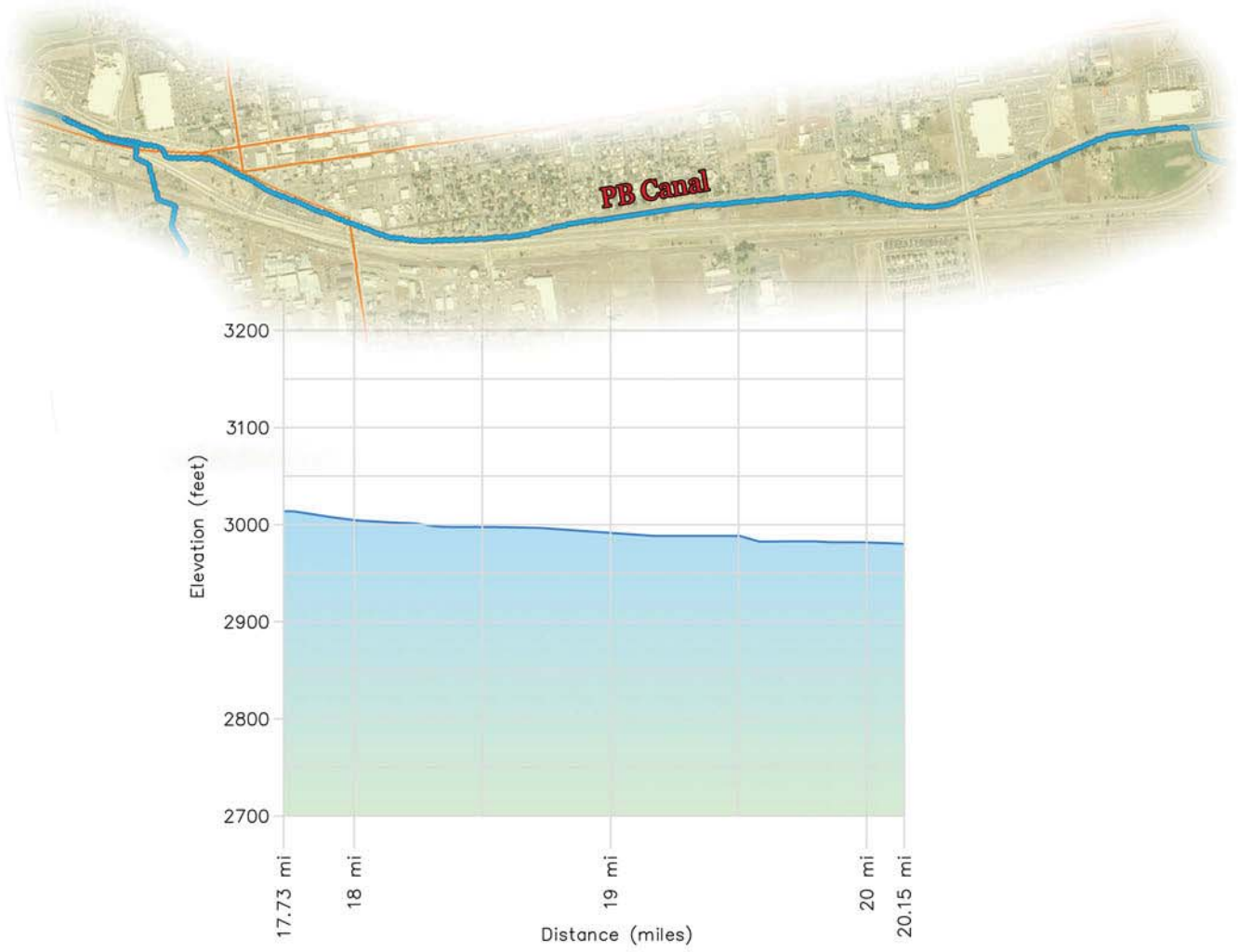
Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/17/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | PBC-10/11/B- | PBC-11-1 | 100 PSI | 102 | 2,424 | LF | $684 | $1,657,688 |
| PIPE | PBC-11-1 | PBC-11-1-0 | 100 PSI | 102 | 1,996 | LF | $684 | $1,365,155 |
| PIPE | PBC-11-1-0 | PBC-11-1-1 | 100 PSI | 102 | 1,177 | LF | $684 | $805,369 |
| PIPE | PBC-11-1-1 | PBC-11-2 | 100 PSI | 102 | 21 | LF | $684 | $14,446 |
| PIPE | PBC-11-2 | PBC-11-3 | 100 PSI | 102 | 333 | LF | $684 | $227,526 |
| PIPE | PBC-11-3 | PBC-12 | 100 PSI | 102 | 702 | LF | $684 | $480,332 |
| PIPE | PBC-12 | PBC-13 | 100 PSI | 102 | 285 | LF | $684 | $195,022 |
| PIPE | PBC-13 | PBC-14 | 100 PSI | 102 | 2,577 | LF | $684 | $1,762,422 |
| PIPE | PBC-14 | PBC-15 | 100 PSI | 102 | 385 | LF | $684 | $263,641 |
| PIPE | PBC-15 | C-1 | 100 PSI | 102 | 1,779 | LF | $684 | $1,217,082 |
| PIPE | C-1 | C | 100 PSI | 102 | 818 | LF | $684 | $559,786 |
| PIPE | C | PRV STA. | 32.5 | 30 | 5 | LF | $106 | $532 |
| PIPE | PRV STA. | C-2-1 | 32.5 | 30 | 1,779 | LF | $106 | $189,202 |
| PIPE | C-2-1 | C-2-2 | 32.5 | 30 | 1,352 | LF | $106 | $143,755 |
| PIPE | C-2-2 | C-3 | 32.5 | 30 | 539 | LF | $106 | $57,277 |
| PIPE | C-3 | C-7 | 32.5 | 30 | 1,410 | LF | $106 | $149,932 |
| PIPE | C-7 | C-10 | 32.5 | 30 | 855 | LF | $106 | $90,970 |
| PIPE | C-10 | C-5 | 32.5 | 30 | 1,304 | LF | $106 | $138,701 |
| PIPE | C-5 | C-14-1 | 32.5 | 30 | 433 | LF | $106 | $46,047 |
| PIPE | C-14-1 | C-14-1-1 | 26 | 30 | 539 | LF | $129 | $69,565 |
| PIPE | C-14-1-1 | C-14-4 | 26 | 28 | 1,605 | LF | $114 | $182,454 |
| PIPE | C-14-4 | C-15-1 | 26 | 28 | 1,959 | LF | $114 | $222,666 |
| PIPE | C-15-1 | C-16 | 26 | 28 | 533 | LF | $114 | $60,618 |
| PIPE | C-16 | C-16-1 | 26 | 28 | 69 | LF | $114 | $7,802 |
| PIPE | C-16-1 | C-19 | 26 | 28 | 1,188 | LF | $114 | $135,040 |
| PIPE | C-19 | C-9 | 21 | 26 | 1,473 | LF | $119 | $176,001 |
| PIPE | C-9 | C-9-1 | 21 | 18 | 2,030 | LF | $56 | $114,011 |
| PIPE | C-9-1 | C-9-3 | 21 | 16 | 2,292 | LF | $44 | $100,974 |
| PIPE | C-9-3 | C-20 | 21 | 20 | 7,883 | LF | $69 | $547,004 |
| PIPE | C-20 | C-11/C-21 | 19 | 18 | 861 | LF | $62 | $53,678 |
| PIPE | C-11/C-21 | PRV STA. | 100 PSI | 102 | 6,700 | LF | $684 | $4,582,800 |
| TURNOUT | | | | | 29 | EA | $10,000 | $290,000 |
| PRV STA. | | PRV Station | Relocated | | 1 | EA | $400,000 | $400,000 |
| PRV STA. | | C Lat PRV | | | 1 | EA | $300,000 | $300,000 |
| | SUBTOTAL | | | | | | | $16,607,497 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $996,450 |
| | CMGC | | | | | 12% | | $1,992,900 |
| | CONTINGENCY | | | | | 20% | | $3,919,369 |
| | **TOTAL** | | | | | | | **$23,516,216** |


Pilot Butte Canal
System Improvements
Phase 5
Jefferson Co.
Crook Co.
Jefferson Co.
Deschutes Co.
Hwy 26
Prineville
Ph.5
Redmond
Hwy 20
Hwy 97
Powell Butte Rd
Bend
Hwy 20
Hwy 97
PB Canal
E Lat

# Pilot Butte Canal
# Phase 5 Profile

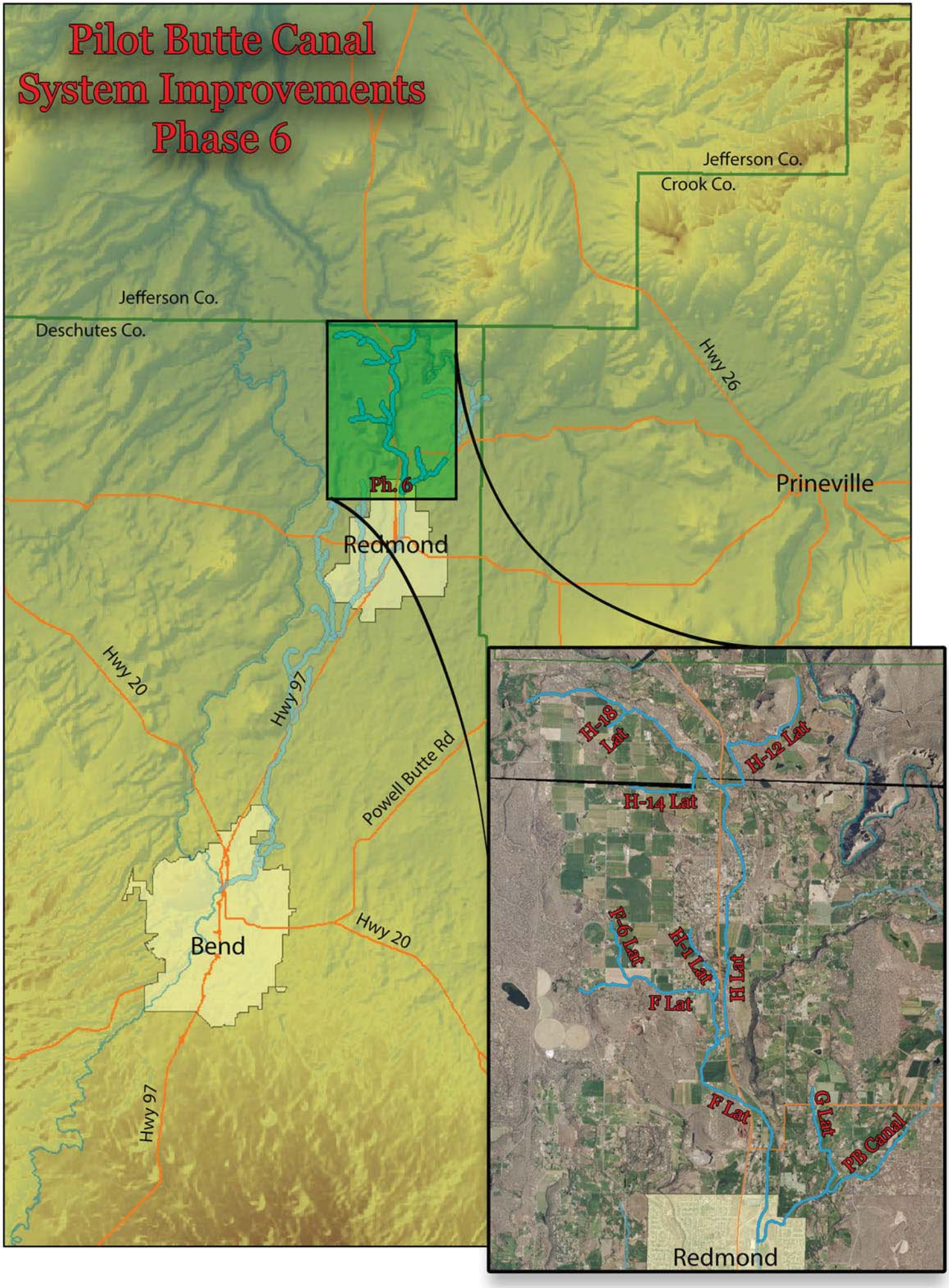


# PHASE 5 - PILOT BUTTE CANAL

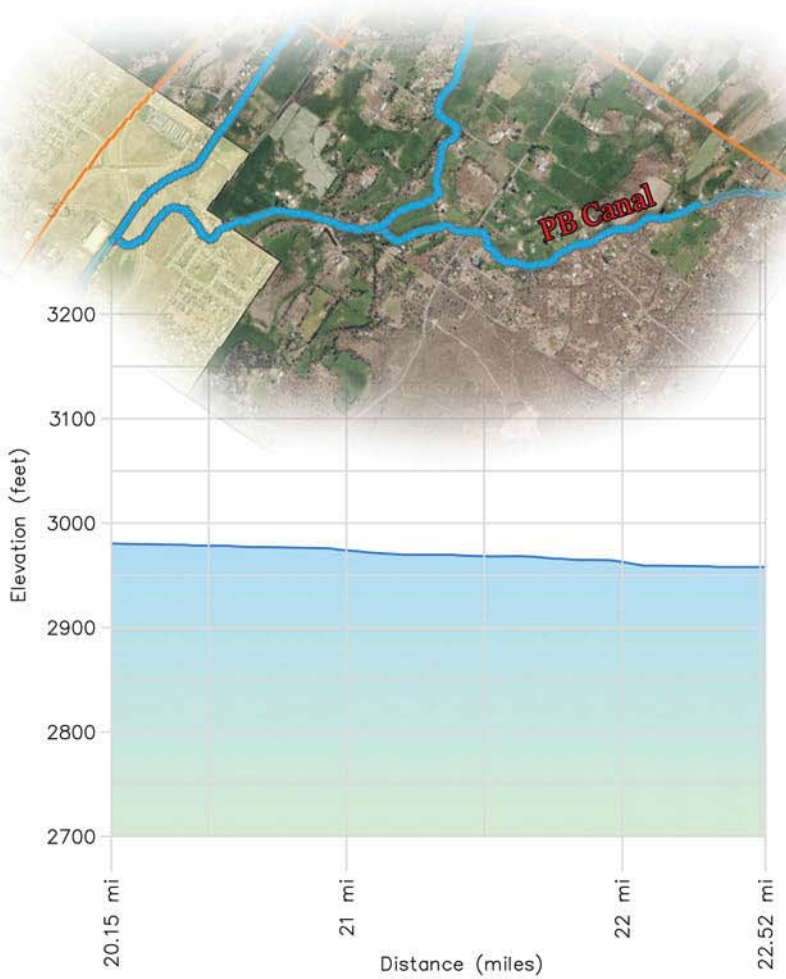
Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/17/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | PRV STA. | E | 100 PSI | 102 | 4,330 | LF | $684 | $2,961,446 |
| PIPE | E | E-3 | 17 | 30 | 2,371 | LF | $189 | $448,898 |
| PIPE | E-3 | RR Pipe Begin | 100 PSI | 96 | 7 | LF | $636 | $4,452 |
| PIPE | RR Pipe Begin | RR Pipe End | Exist | Exist | 5,963 | LF | $0 | $0 |
| PIPE | RR Pipe End | PBC-26 | 100 PSI | 96 | 1,021 | LF | $636 | $649,178 |
| PIPE | PBC-26 | D | 100 PSI | 96 | 2,571 | LF | $636 | $1,635,385 |
| PIPE | D | PBC-28-1 | 100 PSI | 96 | 2,973 | LF | $636 | $1,890,599 |
| PIPE | PBC-28-1 | F | 100 PSI | 96 | 259 | LF | $636 | $164,546 |
| PIPE | F | F-0 | 26 | 63 | 3,147 | LF | $644 | $2,026,226 |
| PIPE | F-0 | F-1 | 26 | 63 | 1,104 | LF | $644 | $710,582 |
| PIPE | F-1 | F-0-1 | 26 | 63 | 11 | LF | $644 | $6,800 |
| PIPE | F-0-1 | F-0-2 | 26 | 63 | 824 | LF | $644 | $530,386 |
| PIPE | F-0-2 | F-4 | 26 | 63 | 143 | LF | $644 | $91,798 |
| PIPE | F-4 | F-2 | 26 | 63 | 11 | LF | $644 | $6,800 |
| PIPE | F-2 | F-5 | 26 | 63 | 1,325 | LF | $644 | $853,378 |
| PIPE | F-5 | F-7 | 26 | 63 | 1,373 | LF | $644 | $883,977 |
| PIPE | F-7 | F-7-0 | 26 | 63 | 7,520 | LF | $644 | $4,842,114 |
| PIPE | F-7-0 | F-7-1 | 26 | 63 | 803 | LF | $644 | $516,787 |
| PIPE | F-7-1 | F-8 | 26 | 63 | 1,283 | LF | $644 | $826,179 |
| PIPE | F-8 | F-9 | 26 | 63 | 1,705 | LF | $644 | $1,098,172 |
| PIPE | F-9 | F-9-1 | 26 | 63 | 607 | LF | $644 | $390,990 |
| PIPE | F-9-1 | F-10 | 26 | 63 | 676 | LF | $644 | $435,189 |
| PIPE | F-10 | F-10-1 | 26 | 63 | 602 | LF | $644 | $387,590 |
| PIPE | F-10-1 | F-3 | 26 | 63 | 5 | LF | $644 | $3,400 |
| PIPE | F-3 | F-11 | 26 | 63 | 950 | LF | $644 | $611,984 |
| PIPE | F-11 | PRV STA | | | 0 | LF | $119 | $0 |
| TURNOUT | | | | | 23 | EA | $10,000 | $230,000 |
| PRV STA. | | Temp PRV | | | 1 | EA | $800,000 | $800,000 |
| PRV STA. | | F Lat PRV | | | 1 | EA | $500,000 | $500,000 |
| | SUBTOTAL | | | | | | | $23,506,858 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $1,410,411 |
| | CMGC | | | | | 12% | | $2,820,823 |
| | CONTINGENCY | | | | | 20% | | $5,547,618 |
| | **TOTAL** | | | | | | | **$33,285,710** |


Pilot Butte Canal
System Improvements
Phase 6
Jefferson Co.
Crook Co.
Jefferson Co.
Deschutes Co.
Hwy 26
Ph. 6
Prineville
Redmond
Hwy 20
Hwy 97
Powell Butte Rd
Bend
Hwy 20
Hwy 97
H-18 Lat
H-12 Lat
H-14 Lat
F-6 Lat
H-1 Lat
H Lat
F Lat
F Lat
G Lat
PB Canal
Redmond

# Pilot Butte Canal
# Phase 6 Profile



# PHASE 6 - PILOT BUTTE CANAL

Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/17/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | PRV STA | H/F-12 | 32.5 | 48 | 729 | LF | $274 | $199,999 |
| PIPE | H/F-12 | H-0-1 | 32.5 | 48 | 296 | LF | $274 | $81,159 |
| PIPE | H-0-1 | H-2 | 32.5 | 48 | 1,251 | LF | $274 | $343,476 |
| PIPE | H-2 | H-2-1 | 32.5 | 48 | 216 | LF | $274 | $59,420 |
| PIPE | H-2-1 | H-3 | 32.5 | 48 | 1,399 | LF | $274 | $384,055 |
| PIPE | H-3 | H-3-1 | 32.5 | 48 | 1,668 | LF | $274 | $457,968 |
| PIPE | H-3-1 | H-4 | 32.5 | 48 | 158 | LF | $274 | $43,478 |
| PIPE | H-4 | H-5 | 32.5 | 48 | 16 | LF | $274 | $4,348 |
| PIPE | H-5 | H-6 | 32.5 | 48 | 528 | LF | $274 | $144,926 |
| PIPE | H-6 | H-7 | 32.5 | 48 | 2,181 | LF | $274 | $598,546 |
| PIPE | H-7 | H-7-0 | 32.5 | 48 | 533 | LF | $274 | $146,376 |
| PIPE | H-7-0 | H-7-2 | 32.5 | 48 | 296 | LF | $274 | $81,159 |
| PIPE | H-7-2 | H-7-1 | 32.5 | 48 | 21 | LF | $274 | $5,797 |
| PIPE | H-7-1 | H-7-2 | 32.5 | 48 | 285 | LF | $274 | $78,260 |
| PIPE | H-7-2 | H-7-3 | 32.5 | 48 | 739 | LF | $274 | $202,897 |
| PIPE | H-7-3 | H-7-4 | 32.5 | 48 | 686 | LF | $274 | $188,404 |
| PIPE | H-7-4 | H-7-5 | 32.5 | 48 | 121 | LF | $274 | $33,333 |
| PIPE | H-7-5 | H-8 | 32.5 | 48 | 412 | LF | $274 | $113,043 |
| PIPE | H-8 | H-9 | 32.5 | 48 | 2,698 | LF | $274 | $740,574 |
| PIPE | H-9 | H-9-1 | 32.5 | 48 | 5 | LF | $274 | $1,449 |
| PIPE | H-9-1 | H-12 | 32.5 | 48 | 2,376 | LF | $274 | $652,169 |
| PIPE | H-12 | H-12-3 | 26 | 28 | 3,334 | LF | $114 | $379,012 |
| PIPE | H-12-3 | H-12-5 | 26 | 28 | 576 | LF | $114 | $65,419 |
| PIPE | H-12-5 | H-12-6 | 26 | 26 | 2,070 | LF | $99 | $205,819 |
| PIPE | H-12-6 | H-12-6-1 | 21 | 26 | 5,292 | LF | $119 | $632,255 |
| PIPE | H-12-6-1 | H-12-6-1-2 | 21 | 26 | 750 | LF | $119 | $89,578 |
| PIPE | H-12-6-1-2 | H-12-6-1-3 | 21 | 24 | 1,452 | LF | $99 | $144,271 |
| PIPE | H-12-6-1-3 | H-12-6-2 | 21 | 24 | 1,795 | LF | $99 | $178,371 |
| PIPE | H-12-6-2 | H-12-7 | 26 | 20 | 15 | LF | $58 | $865 |
| PIPE | H-12-7 | H-9-2 | 26 | 36 | 84 | LF | $194 | $16,389 |
| PIPE | H-9-2 | H-10 | 26 | 36 | 121 | LF | $194 | $23,559 |
| PIPE | H-10 | H-10-1 | 26 | 36 | 11 | LF | $194 | $2,049 |
| PIPE | H-10-1 | H-11/H-10-2 | 26 | 36 | 264 | LF | $194 | $51,215 |
| PIPE | H-11/H-10-2 | H-13 | 26 | 36 | 581 | LF | $194 | $112,672 |
| PIPE | H-13 | H-13-0 | 26 | 36 | 348 | LF | $194 | $67,603 |
| PIPE | H-13-0 | H-13-0-1 | 26 | 36 | 185 | LF | $194 | $35,850 |
| PIPE | H-13-0-1 | H-14 | 26 | 36 | 348 | LF | $194 | $67,603 |
| PIPE | H-14 | H-14-2/H-14- | 26 | 20 | 1,526 | LF | $58 | $87,962 |
| PIPE | H-14-2/H-14- | H-14-1-3 | 26 | 20 | 2,999 | LF | $58 | $172,880 |
| PIPE | H-14-1-3 | H-14-1-5 | 26 | 16 | 375 | LF | $36 | $13,654 |
| PIPE | H-14-1-5 | H-14-1-5-1 th | 26 | 16 | 348 | LF | $36 | $12,693 |
| PIPE | H-14-1-5-1 th | H-13-1 | 26 | 30 | 11 | LF | $129 | $1,364 |
| PIPE | H-13-1 | H-15 | 26 | 30 | 1,938 | LF | $129 | $250,297 |
| PIPE | H-15 | H-15-1 | 26 | 30 | 264 | LF | $129 | $34,100 |
| PIPE | H-15-1 | H-16 | 26 | 28 | 1,753 | LF | $114 | $199,259 |
| PIPE | H-16 | H-16-1 | 26 | 28 | 898 | LF | $114 | $102,030 |
| PIPE | H-16-1 | H-17/H-16-3 | 26 | 28 | 401 | LF | $114 | $45,613 |

# PHASE 6 - PILOT BUTTE CANAL

Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/17/2016

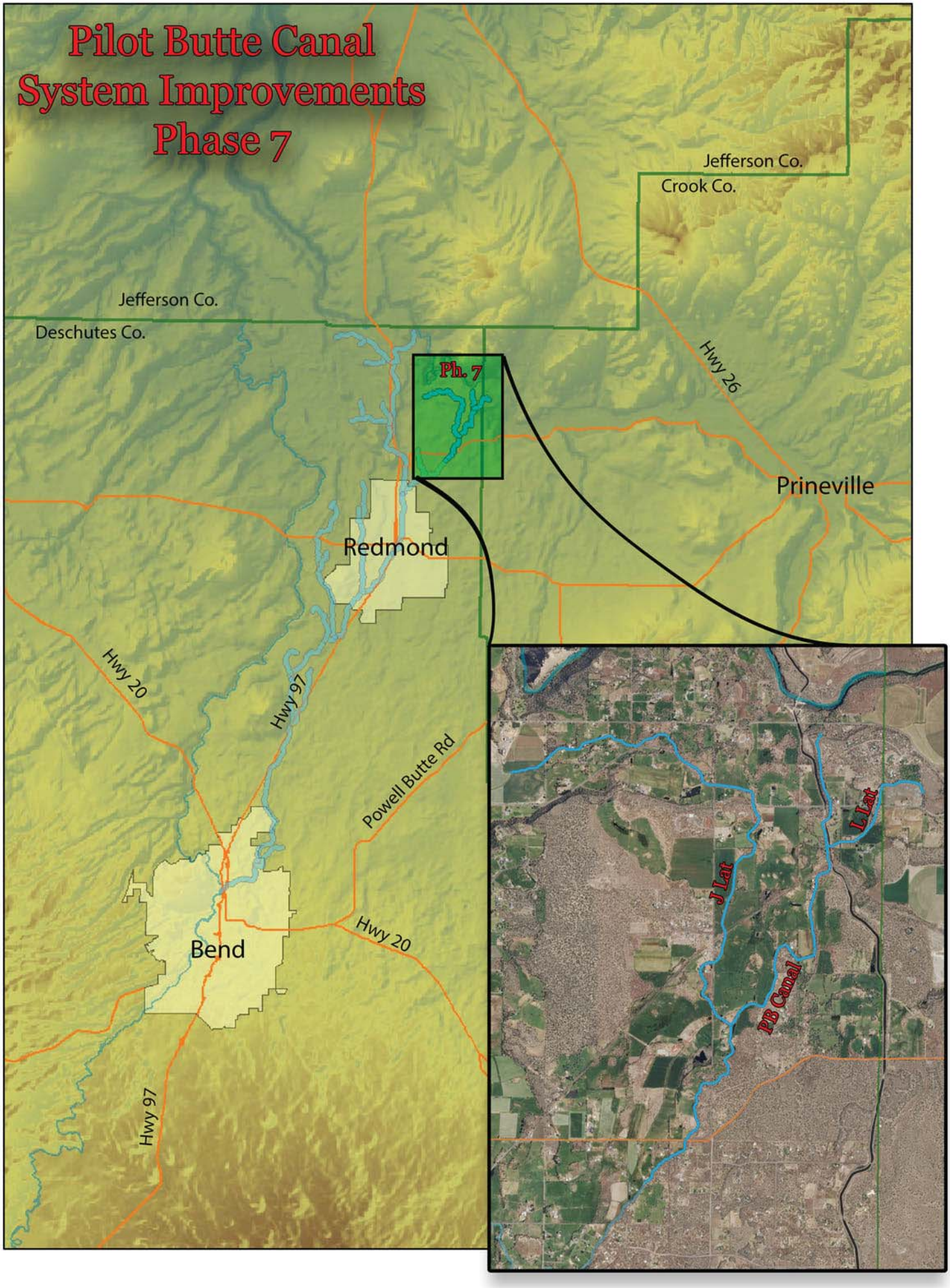
| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | H-17/H-16-3 | H-18 | 26 | 26 | 565 | LF | $99 | $56,180 |
| PIPE | H-18 | H-18-1 | 21 | 18 | 718 | LF | $56 | $40,327 |
| PIPE | H-18-1 | H-18-2 | 21 | 16 | 185 | LF | $44 | $8,143 |
| PIPE | H-18-2 | H-18-3 | 21 | 16 | 528 | LF | $44 | $23,266 |
| PIPE | H-18-3 | H-19 | 26 | 20 | 11 | LF | $58 | $609 |
| PIPE | H-19 | H-19-0 | 21 | 20 | 723 | LF | $69 | $50,194 |
| PIPE | H-19-0 | H-19-1 | 21 | 20 | 966 | LF | $69 | $67,047 |
| PIPE | H-19-1 | H-20-1 | 21 | 20 | 607 | LF | $69 | $42,134 |
| PIPE | H-20-1 | H-21 | 21 | 20 | 1,637 | LF | $69 | $113,578 |
| PIPE | H-21 | H-22 | 19 | 18 | 1,463 | LF | $62 | $91,220 |
| PIPE | H-22 | H-23 | 19 | 18 | 301 | LF | $62 | $18,771 |
| PIPE | H-23 | H-#3 | 19 | 18 | 818 | LF | $62 | $51,044 |
| PIPE | H-#3 | H-1 | 26 | 28 | 2,867 | LF | $114 | $325,896 |
| PIPE | H-1 | H-1-1 | 26 | 18 | 2,813 | LF | $48 | $133,687 |
| PIPE | H-1-1 | H-1-2 | 26 | 16 | 190 | LF | $36 | $6,923 |
| PIPE | H-1-2 | H-1-3 | 26 | 16 | 243 | LF | $36 | $8,846 |
| PIPE | H-1-3 | H-1-4 | 26 | 16 | 924 | LF | $36 | $33,655 |
| PIPE | H-1-4 | H-1-4-1 | 21 | 16 | 1,183 | LF | $44 | $52,115 |
| PIPE | H-1-4-1 | H-1-5 | 21 | 16 | 21 | LF | $44 | $931 |
| PIPE | H-1-5 | H-1-5-1 | 21 | 16 | 565 | LF | $44 | $24,894 |
| PIPE | H-1-5-1 | F-13 | 26 | 24 | 2,698 | LF | $82 | $222,333 |
| PIPE | F-13 | F-13-1 | 26 | 24 | 1,547 | LF | $82 | $127,482 |
| PIPE | F-13-1 | F-14 | 26 | 24 | 42 | LF | $82 | $3,481 |
| PIPE | F-14 | F-6 | 26 | 24 | 1,431 | LF | $82 | $117,910 |
| PIPE | F-6 | F-6-1 | 26 | 20 | 882 | LF | $58 | $50,829 |
| PIPE | F-6-1 | F-6-2 | 26 | 20 | 671 | LF | $58 | $38,654 |
| PIPE | F-6-2 | F-6-4 | 21 | 18 | 697 | LF | $56 | $39,141 |
| PIPE | F-6-4 | F-6-6 | 21 | 18 | 5 | LF | $56 | $297 |
| PIPE | F-6-6 | F-6-7 | 21 | 18 | 1,711 | LF | $56 | $96,074 |
| PIPE | F-6-7 | F-15-1 | 26 | 14 | 5 | LF | $29 | $152 |
| PIPE | F-15-1 | F-16 | 26 | 14 | 1,753 | LF | $29 | $50,359 |
| PIPE | F-16 | F-17 | 26 | 6 | 512 | LF | $15 | $7,813 |
| PIPE | F-17 | F-18/F-#4 | 21 | 4 | 1,236 | LF | $7 | $8,907 |
| PIPE | F-18/F-#4 | PBC-32 | 100 PSI | 84 | 3,934 | LF | $502 | $1,974,667 |
| PIPE | PBC-32 | PBC-33 | 100 PSI | 84 | 512 | LF | $502 | $257,104 |
| PIPE | PBC-33 | G/PBC-34 | 100 PSI | 84 | 1,104 | LF | $502 | $553,967 |
| PIPE | G/PBC-34 | PBC-34 | 26 | 30 | 2,500 | LF | $129 | $322,872 |
| PIPE | PBC-34 | G-3 | 26 | 28 | 1,067 | LF | $114 | $121,236 |
| PIPE | G-3 | G-4 | 26 | 28 | 1,214 | LF | $114 | $138,041 |
| PIPE | G-4 | G-6 | 26 | 20 | 871 | LF | $58 | $50,220 |
| PIPE | G-6 | G-7 | 26 | 20 | 1,162 | LF | $58 | $66,960 |
| PIPE | G-7 | G-8 | 21 | 20 | 929 | LF | $69 | $64,483 |
| PIPE | G-8 | G-9/G-9-1 | 21 | 18 | 417 | LF | $56 | $23,425 |
| PIPE | G-9/G-9-1 | G-9-2 | 21 | 16 | 84 | LF | $44 | $3,723 |
| PIPE | G-9-2 | G-9-3 | 21 | 16 | 354 | LF | $44 | $15,588 |
| PIPE | G-9-3 | G-10 | 21 | 16 | 634 | LF | $44 | $27,919 |
| PIPE | G-10 | PBC-34-1 | 100 PSI | 78 | 676 | LF | $464 | $313,590 |

# PHASE 6 - PILOT BUTTE CANAL

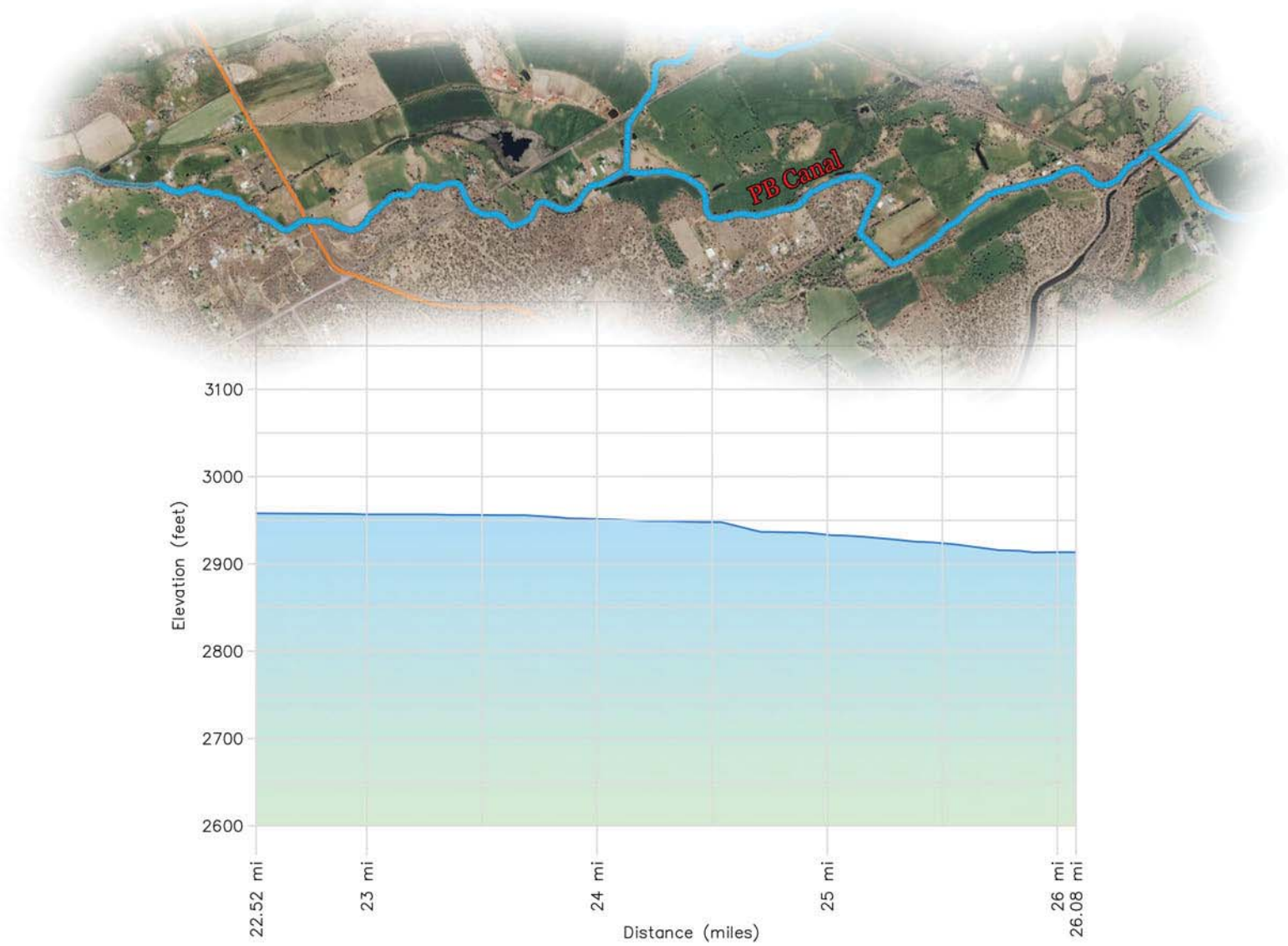
Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/17/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | PBC-34-1 | PBC-34-2 | 100 PSI | 78 | 1,135 | LF | $464 | $526,733 |
| PIPE | PBC-34-2 | PBC-35-1 | 100 PSI | 78 | 375 | LF | $464 | $173,944 |
| PIPE | PBC-35-1 | PBC-35 | 100 PSI | 78 | 37 | LF | $464 | $17,149 |
| PIPE | PBC-35 | PBC-35-2 | 100 PSI | 78 | 523 | LF | $464 | $242,542 |
| PIPE | PBC-35-2 | PBC-36 | 100 PSI | 78 | 428 | LF | $464 | $198,444 |
| PIPE | PBC-36 | PBC-37 | 100 PSI | 78 | 1,948 | LF | $464 | $904,020 |
| PIPE | PBC-37 | I/PBC-38 | 100 PSI | 78 | 998 | LF | $464 | $463,035 |
| PIPE | I/PBC-38 | PBC-39 | 100 PSI | 72 | 840 | LF | $426 | $357,636 |
| PRV STA. | | Temp PRV | Relocated | | 1 | EA | $400,000 | $400,000.00 |
| TURNOUT | | | | | 102 | EA | $10,000 | $1,020,000.00 |
| | SUBTOTAL | | | | | | | $17,703,408 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $1,062,204 |
| | CMGC | | | | | 12% | | $2,124,409 |
| | CONTINGENCY | | | | | 20% | | $4,178,004 |
| | **TOTAL** | | | | | | | **$25,068,026** |


Pilot Butte Canal
System Improvements
Phase 7
Jefferson Co.
Crook Co.
Jefferson Co.
Deschutes Co.
Ph. 7
Hwy 26
Prineville
Redmond
Hwy 20
Hwy 97
Powell Butte Rd
Bend
Hwy 20
Hwy 97
J Lat
L Lat
PB Canal

# Pilot Butte Canal
# Phase 7 Profile



# PHASE 7 - PILOT BUTTE CANAL

Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/17/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | PBC-39 | PBC-40/40-1 | 100 PSI | 72 | 1,272 | LF | $426 | $542,076 |
| PIPE | PBC-40/40-1 | PBC-41 | 100 PSI | 72 | 808 | LF | $426 | $344,140 |
| PIPE | PBC-41 | PBC-42 | 100 PSI | 72 | 1,621 | LF | $426 | $690,529 |
| PIPE | PBC-42 | PBC-44 | 100 PSI | 72 | 919 | LF | $426 | $391,375 |
| PIPE | PBC-44 | PBC-45 | 100 PSI | 72 | 1,067 | LF | $426 | $454,355 |
| PIPE | PBC-45 | PBC-45-0 | 100 PSI | 72 | 597 | LF | $426 | $254,169 |
| PIPE | PBC-45-0 | PBC-45-1 | 100 PSI | 72 | 380 | LF | $426 | $161,948 |
| PIPE | PBC-45-1 | J/PBC-46/PBC | 100 PSI | 72 | 42 | LF | $426 | $17,994 |
| PIPE | J/PBC-46/PBC | PBC-46 | 26 | 32 | 2,476 | LF | $146 | $362,104 |
| PIPE | PBC-46 | J-0 | 21 | 32 | 702 | LF | $176 | $123,926 |
| PIPE | J-0 | J-0-1 | 21 | 32 | 924 | LF | $176 | $163,060 |
| PIPE | J-0-1 | J-1 | 21 | 32 | 686 | LF | $176 | $121,130 |
| PIPE | J-1 | J-2 | 21 | 32 | 1,014 | LF | $176 | $178,900 |
| PIPE | J-2 | J-3 | 21 | 32 | 528 | LF | $176 | $93,177 |
| PIPE | J-3 | J-5 | 21 | 28 | 676 | LF | $137 | $92,771 |
| PIPE | J-5 | J-5-1 | 21 | 28 | 1,816 | LF | $137 | $249,323 |
| PIPE | J-5-1 | J-7 | 21 | 28 | 1,853 | LF | $137 | $254,396 |
| PIPE | J-7 | J-8 | 21 | 28 | 5 | LF | $137 | $725 |
| PIPE | J-8 | J-6 | 21 | 24 | 1,415 | LF | $99 | $140,598 |
| PIPE | J-6 | J-9/J-9-1/PRV | 21 | 24 | 79 | LF | $99 | $7,869 |
| PIPE | J-9/J-9-1/PRV | J-10 | 32.5 | 20 | 1,764 | LF | $47 | $83,407 |
| PIPE | J-10 | J-11 | 26 | 20 | 1,114 | LF | $58 | $64,221 |
| PIPE | J-11 | J-13 | 26 | 20 | 1,187 | LF | $58 | $68,414 |
| PIPE | J-13 | J-14 | 26 | 20 | 744 | LF | $58 | $42,916 |
| PIPE | J-14 | J-14-1 | 21 | 20 | 1,742 | LF | $58 | $100,441 |
| PIPE | J-14-1 | J-15 | 21 | 20 | 100 | LF | $58 | $5,783 |
| PIPE | J-15 | J-16 | 21 | 20 | 100 | LF | $58 | $5,783 |
| PIPE | J-16 | J-12 | 21 | 18 | 1,795 | LF | $56 | $100,818 |
| PIPE | J-12 | PBC-48 | 100 PSI | 66 | 1,125 | LF | $312 | $350,888 |
| PIPE | PBC-48 | PBC-48-0 | 100 PSI | 66 | 26 | LF | $312 | $8,237 |
| PIPE | PBC-48-0 | PBC-48-1 | 100 PSI | 66 | 1,040 | LF | $312 | $324,530 |
| PIPE | PBC-48-1 | PBC-49 | 100 PSI | 66 | 1,104 | LF | $312 | $344,298 |
| PIPE | PBC-49 | PBC-49-1 | 100 PSI | 66 | 380 | LF | $312 | $118,610 |
| PIPE | PBC-49-1 | PBC-50 | 100 PSI | 66 | 433 | LF | $312 | $135,084 |
| PIPE | PBC-50 | K/PBC-51 | 100 PSI | 66 | 26 | LF | $312 | $8,237 |
| PIPE | K/PBC-51 | PBC-53 | 100 PSI | 66 | 1,415 | LF | $312 | $441,492 |
| PIPE | PBC-53 | PBC-53-1/ PB | 100 PSI | 66 | 1,246 | LF | $312 | $388,777 |
| PIPE | PBC-53-1/ PB | PBC-55 | 100 PSI | 66 | 1,542 | LF | $312 | $481,029 |
| PIPE | PBC-55 | L/PBC-56/PBC | 100 PSI | 66 | 32 | LF | $312 | $9,884 |
| PIPE | L/PBC-56/PBC | PBC-56 | 32.5 | 24 | 2,150 | LF | $67 | $144,345 |
| PIPE | PBC-56 | L-1 | 32.5 | 24 | 1,552 | LF | $67 | $104,195 |
| PIPE | L-1 | L-3 | 32.5 | 18 | 5 | LF | $39 | $207 |
| PIPE | L-3 | L-2 | 32.5 | 18 | 5 | LF | $39 | $207 |
| PIPE | L-2 | L-5 | 32.5 | 18 | 718 | LF | $39 | $28,190 |
| PIPE | L-5 | L-6 | 32.5 | 18 | 623 | LF | $39 | $24,459 |
| PIPE | L-6 | L-6-1 | 32.5 | 18 | 222 | LF | $39 | $8,706 |
| PIPE | L-6-1 | L-6-2 | 32.5 | 16 | 586 | LF | $30 | $17,628 |

# PHASE 7 - PILOT BUTTE CANAL

Central Oregon Irrigation District

Reconnaissance-Level Construction Cost Estimate 4/17/2016

| Feature | Location | To | DR or PR | Dia. (In) | Length (ft) | Unit | $/Unit | Total Cost |
|---|---|---|---|---|---|---|---|---|
| PIPE | L-6-2 | L-7 | 32.5 | 16 | 623 | LF | $30 | $18,740 |
| PIPE | L-7 | PBC-58 | 100 PSI | 66 | 32 | LF | $312 | $9,884 |
| PIPE | PBC-58 | PBC-60 | 100 PSI | 60 | 1,447 | LF | $312 | $451,377 |
| PIPE | PBC-60 | PBC-63 | 100 PSI | 60 | 977 | LF | $312 | $304,762 |
| PIPE | PBC-63 | PBC-65/LONE | 100 PSI | 60 | 1,404 | LF | $312 | $438,198 |
| PIPE | PBC-65/LONE | PRV STA. | 100 PSI | 60 | 350 | LF | $312 | $109,200 |
| PRV STA. | | PRV Sta. | Relocated | | 1 | EA | $400,000 | $400,000.00 |
| PRV STA. | | J Lat PRV | | | 1 | EA | $300,000 | $300,000.00 |
| TURNOUT | | | | | 53 | EA | $10,000 | $530,000.00 |
| | SUBTOTAL | | | | | | | $10,617,512 |
| | ENGINEERING, CM, SURVEY | | | | | 6% | | $637,051 |
| | CMGC | | | | | 12% | | $1,274,101 |
| | CONTINGENCY | | | | | 20% | | $2,505,733 |
| | **TOTAL** | | | | | | | **$15,034,397** |

# APPENDIX A
# TABULATED SEEPAGE LOSS DATA

NF = Not Flowing
NM = Not Measurable

Loss
Gain

CFS = Flow based on Weir Calculation
Acres = Est. CFS based on value in K2

| Est. GPM For Deliveries | 6 |
|---|---|

| | Mile | | | Acres W/R | Est. CFS | | | Total (Q) | Loss / Gain | % of Flow |
|---|---|---|---|---|---|---|---|---|---|---|
| **5/6/16** | | | | | | | | | | |
| **Point 1** | **1.5** | | | | | | | **349.0** | | |
| | Delivery | COC -04 | CFS | | 0.15 | | | | | |
| | Delivery | COC -07 | Acres | 1 | | | NF | | | |
| | Delivery | COC -08 | Acres | 1.5 | 0.02 | NM | | | | |
| | Delivery | COC-012 | Acres | 1 | | NM | NF | | | |
| | Delivery | COC-014 | Acres | 0.58 | 0.01 | NM | | | | |
| | Arnold Drainage | | Inflow | | | NM | NF | | | |
| | Delivery | A-1 | CFS | | 0.23 | | | | | |
| | | | **Total CFS** | | **0.41** | | | | | |
| **Point 2** | **4.75** | | | | | | | **343.0** | **-5.62** | **-1.6%** |
| | City Drainage | | CFS | | -0.25 | Intake | | | | |
| | Delivery | COC-1 | Acres | 1.6 | | NM | NF | | | |
| | Delivery | COC-1-1 | Acres | 2.5 | | NM | NF | | | |
| | Delivery | COC-2-1 | Acres | 13 | 0.17 | NM | | | | |
| | Delivery | COC-3-0-2 | Acres | 20.9 | | NM | NF | | | |
| | Delivery | COC-3-1 | Acres | 25.35 | | NM | NF | | | |
| | Delivery | COC-3-3 | Acres | 22 | 0.29 | NM | | | | |
| | Delivery | A-Lateral | CFS | | 33.07 | | | | | |
| | Delivery | COC-6 | CFS | | 0.11 | | | | | |
| | Delivery | COC-6-1 | CFS | | 0.74 | | | | | |
| | Delivery | COC-7 | CFS | | 0.26 | | | | | |
| | Delivery | COC-7-1 | CFS | | 0.95 | | | | | |
| | Delivery | COC-7-2 | Acres | 5 | | | NF | | | |
| | Delivery | COC-7-3 | Acres | 1 | | NM | NF | | | |
| | | | **Total CFS** | | **35.35** | | | | | |
| **Point 3** | **7.75** | | | | | | | **307.0** | **-0.62** | **-0.2%** |
| **5/10/16** | | | | | | | | | | |
| **Point 3 [R]** | **7.75** | | | | | | | **300.5** | | |
| | Delivery | COC-7-4 | Acres | 5 | | NM (pump) | NF | | | |
| | Delivery | COC-9 | Acres | 4 | | NM | NF | | | |
| | Delivery | COC-8 | CFS | | 0.27 | | | | | |
| | Delivery | COC-10 | Acres | 89.44 | 1.20 | NM (pump) | | | | |
| | Delivery | COC-10-1 | CFS | | 0.08 | | | | | |
| | Delivery | COC-11 | Acres | 1.95 | 0.03 | NM | | | | |
| | Delivery | COC-12 | Acres | 9.6 | 0.13 | NM | | | | |
| | Delivery | COC-13 | CFS | | 0.80 | | | | | |
| | Delivery | B-Lateral | CFS | | 14.23 | | | | | |
| | Delivery | B-1 | Acres | 4 | 0.05 | | | | | |
| | Delivery | B-1-0 | Acres | 3.4 | 0.05 | | | | | |
| | Delivery | B-1-1 | CFS | | 1.36 | | | | | |
| | Delivery | COC-14 | Acres | 12.1 | | | NF | | | |
| | Delivery | COC-14-1 | CFS | | 0.46 | | | | | |
| | Delivery | COC-15 | Acres | 24.2 | | NM | NF | | | |
| | Delivery | C-Lateral | CFS | | 15.35 | | | | | |
| | Delivery | COC-16 | Acres | 12 | | | NF | | | |
| | Delivery | C-3 | CFS | | 1.48 | | | | | |
| | Delivery | COC-18 | CFS | | 1.30 | | | | | |
| | | | **Total CFS** | | **36.78** | | | | | |
| **Point 4** | **11.1** | | | | | | | **265.0** | **1.28** | **0.5%** |
| | Delivery | COC-18-0 | Acres | 5.5 | | | NF | | | |
| | Delivery | COC-19 | CFS | | 0.19 | | | | | |
| | Delivery | COC-18-2 | Acres | 5 | 0.07 | NM | | | | |
| | Delivery | C-4 | Acres | 50.22 | 0.67 | NM | | | | |
| | Delivery | C-5 | CFS | | 1.61 | | | | | |
| | Delivery | COC-20 | Acres | 9 | 0.12 | NM | | | | |
| | Delivery | D-Lateral | CFS | | 11.78 | | | | | |
| | Delivery | COC-21 | Acres | 10 | | | NF | | | |
| | Delivery | COC-22 | CFS | | 0.19 | | | | | |
| | Delivery | D-3 | CFS | | 6.14 | | | | | |
| | Delivery | COC-22-1 | CFS | | 0.13 | | | | | |
| | Delivery | COC-22-2 | Acres | 4.5 | | | NF | | | |
| | Delivery | D-1 | CFS | | 6.82 | | | | | |
| | Delivery | COC-22-3 | Acres | | | | NF | | | |
| | | | **Total CFS** | | **27.72** | | | | | |
| **Point 5** | **13** | | | | | | | **241.82** | **4.54** | **1.9%** |
| **5/11/16** | | | | | | | | | | |
| **Point 5[R]** | **13** | | | | | | | **239.07** | | |
| | Delivery | D-4 | CFS | | 4.45 | | | | | |
| | Delivery | COC-23 | Acres | 9.91 | 0.13 | | | | | |
| | Delivery | COC-23-0 | Acres | 2.7 | | | NF | | | |
| | Delivery | COC-23-1 | CFS | | 0.11 | | | | | |
| | Delivery | COC-23-2 | CFS | | 0.13 | | | | | |
| | Delivery | COC-24 | Acres | 30.8 | | | NF | | | |
| | Delivery | E-2 | CFS | | 2.12 | | | | | |
| | Delivery | COC-25 | CFS | | 0.34 | | | | | |
| | | | **Total CFS** | | **7.28** | | | | | |
| **Point 6** | **15** | | | | | | | **231.14** | **-0.65** | **-0.3%** |
| | Delivery | F-1 | CFS | | 0.92 | | | | | |
| | Delivery | COC-26-1 | CFS | | 0.64 | | | | | |
| | Delivery | F-2 | CFS | | 4.91 | | | | | |
| | Delivery | COC-27 | CFS | | 0.50 | | | | | |
| | Delivery | COC-28 | Acres | 25.6 | 0.34 | didn't measure | | | | |
| | Delivery | COC-29 | Acres | 23 | | didn't measure | NF | | | |
| | Delivery | COC-30 | CFS | | 0.55 | | | | | |
| | Delivery | COC-31-1 | CFS | | 0.08 | | | | | |
| | Delivery | COC-31-2 | CFS | | 0.08 | | | | | |
| | Delivery | COC-32 | Acres | 15.1 | | | NF | | | |
| | Delivery | COC-33 | CFS | | 0.55 | | | | | |
| | Delivery | H Lateral | CFS | | 9.82 | | | | | |
| | Delivery | H-2 | CFS | | 2.76 | | | | | |
| | | | **Total CFS** | | **21.15** | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Point 7** | **18.5** | | | | | | | **193.10** | **-16.89** | **-8.7%** |
| **5/12/16** | | | | | | | | | | |
| **Point 7[R]** | **18.5** | | | | | | | **203.95** | | |
| | Delivery | COC-33-1 | CFS | | 0.19 | | | | | |
| | Delivery | COC-34 | Acres | 11 | | NF | | | | |
| | Delivery | COC-35 | CFS | | 0.3 | | | | | |
| | Delivery | I-Lateral | CFS | | 44.88 | NF | | | | |
| | | | **Total CFS** | | **45.37** | | | | | |
| **Point 8** | **22.75** | | | | | | | **151.35** | **-7.23** | **-4.8%** |
| | Delivery | COC-35-1 | Acres | 4 | 0.05 | didn't measure | | | | |
| | Delivery | H-#3 | CFS | | -1.00 | INTAKE | | | | |
| | Delivery | COC-35-2 | Acres | 4 | NM | | NF | | | |
| | Delivery | COC-37 | Acres | 17 | | | NF | | | |
| | Delivery | COC-36 | Acres | 36 | 0.48 | | | | | |
| | Delivery | COC-37-1 | CFS | 25 | 0.33 | | | | | |
| | Delivery | COC-38-1 | CFS | | 0.64 | | | | | |
| | | | **Total CFS** | | **0.51** | | | | | |
| **Point 9** | **25.25** | | | | | | | **147.73** | **-3.11** | **-2.1%** |
| | Delivery | COC-38-2 | Acres | 30 | 0.40 | Partial flow | | | | |
| | Delivery | COC-38-3 | Acres | 2.7 | 0.04 | | | | | |
| | Delivery | COC-38-4 | Acres | 3 | 0.04 | | | | | |
| | Delivery | COC-38-5 | CFS | | 0.15 | | | | | |
| | Delivery | COC-38-6 | Acres | 5 | 0.07 | | | | | |
| | Delivery | COC-39 | CFS | | 0.55 | | | | | |
| | INTAKE | I-3#3 | CFS | | -1.00 | | | | | |
| | Delivery | COC-41-1 | Acres | 34 | | | NF | | | |
| | Delivery | COC-41-2 | CFS | | 0.84 | | | | | |
| | Delivery | COC-41-4 | CFS | | 0.34 | | | | | |
| | Delivery | J-Lateral | CFS | | 4.76 | | | | | |
| | Delivery | PBSP | | | Trickle | | | | | |
| | Delivery | K-0 | CFS | | 0.57 | | | | | |
| | Delivery | K-1 | CFS | | 0.16 | | | | | |
| | Delivery | K-2-1 | CFS | | 0.69 | | | | | |
| | Delivery | K-3-1 | CFS | | 0.23 | | | | | |
| | Delivery | K-3-2 | CFS | | 1.68 | | | | | |
| | Delivery | K-3-4 | Acres | RW | | | NF | | | |
| | Delivery | K-3-5 | CFS | | 0.79 | | | | | |
| | Delivery | K-3-6 | Acres | 30 | | | NF | | | |
| | Delivery | K-4 | CFS | | 0.26 | | | | | |
| | Delivery | K-4-0 | CFS | | 0.13 | | | | | |
| | | | **Total CFS** | | **10.69** | | | | | |
| **Point 10** | **31.5** | | | | | | | **125** | **-12.04** | **-9.6%** |
| **5/18/16** | | | | | | | | | | |
| **Point 10[R]** | **31.5** | | | | | | | **159.19** | | |
| | Delivery | K-4-1 | Acres | 16.8 | 0.22 | | | | | |
| | Delivery | K-4-1-1 | Acres | 60.46 | 0.81 | | | | | |
| | Delivery | K-4-2 | CFS | | 0.42 | | | | | |
| | Lateral | K-4-3 | CFS | | 0.23 | | | | | |
| | Delivery | K-4-4 | CFS | | 0.50 | | | | | |
| | Delivery | K-5 | CFS | | 0.08 | | | | | |
| | Delivery | K-5-0 | Acres | 44.8 | 0.60 | | | | | |
| | Delivery | K-5-1 | CFS | | 1.85 | | | | | |
| | Delivery | K-5-2 | CFS | | 0.42 | | | | | |
| | Delivery | K-5-3 | Acres | 179.94 | 2.41 | | | | | |
| | Delivery | K-5-4 | Acres | 32.25 | 0.43 | | | | | |
| | Delivery | K-5-6 | Acres | 253 | | | NF | | | |
| | Delivery | K-6-1 | CFS | | 1.55 | | | | | |
| | Delivery | K-6-4 | Acres | 155.19 | 2.07 | | | | | |
| | Delivery | K-7-1 | CFS | | 0.84 | | | | | |
| | Delivery | K-7-2 | CFS | | 0.38 | | | | | |
| | Delivery | K-7-3 | Acres | 143.26 | 1.92 | | | | | |
| | Delivery | K-7-4 | Acres | 64.6 | 0.86 | | | | | |
| | Delivery | K-7-5 | Acres | 1 | 0.01 | | | | | |
| | Delivery | K-8-1 | CFS | | 1.30 | | | | | |
| | Delivery | K-8-2 | CFS | | 0.46 | | | | | |
| | Delivery | K-8-3 | Acres | 36.27 | 0.48 | | | | | |
| | Delivery | K-8-4 | CFS | | 0.74 | | | | | |
| | Delivery | K-8-5 | CFS | | 0.50 | | | | | |
| | Delivery | K-9-1 | CFS | | 0.34 | | | | | |
| | Delivery | K-9-2 | CFS | | 0.46 | | | | | |
| | Delivery | K-9-4 | Acres | 7 | 0.06 | | | | | |
| | Delivery | K-10 | CFS | | 1.28 | | | | | |
| | | | **Total CFS** | | **21.23** | | | | | |
| **Point 11** | **34.5** | | | | | | | **135.47** | **-2.49** | **-1.8%** |

NF = Not Flowing
NM = Not Measurable

Loss
Gain

CFS = Flow based on Weir Calculation
Acres = Est. CFS based on value in K2

| Est. GPM For Deliveries | 6 |
|---|---|

| | Mile | | | Acres W/R | Est. CFS | | | Total (Q) | Loss / Gain | % of Flow |
|---|---|---|---|---|---|---|---|---|---|---|
| **9/2/15** | | | | | | | | | | |
| **State Guage** | | | | | | **457.07** | | | | |
| **Point 1** | **0.5** | | | | | | | **453.7** | | |
| **Point 2** | **0.75** | | | | | | | **501.1** | **47.4** | **9%** |
| **Point 3** | **2** | | | | | | | **442.3** | | |
| | Delivery | A-4-3 | CFS | | 0.46 | 2" over 2' weir | | | | |
| | Delivery | A-4-2 | Acres | 18.5 | 0.25 | NM | | | | |
| | Delivery | A-4 | CFS | | 6.54 | 7.5" over 4' weir | | | | |
| | Delivery | PBC-3 | Acres | 67.62 | 0.91 | Avion - no idea if running | | | | |
| | | | **Total CFS** | | **7.25** | | | | | |
| **Point 4** | **3** | | | | | | | **425.5** | **-9.5** | **-2%** |
| **9/3/15** | | | | | | | | | | |
| **State Guage** | | | | | | **446.4** | | **Day Over Change** | | **-11** |
| **Point 5** | **6.5** | | | | | | | **395.4** | | |
| | Robinsons | Industrial | | | 0.00 | NM | NF | | | |
| | | | **Total CFS** | | **0.00** | | | | | |
| **Point 6** | **7.5** | | | | | | | **368.9** | **-26.484** | **-7.2%** |
| **9/10/15** | | | | | | | | | | |
| **State Guage** | | | | | | **404.8** | | | | **-42** |
| **Point 5[R][R]** | **6.5** | | | | | | | **360.9** | | |
| | Robinsons | Industrial | | | 0.00 | NM | NF | | | |
| | | | **Total CFS** | | **0.00** | | | | | |
| **Point 6 [R][R]** | **7.5** | | | | | | | **346.4** | **-14.49** | **-4.2%** |
| | Delivery | PBC 4-1 and 4-2 | Acres | 19.5 | 0.26 | NM (1.25" over 2' Sub.) | | | | |
| | Delivery | A-16 | CFS | | 17.78 | 9.25" over 8' | | | | |
| | | | **Total CFS** | | **18.04** | | | | | |
| **Point 7** | **8.75** | | | | | | | **349.1** | **20.70** | **5.9%** |
| | Delivery | A-18 | Acres | 13.28 | 0.18 | NM (1.25" over 2' Sub.) | | | | |
| | Delivery | PBC 4-2-1 | | | 0.00 | | NF | | | |
| | Delivery | PBC 4-3 | | | 0.00 | | NF | | | |
| | Delivery | PBC 5 | CFS | | 0.33 | 1.625" over 2' | | | | |
| | Delivery | PBC 5-1 | trickle | 0 | 0.00 | NM | | | | |
| | | | **Total CFS** | | **0.51** | | | | | |
| **Point 8** | **10.75** | | | | | | | **321.40** | **-27.16** | **-8.5%** |
| | Delivery | PBC 7 | CFS | | 0.00 | 4 3/8" ver 4 | | | | |
| | Delivery | PBC 6-1 | | 0 | 0.00 | NM | NF | | | |
| | Lateral | A-21 | CFS | | 16.71 | 8 7/8" over 8' | | | | |
| | Delivery | PBC 6-1 | Acres | 0 | 0.00 | NM | NF | | | |
| | | | **Total CFS** | | **16.71** | | | | | |
| **Point 9** | **12.25** | | | | | | | **309.768** | **5.08** | **1.6%** |
| | Delivery | PBC 8-1 | | | 0.00 | | NF | | | |
| | Delivery | PBC 8-2 | | | 0.00 | | NF | | | |
| | Delivery | PBC 8-3 | | | 0.00 | | NF | | | |
| | Delivery | PBC 9 | | | 0.00 | | NF | | | |
| | Lateral | B-2 | Acres | 690 | 9.22 | NM Submerged | | 5.110240699 | | |
| | Lateral | B | CFS | | 39.41 | | | 39.4127597 | | |
| | Delivery | PBC 11 | | | 0.00 | | NF | | | |
| | Delivery | PBC 10 | Acres | 13.50 | 0.18 | NM Weeds | | | | |
| | Delivery | B-1 | CFS | | 1.67 | 3" over 4' | | | | |
| | Delivery | PBC 11-1 | Acres | 3 | 0.04 | NM Pump (No sprinklers seen) | | | | |
| | Delivery | PBC 11-1-1 | CFS | | 1.60 | 4 5/8" over 2' | | | | |
| | Delivery | PBC 11-2 | CFS | | 0.83 | 3" over 2' | | | | |
| | Delivery | PBC 11-3 | Acres | 5 | 0.07 | | | | | |
| | Delivery | PBC 12 | Acres | 18.15 | 0.24 | | | | | |
| | Delivery | PBC 13 | CFS | | | 2 1/8" over 2' | | | | |
| | Delivery | PBC 15 | | | 0.00 | | NF | | | |
| | Delivery | PBC 14 | | | 0.00 | | NF | | | |
| | Lateral | C-1 | Acres | 42.37 | 0.57 | | | | | |
| | Lateral | C | CFS | | 12.57 | 8 7/8" over 6' | | | | |
| | | | **Total CFS** | | **66.40** | | | | | |
| **Point 10** | **15.8** | | | | | | | **211.78** | **-31.58** | **-14.9%** |
| **9/11/15** | | | | | | | | | | |
| **State gauge** | | | | | | **394.09** | | **Day Over Change** | | **-11** |
| **Point 10[R]** | **15.75** | | | | | | | **196.479** | | |
| | Delivery | | | | 0.00 | NF | | | | |
| | | | **Total CFS** | | **0.00** | | | | | |
| **Point 11[R]** | **16.5** | | | | | | | **197.302** | **0.82** | **0.4%** |
| | Delivery | | | 0 | | NF | | | | |
| | | | **Total CFS** | | **0.00** | | | | | |
| **Point 12** | **17.4** | | | | | | | **197.408** | **0.11** | **0.1%** |

NF = Not Flowing | Loss | CFS = Flow based on Weir Calculation | Est. GPM For Deliveries | 6
NM = Not Measurable | Gain | Acres = Est. CFS based on value in K2

| | Mile | | | Acres W/R | Est. CFS | | | Total (Q) | Loss / Gain | % of Flow |
|---|---|---|---|---|---|---|---|---|---|---|
| **9/2/15** | | | | | | | | | | |
| **State Guage** | | | | | | **457.07** | | | | |
| **Point 1** | **0.5** | | | | | | | **453.7** | | |
| **Point 2** | **0.75** | | | | | | | **501.1** | **47.4** | **9%** |
| **Point 3** | **2** | | | | | | | **442.3** | | |
| | Delivery | A-4-3 | CFS | | 0.46 | 2" over 2' weir | | | | |
| | Delivery | A-4-2 | Acres | 18.5 | 0.25 | NM | | | | |
| | Delivery | A-4 | CFS | | 6.54 | 7.5" over 4' weir | | | | |
| | Delivery | PBC-3 | Acres | 67.62 | 0.91 | Avion - no idea if running | | | | |
| | | | **Total CFS** | | **7.25** | | | | | |
| **Point 4** | **3** | | | | | | | **425.5** | **-9.5** | **-2%** |
| **9/3/15** | | | | | | | | | | |
| **State Guage** | | | | | | **446.4** | | **Day Over Change** | | **-11** |
| **Point 5** | **6.5** | | | | | | | **395.4** | | |
| | Robinsons | Industrial | | | 0.00 | NM | NF | | | |
| | | | **Total CFS** | | **0.00** | | | | | |
| **Point 6** | **7.5** | | | | | | | **368.9** | **-26.484** | **-7.2%** |
| **9/10/15** | | | | | | | | | | |
| **State Guage** | | | | | | **404.8** | | | | **-42** |
| **Point 5[R][R]** | **6.5** | | | | | | | **360.9** | | |
| | Robinsons | Industrial | | | 0.00 | NM | NF | | | |
| | | | **Total CFS** | | **0.00** | | | | | |
| **Point 6 [R][R]** | **7.5** | | | | | | | **346.4** | **-14.49** | **-4.2%** |
| | Delivery | PBC 4-1 and 4-2 | Acres | 19.5 | 0.26 | NM (1.25" over 2' Sub.) | | | | |
| | Delivery | A-16 | CFS | | 17.78 | 9.25" over 8' | | | | |
| | | | **Total CFS** | | **18.04** | | | | | |
| **Point 7** | **8.75** | | | | | | | **349.1** | **20.70** | **5.9%** |
| | Delivery | A-18 | Acres | 13.28 | 0.18 | NM (1.25" over 2' Sub.) | | | | |
| | Delivery | PBC 4-2-1 | | | 0.00 | | NF | | | |
| | Delivery | PBC 4-3 | | | 0.00 | | NF | | | |
| | Delivery | PBC 5 | CFS | | 0.33 | 1.625" over 2' | | | | |
| | Delivery | PBC 5-1 | trickle | 0 | 0.00 | NM | | | | |
| | | | **Total CFS** | | **0.51** | | | | | |
| **Point 8** | **10.75** | | | | | | | **321.40** | **-27.16** | **-8.5%** |
| | Delivery | PBC 7 | CFS | | 0.00 | 4 3/8" ver 4 | | | | |
| | Delivery | PBC 6-1 | | 0 | 0.00 | NM | NF | | | |
| | Lateral | A-21 | CFS | | 16.71 | 8 7/8" over 8' | | | | |
| | Delivery | PBC 6-1 | Acres | 0 | 0.00 | NM | NF | | | |
| | | | **Total CFS** | | **16.71** | | | | | |
| **Point 9** | **12.25** | | | | | | | **309.768** | **5.08** | **1.6%** |
| | Delivery | PBC 8-1 | | | 0.00 | | NF | | | |
| | Delivery | PBC 8-2 | | | 0.00 | | NF | | | |
| | Delivery | PBC 8-3 | | | 0.00 | | NF | | | |
| | Delivery | PBC 9 | | | 0.00 | | NF | | | |
| | Lateral | B-2 | Acres | 690 | 9.22 | NM Submerged | | 5.110241 | | |
| | Lateral | B | CFS | | 39.41 | | | 39.41276 | | |
| | Delivery | PBC 11 | | | 0.00 | | NF | | | |
| | Delivery | PBC 10 | Acres | 13.50 | 0.18 | NM Weeds | | | | |
| | Delivery | B-1 | CFS | | 1.67 | 3" over 4' | | | | |
| | Delivery | PBC 11-1 | Acres | 3 | 0.04 | NM Pump (No sprinklers seen) | | | | |
| | Delivery | PBC 11-1-1 | CFS | | 1.60 | 4 5/8" over 2' | | | | |
| | Delivery | PBC 11-2 | CFS | | 0.83 | 3" over 2' | | | | |
| | Delivery | PBC 11-3 | Acres | 5 | 0.07 | | | | | |
| | Delivery | PBC 12 | Acres | 18.15 | 0.24 | | | | | |
| | Delivery | PBC 13 | CFS | | | 2 1/8" over 2' | | | | |
| | Delivery | PBC 15 | | | 0.00 | | NF | | | |
| | Delivery | PBC 14 | | | 0.00 | | NF | | | |
| | Lateral | C-1 | Acres | 42.37 | 0.57 | | | | | |
| | Lateral | C | CFS | | 12.57 | 8 7/8" over 6' | | | | |
| | | | **Total CFS** | | **66.40** | | | | | |
| **Point 10** | **15.8** | | | | | | | **211.78** | **-31.58** | **-14.9%** |
| **9/11/15** | | | | | | | | | | |
| **State gauge** | | | | | | **394.09** | | **Day Over Change** | | **-11** |
| **Point 10[R]** | **15.75** | | | | | | | **196.479** | | |
| | Delivery | | | | 0.00 | NF | | | | |
| | | | **Total CFS** | | **0.00** | | | | | |
| **Point 11[R]** | **16.5** | | | | | | | **197.302** | **0.82** | **0.4%** |
| | Delivery | | | 0 | | NF | | | | |
| | | | **Total CFS** | | **0.00** | | | | | |
| **Point 12** | **17.4** | | | | | | | **197.408** | **0.11** | **0.1%** |

# APPENDIX B
# EPANET HYDRAULIC MODELS

EPANET Model - COC Main Canal

[JUNCTIONS]

| ;ID | Elev | Demand | Pattern | |
|---|---|---|---|---|
| COC3 | 3742.45 | 57.75 | | ; |
| COC7 | 3738.53 | 7 | | ; |
| COC8 | 3737.77 | 10.5 | | ; |
| CO12 | 3731.73 | 7 | | ; |
| CO14 | 3731.73 | 4.06 | | ; |
| A1 | 3727.73 | 128.05 | | ; |
| CO1 | 3708.04 | 11.2 | | ; |
| 1-1 | 3708.14 | 17.5 | | ; |
| 2-1 | 3700.54 | 70 | | ; |
| 3-0/1 | 3698.58 | 333.2 | | ; |
| 3-3 | 3698.13 | 175 | | ; |
| ALAT | 3695.66 | 0 | | ; |
| A2/4 | 3692.4 | 1016.33 | | ;A2/A4 |
| A6 | 3674.44 | 147 | | ; |
| A7/8 | 3672.87 | 203 | | ; |
| A9 | 3674.15 | 91 | | ; |
| A10 | 3662.41 | 85.82 | | ; |
| A11 | 3655.7 | 2.1 | | ; |
| A15 | 3656.41 | 345.52 | | ;A15/12/13/16 |
| A17 | 3653.2 | 56 | | ;A17 |
| A18 | 3652.89 | 7 | | ; |
| A20 | 3656.22 | 70 | | ; |
| A21 | 3653.2 | 7.7 | | ; |
| A23 | 3640.98 | 17.5 | | ; |
| A23-1 | 3637.05 | 3.5 | | ; |
| A24 | 3633.7 | 0 | | ; |
| A24-2 | 3630.61 | 0 | | ; |
| A24-1 | 3631.06 | 7 | | ; |
| A24-3 | 3616.49 | 28.35 | | ; |
| A24-4 | 3615.19 | 28 | | ; |
| A24-2R | 3613.4 | 42 | | ;A24-2Replaced |
| A24-5 | 3612.14 | 161 | | ; |
| A24-6 | 3587.34 | 7 | | ; |
| A24-7 | 3571 | 63.63 | | ; |
| A24-8 | 3560.22 | 423.5 | | ; |
| A2491 | 3528.69 | 17.5 | | ;A24-9-1 |
| A2492 | 3528 | 5.81 | | ; |
| A2493 | 3527.81 | 52.36 | | ;A24-9-3 |
| A2494 | 3528.22 | 7 | | ; |
| A2410 | 3525.26 | 1553.51 | | ; |
| A2411 | 3518.02 | 35 | | ; |
| A2412 | 3517.89 | 29.75 | | ; |
| A2413 | 3515.38 | 14 | | ; |
| A2414 | 3505.27 | 26.25 | | ; |
| A2416 | 3504.86 | 518 | | ;A24-16/17 |
| A2415 | 3502.4 | 35 | | ; |
| A2421 | 3498.44 | 10.5 | | ; |
| A2422 | 3495.99 | 21 | | ; |
| A2423 | 3495.3 | 2847.5 | | ;A24-23/24 |
| A26 | 3603.36 | 478.24 | | ; |
| A27 | 3593.33 | 36.4 | | ; |
| A28 | 3577 | 96.25 | | ; |
| A29 | 3574.21 | 66.5 | | ; |
| A30 | 3566.77 | 28 | | ; |
| A31/32 | 3556.51 | 376.6 | | ; |
| A33 | 3542.94 | 211.4 | | ; |
| A34 | 3532.47 | 114.8 | | ; |
| A35 | 3523.89 | 245 | | ; |
| A3738 | 3504.78 | 60.2 | | ;A37/38 |
| A39 | 3505.08 | 259.5 | | ; |
| A40 | 3505.07 | 2203.5 | | ; |
| 6/6-1 | 3691.89 | 406 | | ; |
| 6-2 | 3682.94 | 196 | | ;6-2/6-3/6-4/7 |
| 7-1 | 3671.56 | 325.5 | | ; |
| 7-2 | 3659.4 | 35 | | ; |
| 7-3 | 3661.05 | 7 | | ; |
| 7-4 | 3660.71 | 35 | | ; |
| 8/9 | 3660.83 | 78.82 | | ; |

[PIPES]

| ;ID | Node1 | Node2 | Length | Diameter | Roughness | MinorLoss | Status | |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | COC3 | 2055.28 | 120 | 125 | 0 | Open | ; |
| 2 | COC3 | COC7 | 3039.92 | 120 | 125 | 0 | Open | ; |
| 3 | COC7 | COC8 | 1271.8 | 120 | 125 | 0 | Open | ; |
| 4 | COC8 | CO12 | 3258.44 | 120 | 125 | 0 | Open | ; |
| 5 | CO12 | CO14 | 1008.48 | 120 | 125 | 0 | Open | ; |
| 6 | CO14 | A1 | 2370.72 | 120 | 125 | 0 | Open | ; |
| 7 | A1 | CO1 | 8057.28 | 120 | 125 | 0 | Open | ; |
| 8 | CO1 | 1-Jan | 1066.56 | 120 | 125 | 0 | Open | ; |
| 9 | 1-Jan | 1-Feb | 2877.6 | 120 | 125 | 0 | Open | ; |
| 10 | 1-Feb | 3-0/1 | 1958.88 | 120 | 125 | 0 | Open | ; |
| 11 | 3-0/1 | 3-Mar | 1620.96 | 120 | 125 | 0 | Open | ; |
| 12 | 3-Mar | ALAT | 42.24 | 120 | 125 | 0 | Open | ; |
| 13 | ALAT | A2/4 | 934.56 | 31.78 | 135 | 0 | Open | ; |
| 14 | A2/4 | A6 | 1948.32 | 31.78 | 135 | 0 | Open | ; |
| 15 | A6 | A7/8 | 89.76 | 31.78 | 135 | 0 | Open | ; |
| 16 | A7/8 | A9 | 21.12 | 31.78 | 135 | 0 | Open | ; |
| 17 | A9 | A10 | 797.28 | 29.91 | 135 | 0 | Open | ; |
| 18 | A10 | A11 | 844.82 | 29.91 | 135 | 0 | Open | ; |
| 19 | A11 | A15 | 73.97 | 29.91 | 135 | 0 | Open | ; |
| 20 | A15 | A17 | 390.72 | 29.91 | 135 | 0 | Open | ; |
| 21 | A17 | A18 | 311.52 | 29.91 | 135 | 0 | Open | ; |
| 22 | A18 | A20 | 158.42 | 29.91 | 135 | 0 | Open | ; |
| 23 | A20 | A21 | 73.97 | 29.91 | 135 | 0 | Open | ; |
| 24 | A21 | A23 | 997.92 | 29.91 | 135 | 0 | Open | ; |
| 25 | A23 | A23-1 | 580.8 | 29.91 | 135 | 0 | Open | ; |
| 26 | A23-1 | A24 | 95.04 | 29.91 | 135 | 0 | Open | ; |
| 27 | A24 | A24-2 | 1544.87 | 22.44 | 135 | 0 | Open | ; |
| 28 | A24-2 | A24-1 | 5 | 22.44 | 135 | 0 | Open | ; |
| 29 | A24-1 | A24-3 | 1863.84 | 22.44 | 135 | 0 | Open | ;24 dr 32.5 |
| 30 | A24-3 | A24-4 | 105.63 | 22.44 | 135 | 0 | Open | ; |
| 31 | A24-4 | A24-2R | 633.6 | 22.44 | 135 | 0 | Open | ; |
| 32 | A24-2R | A24-5 | 232.32 | 22.44 | 135 | 0 | Open | ; |
| 33 | A24-5 | A24-6 | 1684.32 | 22.04 | 135 | 0 | Open | ;24dr26 |
| 34 | A24-6 | A24-7 | 1103.52 | 22.04 | 135 | 0 | Open | ; |
| 35 | A24-7 | A24-8 | 1948.32 | 21.58 | 135 | 0 | Open | ;24dr21 |
| 36 | A24-8 | A2491 | 2508 | 21.58 | 135 | 0 | Open | ; |
| 37 | A2491 | A2492 | 681.12 | 21.32 | 135 | 0 | Open | ; |
| 38 | A2492 | A2493 | 121.44 | 21.32 | 135 | 0 | Open | ; |
| 39 | A2493 | A2494 | 1050.72 | 21.32 | 135 | 0 | Open | ; |
| 40 | A2494 | A2410 | 227.04 | 17.77 | 135 | 0 | Open | ; |
| 41 | A2410 | A2411 | 1024.32 | 17.77 | 135 | 0 | Open | ; |
| 42 | A2411 | A2412 | 5.28 | 17.77 | 135 | 0 | Open | ; |
| 43 | A2412 | A2413 | 264 | 17.77 | 135 | 0 | Open | ; |
| 44 | A2413 | A2414 | 1114.08 | 17.77 | 135 | 0 | Open | ; |
| 45 | A2414 | A2416 | 253.44 | 17.77 | 135 | 0 | Open | ; |
| 46 | A2416 | A2415 | 211.2 | 15.99 | 135 | 0 | Open | ; |
| 47 | A2415 | A2421 | 359.04 | 15.99 | 135 | 0 | Open | ; |
| 48 | A2421 | A2422 | 491.04 | 15.99 | 135 | 0 | Open | ; |
| 49 | A2422 | A2423 | 348.48 | 15.99 | 135 | 0 | Open | ; |
| 50 | A24 | A26 | 2872.32 | 18.7 | 135 | 0 | Open | ;20 dr32.5 |
| 51 | A26 | A27 | 871.26 | 18.37 | 135 | 0 | Open | ;20dr26 |
| 52 | A27 | A28 | 1784.67 | 18.37 | 135 | 0 | Open | ; |
| 53 | A28 | A29 | 153.12 | 18.37 | 135 | 0 | Open | ; |
| 54 | A29 | A30 | 517.44 | 18.37 | 135 | 0 | Open | ; |
| 55 | A30 | A31/32 | 168.96 | 17.98 | 135 | 0 | Open | ;20dr21 |
| 56 | A31/32 | A33 | 1378.08 | 17.98 | 135 | 0 | Open | ;20dr21 |
| 57 | A33 | A34 | 855.36 | 16.18 | 135 | 0 | Open | ; |
| 58 | A34 | A35 | 1119.36 | 16.18 | 135 | 0 | Open | ;18dr21 |
| 59 | A35 | A3738 | 1473.12 | 15.99 | 135 | 0 | Open | ;18dr19 |
| 60 | A3738 | A39 | 137.28 | 15.99 | 135 | 0 | Open | ; |
| 61 | A39 | A40 | 5.28 | 20 | 135 | 0 | Open | ; |
| 62 | ALAT | 6/6/2001 | 1092.96 | 114 | 125 | 0 | Open | ; |
| 63 | 6/6/2001 | 2-Jun | 955.68 | 114 | 125 | 0 | Open | ; |
| 64 | 2-Jun | 1-Jul | 1309.44 | 114 | 125 | 0 | Open | ; |
| 65 | 1-Jul | 2-Jul | 1056 | 114 | 125 | 0 | Open | ; |
| 66 | 2-Jul | 3-Jul | 248.16 | 114 | 125 | 0 | Open | ; |
| 67 | 3-Jul | 4-Jul | 755.04 | 114 | 125 | 0 | Open | ; |
| 68 | 4-Jul | 9-Aug | 427.68 | 114 | 125 | 0 | Open | ; |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | 3657.74 | 626.08 | ; | | 69 | 9-Aug | 10 | 2597.76 | 114 | 125 | 0 | Open | ; | |
| 10-1 | | 3657.79 | 42 | ; | | 70 | 10 | 1-Oct | 485.76 | 114 | 125 | 0 | Open | ; | |
| | 11 | 3659.04 | 13.65 | ; | | 71 | 1-Oct | 11 | 480.48 | 114 | 125 | 0 | Open | ; | |
| | 12 | 3657.3 | 67.2 | ; | | 72 | 11 | 12 | 258.72 | 114 | 125 | 0 | Open | ; | |
| | 13 | 3657.29 | 238 | ; | | 73 | 12 | 13 | 174.24 | 114 | 125 | 0 | Open | ; | |
| B-LAT | | 3632.45 | 0 | ; | | 74 | 13 | B-LAT | 1108.8 | 114 | 125 | 0 | Open | ; | |
| B2 | | 3626.01 | 17.5 | ; | | 75 | B-LAT | B2 | 326.61 | 24.3 | 135 | 0 | Open | ; | |
| B3 | | 3627.2 | 19.6 | ; | | 76 | B2 | B3 | 343.2 | 24.3 | 135 | 0 | Open | ; | |
| B4 | | 3624.79 | 67.9 | ; | | 77 | B3 | B4 | 322.08 | 24.3 | 135 | 0 | Open | ; | |
| B5 | | 3616.73 | 24.5 | ; | | 78 | B4 | B5 | 549.12 | 24.3 | 135 | 0 | Open | ; | |
| B6 | | 3617.42 | 110.95 | ; | | 79 | B5 | B6 | 253.44 | 24.3 | 135 | 0 | Open | ; | |
| B7 | | 3615.05 | 63.7 | ; | | 80 | B6 | B7 | 47.52 | 24.3 | 135 | 0 | Open | ; | |
| B8 | | 3576.86 | 61.95 | ; | | 81 | B7 | B8 | 2265.12 | 23.88 | 135 | 0 | Open | ;26dr26 | |
| B9 | | 3577.27 | 108.5 | ; | | 82 | B8 | B9 | 100.32 | 23.88 | 135 | 0 | Open | ; | |
| B1011 | | 3577.22 | 252 | ; | | 83 | B9 | B1011 | 802.56 | 23.88 | 135 | 0 | Open | ; | |
| B12 | | 3576.52 | 28 | ; | | 84 | B1011 | B12 | 306.24 | 23.88 | 135 | 0 | Open | ; | |
| B13 | | 3563.4 | 17.5 | ; | | 85 | B12 | B13 | 1077.12 | 23.38 | 135 | 0 | Open | ;26dr21 | |
| B1415 | | 3564.86 | 791 | ;B14/15-0/15 | | 86 | B13 | B1415 | 10.56 | 23.38 | 135 | 0 | Open | ; | |
| B16 | | 3562.61 | 3.5 | ; | B16 | | B1415 | B16 | 116.17 | 23.38 | 135 | 0 | Open | ; | |
| B17 | | 3557.51 | 14 | ; | | 87 | B16 | B17 | 501.6 | 23.38 | 135 | 0 | Open | ; | |
| B18 | | 3552.37 | 14 | ; | | 88 | B17 | B18 | 374.88 | 21.58 | 135 | 0 | Open | ;24dr21 | |
| B18-1 | | 3549.75 | 22.4 | ; | | 89 | B18 | B18-1 | 311.52 | 21.58 | 135 | 0 | Open | ; | |
| B19 | | 3541.78 | 21 | ; | | 90 | B18-1 | B19 | 702.24 | 21.58 | 135 | 0 | Open | ; | |
| B20 | | 3538.79 | 232.4 | ; | | 91 | B19 | B20 | 575.52 | 21.58 | 135 | 0 | Open | ; | |
| B21 | | 3534.35 | 56 | ; | | 92 | B20 | B21 | 496.32 | 21.58 | 135 | 0 | Open | ; | |
| B21-1 | | 3530.43 | 199.57 | ; | | 93 | B21 | B21-1 | 184.8 | 21.58 | 135 | 0 | Open | ; | |
| B22 | | 3514.72 | 478.1 | ; | | 94 | B21-1 | B22 | 1578.72 | 21.32 | 135 | 0 | Open | ;24dr19 | |
| B23 | | 3511.48 | 259 | ; | | 95 | B22 | B23 | 712.8 | 21.32 | 135 | 0 | Open | ; | |
| B24 | | 3511.77 | 35 | ; | | 96 | B23 | B24 | 15.84 | 21.32 | 135 | 0 | Open | ; | |
| B26 | | 3504.72 | 1844.43 | ;B26/27/28/29 | | 97 | B24 | B26 | 1040.5 | 21.32 | 135 | 0 | Open | ; | |
| B25 | | 3494.11 | 126 | ; | | 98 | B26 | B25 | 1108.46 | 15.99 | 135 | 0 | Open | ;18dr19 | |
| B30 | | 3494.72 | 45.64 | ; | | 99 | B25 | B30 | 337.92 | 15.99 | 135 | 0 | Open | ; | |
| B32 | | 3493.44 | 179.9 | ; | | 100 | B30 | B32 | 469.92 | 14.21 | 135 | 0 | Open | ; | |
| B31 | | 3493.59 | 2145.15 | ;B31/31-0 | | 101 | B32 | B31 | 21.12 | 14.21 | 135 | 0 | Open | ; | |
| B-1 | | 3634.38 | 457.8 | ;B-1/B-1-0/B-1-1 | | 102 | B-LAT | B-1 | 691.68 | 114 | 125 | 0 | Open | ; | |
| 14-1 | | 3631.48 | 129.5 | ; | | 104 | 14-1 | 15 | 881.76 | 114 | 125 | 0 | Open | ; | |
| | 15 | 3623.06 | 254.1 | ; | | 105 | 15 | C-LAT | 15.85 | 114 | 125 | 0 | Open | ; | |
| C-LAT | | 3623.44 | 0 | ; | | 106 | C-LAT | C-0 | 849.75 | 22.44 | 135 | 0 | Open | ;24dr32.5 | |
| C-0 | | 3621.86 | 203 | ; | | 107 | C-0 | C-0-1 | 654.72 | 22.44 | 135 | 0 | Open | ; | |
| C-0-1 | | 3617.03 | 14 | ; | | 108 | C-0-1 | C-0-2 | 802.58 | 22.44 | 135 | 0 | Open | ; | |
| C-0-2 | | 3606.4 | 112 | ; | | 109 | C-0-2 | C-0-3 | 205.92 | 22.04 | 135 | 0 | Open | ; | |
| C-0-3 | | 3607.03 | 14 | ; | | 110 | C-1 | C-1-0 | 422.09 | 14.7 | 135 | 0 | Open | ;16dr26 | |
| C-1 | | 3606.65 | 0 | ; | | 111 | C-1-0 | C-1-1 | 116.16 | 14.7 | 135 | 0 | Open | ; | |
| C-1-0 | | 3602.55 | 63 | ; | | 112 | C-1 | C-6 | 1430.89 | 14.7 | 135 | 0 | Open | ;16dr26 | |
| C-1-1 | | 3603.36 | 2297.75 | ; | | 113 | C-6 | C-6-1 | 1114.08 | 14.7 | 135 | 0 | Open | ; | |
| C-6 | | 3596.22 | 21 | ; | | 114 | C-6-1 | C7 | 348.48 | 14.7 | 135 | 0 | Open | ; | |
| C-6-1 | | 3591.76 | 93.1 | ; | | 115 | C7 | C-7-2 | 242.88 | 14.7 | 135 | 0 | Open | ; | |
| C7 | | 3587.66 | 66.5 | ;C7/C-7-1 | | 116 | C-7-2 | C-8 | 1552.33 | 14.7 | 135 | 0 | Open | ; | |
| C-7-2 | | 3586.02 | 28 | ; | | 117 | C-8 | C-9 | 95.04 | 14.7 | 135 | 0 | Open | ; | |
| C-8 | | 3570.22 | 28 | ; | | 118 | C-9 | C-10 | 464.67 | 14.38 | 135 | 0 | Open | ;16dr21 | |
| C-9 | | 3562.08 | 3.5 | ; | | 119 | C-LAT | 16 | 253.44 | 114 | 125 | 0 | Open | ; | |
| C-10 | | 3561.42 | 2274.06 | ; | | 120 | 16 | C-3 | 3849.12 | 114 | 125 | 0 | Open | ; | |
| | 16 | 3622.44 | 84 | ; | | 121 | C-3 | 18 | 1510.08 | 114 | 125 | 0 | Open | ; | |
| C-3 | | 3610.04 | 781.9 | ; | | 122 | 18 | 18-0 | 1694.88 | 114 | 125 | 0 | Open | ; | |
| | 18 | 3605.05 | 469.42 | ; | | 123 | 18-0 | 18-2 | 432.96 | 114 | 125 | 0 | Open | ; | |
| 18-0 | | 3604.85 | 38.5 | ; | | 124 | 18-2 | C-4 | 1573.44 | 114 | 125 | 0 | Open | ; | |
| 18-2 | | 3603.6 | 129 | ;18-2/19/18-1 | | 125 | C-4 | C-5 | 1008.48 | 114 | 125 | 0 | Open | ; | |
| C-4 | | 3601.55 | 351.54 | ; | | 126 | C-5 | 20 | 2312.64 | 114 | 125 | 0 | Open | ; | |
| C-5 | | 3600.61 | 365.75 | ; | | 127 | 20 | D-LAT | 168.96 | 114 | 125 | 0 | Open | ; | |
| | 20 | 3602.14 | 63 | ; | | 128 | D-LAT | D-0 | 1439.79 | 22.44 | 135 | 0 | Open | ; | |
| D-LAT | | 3600.56 | 0 | ; | | 129 | D-0 | D-0-1 | 300.96 | 22.04 | 135 | 0 | Open | ;24dr26 | |
| D-0 | | 3603.71 | 50.19 | ; | | 130 | D-0-1 | D01-1 | 464.64 | 22.04 | 135 | 0 | Open | ; | |
| D-0-1 | | 3595.62 | 41.44 | ; | | 131 | D01-1 | D-2 | 205.92 | 22.04 | 135 | 0 | Open | ; | |
| D01-1 | | 3597.84 | 10.5 | ; | | 132 | D-2 | D-2-1 | 686.4 | 22.04 | 135 | 0 | Open | ; | |
| D-2 | | 3586.66 | 47.6 | ;D-2/D-2-0 | | 133 | D-2-1 | D-5 | 733.92 | 22.04 | 135 | 0 | Open | ; | |
| D-2-1 | | 3597.45 | 5.46 | ; | | 134 | D-5 | D-6 | 601.92 | 22.04 | 135 | 0 | Open | ; | |
| D-5 | | 3592.72 | 21.7 | ; | | 135 | D-6-1 | D7/8 | 1077.12 | 18.37 | 135 | 0 | Open | ; | |
| D-6 | | 3590.08 | 385 | ; | | 136 | D7/8 | D-8-1 | 2713.94 | 18.37 | 135 | 0 | Open | ; | |
| D-6-1 | | 3585.85 | 0 | ; | | 137 | D-8-1 | D-8-2 | 148.22 | 17.98 | 135 | 0 | Open | ; | |
| D7/8 | | 3580.29 | 456.4 | ; | | 138 | D-8-2 | D-8-3 | 348.64 | 17.98 | 135 | 0 | Open | ; | |
| D-8-1 | | 3525.69 | 42 | ; | | 139 | D-8-3 | D-12 | 538.66 | 17.77 | 135 | 0 | Open | ;20dr19 | |
| D-8-2 | | 3524.96 | 14 | ; | | 140 | D-12 | D-13 | 1573.44 | 15.99 | 135 | 0 | Open | ;18dr19 | |
| D-8-3 | | 3530.01 | 14 | ; | | 141 | D-13 | D13-0 | 221.76 | 15.99 | 135 | 0 | Open | ; | |

| | | | | | |
|---|---|---|---|---|---|
| D-12 | | 3522.45 | 721 | ; | |
| D-13 | | 3504.32 | 7 | ; | |
| D13-0 | | 3503.76 | 283.5 | ;D1-13-0/D-14/D-15 | |
| D-15-1-0 | | 3513.52 | 59.5 | ; | |
| D-15-1 | | 3493.87 | 28 | ; | |
| D-17 | | 3486.08 | 123.2 | ; | |
| D-16 | | 3485.65 | 2042.53 | ;D16/D-18 | |
| | 21 | 3601.22 | 70 | ; | |
| D-3 | | 3600.55 | 2134.16 | ;D-3/21/22 | |
| 22-1 | | 3596.94 | 31.5 | ; | |
| 22-2 | | 3596.6 | 11.9 | ; | |
| D-1 | | 3596.14 | 1680.56 | ; | |
| 22-3 | | 3596.84 | 53.9 | ; | |
| D-4 | | 3596.05 | 1678.95 | ; | |
| | 23 | 3595.5 | 69.37 | ; | |
| 23-0 | | 3549.81 | 18.9 | ; | |
| 23-1 | | 3548 | 59.5 | ;23-1/23-2 | |
| | 24 | 3548.12 | 269.64 | ; | |
| E-2 | | 3547.47 | 1248.59 | ; | |
| | 25 | 3539.54 | 210 | ; | |
| | 26 | 3520.77 | 252 | ; | |
| 26-1 | | 3498.74 | 266 | ; | |
| F-1 | | 3498.48 | 2471.8 | ;F-1/F-2 | |
| | 27 | 3497.98 | 252 | ; | |
| | 28 | 3489.76 | 179.2 | ; | |
| | 29 | 3456.85 | 161 | ; | |
| | 30 | 3457.79 | 385 | ; | |
| 31-1 | | 3457.41 | 35 | ; | |
| 31-2 | | 3455.75 | 15.75 | ; | |
| | 32 | 3454.55 | 104.3 | ; | |
| | 33 | 3454.62 | 259.35 | ; | |
| H-LAT | | 3451.92 | 0 | ; | |
| H-5 | | 3390.01 | 138.39 | ; | |
| H-6 | | 3387.77 | 56 | ; | |
| H-7 | | 3386.6 | 42 | ; | |
| H-8-0 | | 3387.86 | 224 | ;H-8-0/H-8-1 | |
| H-9-0 | | 3389.15 | 886.76 | ;H-9-0/H-9-1/H-10/H-10-2 | |
| H-11 | | 3385.37 | 105 | ; | |
| H-15 | | 3375.93 | 0 | ; | |
| H15-2 | | 3374 | 2321.76 | ;H-15-2/H-15-3 | |
| H-16 | | 3375.4 | 252 | ; | |
| H-17 | | 3373 | 1652.42 | ; | |
| H-2 | | 3451.23 | 1404.9 | ; | |
| 33-1 | | 3430.02 | 107.1 | ; | |
| | 34 | 3430.86 | 77 | ; | |
| | 35 | 3424.85 | 320.6 | ; | |
| I-LAT | | 3406.37 | 0 | ; | |
| I-1 | | 3385.33 | 685.58 | ; | |
| I-2 | | 3377.35 | 21 | ; | |
| I-3 | | 3373.81 | 0 | ; | |
| I-3-1 | | 3372.53 | 35 | ; | |
| I-3-2 | | 3372.23 | 1136.31 | ; | |
| I-3-3 | | 3369.01 | 16.8 | ; | |
| I-3-4 | | 3368.66 | 543.62 | ;1-3-4/1-3-5 | |
| I-3-6 | | 3370.99 | 7 | ; | |
| I-3-7 | | 3366.53 | 1353.8 | ; | |
| I-3-8 | | 3366.46 | 539.7 | ; | |
| I-3-9 | | 3360.18 | 63 | ; | |
| I-3-10 | | 3360.43 | 192.5 | ; | |
| I-3-11 | | 3358.74 | 506.8 | ; | |
| I-3-12 | | 3356.7 | 765.1 | ;I-3-12/I-3-13 | |
| I-3-14 | | 3356.54 | 1099 | ; | |
| I-3-15 | | 3356.12 | 199.5 | ; | |
| I-3-16 | | 3354.89 | 14 | ; | |
| I-3-17 | | 3354.85 | 1661.8 | ; | |
| I-4 | | 3373.37 | 63 | ; | |
| I-5 | | 3373.89 | 16.1 | ; | |
| I-7 | | 3372.68 | 364.35 | ;I-7/I-9 | |
| I-8 | | 3372.68 | 280.07 | ; | |
| I-10 | | 3372.51 | 0 | ; | |
| I-10-1 | | 3371.98 | 25.9 | ; | |
| I-10-2 | | 3368.04 | 402.5 | ; | |
| I-10-3 | | 3367.98 | 537.6 | ; | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 142 | D13-0 | D-15-1-0 | 1108.8 | 14.21 | 135 | 0 | Open | ;16dr19 | |
| 143 | D-15-1-0 | D-15-1 | 337.92 | 14.01 | 135 | 0 | Open | ;16dr17 | |
| 144 | D-15-1 | D-17 | 501.6 | 14.01 | 135 | 0 | Open | ; | |
| 145 | D-17 | D-16 | 21.12 | 14.01 | 135 | 0 | Open | ; | |
| 146 | D-LAT | 21 | 52.83 | 108 | 125 | 0 | Open | ; | |
| 147 | 21 | D-3 | 427.69 | 108 | 125 | 0 | Open | ; | |
| 148 | D-3 | 22-1 | 1420.32 | 108 | 125 | 0 | Open | ; | |
| 149 | 22-1 | 22-2 | 443.52 | 108 | 125 | 0 | Open | ; | |
| 150 | 22-2 | D-1 | 1161.6 | 108 | 125 | 0 | Open | ; | |
| 151 | D-1 | 22-3 | 311.52 | 108 | 125 | 0 | Open | ; | |
| 152 | 22-3 | D-4 | 644.16 | 108 | 125 | 0 | Open | ; | |
| 153 | D-4 | 23 | 190.08 | 108 | 125 | 0 | Open | ; | |
| 154 | 23 | 23-0 | 4730.88 | 108 | 125 | 0 | Open | ; | |
| 155 | 23-0 | 23-1 | 1372.8 | 108 | 125 | 0 | Open | ; | |
| 156 | 23-1 | 24 | 844.8 | 108 | 125 | 0 | Open | ; | |
| 157 | 24 | E-2 | 31.68 | 108 | 125 | 0 | Open | ; | |
| 158 | E-2 | 25 | 1309.44 | 108 | 125 | 0 | Open | ; | |
| 159 | 25 | 26 | 1404.48 | 108 | 125 | 0 | Open | ; | |
| 160 | 26 | 26-1 | 2750.88 | 108 | 125 | 0 | Open | ; | |
| 161 | 26-1 | F-1 | 10.58 | 108 | 125 | 0 | Open | ; | |
| 162 | F-1 | 27 | 21.29 | 108 | 125 | 0 | Open | ; | |
| 163 | 27 | 28 | 1478.4 | 108 | 125 | 0 | Open | ; | |
| 165 | 29 | 30 | 396 | 108 | 125 | 0 | Open | ; | |
| 166 | 30 | 31-1 | 1388.64 | 108 | 125 | 0 | Open | ; | |
| 167 | 31-1 | 31-2 | 163.68 | 108 | 125 | 0 | Open | ; | |
| 168 | 31-2 | 32 | 4424.64 | 108 | 125 | 0 | Open | ; | |
| 169 | 32 | 33 | 132 | 108 | 125 | 0 | Open | ; | |
| 170 | 33 | H-LAT | 3484.8 | 108 | 125 | 0 | Open | ; | |
| 171 | B-1 | 14-1 | 2999.04 | 114 | 125 | 0 | Open | ; | |
| 172 | C-0-3 | C-1 | 95.04 | 22.04 | 135 | 0 | Open | ;24dr26 | |
| 173 | D-6 | D-6-1 | 79.2 | 18.37 | 135 | 0 | Open | ;20dr26 | |
| 174 | H-LAT | H-5 | 12417.9 | 22.04 | 135 | 0 | Open | ; | |
| 175 | H-5 | H-6 | 649.53 | 22.04 | 135 | 0 | Open | ; | |
| 176 | H-6 | H-7 | 755.04 | 22.04 | 135 | 0 | Open | ; | |
| 177 | H-7 | H-8-0 | 490.85 | 22.04 | 135 | 0 | Open | ; | |
| 178 | H-8-0 | H-9-0 | 328.35 | 22.04 | 135 | 0 | Open | ; | |
| 179 | H-9-0 | H-11 | 602.01 | 22.04 | 135 | 0 | Open | ; | |
| 180 | H-11 | H-15 | 2381.28 | 22.04 | 135 | 0 | Open | ; | |
| 181 | H-15 | H15-2 | 1530.62 | 14.7 | 135 | 0 | Open | ; | |
| 182 | H-15 | H-16 | 1256.64 | 14.7 | 135 | 0 | Open | ; | |
| 183 | H-16 | H-17 | 126.72 | 14.7 | 135 | 0 | Open | ; | |
| 184 | H-LAT | H-2 | 644.26 | 102 | 125 | 0 | Open | ; | |
| 185 | H-2 | 33-1 | 1525.96 | 102 | 125 | 0 | Open | ; | |
| 186 | 33-1 | 34 | 1092.96 | 102 | 125 | 0 | Open | ; | |
| 187 | 34 | 35 | 2791.67 | 102 | 125 | 0 | Open | ; | |
| 188 | 35 | I-LAT | 8342.4 | 102 | 125 | 0 | Open | ; | |
| 189 | I-LAT | I-1 | 10835.28 | 44.08 | 135 | 0 | Open | ;48dr26 | |
| 190 | I-1 | I-2 | 1325.28 | 44.08 | 135 | 0 | Open | ; | |
| 191 | I-2 | I-3 | 2782.56 | 44.08 | 135 | 0 | Open | ; | |
| 192 | I-3 | I-3-1 | 1641.93 | 26.97 | 135 | 0 | Open | ; | |
| 193 | I-3-1 | I-3-2 | 327.36 | 26.97 | 135 | 0 | Open | ; | |
| 194 | I-3-2 | I-3-3 | 2265.12 | 26.97 | 135 | 0 | Open | ; | |
| 195 | I-3-3 | I-3-4 | 269.28 | 25.17 | 135 | 0 | Open | ; | |
| 196 | I-3-4 | I-3-6 | 10.56 | 25.17 | 135 | 0 | Open | ; | |
| 197 | I-3-6 | I-3-7 | 1341.12 | 25.17 | 135 | 0 | Open | ; | |
| 198 | I-3-7 | I-3-8 | 10.56 | 25.17 | 135 | 0 | Open | ; | |
| 199 | I-3-8 | I-3-9 | 2882.88 | 21.58 | 135 | 0 | Open | ; | |
| 200 | I-3-9 | I-3-10 | 0.05 | 20 | 135 | 0 | Open | ; | |
| 201 | I-3-9 | I-3-11 | 1652.65 | 21.58 | 135 | 0 | Open | ; | |
| 202 | I-3-11 | I-3-12 | 1293.61 | 17.98 | 135 | 0 | Open | ; | |
| 203 | I-3-12 | I-3-14 | 2840.64 | 16.18 | 135 | 0 | Open | ; | |
| 204 | I-3-14 | I-3-15 | 10.58 | 16.18 | 135 | 0 | Open | ; | |
| 205 | I-3-15 | I-3-16 | 760.34 | 14.38 | 135 | 0 | Open | ; | |
| 206 | I-3-16 | I-3-17 | 765.6 | 14.38 | 135 | 0 | Open | ;16dr21 | |
| 207 | I-3 | I-4 | 2840.65 | 32.36 | 135 | 0 | Open | ;36dr21 | |
| 208 | I-4 | I-5 | 1483.68 | 32.36 | 135 | 0 | Open | ; | |
| 209 | I-5 | I-7 | 4097.28 | 32.36 | 135 | 0 | Open | ; | |
| 210 | I-7 | I-8 | 15.84 | 32.36 | 135 | 0 | Open | ; | |
| 211 | I-8 | I-10 | 755.04 | 32.36 | 135 | 0 | Open | ; | |
| 212 | I-10 | I-10-1 | 776.16 | 17.98 | 135 | 0 | Open | ; | |
| 213 | I-10-1 | I-10-2 | 2581.92 | 17.98 | 135 | 0 | Open | ; | |
| 214 | I-10-2 | I-10-3 | 406.56 | 16.18 | 135 | 0 | Open | ; | |
| 215 | I-10-3 | I-10-4 | 1045.44 | 16.18 | 135 | 0 | Open | ; | |

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|---|---|---|---|---|
| I-10-4 | 3367.37 | 2316.15 | ; | |
| I-11 | 3372.52 | 1723.75 | ;I-11/I-12/I-13 | |
| I-14 | 3369.98 | 245 | ; | |
| I-15 | 3365.91 | 1455.3 | ;I-15/I-16 | |
| I-17 | 3366.58 | 119 | ; | |
| I-18 | 3366.8 | 215.6 | ; | |
| I-19 | 3361.65 | 106.75 | ; | |
| I-20 | 3362.23 | 639.03 | ;I-20/I-21 | |
| I-22 | 3362.56 | 51.45 | ; | |
| I-23 | 3360.91 | 708.05 | ;I-23/I-24 | |
| I-25 | 3360.45 | 123.9 | ; | |
| I-26 | 3357.61 | 2793.14 | ;I-26/I-27 | |
| 35-1 | 3363.72 | 28 | ; | |
| 35-2 | 3361.18 | 28 | ; | |
| 37 | 3360.99 | 119 | ; | |
| 36 | 3359.98 | 259 | ; | |
| 37-1 | 3358.84 | 175 | ; | |
| 38-1 | 3360.27 | 98 | ; | |
| 38-2 | 3353.91 | 623 | ; | |
| 38-3 | 3354.17 | 18.9 | ; | |
| 38-4 | 3352.44 | 21 | ; | |
| 38-5 | 3352.84 | 70 | ;38-5/38-6 | |
| 39 | 3352.47 | 210 | ; | |
| 41-1 | 3344.54 | 0 | ; | |
| 41-2 | 3343.5 | 532 | ; | |
| 41-4 | 3265.72 | 238 | ; | |
| J | 3250.34 | 1918.14 | ; | |
| K-0 | 3150 | 1188.18 | ; | |
| K-1 | 3234.74 | 134.4 | ; | |
| K-2-1 | 3234.02 | 429.8 | ; | |
| K-3-1 | 3233.63 | 35 | ; | |
| K-3-2 | 3233.63 | 1178.1 | ; | |
| K-3-4 | 3233.97 | 0 | ; | |
| K-3-5 | 3233.93 | 462 | ; | |
| K-3-6 | 3233.93 | 210 | ; | |
| K-4 | 3230.42 | 175 | ; | |
| K-4-0 | 3230.42 | 44.8 | ; | |
| K-4-1 | 3230.7 | 117.6 | ; | |
| K-4-1-1 | 3230.7 | 895.02 | ;K-4-1-1/K-4-2 | |
| K-4-3 | 3230.91 | 110.6 | ; | |
| K-4-4 | 3229.19 | 0 | ; | |
| K-5 | 3229.19 | 144.2 | ; | |
| K-5-0 | 3229.4 | 313.6 | ; | |
| K-5-1 | 3228.8 | 1011.5 | ; | |
| K-5-2 | 3229.4 | 320.6 | ; | |
| K-5-3 | 3228.8 | 1259.58 | ; | |
| K-5-4 | 3228.3 | 301 | ; | |
| K-5-6 | 3226.39 | 1771 | ; | |
| K-6-1 | 3226.64 | 696.99 | ; | |
| K-6-4 | 3225.5 | 1551.9 | ; | |
| K-7-1 | 3225.81 | 492.17 | ; | |
| K-7-2 | 3225.25 | 53.59 | ; | |
| K-7-3 | 3225.03 | 1002.82 | ; | |
| K-7-4 | 3224.98 | 452.2 | ; | |
| K-7-5 | 3224.26 | 7 | ; | |
| K-8-1 | 3224.46 | 919.8 | ; | |
| K-8-2 | 3225.06 | 532.14 | ;K-8-2/K-8-3 | |
| K-8-4 | 3223.59 | 278.25 | ; | |
| K-8-5 | 3223.67 | 157.29 | ; | |
| K-9-1 | 3223.65 | 228.9 | ; | |
| K-9-2 | 3223.15 | 217 | ; | |
| K-9-4 | 3223.34 | 49 | ; | |
| K-10 | 3221.84 | 1458.38 | ; | |
| K-10-2 | 3222.01 | 501.48 | ; | |
| K-11-1 | 3220.65 | 175 | ; | |
| L-LAT | 3220.02 | 0 | ; | |
| L-1 | 3184.34 | 514.5 | ; | |
| L-2 | 3184.3 | 987.91 | ; | |
| L-4 | 3184.17 | 364 | ; | |
| L-7 | 3125.04 | 795.9 | ;L-7/L-7-0 | |
| L-7-1 | 3124.6 | 147 | ; | |
| L-7-2 | 3124.21 | 266 | ; | |
| L-8 | 3116.18 | 653.1 | ; | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 216 | I-10 | I-11 | 406.57 | 28.73 | 135 | 0 | Open | ;32dr21 |
| 217 | I-11 | I-14 | 1436.16 | 25.17 | 135 | 0 | Open | ; |
| 218 | I-14 | I-15 | 1198.56 | 25.17 | 135 | 0 | Open | ; |
| 219 | I-15 | I-17 | 10.58 | 21.58 | 135 | 0 | Open | ; |
| 220 | I-17 | I-18 | 10.56 | 21.58 | 135 | 0 | Open | ; |
| 221 | I-18 | I-19 | 1246.08 | 21.58 | 135 | 0 | Open | ;24dr21 |
| 222 | I-19 | I-20 | 63.37 | 21.58 | 135 | 0 | Open | ; |
| 223 | I-20 | I-22 | 5.28 | 21.58 | 135 | 0 | Open | ; |
| 224 | I-22 | I-23 | 1261.92 | 17.98 | 135 | 0 | Open | ; |
| 225 | I-23 | I-25 | 10.6 | 17.98 | 135 | 0 | Open | ; |
| 226 | I-25 | I-26 | 1330.56 | 17.98 | 135 | 0 | Open | ; |
| 103 | I-LAT | 35-1 | 10860.96 | 96 | 125 | 0 | Open | ; |
| 227 | 35-1 | 35-2 | 4334.88 | 96 | 125 | 0 | Open | ; |
| 228 | 35-2 | 37 | 221.76 | 96 | 125 | 0 | Open | ; |
| 229 | 37 | 36 | 1135.21 | 96 | 125 | 0 | Open | ; |
| 230 | 36 | 37-1 | 2603.04 | 96 | 125 | 0 | Open | ; |
| 231 | 37-1 | 38-1 | 807.84 | 96 | 125 | 0 | Open | ; |
| 232 | 38-1 | 38-2 | 1589.28 | 96 | 125 | 0 | Open | ; |
| 233 | 38-2 | 38-3 | 1689.61 | 96 | 125 | 0 | Open | ; |
| 234 | 38-3 | 38-4 | 242.94 | 96 | 125 | 0 | Open | ; |
| 235 | 38-4 | 38-5 | 184.8 | 96 | 125 | 0 | Open | ; |
| 236 | 39 | 41-1 | 6953.76 | 96 | 125 | 0 | Open | ; |
| 237 | 41-1 | 41-2 | 306.24 | 96 | 125 | 0 | Open | ; |
| 239 | 41-4 | J | 2798.4 | 90 | 125 | 0 | Open | ; |
| 240 | 38-5 | 39 | 15.84 | 96 | 125 | 0 | Open | ; |
| 243 | K-1 | K-2-1 | 1726.56 | 90 | 125 | 0 | Open | ; |
| 244 | K-2-1 | K-3-1 | 860.64 | 90 | 125 | 0 | Open | ; |
| 245 | K-3-1 | K-3-2 | 1679.04 | 90 | 125 | 0 | Open | ; |
| 246 | K-3-2 | K-3-4 | 1599.84 | 90 | 125 | 0 | Open | ; |
| 247 | K-3-4 | K-3-5 | 485.76 | 90 | 125 | 0 | Open | ; |
| 248 | K-3-5 | K-3-6 | 10.56 | 90 | 125 | 0 | Open | ; |
| 249 | K-3-6 | K-4 | 1161.6 | 90 | 125 | 0 | Open | ; |
| 250 | K-4 | K-4-0 | 21.12 | 90 | 125 | 0 | Open | ; |
| 251 | K-4-0 | K-4-1 | 781.44 | 90 | 125 | 0 | Open | ; |
| 252 | K-4-1 | K-4-1-1 | 100.32 | 90 | 125 | 0 | Open | ; |
| 253 | K-4-1-1 | K-4-3 | 21.12 | 90 | 125 | 0 | Open | ; |
| 254 | K-4-3 | K-4-4 | 1520.64 | 90 | 125 | 0 | Open | ; |
| 255 | K-4-4 | K-5 | 5.28 | 90 | 125 | 0 | Open | ; |
| 256 | K-5 | K-5-0 | 15.84 | 90 | 125 | 0 | Open | ; |
| 257 | K-5-0 | K-5-1 | 1024.32 | 90 | 125 | 0 | Open | ; |
| 258 | K-5-1 | K-5-2 | 42.24 | 90 | 125 | 0 | Open | ; |
| 259 | K-5-2 | K-5-3 | 1129.92 | 90 | 125 | 0 | Open | ; |
| 260 | K-5-3 | K-5-4 | 380.16 | 90 | 125 | 0 | Open | ; |
| 261 | K-5-4 | K-5-6 | 1657.92 | 90 | 125 | 0 | Open | ; |
| 262 | K-5-6 | K-6-1 | 200.64 | 90 | 125 | 0 | Open | ; |
| 263 | K-6-1 | K-6-4 | 2622.76 | 90 | 125 | 0 | Open | ; |
| 264 | K-6-4 | K-7-1 | 179.52 | 90 | 125 | 0 | Open | ; |
| 265 | K-7-1 | K-7-2 | 1166.88 | 90 | 125 | 0 | Open | ; |
| 266 | K-7-2 | K-7-3 | 163.68 | 90 | 125 | 0 | Open | ; |
| 267 | K-7-3 | K-7-4 | 337.92 | 90 | 125 | 0 | Open | ; |
| 268 | K-7-4 | K-7-5 | 966.24 | 90 | 125 | 0 | Open | ; |
| 269 | K-7-5 | K-8-1 | 68.64 | 90 | 125 | 0 | Open | ; |
| 270 | K-8-1 | K-8-2 | 10.56 | 90 | 125 | 0 | Open | ; |
| 271 | K-8-2 | K-8-4 | 1298.88 | 90 | 125 | 0 | Open | ; |
| 272 | K-8-4 | K-8-5 | 15.84 | 90 | 125 | 0 | Open | ; |
| 273 | K-8-5 | K-9-1 | 1393.92 | 90 | 125 | 0 | Open | ; |
| 274 | K-9-1 | K-9-2 | 10.56 | 90 | 125 | 0 | Open | ; |
| 275 | K-9-2 | K-9-4 | 591.36 | 84 | 125 | 0 | Open | ; |
| 276 | K-9-4 | K-10 | 908.16 | 84 | 125 | 0 | Open | ; |
| 277 | K-10 | K-10-2 | 190.08 | 84 | 125 | 0 | Open | ; |
| 278 | K-10-2 | K-11-1 | 1721.28 | 84 | 125 | 0 | Open | ; |
| 279 | K-11-1 | L-LAT | 522.72 | 84 | 125 | 0 | Open | ; |
| 280 | L-LAT | L-1 | 1973.07 | 37.76 | 135 | 0 | Open | ;42dr21 |
| 283 | L-7 | L-7-1 | 73.92 | 33.65 | 135 | 0 | Open | ;36dr32.5 |
| 284 | L-7-1 | L-7-2 | 300.96 | 33.65 | 135 | 0 | Open | ; |
| 285 | L-7-2 | L-8 | 2793.12 | 31.78 | 135 | 0 | Open | ; |
| 286 | L-8 | L-8-1 | 10.56 | 31.78 | 135 | 0 | Open | ; |
| 287 | L-8-1 | L-8-2 | 5.28 | 31.78 | 135 | 0 | Open | ; |
| 288 | L-8-2 | L-8-2-1 | 1019.04 | 31.78 | 135 | 0 | Open | ; |
| 289 | L-8-2-1 | L-8-2-2 | 781.44 | 31.78 | 135 | 0 | Open | ; |
| 290 | L-8-2-2 | L-8-3 | 242.88 | 29.91 | 135 | 0 | Open | ;32dr32.5 |
| 291 | L-8-3 | L-8-3-1 | 501.6 | 29.91 | 135 | 0 | Open | ; |
| 292 | L-8-3-1 | L-8-4 | 21.12 | 29.91 | 135 | 0 | Open | ; |

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|---|---|---|---|---|---|
| L-8-1 | | 3115.59 | 749 | ; | |
| L-8-2 | | 3115.98 | 0 | ; | |
| L-8-2-1 | | 3114.77 | 482.3 | ; | |
| L-8-2-2 | | 3114.23 | 154 | ; | |
| L-8-3 | | 3113.68 | 84 | ; | |
| L-8-3-1 | | 3113.77 | 49.7 | ; | |
| L-8-4 | | 3113.36 | 35 | ; | |
| L-9 | | 3108.78 | 525 | ; | |
| L-6 | | 3104.84 | 0 | ; | |
| L-6-1 | | 3097.93 | 1289.05 | ;L-6-1/L-6-3 | |
| L-6-2 | | 3097.89 | 756 | ; | |
| L-6-4 | | 3073.03 | 2526.3 | ; | |
| L-10 | | 3098.31 | 243.53 | ; | |
| L-11 | | 3097.88 | 248.5 | ; | |
| L-12 | | 3085.57 | 268.1 | ; | |
| L-13 | | 3075.78 | 3842.51 | ;L-13/L-14 | |
| | 43 | 3221.4 | 196 | ; | |
| 43-1 | | 3221.14 | 10.5 | ; | |
| | 44 | 3220.55 | 1372.28 | ; | |
| M-2 | | 3221.44 | 2579.92 | ; | |
| M-3 | | 3219.56 | 1339.73 | ; | |
| | 46 | 3219 | 266 | ; | |
| 46-1 | | 3217.83 | 273 | ; | |
| | 47 | 3217.93 | 156.24 | ; | |
| M-4 | | 3217.17 | 1830.15 | ; | |
| 47-1 | | 3217.93 | 42 | ; | |
| | 48 | 3216.76 | 456.12 | ; | |
| 48-1 | | 3215.96 | 33.6 | ; | |
| | 49 | 3215.97 | 534.17 | ; | |
| M-5 | | 3216.67 | 7 | ;49-2/M-5 | |
| M-5-1 | | 3178.86 | 942.9 | ;M-5-1/M-5-2 | |
| M-5-3 | | 3141.63 | 65.1 | ; | |
| M-5-4 | | 3129.26 | 3.5 | ; | |
| M-5-4-0 | | 3129.65 | 0 | ; | |
| M-5-4-1 | | 3125.83 | 2380.28 | ;M-5-4-1/M-5-5 | |
| 50-0 | | 3215.02 | 28 | ; | |
| 50-1 | | 3215.28 | 325.5 | ; | |
| 50-2 | | 3215.02 | 456.75 | ; | |
| N-LAT | | 3213.89 | 0 | ; | |
| N-1 | | 3195.36 | 437.5 | ; | |
| N-2 | | 3176.98 | 468.86 | ; | |
| N-3 | | 3158.51 | 1959.3 | ;N-3/N-4/N-5 | |
| N-6 | | 3145.12 | 489.3 | ;N-6/N-6-1 | |
| N-7 | | 3129.51 | 1785 | ;N-7/N-8 | |
| N-9 | | 3112.4 | 2531.9 | ; | |
| | 51 | 3213.67 | 93.8 | ; | |
| | 52 | 3212.36 | 970.76 | ; | |
| 52-1 | | 3212.17 | 0 | ; | |
| | 53 | 3212.14 | 1241.8 | ; | |
| | 54 | 3212.56 | 0 | ; | |
| | 55 | 3210.93 | 599.9 | ; | |
| 56-1 | | 3210.37 | 0 | ; | |
| 56-2 | | 3207.87 | 261.1 | ; | |
| | 58 | 3207.93 | 2064.3 | ; | |
| 58-1 | | 3207.86 | 448 | ; | |
| 58-2 | | 3207.62 | 183 | ; | |
| | 59 | 3208.12 | 1496.6 | ; | |
| | 60 | 3208.35 | 301 | ; | |
| O-LAT | | 3208.54 | 0 | ; | |
| O-1 | | 3207.98 | 686 | ; | |
| O-2 | | 3207.08 | 2774.8 | ; | |
| | 63 | 3175.5 | 525 | ; | |
| | 65 | 3160.69 | 299.6 | ; | |
| O-7 | | 3160.26 | 1121.4 | ;O-7/64 | |
| 65-1 | | 3140.81 | 720.23 | ; | |
| 65-2 | | 3138.63 | 187.25 | ; | |
| P-LAT | | 3135.83 | 0 | ; | |
| | 66 | 3135.74 | 791.35 | ;66/66-1 | |
| P-1 | | 3115.2 | 436.8 | ; | |
| P-2 | | 3112.98 | 926.1 | ; | |
| P-3 | | 3087.44 | 70 | ; | |
| P-4 | | 3079.4 | 133 | ; | |
| P-6 | | 3074.64 | 1096.2 | ; | |

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|---|---|---|---|---|---|---|---|---|---|
| 293 | L-8-4 | L-9 | 586.08 | 29.39 | 135 | 0 | Open | ;32dr26 | |
| 294 | L-9 | L-6 | 406.56 | 29.39 | 135 | 0 | Open | ; | |
| 295 | L-6 | L-6-1 | 1661.21 | 22.04 | 135 | 0 | Open | ;24dr26 | |
| 296 | L-6-1 | L-6-2 | 10.56 | 22.04 | 135 | 0 | Open | ; | |
| 297 | L-6-2 | L-6-4 | 1679.04 | 14.7 | 135 | 0 | Open | ;20dr26 | |
| 298 | L-6 | L-10 | 1916.64 | 22.04 | 135 | 0 | Open | ; | |
| 299 | L-10 | L-11 | 464.64 | 22.04 | 135 | 0 | Open | ; | |
| 300 | L-11 | L-12 | 1151.04 | 18.37 | 135 | 0 | Open | ; | |
| 301 | L-12 | L-13 | 945.12 | 18.37 | 135 | 0 | Open | ; | |
| 303 | L-LAT | 43 | 26.4 | 72 | 125 | 0 | Open | ; | |
| 304 | 43 | 43-1 | 1647.36 | 72 | 125 | 0 | Open | ; | |
| 305 | 43-1 | 44 | 63.36 | 72 | 125 | 0 | Open | ; | |
| 306 | 44 | M-2 | 5.28 | 72 | 130 | 0 | Open | ; | |
| 307 | M-2 | M-3 | 1525.92 | 72 | 125 | 0 | Open | ; | |
| 308 | M-3 | 46 | 828.96 | 72 | 125 | 0 | Open | ; | |
| 309 | 46 | 46-1 | 828.96 | 72 | 125 | 0 | Open | ; | |
| 310 | 46-1 | 47 | 21.12 | 72 | 125 | 0 | Open | ; | |
| 311 | 47 | M-4 | 601.92 | 72 | 125 | 0 | Open | ; | |
| 312 | M-4 | 47-1 | 786.72 | 72 | 125 | 0 | Open | ; | |
| 313 | 47-1 | 48 | 1636.8 | 72 | 125 | 0 | Open | ; | |
| 314 | 48 | 48-1 | 501.6 | 72 | 125 | 0 | Open | ; | |
| 315 | 48-1 | 49 | 739.2 | 72 | 125 | 0 | Open | ; | |
| 316 | 49 | M-5 | 5.28 | 72 | 135 | 0 | Open | ; | |
| 317 | 49 | M-5-1 | 2895.68 | 17.98 | 135 | 0 | Open | ;20dr21 | |
| 318 | M-5-1 | M-5-3 | 1615.68 | 15.75 | 135 | 0 | Open | ;18dr17 | |
| 319 | M-5-3 | M-5-4 | 1156.32 | 15.75 | 135 | 0 | Open | ; | |
| 320 | M-5-4 | M-5-4-0 | 31.68 | 14.01 | 135 | 0 | Open | ; | |
| 321 | M-5-4-0 | M-5-4-1 | 728.64 | 14.01 | 135 | 0 | Open | ; | |
| 322 | 49 | 50-0 | 1030.18 | 66 | 125 | 0 | Open | ; | |
| 323 | 50-0 | 50-1 | 1425.6 | 66 | 125 | 0 | Open | ; | |
| 324 | 50-1 | 50-2 | 15.84 | 66 | 125 | 0 | Open | ; | |
| 325 | 50-2 | N-LAT | 1388.64 | 66 | 125 | 0 | Open | ; | |
| 326 | N-LAT | N-1 | 1077.12 | 26.97 | 135 | 0 | Open | ; | |
| 327 | N-1 | N-2 | 1335.84 | 26.97 | 135 | 0 | Open | ; | |
| 328 | N-2 | N-3 | 1066.56 | 24.88 | 135 | 0 | Open | ;28dr19 | |
| 330 | N-6 | N-7 | 1034.88 | 22.04 | 135 | 0 | Open | ; | |
| 331 | N-7 | N-9 | 2661.12 | 16.53 | 135 | 0 | Open | ;20dr26 | |
| 332 | N-LAT | 51 | 5.28 | 56.64 | 135 | 0 | Open | ; | |
| 333 | 51 | 52 | 1911.36 | 56.64 | 135 | 0 | Open | ;63dr21 | |
| 334 | 52 | 52-1 | 1140.48 | 56.64 | 135 | 0 | Open | ; | |
| 335 | 52-1 | 53 | 58.08 | 56.64 | 135 | 0 | Open | ; | |
| 336 | 53 | 54 | 21.12 | 56.64 | 135 | 0 | Open | ; | |
| 337 | 54 | 55 | 1330.56 | 56.64 | 135 | 0 | Open | ; | |
| 338 | 55 | 56-1 | 1547.04 | 56.64 | 135 | 0 | Open | ; | |
| 339 | 56-1 | 56-2 | 1293.6 | 56.64 | 135 | 0 | Open | ; | |
| 340 | 56-2 | 58 | 211.2 | 56.64 | 135 | 0 | Open | ; | |
| 341 | 58 | 58-1 | 190.08 | 56.64 | 135 | 0 | Open | ; | |
| 342 | 58-1 | 58-2 | 987.36 | 56.64 | 135 | 0 | Open | ; | |
| 343 | 58-2 | 59 | 448.8 | 56.64 | 135 | 0 | Open | ; | |
| 344 | 59 | 60 | 68.64 | 56.64 | 135 | 0 | Open | ; | |
| 345 | 60 | O-LAT | 1098.24 | 56.64 | 135 | 0 | Open | ; | |
| 346 | O-LAT | O-1 | 385.58 | 17.98 | 135 | 0 | Open | ; | |
| 347 | O-1 | O-2 | 1800.48 | 16.18 | 135 | 0 | Open | ; | |
| 348 | O-LAT | 63 | 1679.04 | 48.55 | 135 | 0 | Open | ; | |
| 350 | 65 | O-7 | 10.56 | 50.477 | 135 | 0 | Open | ; | |
| 351 | O-7 | 65-1 | 1668.48 | 50.477 | 135 | 0 | Open | ;54dr32.5 | |
| 352 | 65-1 | 65-2 | 2228.16 | 50.477 | 135 | 0 | Open | ; | |
| 353 | 65-2 | P-LAT | 1969.44 | 50.477 | 135 | 0 | Open | ; | |
| 354 | P-LAT | 66 | 461.28 | 39.26 | 135 | 0 | Open | ; | |
| 355 | 66 | P-1 | 2766.72 | 33.06 | 135 | 0 | Open | ; | |
| 356 | P-1 | P-2 | 380.16 | 33.06 | 135 | 0 | Open | ; | |
| 357 | P-2 | P-3 | 2661.12 | 33.06 | 135 | 0 | Open | ; | |
| 358 | P-3 | P-4 | 1884.96 | 32.37 | 135 | 0 | Open | ; | |
| 359 | P-4 | P-6 | 786.72 | 32.37 | 135 | 0 | Open | ; | |
| 360 | P-6 | P-7 | 871.2 | 30.57 | 135 | 0 | Open | ; | |
| 361 | P-7 | P-7-0 | 538.56 | 30.57 | 135 | 0 | Open | ; | |
| 362 | P-7-0 | P-7-1 | 248.16 | 30.57 | 135 | 0 | Open | ; | |
| 363 | P-7-1 | P-8 | 15.84 | 28.73 | 135 | 0 | Open | ; | |
| 364 | P-8 | P-10 | 1610.4 | 28.73 | 135 | 0 | Open | ; | |
| 365 | P-10 | P-12 | 1029.6 | 28.73 | 135 | 0 | Open | ; | |
| 366 | P-12 | P-13-1 | 1900.8 | 26.65 | 135 | 0 | Open | ;30dr19 | |
| 367 | P-13-1 | P-14 | 174.24 | 26.65 | 135 | 0 | Open | ; | |
| 368 | P-14 | P-16 | 1589.28 | 24.88 | 135 | 0 | Open | ;28dr19 | |

```
P-7             3071.38         182             ;
P-7-0           3071.09           0             ;
P-7-1           3069.88       158.2             ;
P-8              3070.1      1130.5             ;P-8/P-9
P-10            3056.37          14             ;P-10/P-10-1
P-12            3047.87       820.4             ;P-12/P-13
P-13-1          3038.68          21             ;
P-14            3038.08       510.3             ;
P-16            3036.36       364.7             ;P-16/P-17
P-18               3036       220.5             ;
P-21            3032.76         189             ;P-21/P-22
P-20            3032.36      3130.4             ;p-19/P-20
P-20-0          3028.47        36.4             ;
P-20-0-1        3027.04         105             ;
P-20-1          3026.62          49             ;
P-20-2          3026.79        2940             ;P-20-2/P-20-3
        67      3135.72       442.4             ;
67-1            3133.51       283.5             ;
        68      3134.24         427             ;
        70      3134.33           0             ;
70-1            3093.65      1013.6             ;
        71      3090.03         238             ;
        72      3089.82       577.5             ;
        73       3089.3         322             ;
75-0            3088.66      188.65             ;
75-0-2          3087.98      374.01             ;
75-0-3          3088.86          49             ;75-0-3/75-0-4
75-1            3087.11      1285.9             ;
75-3            3084.02       148.4             ;
        76      3084.07         294             ;
76-1            3082.91         140             ;
        77      3082.64      405.09             ;77/78
78-1            3080.98        81.9             ;
78-2            3079.49       200.9             ;
        79      3079.76       228.2             ;
79-1            3078.49        1491             ;
        80      3076.29       575.4             ;
        81      3076.93       950.6             ;
81-1            3074.63       543.9             ;
        82      3074.65     4201.54             ;
Siph               3250           0             ;
End                3236           0             ;Siphon End
Hydro1          3456.85           0             ;
Hydro2             3266           0             ;
Hydro3             3125           0             ;
PRV                3158           0             ;
Hydro4             3160           0             ;

[RESERVOIRS]
;ID             Head            Pattern
          1     3748.48                 ;

[TANKS]
;ID             Elevation       InitLevel       MinLevel        MaxLevel        Diameter        MinVol  VolCurve


[PUMPS]
;ID             Node1           Node2           Parameters

[VALVES]
;ID             Node1           Node2           Diameter        Type            Setting         MinorLoss
Hydro1          Hydro1                  29              108     PRV                     40              0 ;
Hydro2          Hydro2          41-4                     96     PRV                     55              0 ;
        164     Hydro3          L-7                   37.76     PRV                     55              0 ;
        238     N-3             PRV                   24.88     PRV                     55              0 ;
Hydro4          Hydro4                  65            47.95     PRV                     45              0 ;

[TAGS]

[DEMANDS]
;Junction       Demand          Pattern         Category

[STATUS]
```

```
369 P-16        P-18            322.08          24.88           135             0 Open          ;
370 P-18        P-21           1356.96          24.88           135             0 Open          ;
371 P-21        P-20            179.52          24.88           135             0 Open          ;
372 P-20        P-20-0         3372.66          17.77           135             0 Open          ;
373 P-20-0      P-20-0-1        945.12          17.77           135             0 Open          ;
374 P-20-0-1    P-20-1         1277.76          15.99           135             0 Open          ;
375 P-20-1      P-20-2          390.72          15.99           135             0 Open          ;18dr19
376 P-LAT               67      248.16          39.26           135             0 Open          ;
377             67 67-1        1594.56          39.26           135             0 Open          ;
378 67-1                68       73.92          39.26           135             0 Open          ;
379             68              70      142.56  39.26           135             0 Open          ;
380             70 70-1         2349.6          38.57           135             0 Open          ;42dr26
381 70-1                71     3600.96          32.36           135             0 Open          ;
382             71              72      216.48  32.36           135             0 Open          ;
383             72              73      644.16  32.36           135             0 Open          ;
384             73 75-0         628.32          32.36           135             0 Open          ;
385 75-0        75-0-2          385.44          32.35           135             0 Open          ;
386 75-0-2      75-0-3          142.56          32.36           135             0 Open          ;
387 75-0-3      75-1           1504.8           32.36           135             0 Open          ;75-1/75-2
388 75-1        75-3           3791.04          32.35           135             0 Open          ;
389 75-3                76      586.08          30.57           135             0 Open          ;
390             76 76-1         1478.4          28.73           135             0 Open          ;
392 76-1                77      110.88          28.73           135             0 Open          ;
393             77 78-1        1752.96          26.97           135             0 Open          ;
394 78-1        78-2           1494.24          26.97           135             0 Open          ;
395 78-2                79       31.68          26.97           135             0 Open          ;
396             79 79-1         359.04          26.97           135             0 Open          ;
397 79-1                80     2534.4           25.17           135             0 Open          ;
398             80              81       844.8  23.38           135             0 Open          ;
399             81 81-1         543.84          23.38           135             0 Open          ;
400 81-1                82     1557.6           21.58           135             0 Open          ;
401 J           Siph            219.36          90              125             0 Open          ;
402 Siph        K-0            1460             60              120             0 Open          ;
403 K-0         End            2490             60              120             0 Open          ;
404 End         K-1             440.08          90              125             0 Open          ;
405             28 Hydro1       2820            108             125             0 Open          ;
406 41-2        Hydro2          9440            96              125             0 Open          ;
408 PRV         N-6            4251.4           22.04           135             0 Open          ;24dr26
409             63 Hydro4       930.79          47.95           135             0 Open          ;
410 L-1         L-2               5.28          37.76           135             0 Open          ;
411 L-2         L-4               5.28          37.78           135             0 Open          ;
412 L-4         Hydro3         3359.87          37.78           135             0 Open          ;
```

```
;ID              Status/Setting

[PATTERNS]
;ID              Multipliers

[CURVES]
;ID              X-Value     Y-Value

[CONTROLS]

[RULES]

[ENERGY]
 Global Eff           75
 Global Pri           0
 Demand C             0

[EMITTERS]
;Junction        Coefficient

[QUALITY]
;Node            InitQual

[SOURCES]
;Node            Type        Quality     Pattern

[REACTIONS]
;Type            Pipe/Tank Coefficient


[REACTIONS]
 Order Bul            1
 Order Tan            1
 Order Wa             1
 Global Bu            0
 Global Wa            0
 Limiting P           0
 Roughnes             0

[MIXING]
;Tank            Model

[TIMES]
 Duration             0
 Hydraulic         1:00
 Quality Ti        0:05
 Pattern Ti        1:00
 Pattern St        0:00
 Report Tir        1:00
 Report Sta        0:00
 Start Cloc  12:00 AM
 Statistic    None

[REPORT]
 Status       No
 Summary      No
 Page                 0

[OPTIONS]
 Units        GPM
 Headloss     H-W
 Specific G           1
 Viscosity            1
 Trials              40
 Accuracy         0.001
 CHECKFRE             2
 MAXCHEC             10
 DAMPLIM              0
 Unbalanc    Continue 10
 Pattern              1
 Demand M             1
 Emitter Ex         0.5
 Quality     None mg/L
```

| | |
|---|---|
| Diffusivity | 1 |
| Tolerance | 0.01 |

[COORDINATES]

| ;Node | X-Coord | Y-Coord |
|---|---|---|
| COC3 | 9447.28 | 0 |
| COC7 | 12487.2 | 0 |
| COC8 | 13759 | 0 |
| CO12 | 17017.44 | 0 |
| CO14 | 18025.92 | 0 |
| A1 | 20396.64 | 0 |
| CO1 | 28453.92 | 0 |
| 1-1 | 29520.48 | 0 |
| 2-1 | 32398.08 | 0 |
| 3-0/1 | 34356.96 | 0 |
| 3-3 | 35977.92 | 0 |
| ALAT | 36020.16 | 0 |
| A2/4 | 36020.41 | 934.56 |
| A6 | 36022.53 | 2882.88 |
| A7/8 | 36022.53 | 2972.64 |
| A9 | 36022.53 | 2993.76 |
| A10 | 36023.52 | 3791.04 |
| A11 | 36018.21 | 4635.84 |
| A15 | 36020.87 | 4709.76 |
| A17 | 36020.87 | 5100.48 |
| A18 | 36020.87 | 5412 |
| A20 | 36023.52 | 5570.4 |
| A21 | 36020.87 | 5644.32 |
| A23 | 36020.87 | 6642.24 |
| A23-1 | 36020.87 | 7223.04 |
| A24 | 36020.87 | 7318.08 |
| A24-2 | 37001.41 | 7883.32 |
| A24-1 | 37001.41 | 7888.32 |
| A24-3 | 36999.05 | 9752.16 |
| A24-4 | 37001.38 | 9857.76 |
| A24-2R | 37001.38 | 10491.36 |
| A24-5 | 37001.38 | 10723.68 |
| A24-6 | 37001.38 | 12408 |
| A24-7 | 37001.38 | 13511.52 |
| A24-8 | 37001.38 | 15459.84 |
| A2491 | 37001.38 | 17967.84 |
| A2492 | 37001.38 | 18648.96 |
| A2493 | 37001.38 | 18770.4 |
| A2494 | 37001.38 | 19821.12 |
| A2410 | 37001.38 | 20048.16 |
| A2411 | 37001.38 | 21072.48 |
| A2412 | 37001.38 | 21077.76 |
| A2413 | 37001.21 | 21341.76 |
| A2414 | 37001.21 | 22455.84 |
| A2416 | 37001.21 | 22709.28 |
| A2415 | 37001.21 | 22920.48 |
| A2421 | 37001.21 | 23279.52 |
| A2422 | 37001.21 | 23770.56 |
| A2423 | 37001.21 | 24119.04 |
| A26 | 36023.32 | 10190.4 |
| A27 | 36012.69 | 11061.6 |
| A28 | 36023.32 | 12846.24 |
| A29 | 36023.32 | 12999.36 |
| A30 | 36023.32 | 13516.8 |
| A31/32 | 36023.32 | 13685.76 |
| A33 | 36023.32 | 15063.84 |
| A34 | 36023.32 | 15919.2 |
| A35 | 36023.32 | 17038.56 |
| A3738 | 36023.32 | 18511.68 |
| A39 | 36023.32 | 18648.96 |
| A40 | 36023.32 | 18654.24 |
| 6/6-1 | 37113.12 | 0.75 |
| 6-2 | 38068.8 | 0.75 |
| 7-1 | 39378.24 | 0.75 |
| 7-2 | 40434.24 | 0.75 |
| 7-3 | 40682.4 | 0.75 |
| 7-4 | 41437.44 | 0.75 |
| 8/9 | 41865.12 | 0.75 |

| | | | |
|---|---|---|---|
| | 10 | 44462.88 | 0.75 |
| 10-1 | | 44948.64 | 0.75 |
| | 11 | 45429.12 | 0.75 |
| | 12 | 45687.84 | 0.75 |
| | 13 | 45862.08 | 0.75 |
| B-LAT | | 46970.88 | 0.75 |
| B2 | | 46972.12 | 327.36 |
| B3 | | 46972.12 | 670.56 |
| B4 | | 46973.44 | 992.64 |
| B5 | | 46972.12 | 1541.76 |
| B6 | | 46972.12 | 1795.2 |
| B7 | | 46972.12 | 1842.72 |
| B8 | | 46972.12 | 4107.84 |
| B9 | | 46971.78 | 4208.16 |
| B1011 | | 46974.44 | 5010.72 |
| B12 | | 46974.44 | 5316.96 |
| B13 | | 46974.44 | 6394.08 |
| B1415 | | 46974.44 | 6404.64 |
| B16 | | 46972.61 | 6520.8 |
| B17 | | 46973.28 | 7022.4 |
| B18 | | 46971.95 | 7397.28 |
| B18-1 | | 46971.95 | 7708.8 |
| B19 | | 46971.95 | 8411.04 |
| B20 | | 46971.95 | 8986.56 |
| B21 | | 46970.62 | 9482.88 |
| B21-1 | | 46970.62 | 9667.68 |
| B22 | | 46969.29 | 11246.4 |
| B23 | | 46971.95 | 11959.2 |
| B24 | | 46971.95 | 11975.04 |
| B26 | | 46973.59 | 13015.54 |
| B25 | | 46973.59 | 14124 |
| B30 | | 46973.59 | 14461.92 |
| B32 | | 46973.59 | 14931.84 |
| B31 | | 46973.59 | 14952.96 |
| B-1 | | 47662.56 | 0.99 |
| 14-1 | | 50661.6 | 0.99 |
| | 15 | 51543.36 | 0.99 |
| C-LAT | | 51559.2 | 0.33 |
| C-0 | | 51559.2 | 850.08 |
| C-0-1 | | 51558.39 | 1504.8 |
| C-0-2 | | 51553.08 | 2307.36 |
| C-0-3 | | 51553.08 | 2513.28 |
| C-1 | | 51553.08 | 2608.32 |
| C-1-0 | | 51131 | 2611.14 |
| C-1-1 | | 51014.84 | 2611.14 |
| C-6 | | 51558.39 | 4039.2 |
| C-6-1 | | 51558.39 | 5153.28 |
| C7 | | 51558.39 | 5501.76 |
| C-7-2 | | 51558.39 | 5744.64 |
| C-8 | | 51553.08 | 7296.96 |
| C-9 | | 51553.08 | 7392 |
| C-10 | | 51558.39 | 7856.64 |
| | 16 | 51812.64 | 1.66 |
| C-3 | | 55661.76 | 1.66 |
| | 18 | 57171.84 | 1.66 |
| 18-0 | | 58866.72 | 1.66 |
| 18-2 | | 59299.68 | 1.66 |
| C-4 | | 60873.12 | 1.66 |
| C-5 | | 61881.6 | 1.66 |
| | 20 | 64194.24 | 1.66 |
| D-LAT | | 64363.2 | 1.66 |
| D-0 | | 64366.64 | 1441.44 |
| D-0-1 | | 64366.64 | 1742.4 |
| D01-1 | | 64366.64 | 2207.04 |
| D-2 | | 64366.64 | 2412.96 |
| D-2-1 | | 64366.64 | 3099.36 |
| D-5 | | 64366.64 | 3833.28 |
| D-6 | | 64366.64 | 4435.2 |
| D-6-1 | | 64366.64 | 4514.4 |
| D7/8 | | 64366.64 | 5591.52 |
| D-8-1 | | 64356.01 | 8305.44 |
| D-8-2 | | 64366.64 | 8453.28 |
| D-8-3 | | 64356.01 | 8801.76 |

| | | | |
|---|---|---|---|
| D-12 | | 64366.64 | 9340.32 |
| D-13 | | 64364.98 | 10913.76 |
| D13-0 | | 64364.98 | 11135.52 |
| D-15-1-0 | | 64364.98 | 12244.32 |
| D-15-1 | | 64364.98 | 12582.24 |
| D-17 | | 64364.98 | 13083.84 |
| D-16 | | 64364.98 | 13104.96 |
| | 21 | 64416 | 3.32 |
| D-3 | | 64843.68 | 0.66 |
| 22-1 | | 66264 | 0.66 |
| 22-2 | | 66707.52 | 0.66 |
| D-1 | | 67869.12 | 0.66 |
| 22-3 | | 68180.64 | 0.66 |
| D-4 | | 68824.8 | 0.66 |
| | 23 | 69014.88 | 0.66 |
| 23-0 | | 73745.76 | -2 |
| 23-1 | | 75118.56 | -2 |
| | 24 | 75963.36 | -2 |
| E-2 | | 75995.04 | -2 |
| | 25 | 77304.48 | 0.66 |
| | 26 | 78708.96 | 0.66 |
| 26-1 | | 81459.84 | 0.66 |
| F-1 | | 81470.4 | 1.33 |
| | 27 | 81491.52 | -1.33 |
| | 28 | 82969.92 | 0.66 |
| | 29 | 85789.44 | 0.66 |
| | 30 | 86185.44 | 0.66 |
| 31-1 | | 87574.08 | 0.66 |
| 31-2 | | 87737.76 | 0.66 |
| | 32 | 92162.4 | 0.66 |
| | 33 | 92294.4 | 0.66 |
| H-LAT | | 95779.2 | 0.66 |
| H-5 | | 95767.61 | 12418.56 |
| H-6 | | 95778.24 | 13068 |
| H-7 | | 95778.24 | 13823.04 |
| H-8-0 | | 95788.87 | 14313.78 |
| H-9-0 | | 95767.61 | 14641.44 |
| H-11 | | 95778.24 | 15243.36 |
| H-15 | | 95778.24 | 17624.64 |
| H15-2 | | 94247.63 | 17630.11 |
| H-16 | | 95778.24 | 18881.28 |
| H-17 | | 95778.24 | 19008 |
| H-2 | | 96423.36 | 12.12 |
| 33-1 | | 97949.28 | 1.49 |
| | 34 | 99042.24 | 1.49 |
| | 35 | 99057.36 | 2793.12 |
| I-LAT | | 99057.36 | 11135.52 |
| I-1 | | 109892.6 | 11140.95 |
| I-2 | | 111217.9 | 11140.95 |
| I-3 | | 114000.5 | 11140.95 |
| I-3-1 | | 114002.1 | 12782.88 |
| I-3-2 | | 114002.1 | 13110.24 |
| I-3-3 | | 114002.1 | 15375.36 |
| I-3-4 | | 114002.1 | 15644.64 |
| I-3-6 | | 114002.1 | 15655.2 |
| I-3-7 | | 114004.1 | 16996.32 |
| I-3-8 | | 114004.1 | 17006.88 |
| I-3-9 | | 114003.4 | 19889.76 |
| I-3-10 | | 114003.4 | 19889.76 |
| I-3-11 | | 113997.2 | 21542.4 |
| I-3-12 | | 114002.5 | 22836 |
| I-3-14 | | 114007.9 | 25676.64 |
| I-3-15 | | 114008.5 | 25687.2 |
| I-3-16 | | 114002.5 | 26447.52 |
| I-3-17 | | 114002.5 | 27213.12 |
| I-4 | | 116841.1 | 11135.3 |
| I-5 | | 118324.8 | 11135.3 |
| I-7 | | 122422.1 | 11135.3 |
| I-8 | | 122437.9 | 11135.3 |
| I-10 | | 123193 | 11135.3 |
| I-10-1 | | 123193.5 | 10359.14 |
| I-10-2 | | 123190.9 | 7777.22 |
| I-10-3 | | 123190.9 | 7370.66 |

| | | | |
|---|---|---|---|
| I-10-4 | | 123193 | 6325.22 |
| I-11 | | 123599.5 | 11137.96 |
| I-14 | | 125035.7 | 11137.96 |
| I-15 | | 126234.2 | 11137.96 |
| I-17 | | 126244.8 | 11137.3 |
| I-18 | | 126255.4 | 11137.3 |
| I-19 | | 127501.4 | 11136.63 |
| I-20 | | 127564.8 | 11135.3 |
| I-22 | | 127570.1 | 11135.3 |
| I-23 | | 128832 | 11133.31 |
| I-25 | | 128842.6 | 11134.23 |
| I-26 | | 130173.1 | 11133.56 |
| 35-1 | | 99059.31 | 21996.48 |
| 35-2 | | 99059.31 | 26331.36 |
| | 37 | 99059.31 | 26553.12 |
| | 36 | 99054 | 27688.32 |
| 37-1 | | 99054 | 30291.36 |
| 38-1 | | 99054 | 31099.2 |
| 38-2 | | 99054 | 32688.48 |
| 38-3 | | 99059.31 | 34378.08 |
| 38-4 | | 99054 | 34620.96 |
| 38-5 | | 99054 | 34805.76 |
| | 39 | 99054 | 34821.6 |
| 41-1 | | 99054 | 41775.36 |
| 41-2 | | 99054 | 42081.6 |
| 41-4 | | 99054 | 51522.24 |
| J | | 99054 | 54320.64 |
| K-0 | | 99054 | 56000 |
| K-1 | | 99054 | 58930.08 |
| K-2-1 | | 99054 | 60656.64 |
| K-3-1 | | 99054 | 61517.28 |
| K-3-2 | | 99054 | 63196.32 |
| K-3-4 | | 99054 | 64796.16 |
| K-3-5 | | 99054 | 65281.92 |
| K-3-6 | | 99054 | 65292.48 |
| K-4 | | 99054 | 66454.08 |
| K-4-0 | | 99054 | 66475.2 |
| K-4-1 | | 99054 | 67256.64 |
| K-4-1-1 | | 99054 | 67356.96 |
| K-4-3 | | 99054 | 67378.08 |
| K-4-4 | | 99054 | 68898.72 |
| K-5 | | 99054 | 68904 |
| K-5-0 | | 99054 | 68919.84 |
| K-5-1 | | 99054 | 69944.16 |
| K-5-2 | | 99054 | 69986.4 |
| K-5-3 | | 99054 | 71116.32 |
| K-5-4 | | 99054 | 71496.48 |
| K-5-6 | | 99054 | 73154.4 |
| K-6-1 | | 99054 | 73355.04 |
| K-6-4 | | 99054 | 75973.92 |
| K-7-1 | | 99054 | 76153.44 |
| K-7-2 | | 99054 | 77320.32 |
| K-7-3 | | 99054 | 77484 |
| K-7-4 | | 99054 | 77821.92 |
| K-7-5 | | 99054 | 78788.16 |
| K-8-1 | | 99054 | 78856.8 |
| K-8-2 | | 99054 | 78867.36 |
| K-8-4 | | 99054 | 80166.24 |
| K-8-5 | | 99054 | 80182.08 |
| K-9-1 | | 99054 | 81576 |
| K-9-2 | | 99054 | 81586.56 |
| K-9-4 | | 99054 | 82177.92 |
| K-10 | | 99054 | 83086.08 |
| K-10-2 | | 99054 | 83276.16 |
| K-11-1 | | 99054 | 84997.44 |
| L-LAT | | 99054 | 85520.16 |
| L-1 | | 98500 | 86940.48 |
| L-2 | | 98500 | 86945.76 |
| L-4 | | 98500 | 86951.04 |
| L-7 | | 98500 | 90383.04 |
| L-7-1 | | 98500 | 90456.96 |
| L-7-2 | | 98500 | 90757.92 |
| L-8 | | 98500 | 93551.04 |

| | | | |
|---|---|---|---|
| L-8-1 | | 98500 | 93561.6 |
| L-8-2 | | 98500 | 93566.88 |
| L-8-2-1 | | 98500 | 94585.92 |
| L-8-2-2 | | 98500 | 95367.36 |
| L-8-3 | | 98500 | 95610.24 |
| L-8-3-1 | | 98500 | 96111.84 |
| L-8-4 | | 98500 | 96132.96 |
| L-9 | | 98500 | 96719.04 |
| L-6 | | 98500 | 97125.6 |
| L-6-1 | | 98000 | 98287.2 |
| L-6-2 | | 98000 | 98297.76 |
| L-6-4 | | 98000 | 99976.8 |
| L-10 | | 98500 | 99042.24 |
| L-11 | | 98500 | 99506.88 |
| L-12 | | 98500 | 100657.9 |
| L-13 | | 98500 | 101603 |
| | 43 | 99054 | 85546.56 |
| 43-1 | | 99054 | 87193.92 |
| | 44 | 99054 | 87257.28 |
| M-2 | | 99054 | 87262.56 |
| M-3 | | 99054 | 88788.48 |
| | 46 | 99054 | 89617.44 |
| 46-1 | | 99054 | 90446.4 |
| | 47 | 99054 | 90467.52 |
| M-4 | | 99054 | 91069.44 |
| 47-1 | | 99054 | 91856.16 |
| | 48 | 99054 | 93492.96 |
| 48-1 | | 99054 | 93994.56 |
| | 49 | 99054 | 94733.76 |
| M-5 | | 99054 | 94739.04 |
| M-5-1 | | 98750 | 97320.96 |
| M-5-3 | | 98750 | 98936.64 |
| M-5-4 | | 98750 | 100093 |
| M-5-4-0 | | 98750 | 100124.6 |
| M-5-4-1 | | 98750 | 100853.3 |
| 50-0 | | 100000 | 94823.52 |
| 50-1 | | 100000 | 96249.12 |
| 50-2 | | 100000 | 96264.96 |
| N-LAT | | 100000 | 97653.6 |
| N-1 | | 99500 | 98730.72 |
| N-2 | | 99500 | 100066.6 |
| N-3 | | 99500 | 101133.1 |
| N-6 | | 99500 | 105531.4 |
| N-7 | | 99500 | 106566.2 |
| N-9 | | 99500 | 109227.4 |
| | 51 | 100000 | 97658.88 |
| | 52 | 100000 | 99570.24 |
| 52-1 | | 100000 | 100710.7 |
| | 53 | 100000 | 100768.8 |
| | 54 | 100000 | 100789.9 |
| | 55 | 100000 | 102120.5 |
| 56-1 | | 100000 | 103667.5 |
| 56-2 | | 100000 | 104961.1 |
| | 58 | 100000 | 105172.3 |
| 58-1 | | 100000 | 105362.4 |
| 58-2 | | 100000 | 106349.8 |
| | 59 | 100000 | 106798.6 |
| | 60 | 100000 | 106867.2 |
| O-LAT | | 100000 | 107965.4 |
| O-1 | | 99750 | 108097.4 |
| O-2 | | 99750 | 109897.9 |
| | 63 | 100000 | 109644.5 |
| | 65 | 100000 | 110774.4 |
| O-7 | | 100000 | 110785 |
| 65-1 | | 100000 | 112453.4 |
| 65-2 | | 100000 | 114681.6 |
| P-LAT | | 100000 | 116651 |
| | 66 | 99750 | 116862.2 |
| P-1 | | 99750 | 119629 |
| P-2 | | 99750 | 120009.1 |
| P-3 | | 99750 | 122670.2 |
| P-4 | | 99750 | 124555.2 |
| P-6 | | 99750 | 125341.9 |

```
P-7             99750  126213.1
P-7-0           99750  126751.7
P-7-1           99750  126999.8
P-8             99750  127015.7
P-10            99750  128626.1
P-12            99750  129655.7
P-13-1          99750  131556.5
P-14            99750  131730.7
P-16            99750    133320
P-18            99750  133642.1
P-21            99750    134999
P-20            99750  135178.6
P-20-0          99000    137808
P-20-0-1        99000  138753.1
P-20-1          99000  140030.9
P-20-2          99000  140421.6
        67     100000  116899.2
67-1            100000  118493.8
        68     100000  118567.7
        70     100000  118710.2
70-1            100000  121059.8
        71     100000  124660.8
        72     100000  124877.3
        73     100000  125521.4
75-0            100000  126149.8
75-0-2          100000  126535.2
75-0-3          100000  126677.8
75-1            100000  128182.6
75-3            100000  131973.6
        76     100000  132559.7
76-1            100000  134038.1
        77     100000    134149
78-1            100000  135901.9
78-2            100000  137396.2
        79     100000  137427.8
79-1            100000  137786.9
        80     100000  140321.3
        81     100000  141166.1
81-1            100000  141709.9
        82     100000  143267.5
Siph             99054     54540
End              99054     58490
Hydro1       85566.56     -1.49
Hydro2       99057.19  51317.82
Hydro3       98502.76   90310.9
PRV          99501.63    101280
Hydro4       100007.9  110575.2
          1       7392         0

[VERTICES]
;Link        X-Coord    Y-Coord
         27  37001.41       7319
        263  99066.62   75955.14
        280  98500.61    85520.8
        295  98000.87   97125.12
        317  98749.49   94729.82
        322  99999.76   94739.12
        326  99508.16   97651.53
        346  99748.81   107963.1
        354   99750.8   116650.2
        372  99009.08   135176.3

[LABELS]
;X-Coord         Y-Coord         Label & Anchor Node

[BACKDROP]
 DIMENSIC            0            0     150000     150000
 UNITS      Feet
 FILE
 OFFSET              0            0

[END]
```

EPANET Model - PBC Main Canal w/ 50cfs NUID Option

[JUNCTIONS]

| ;ID | Elev | Demand | Pattern | |
|---|---|---|---|---|
| A-4 | 3484.29 | 0 | | ; |
| A-4-2 | 3473.55 | 330.05 | | ;A-4-2/A-4-3 |
| A-4-7 | 3470.53 | 644.42 | | ; |
| A-4-7-1 | 3433.73 | 45.5 | | ;A-4-7-1/A-4-8 |
| A-4-8-2 | 3431.62 | 18.9 | | ;A-4-8-2/A-4-8-1 |
| A-4-9 | 3429.31 | 140 | | ; |
| A-4-10 | 3429.07 | 2175.88 | | ; |
| 3 | 3461.25 | 488.81 | | ; |
| 3-1 | 3443.93 | 7 | | ; |
| 3-1-1 | 3427.09 | 8.4 | | ; |
| JRI | 3407.6 | 0 | | ; |
| A-10 | 3380 | 1712.13 | | ; |
| 3-2 | 3370 | 25.2 | | ; |
| A-12 | 3357 | 2209.69 | | ; |
| JRIend | 3299.5 | 0 | | ; |
| 4 | 3270.6 | 21 | | ; |
| 4-1 | 3264.95 | 231 | | ;4-1/4-2 |
| A-16 | 3239.26 | 20.3 | | ; |
| A-16-2 | 3232.32 | 128.8 | | ; |
| A-16-3 | 3229 | 267.4 | | ; |
| A-16-5 | 3215.45 | 78.05 | | ; |
| A-16-6 | 3212.43 | 494.2 | | ;A-16-6/A-16-7 |
| A-16-7 | 3209.28 | 147 | | ; |
| A-16-7-1 | 3209.14 | 105 | | ; |
| A-16-8-1 | 3201.6 | 399.7 | | ;A-16-8-1/8-2 |
| A-16-9-1 | 3200.37 | 28 | | ; |
| A-16-10-0 | 3199.97 | 505.61 | | ;A-16-10-0/16-9 |
| A-16-10-1 | 3196.06 | 63 | | ; |
| A-16-10-2 | 3180.71 | 157.5 | | ; |
| A-16-11 | 3177.07 | 181.3 | | ; |
| A-16-11-1 | 3164.61 | 56 | | ; |
| A-16-11-0 | 3164.16 | 28 | | ; |
| A-16-11-2 | 3161.62 | 80.43 | | ; |
| A-16-12 | 3160.75 | 1993.53 | | ; |
| A-18 | 3205.59 | 92.96 | | ; |
| 4-2-1 | 3188.49 | 33.6 | | ; |
| 4-3 | 3180.81 | 14 | | ; |
| 5 | 3172.19 | 231 | | ; |
| 5-1 | 3166.89 | 191.1 | | ; |
| A-21 | 3168.44 | 0 | | ;A-21/6/6-1 |
| 6 | 3168.63 | 189 | | ;6/6-1 |
| A-21-1 | 3168.3 | 168 | | ; |
| A-21-2 | 3168.3 | 0 | | ; |
| A-21-4 | 3166.61 | 42 | | ; |
| A-21-5 | 3168.08 | 748.3 | | ; |
| A-21-6 | 3167.15 | 243.6 | | ; |
| A-21-7 | 3167.05 | 510.51 | | ;A-21-7/A21-6-1 |
| A-21-7-1 | 3166.66 | 72.8 | | ; |
| A-21-7-2 | 3165.98 | 417.34 | | ;A-21-7-2/A-21-8 |
| A-21-10-1 | 3165.5 | 824.81 | | ; |
| A-21-9 | 3165.23 | 98 | | ; |
| A-21-9-0-2 | 3163.98 | 134.4 | | ;A-21-9-0-2/A-21-9-0 |
| A-21-9-1 | 3161.18 | 2610.72 | | ; |
| 7 | 3168.94 | 827.75 | | ; |
| 8 | 3140.05 | 133 | | ; |
| 8-1 | 3118.29 | 98 | | ; |
| 8-2 | 3120.28 | 114.8 | | ; |
| 8-3 | 3115.15 | 200.2 | | ; |
| 9 | 3116.96 | 56 | | ; |
| B-2 | 3115.86 | 0 | | ; |
| B-2-0 | 3116.09 | 42 | | ; |
| B-2-0-0 | 3115.67 | 28 | | ; |
| B-2-0-1 | 3115.28 | 76.3 | | ;B-2-0-1/B-2-0-2 |
| B-2-1 | 3115.35 | 0 | | ; |
| B-2-2 | 3115.38 | 21 | | ; |

[PIPES]

| ;ID | Node1 | Node2 | Length | Diameter | Roughness | MinorLoss | Status | |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | A-4 | 10987.68 | 120 | 130 | 0 | Open | ; |
| 2 | A-4 | A-4-2 | 5237.5 | 16.83 | 135 | 0 | Open | ; |
| 3 | A-4-2 | A-4-7 | 1219.68 | 16.83 | 135 | 0 | Open | ; |
| 4 | A-4-7 | A-4-7-1 | 2898.72 | 14.96 | 135 | 0 | Open | ; |
| 5 | A-4-7-1 | A-4-8-2 | 258.72 | 14.96 | 135 | 0 | Open | ; |
| 6 | A-4-8-2 | A-4-9 | 137.28 | 14.96 | 135 | 0 | Open | ; |
| 7 | A-4-9 | A-4-10 | 369.6 | 14.96 | 135 | 0 | Open | ; |
| 8 | A-4 | 3 | 4345.44 | 120 | 125 | 0 | Open | ; |
| 9 | 3 | 42430 | 2201.76 | 120 | 125 | 0 | Open | ; |
| 10 | 42430 | 36951 | 2323.2 | 120 | 125 | 0 | Open | ; |
| 12 | JRI | A-10 | 5141 | 108 | 125 | 0 | Open | ; |
| 13 | A-10 | 42431 | 2027.52 | 108 | 125 | 0 | Open | ; |
| 14 | 42431 | A-12 | 1441.44 | 108 | 125 | 0 | Open | ; |
| 16 | JRIend | 4 | 5812.84 | 114 | 125 | 0 | Open | ; |
| 17 | 4 | 42461 | 1330.56 | 114 | 125 | 0 | Open | ; |
| 18 | 42461 | A-16 | 4725.6 | 114 | 125 | 0 | Open | ; |
| 19 | A-16 | A-16-2 | 5291.82 | 22.44 | 135 | 0 | Open | ; |
| 20 | A-16-2 | A-16-3 | 411.84 | 22.44 | 135 | 0 | Open | ; |
| 21 | A-16-3 | A-16-5 | 3505.92 | 18.7 | 135 | 0 | Open | ; |
| 22 | A-16-5 | A-16-6 | 1594.56 | 18.7 | 135 | 0 | Open | ; |
| 23 | A-16-6 | A-16-7 | 396 | 18.7 | 135 | 0 | Open | ; |
| 24 | A-16-7 | A-16-7-1 | 190.08 | 18.7 | 135 | 0 | Open | ; |
| 25 | A-16-7-1 | A-16-8-1 | 184.8 | 18.7 | 135 | 0 | Open | ; |
| 26 | A-16-8-1 | A-16-9-1 | 1071.84 | 16.83 | 135 | 0 | Open | ; |
| 27 | A-16-9-1 | A-16-10-0 | 15.84 | 16.83 | 135 | 0 | Open | ; |
| 28 | A-16-10-0 | A-16-10-1 | 723.36 | 14.96 | 135 | 0 | Open | ; |
| 29 | A-16-10-1 | A-16-10-2 | 549.12 | 14.96 | 135 | 0 | Open | ; |
| 30 | A-16-10-2 | A-16-11 | 36.96 | 14.96 | 135 | 0 | Open | ; |
| 31 | A-16-11 | A-16-11-1 | 501.6 | 14.96 | 135 | 0 | Open | ; |
| 32 | A-16-11-1 | A-16-11-0 | 105.6 | 13.09 | 135 | 0 | Open | ; |
| 33 | A-16-11-0 | A-16-11-2 | 1066.56 | 13.09 | 135 | 0 | Open | ; |
| 34 | A-16-11-2 | A-16-12 | 137.28 | 13.09 | 135 | 0 | Open | ; |
| 35 | A-16 | A-18 | 3189.12 | 114 | 125 | 0 | Open | ; |
| 36 | A-18 | 36983 | 1541.76 | 114 | 125 | 0 | Open | ; |
| 37 | 36983 | 42463 | 892.32 | 114 | 125 | 0 | Open | ; |
| 38 | 42463 | 5 | 1510.08 | 114 | 125 | 0 | Open | ; |
| 39 | 5 | 42491 | 2629.44 | 114 | 125 | 0 | Open | ; |
| 40 | 42491 | A-21 | 1360.96 | 114 | 125 | 0 | Open | ; |
| 41 | A-21 | 6 | 2070.76 | 22.44 | 135 | 0 | Open | ; |
| 42 | 6 | A-21-1 | 897.6 | 22.44 | 135 | 0 | Open | ; |
| 43 | A-21-1 | A-21-2 | 5.28 | 22.44 | 135 | 0 | Open | ; |
| 44 | A-21-2 | A-21-4 | 786.72 | 22.44 | 135 | 0 | Open | ; |
| 45 | A-21-4 | A-21-5 | 686.4 | 22.44 | 135 | 0 | Open | ; |
| 46 | A-21-5 | A-21-6 | 443.52 | 22.44 | 135 | 0 | Open | ; |
| 47 | A-21-6 | A-21-7 | 1985.28 | 22.44 | 135 | 0 | Open | ; |
| 48 | A-21-7 | A-21-7-1 | 227.04 | 18.7 | 135 | 0 | Open | ; |
| 49 | A-21-7-1 | A-21-7-2 | 702.24 | 18.7 | 135 | 0 | Open | ; |
| 50 | A-21-7-2 | A-21-10-1 | 21.12 | 18.7 | 135 | 0 | Open | ; |
| 51 | A-21-10-1 | A-21-9 | 15.84 | 16.83 | 135 | 0 | Open | ; |
| 52 | A-21-9 | A-21-9-0-2 | 633.6 | 14.96 | 135 | 0 | Open | ; |
| 53 | A-21-9-0-2 | A-21-9-1 | 617.76 | 14.96 | 135 | 0 | Open | ; |
| 54 | A-21 | 7 | 17.12 | 120 | 135 | 0 | Open | ; |
| 55 | 7 | 8 | 5961.12 | 114 | 125 | 0 | Open | ; |
| 56 | 8 | 42583 | 3368.64 | 114 | 125 | 0 | Open | ; |
| 57 | 42583 | 42584 | 237.6 | 114 | 125 | 0 | Open | ; |
| 58 | 42584 | 42585 | 364.32 | 114 | 125 | 0 | Open | ; |
| 59 | 42585 | 9 | 264 | 114 | 125 | 0 | Open | ; |
| 60 | 9 | B-2 | 491.04 | 114 | 125 | 0 | Open | ; |
| 61 | B-2 | B-2-0 | 95.04 | 21.58 | 135 | 0 | Open | ; |
| 62 | B-2-0 | B-2-0-0 | 295.68 | 21.58 | 135 | 0 | Open | ; |
| 63 | B-2-0-0 | B-2-0-1 | 348.48 | 21.58 | 135 | 0 | Open | ; |
| 64 | B-2-0-1 | B-2-1 | 295.68 | 21.58 | 135 | 0 | Open | ; |
| 65 | B-2-1 | B-2-2 | 200.64 | 21.58 | 135 | 0 | Open | ; |
| 66 | B-2-2 | B-2-2-0 | 279.84 | 21.58 | 135 | 0 | Open | ; |
| 67 | B-2-2-0 | B-2-3 | 396 | 21.58 | 135 | 0 | Open | ; |

| | | | |
|---|---|---|---|
| B-2-2-0 | 3115.4 | 7 | ; |
| B-2-3 | 3115.16 | 0 | ; |
| B-2-3-1 | 3117.67 | 32.2 | ; |
| B-2-3-2 | 3109.11 | 36.4 | ; |
| B-2-5 | 3106.9 | 77 | ; |
| B-2-5-1 | 3104.09 | 121.1 | ; |
| B-2-6 | 3105.21 | 241.5 | ;B-2-6/B-2-6-1 |
| B-2-6-2 | 3096.12 | 1445.01 | ;B-2-6-2/B-2-4 |
| B-2-7 | 3094.65 | 39.9 | ; |
| B-2-7-1 | 3097.22 | 73.5 | ; |
| B-2-8 | 3094.79 | 233.8 | ; |
| B-10-2 | 3087.16 | 195.3 | ; |
| B-2-11 | 3084.49 | 2163.35 | ; |
| B-LAT | 3104.62 | 0 | ; |
| B-0-1 | 3085.07 | 50.4 | ; |
| B-0-3-1 | 3075.15 | 4.9 | ;B-0-3-1/B-0-3-2 |
| B-3 | 3070 | 28 | ; |
| B-4 | 3060.75 | 4.9 | ; |
| B-4-1 | 3062 | 336 | ;B-4-1/B-4-6 |
| B-6-1 | 3059.5 | 266.84 | ;B-6-1/B-8 |
| B-5 | 3055.87 | 973 | ; |
| B-8-2 | 3055.28 | 93.8 | ; |
| B-9 | 3055.05 | 399 | ; |
| B-12 | 3051.91 | 804.09 | ; |
| B-7 | 3034.64 | 0 | ; |
| B-7-0 | 3031.14 | 73.92 | ; |
| B-7-1 | 3027.38 | 133 | ; |
| B-7-1-0 | 3020.21 | 21 | ; |
| B-7-2 | 3016.75 | 2305.66 | ; |
| B-13 | 2999.95 | 387.31 | ;B-13/B-14 |
| B-15-1 | 2997.91 | 245.84 | ;B-15-1/B-15-2 |
| B-16 | 2997.74 | 84 | ; |
| B-16-1 | 2990.26 | 147.7 | ;B-16-1/B-17 |
| B-10 | 2989.79 | 1164.8 | ; |
| B-18 | 2990.19 | 73.5 | ; |
| B-19 | 2990.51 | 175.21 | ; |
| B-19-0 | 2991.43 | 9.87 | ; |
| B-11 | 2989.37 | 2036.58 | ; |
| B-19-1 | 2973.36 | 176.05 | ; |
| B-19-1-1 | 2962.97 | 22.4 | ; |
| B-19-2 | 2961.65 | 178.64 | ; |
| B-19-3 | 2962.81 | 84.35 | ; |
| B-19-4 | 2962.97 | 29.4 | ; |
| B-21 | 2962.76 | 229.6 | ; |
| B-22 | 2931.99 | 14 | ; |
| B-22-1 | 2930.37 | 21 | ; |
| B-23 | 2930.64 | 35 | ; |
| B-23-1 | 2930.4 | 35 | ; |
| B-25 | 2929.92 | 527.94 | ;B-25/B-24 |
| B-24-4 | 2929.64 | 14 | ; |
| B-26 | 2926.79 | 1709.33 | ;B-26/B-27 |
| 10/11 | 3105.78 | 1154.65 | ;10/11/B-1 |
| 11-1 | 3095.18 | 21 | ; |
| 11-1-0 | 3092.38 | 130.9 | ; |
| 11-1-1 | 3091.28 | 567 | ; |
| 11-2 | 3091.28 | 296.8 | ; |
| 11-3 | 3090.02 | 35 | ; |
| 12 | 3091.7 | 127.05 | ; |
| 13 | 3091.26 | 208.25 | ; |
| 14 | 3091 | 382.34 | ; |
| 15 | 3088.82 | 25.2 | ; |
| C-1 | 3088.39 | 562.1 | ; |
| C-LAT | 3066.42 | 0 | ; |
| C-2-1 | 3056.12 | 34.51 | ; |
| C-2-2 | 3052.61 | 5.6 | ; |
| C-3 | 3051.47 | 6.3 | ; |
| C-7 | 3040 | 36.4 | ; |
| C-10 | 3030.13 | 9.8 | ; |
| C-5 | 3028.88 | 725.55 | ;C-5/C-13/C-14 |
| C-14-1 | 3027.72 | 68.6 | ; |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 68 | B-2-3 | B-2-3-1 | 755.04 | 21.58 | 135 | 0 Open | ; |
| 69 | B-2-3-1 | B-2-3-2 | 987.36 | 21.58 | 135 | 0 Open | ; |
| 70 | B-2-3-2 | B-2-5 | 559.68 | 21.58 | 135 | 0 Open | ; |
| 71 | B-2-5 | B-2-5-1 | 491.04 | 21.58 | 135 | 0 Open | ; |
| 72 | B-2-5-1 | B-2-6 | 168.96 | 21.58 | 135 | 0 Open | ; |
| 73 | B-2-6 | B-2-6-2 | 1061.28 | 21.58 | 135 | 0 Open | ; |
| 74 | B-2-6-2 | B-2-7 | 491.04 | 16.18 | 135 | 0 Open | ; |
| 75 | B-2-7 | B-2-7-1 | 137.28 | 16.18 | 135 | 0 Open | ; |
| 76 | B-2-7-1 | B-2-8 | 506.88 | 16.18 | 135 | 0 Open | ; |
| 77 | B-2-8 | B-10-2 | 2280.96 | 14.38 | 135 | 0 Open | ; |
| 78 | B-10-2 | B-2-11 | 633.6 | 14.38 | 135 | 0 Open | ; |
| 79 | B-2 | B-LAT | 2634.72 | 108 | 125 | 0 Open | ; |
| 80 | B-LAT | B-0-1 | 11183.04 | 32.37 | 135 | 0 Open | ; |
| 81 | B-0-1 | B-0-3-1 | 3933.6 | 32.37 | 135 | 0 Open | ; |
| 83 | B-3 | B-4 | 2075.04 | 31.78 | 135 | 0 Open | ; |
| 84 | B-4 | B-4-1 | 285.12 | 31.78 | 135 | 0 Open | ; |
| 85 | B-4-1 | B-6-1 | 728.64 | 31.78 | 135 | 0 Open | ; |
| 86 | B-6-1 | B-5 | 691.68 | 31.78 | 135 | 0 Open | ; |
| 87 | B-5 | B-8-2 | 506.88 | 31.78 | 135 | 0 Open | ; |
| 88 | B-8-2 | B-9 | 580.8 | 31.78 | 135 | 0 Open | ; |
| 89 | B-9 | B-12 | 158.4 | 31.78 | 135 | 0 Open | ; |
| 90 | B-12 | B-7 | 68.64 | 31.23 | 135 | 0 Open | ; |
| 91 | B-7 | B-7-0 | 533.28 | 14.7 | 135 | 0 Open | ; |
| 92 | B-7-0 | B-7-1 | 860.64 | 14.7 | 135 | 0 Open | ; |
| 93 | B-7-1 | B-7-1-0 | 982.08 | 14.7 | 135 | 0 Open | ; |
| 94 | B-7-1-0 | B-7-2 | 2391.84 | 14.7 | 135 | 0 Open | ; |
| 95 | B-7 | B-13 | 2481.6 | 25.72 | 135 | 0 Open | ; |
| 96 | B-13 | B-15-1 | 1752.96 | 23.38 | 135 | 0 Open | ; |
| 97 | B-15-1 | B-16 | 813.12 | 23.38 | 135 | 0 Open | ; |
| 98 | B-16 | B-16-1 | 1409.76 | 23.38 | 135 | 0 Open | ; |
| 99 | B-16-1 | B-10 | 839.52 | 23.38 | 135 | 0 Open | ; |
| 100 | B-10 | B-18 | 168.96 | 23.38 | 135 | 0 Open | ; |
| 101 | B-18 | B-19 | 73.92 | 21.58 | 135 | 0 Open | ; |
| 102 | B-19 | B-19-0 | 227.04 | 21.58 | 135 | 0 Open | ; |
| 103 | B-19-0 | B-11 | 253.44 | 21.58 | 135 | 0 Open | ; |
| 104 | B-11 | B-19-1 | 279.84 | 16.18 | 135 | 0 Open | ; |
| 105 | B-19-1 | B-19-1-1 | 1552.32 | 16.18 | 135 | 0 Open | ; |
| 106 | B-19-1-1 | B-19-2 | 887.04 | 16.18 | 135 | 0 Open | ; |
| 107 | B-19-2 | B-19-3 | 517.44 | 16.18 | 135 | 0 Open | ; |
| 108 | B-19-3 | B-19-4 | 121.44 | 16.18 | 135 | 0 Open | ; |
| 109 | B-19-4 | B-21 | 316.8 | 16.18 | 135 | 0 Open | ; |
| 110 | B-21 | B-22 | 4451.04 | 14.21 | 135 | 0 Open | ; |
| 111 | B-22 | B-22-1 | 617.76 | 14.21 | 135 | 0 Open | ; |
| 112 | B-22-1 | B-23 | 422.4 | 14.21 | 135 | 0 Open | ; |
| 113 | B-23 | B-23-1 | 533.28 | 14.21 | 135 | 0 Open | ; |
| 114 | B-23-1 | B-25 | 1351.68 | 14.21 | 135 | 0 Open | ; |
| 115 | B-25 | B-24-4 | 84.48 | 12.44 | 135 | 0 Open | ; |
| 116 | B-24-4 | B-26 | 543.84 | 12.44 | 135 | 0 Open | ; |
| 117 | B-LAT | 42654 | 5.28 | 120 | 125 | 0 Open | ; |
| 118 | 42654 | 42675 | 2423.52 | 102 | 125 | 0 Open | ; |
| 119 | 42675 | 36831 | 1995.84 | 102 | 125 | 0 Open | ; |
| 120 | 36831 | 37196 | 1177.44 | 102 | 125 | 0 Open | ; |
| 121 | 37196 | 42676 | 21.12 | 102 | 125 | 0 Open | ; |
| 122 | 42676 | 42677 | 332.64 | 102 | 125 | 0 Open | ; |
| 123 | 42677 | 12 | 702.24 | 102 | 125 | 0 Open | ; |
| 124 | 12 | 13 | 285.12 | 102 | 125 | 0 Open | ; |
| 125 | 13 | 14 | 2576.64 | 102 | 125 | 0 Open | ; |
| 126 | 14 | 15 | 385.44 | 102 | 125 | 0 Open | ; |
| 127 | 15 | C-1 | 1779.36 | 102 | 125 | 0 Open | ; |
| 128 | C-1 | C-LAT | 818.4 | 102 | 125 | 0 Open | ; |
| 130 | C-2-1 | C-2-2 | 1351.68 | 28.04 | 135 | 0 Open | ; |
| 131 | C-2-2 | C-3 | 538.56 | 28.04 | 135 | 0 Open | ; |
| 132 | C-3 | C-7 | 1409.76 | 28.04 | 135 | 0 Open | ; |
| 133 | C-7 | C-10 | 855.36 | 28.04 | 135 | 0 Open | ; |
| 134 | C-10 | C-5 | 1304.16 | 28.04 | 135 | 0 Open | ; |
| 135 | C-5 | C-14-1 | 432.96 | 28.04 | 135 | 0 Open | ; |
| 136 | C-14-1 | C-14-1-1 | 538.56 | 27.55 | 135 | 0 Open | ; |
| 137 | C-14-1-1 | C-14-4 | 1605.12 | 25.72 | 135 | 0 Open | ; |
| 138 | C-14-4 | C-5-1 | 1958.88 | 25.72 | 135 | 0 Open | ; |
| 139 | C-5-1 | C-16 | 533.28 | 25.72 | 135 | 0 Open | ; |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C-14-1-1 | 3020.39 | 52.29 | ; | 140 | C-16 | C-16-1 | 68.64 | 25.72 | 135 | 0 | Open | ; |
| C-14-4 | 3011.07 | 16.31 | ; | 141 | C-16-1 | C-19 | 1188 | 25.72 | 135 | 0 | Open | ; |
| C-5-1 | 3005.02 | 6.58 | ; | 142 | C-19 | C-9 | 1473.12 | 23.38 | 135 | 0 | Open | ; |
| C-16 | 3003.48 | 21 | ; | 143 | C-9 | C-9-1 | 2030.11 | 16.18 | 135 | 0 | Open | ; |
| C-16-1 | 3003.6 | 397.39 | ;C-16-1/C-6 | 144 | C-9-1 | C-9-3 | 2291.52 | 14.38 | 135 | 0 | Open | ; |
| C-19 | 2998.12 | 1047.97 | ;C-19/C-8 | 145 | C-9 | C-20 | 7883.04 | 17.98 | 135 | 0 | Open | ; |
| C-9 | 2985.24 | 0 | ; | 146 | C-20 | C-11 | 860.64 | 15.99 | 135 | 0 | Open | ; |
| C-9-1 | 2980.57 | 907.76 | ;C-9-1/C-9-2 | 148 | 21 | E | 4329.6 | 102 | 125 | 0 | Open | ; |
| C-9-3 | 2965.14 | 1904.91 | ; | 149 | E | E-3 | 2370.72 | 26.26 | 135 | 0 | Open | ; |
| C-20 | 2938.57 | 308 | ; | 151 | 26 | D | 2571.36 | 96 | 125 | 0 | Open | ; |
| C-11 | 2930.42 | 3086.51 | ;C-11/C-21 | 152 | D | 28-1 | 2972.64 | 96 | 125 | 0 | Open | ; |
| 21 | 3020.27 | 132.51 | ;21/23 | 153 | 28-1 | F-LAT | 258.72 | 96 | 125 | 0 | Open | ; |
| E | 3010 | 0 | ; | 154 | F-LAT | F-0 | 3146.69 | 57.86 | 135 | 0 | Open | ; |
| E-3 | 3004.11 | 2649.43 | ; | 155 | F-0 | F-1 | 1103.52 | 57.86 | 135 | 0 | Open | ; |
| 26 | 2988.04 | 119.7 | ; | 157 | F-1 | F-0-1 | 10.56 | 57.86 | 135 | 0 | Open | ; |
| D | 2983.57 | 913.29 | ;D/27 | 159 | F-0-2 | F-4 | 142.56 | 57.86 | 135 | 0 | Open | ; |
| 28-1 | 2980 | 14 | ; | 160 | F-4 | F-2 | 10.56 | 57.86 | 135 | 0 | Open | ; |
| F-LAT | 2978.28 | 0 | ; | 161 | F-2 | F-5 | 1325.28 | 57.86 | 135 | 0 | Open | ; |
| F-0 | 2971.95 | 74.9 | ; | 162 | F-5 | F-7 | 1372.8 | 57.86 | 135 | 0 | Open | ; |
| F-1 | 2967.74 | 1281.35 | ; | 163 | F-7 | F-7-0 | 7519.71 | 57.86 | 135 | 0 | Open | ; |
| F-0-1 | 2967.74 | 81.9 | ; | 164 | F-7-0 | F-7-1 | 802.56 | 57.86 | 135 | 0 | Open | ; |
| F-0-2 | 2962.33 | 28 | ; | 165 | F-7-1 | F-8 | 1283.04 | 57.86 | 135 | 0 | Open | ; |
| F-4 | 2962.32 | 247.1 | ; | 166 | F-8 | F-9 | 1705.44 | 57.86 | 135 | 0 | Open | ; |
| F-2 | 2962.16 | 49 | ; | 167 | F-9 | F-9-1 | 607.2 | 57.86 | 135 | 0 | Open | ; |
| F-5 | 2955.46 | 133 | ; | 168 | F-9-1 | F-10 | 675.84 | 57.86 | 135 | 0 | Open | ; |
| F-7 | 2953.07 | 49 | ; | 169 | F-10 | F-10-1 | 601.92 | 57.86 | 135 | 0 | Open | ; |
| F-7-0 | 2951.67 | 105 | ; | 170 | F-10-1 | F-3 | 5.28 | 57.86 | 135 | 0 | Open | ; |
| F-7-1 | 2950.79 | 58.1 | ; | 171 | F-3 | F-11 | 950.4 | 57.86 | 135 | 0 | Open | ; |
| F-8 | 2949.51 | 167.3 | ; | 173 | H-LAT | F-12 | 728.64 | 44.86 | 135 | 0 | Open | ; |
| F-9 | 2948 | 18.9 | ; | 174 | F-12 | H-0-1 | 295.68 | 44.86 | 135 | 0 | Open | ; |
| F-9-1 | 2946.96 | 543.06 | ; | 175 | H-0-1 | H-2 | 1251.36 | 44.86 | 135 | 0 | Open | ; |
| F-10 | 2945.98 | 306.6 | ; | 176 | H-2 | H-2-1 | 216.48 | 44.86 | 135 | 0 | Open | ; |
| F-10-1 | 2945.51 | 185.5 | ; | 177 | H-2-1 | H-3 | 1399.2 | 44.86 | 135 | 0 | Open | ; |
| F-3 | 2945.51 | 157.5 | ; | 178 | H-3 | H-3-1 | 1668.48 | 44.86 | 135 | 0 | Open | ; |
| F-11 | 2908.07 | 343 | ; | 179 | H-3-1 | H-4 | 158.4 | 44.86 | 135 | 0 | Open | ; |
| H-LAT | 2904.6 | 0 | ;H/F-12 | 180 | H-4 | H-5 | 15.84 | 44.86 | 135 | 0 | Open | ; |
| F-12 | 2895.4 | 21 | ; | 181 | H-5 | H-6 | 528 | 44.86 | 135 | 0 | Open | ; |
| H-0-1 | 2891.82 | 23.8 | ; | 182 | H-6 | H-7 | 2180.64 | 44.86 | 135 | 0 | Open | ; |
| H-2 | 2892.82 | 87.5 | ; | 183 | H-7 | H-7-0 | 533.28 | 44.86 | 135 | 0 | Open | ; |
| H-2-1 | 2891.18 | 382.9 | ; | 184 | H-7-0 | H-7-2 | 295.68 | 44.86 | 135 | 0 | Open | ; |
| H-3 | 2881.32 | 58.1 | ; | 185 | H-7-2 | H-7-1 | 21.12 | 44.86 | 135 | 0 | Open | ; |
| H-3-1 | 2881.95 | 14 | ; | 186 | H-7-1 | H-7-2-1 | 285.12 | 44.86 | 135 | 0 | Open | ; |
| H-4 | 2880.88 | 220.36 | ; | 187 | H-7-2-1 | H-7-3 | 739.2 | 44.86 | 135 | 0 | Open | ; |
| H-5 | 2880.88 | 303.52 | ; | 188 | H-7-3 | H-7-4 | 686.4 | 44.86 | 135 | 0 | Open | ; |
| H-6 | 2879.8 | 702.1 | ; | 189 | H-7-4 | H-7-5 | 121.44 | 44.86 | 135 | 0 | Open | ; |
| H-7 | 2865.46 | 4.76 | ; | 190 | H-7-5 | H-8 | 411.84 | 44.86 | 135 | 0 | Open | ; |
| H-7-0 | 2865.34 | 8.89 | ; | 191 | H-8 | H-9 | 2698.08 | 44.86 | 135 | 0 | Open | ; |
| H-7-2 | 2864.16 | 45.01 | ; | 192 | H-9 | H-9-1 | 5.28 | 44.86 | 135 | 0 | Open | ; |
| H-7-1 | 2864.16 | 4.9 | ; | 193 | H-9-1 | H-12 | 2376 | 44.86 | 135 | 0 | Open | ; |
| H-7-2-1 | 2862.78 | 45.01 | ; | 194 | H-12 | H-12-3 | 3334.32 | 25.72 | 135 | 0 | Open | ; |
| H-7-3 | 2863.27 | 37.66 | ; | 195 | H-12-3 | H-12-5 | 575.52 | 25.72 | 135 | 0 | Open | ; |
| H-7-4 | 2862.59 | 96.25 | ; | 196 | H-12-5 | H-12-6 | 2069.76 | 23.88 | 135 | 0 | Open | ; |
| H-7-5 | 2861.88 | 28.91 | ; | 197 | H-12-6 | H-12-6-1 | 5291.94 | 23.38 | 135 | 0 | Open | ; |
| H-8 | 2861.36 | 1391.88 | ; | 198 | H-12-6-1 | H-12-6-1-2 | 749.76 | 23.38 | 135 | 0 | Open | ; |
| H-9 | 2844.74 | 332.36 | ; | 199 | H-12-6-1-2 | H-12-6-1-3 | 1452 | 21.58 | 135 | 0 | Open | ; |
| H-9-1 | 2844.74 | 68.6 | ; | 200 | H-12-6-1-3 | H-12-6-2 | 1795.2 | 21.58 | 135 | 0 | Open | ; |
| H-12 | 2827.14 | 0 | ; | 202 | H-12 | H-9-2 | 84.48 | 33.06 | 135 | 0 | Open | ; |
| H-12-3 | 2814.61 | 1381.66 | ; | 203 | H-9-2 | H-10 | 121.44 | 33.06 | 135 | 0 | Open | ; |
| H-12-5 | 2814.33 | 545.16 | ; | 204 | H-10 | H-10-1 | 10.56 | 33.06 | 135 | 0 | Open | ; |
| H-12-6 | 2793.67 | 0 | ; | 205 | H-10-1 | H-11 | 264 | 33.06 | 135 | 0 | Open | ; |
| H-12-6-1 | 2771.26 | 609.84 | ; | 206 | H-11 | H-13 | 580.8 | 33.06 | 135 | 0 | Open | ; |
| H-12-6-1- | 2767.82 | 182.35 | ; | 207 | H-13 | H-13-0 | 348.48 | 33.06 | 135 | 0 | Open | ; |
| H-12-6-1- | 2766.39 | 25.2 | ; | 208 | H-13-0 | H-13-0-1 | 184.8 | 33.06 | 135 | 0 | Open | ; |
| H-12-6-2 | 2765.12 | 1731.87 | ; | 209 | H-13-0-1 | H-14 | 348.48 | 33.06 | 135 | 0 | Open | ; |
| H-9-2 | 2826.12 | 215.25 | ; | 210 | H-14 | H-14-2 | 1525.92 | 18.37 | 135 | 0 | Open | ; |
| H-10 | 2826.17 | 98 | ; | 211 | H-14-2 | H-14-1-3 | 2999.04 | 18.37 | 135 | 0 | Open | ; |
| H-10-1 | 2826.16 | 157.5 | ; | 212 | H-14-1-3 | H-14-1-5 | 374.88 | 14.7 | 135 | 0 | Open | ; |
| H-11 | 2826.24 | 642.6 | ;H-11/H-10-2 | 213 | H-14-1-5 | H-14-1-5-1 | 348.48 | 14.7 | 135 | 0 | Open | ; |
| H-13 | 2825.37 | 0 | ; | 214 | H-14 | H-13-1 | 10.56 | 27.55 | 135 | 0 | Open | ; |
| H-13-0 | 2825.39 | 7 | ; | 215 | H-13-1 | H-15 | 1937.76 | 27.55 | 135 | 0 | Open | ; |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| H-13-0-1 | 2825.21 | 10.5 | ; | 216 | H-15 | H-15-1 | 264 | 27.55 | 135 | 0 | Open | ; |
| H-14 | 2823.97 | 0 | ; | 217 | H-15-1 | H-16 | 1752.96 | 25.72 | 135 | 0 | Open | ; |
| H-14-2 | 2814.93 | 593.6 | ; | 218 | H-16 | H-16-1 | 897.6 | 25.72 | 135 | 0 | Open | ; |
| H-14-1-3 | 2810 | 784.77 | ; | 219 | H-16-1 | H-17 | 401.28 | 25.72 | 135 | 0 | Open | ; |
| H-14-1-5 | 2808 | 63 | ; | 220 | H-17 | H-18 | 564.96 | 23.88 | 135 | 0 | Open | ; |
| H-14-1-5- | 2805 | 2192.05 | ; | 221 | H-18 | H-18-1 | 718.08 | 16.18 | 135 | 0 | Open | ; |
| H-13-1 | 2824.56 | 297.08 | ; | 222 | H-18-1 | H-18-2 | 184.8 | 14.38 | 135 | 0 | Open | ; |
| H-15 | 2822.86 | 497 | ; | 223 | H-18-2 | H-18-3 | 528 | 14.38 | 135 | 0 | Open | ; |
| H-15-1 | 2821.86 | 74.34 | ; | 224 | H-18 | H-19 | 10.56 | 18.37 | 135 | 0 | Open | ; |
| H-16 | 2818.36 | 148.4 | ; | 225 | H-19 | H-19-0 | 723.36 | 17.98 | 135 | 0 | Open | ; |
| H-16-1 | 2805.12 | 222.95 | ; | 226 | H-19-0 | H-19-1 | 966.24 | 17.98 | 135 | 0 | Open | ; |
| H-17 | 2805.25 | 677.88 | ; | 227 | H-19-1 | H-20-1 | 607.2 | 17.98 | 135 | 0 | Open | ; |
| H-18 | 2797.58 | 0 | ; | 228 | H-20-1 | H-21 | 1636.8 | 17.98 | 135 | 0 | Open | ; |
| H-18-1 | 2793.88 | 307.72 | ; | 229 | H-21 | H-22 | 1462.56 | 15.99 | 135 | 0 | Open | ; |
| H-18-2 | 2793.35 | 0 | ; | 230 | H-22 | H-23 | 300.96 | 15.99 | 135 | 0 | Open | ; |
| H-18-3 | 2793.4 | 2313.5 | ;H-18-3/H-18-4 | 231 | H-23 | H-#3 | 818.4 | 15.99 | 135 | 0 | Open | ; |
| H-19 | 2797.87 | 0 | ; | 232 | H-LAT | H-1 | 2867.04 | 25.72 | 135 | 0 | Open | ; |
| H-19-0 | 2792.08 | 14 | ; | 233 | H-1 | H-1-1 | 2813.27 | 16.53 | 135 | 0 | Open | ; |
| H-19-1 | 2791.06 | 49 | ; | 234 | H-1-1 | H-1-2 | 190.08 | 14.7 | 135 | 0 | Open | ; |
| H-20-1 | 2786.73 | 45.22 | ; | 235 | H-1-2 | H-1-3 | 242.88 | 14.7 | 135 | 0 | Open | ; |
| H-21 | 2763.77 | 435.4 | ; | 236 | H-1-3 | H-1-4 | 924 | 14.7 | 135 | 0 | Open | ; |
| H-22 | 2745.34 | 21 | ; | 237 | H-1-4 | H-1-4-1 | 1182.72 | 14.38 | 135 | 0 | Open | ; |
| H-23 | 2745.16 | 12.6 | ; | 238 | H-1-4-1 | H-1-5 | 21.12 | 14.38 | 135 | 0 | Open | ; |
| H-#3 | 2739.99 | 2947 | ; | 239 | H-1-5 | H-1-5-1 | 564.96 | 14.38 | 135 | 0 | Open | ; |
| H-1 | 2835.8 | 0 | ;H-1/F-#2 | 240 | H-1 | F-13 | 2698.08 | 22.04 | 135 | 0 | Open | ; |
| H-1-1 | 2827.91 | 14 | ; | 241 | F-13 | F-13-1 | 1547.04 | 22.04 | 135 | 0 | Open | ; |
| H-1-2 | 2825.82 | 40.6 | ; | 242 | F-13-1 | F-14 | 42.24 | 22.04 | 135 | 0 | Open | ; |
| H-1-3 | 2822.04 | 52.5 | ; | 243 | F-14 | F-6 | 1430.88 | 22.04 | 135 | 0 | Open | ; |
| H-1-4 | 2814.63 | 151.97 | ; | 244 | F-6 | F-6-1 | 881.76 | 18.37 | 135 | 0 | Open | ; |
| H-1-4-1 | 2795.65 | 21 | ; | 245 | F-6-1 | F-6-2 | 670.56 | 18.37 | 135 | 0 | Open | ; |
| H-1-5 | 2795.35 | 147 | ; | 246 | F-6-2 | F-6-4 | 696.96 | 16.18 | 135 | 0 | Open | ; |
| H-1-5-1 | 2794.08 | 2265.41 | ; | 247 | F-6-4 | F-6-6 | 5.28 | 16.18 | 135 | 0 | Open | ; |
| F-13 | 2817.73 | 79.8 | ; | 248 | F-6-6 | F-6-7 | 1710.72 | 16.18 | 135 | 0 | Open | ; |
| F-13-1 | 2812.14 | 130.2 | ; | 249 | F-6 | F-15-1 | 5.28 | 12.86 | 135 | 0 | Open | ; |
| F-14 | 2812.9 | 502.6 | ; | 250 | F-15-1 | F-16 | 1752.96 | 12.86 | 135 | 0 | Open | ; |
| F-6 | 2810.36 | 0 | ; | 251 | F-16 | F-17 | 512.16 | 6.08 | 135 | 0 | Open | ; |
| F-6-1 | 2800 | 350 | ; | 252 | F-17 | F-18 | 1235.52 | 4.05 | 135 | 0 | Open | ; |
| F-6-2 | 2779.16 | 412.65 | ; | 253 | F-LAT | 32 | 3933.6 | 84 | 125 | 0 | Open | ; |
| F-6-4 | 2775.85 | 308 | ; | 254 | 32 | 33 | 512.16 | 84 | 125 | 0 | Open | ; |
| F-6-6 | 2775.85 | 222.6 | ; | 255 | 33 | G-LAT | 1103.52 | 84 | 125 | 0 | Open | ; |
| F-6-7 | 2769.45 | 2574.25 | ; | 256 | G-LAT | 34 | 2499.63 | 27.55 | 135 | 0 | Open | ; |
| F-15-1 | 2810.36 | 332.5 | ; | 257 | 34 | G-3 | 1066.56 | 25.72 | 135 | 0 | Open | ; |
| F-16 | 2808.27 | 49 | ; | 258 | G-3 | G-4 | 1214.4 | 25.72 | 135 | 0 | Open | ; |
| F-17 | 2805.67 | 146.3 | ; | 259 | G-4 | G-6 | 871.2 | 18.37 | 135 | 0 | Open | ; |
| F-18 | 2769.07 | 186.55 | ; | 260 | G-6 | G-7 | 1161.6 | 18.37 | 135 | 0 | Open | ; |
| 32 | 2975.02 | 520.1 | ; | 261 | G-7 | G-8 | 929.28 | 17.98 | 135 | 0 | Open | ; |
| 33 | 2972.33 | 481.39 | ; | 262 | G-8 | G-9 | 417.12 | 16.18 | 135 | 0 | Open | ; |
| G-LAT | 2971.89 | 0 | ; | 263 | G-9 | G-9-2 | 84.48 | 14.38 | 135 | 0 | Open | ; |
| 34 | 2971.01 | 91.7 | ; | 264 | G-9-2 | G-9-3 | 353.76 | 14.38 | 135 | 0 | Open | ; |
| G-3 | 2969.1 | 113.75 | ; | 265 | G-9-3 | G-10 | 633.6 | 14.38 | 135 | 0 | Open | ; |
| G-4 | 2961.61 | 3822.35 | ;G-4/G-5/G-2 | 266 | G-LAT | 34-1 | 675.84 | 78 | 125 | 0 | Open | ; |
| G-6 | 2951.45 | 11.9 | ; | 267 | 34-1 | 34-2 | 1135.2 | 78 | 125 | 0 | Open | ; |
| G-7 | 2950.2 | 187.6 | ; | 268 | 34-2 | 35-1 | 374.88 | 78 | 125 | 0 | Open | ; |
| G-8 | 2947.56 | 204.4 | ; | 269 | 35-1 | 35 | 36.96 | 78 | 125 | 0 | Open | ; |
| G-9 | 2944.3 | 659.4 | ; | 270 | 35 | 35-2 | 522.72 | 78 | 125 | 0 | Open | ; |
| G-9-2 | 2943.4 | 14 | ; | 271 | 35-2 | 36 | 427.68 | 78 | 125 | 0 | Open | ; |
| G-9-3 | 2940.8 | 34.3 | ; | 272 | 36 | 37 | 1948.32 | 78 | 125 | 0 | Open | ; |
| G-10 | 2940.02 | 2340.17 | ; | 273 | 37 | 38 | 997.92 | 78 | 125 | 0 | Open | ; |
| 34-1 | 2970.32 | 56 | ; | 274 | 38 | 39 | 839.52 | 72 | 125 | 0 | Open | ; |
| 34-2 | 2968.47 | 62.02 | ; | 275 | 39 | 40 | 1272.48 | 72 | 125 | 0 | Open | ; |
| 35-1 | 2969.63 | 14 | ; | 276 | 40 | 41 | 807.84 | 72 | 125 | 0 | Open | ; |
| 35 | 2969.62 | 200.2 | ; | 277 | 41 | 42 | 1620.96 | 72 | 125 | 0 | Open | ; |
| 35-2 | 2969.1 | 24.5 | ; | 278 | 42 | 44 | 918.72 | 72 | 125 | 0 | Open | ; |
| 36 | 2965.45 | 129.5 | ; | 279 | 44 | 45 | 1066.56 | 72 | 125 | 0 | Open | ; |
| 37 | 2960.98 | 245 | ; | 280 | 45 | 45-0 | 596.64 | 72 | 125 | 0 | Open | ; |
| 38 | 2959.87 | 2015.58 | ;38/I | 281 | 45-0 | 45-1 | 380.16 | 72 | 125 | 0 | Open | ; |
| 39 | 2959.27 | 251.72 | ; | 282 | 45-1 | J-LAT | 42.24 | 72 | 125 | 0 | Open | ; |
| 40 | 2956.7 | 44.8 | ; | 283 | J-LAT | 46 | 2476.23 | 29.39 | 135 | 0 | Open | ; |
| 41 | 2956.26 | 123.2 | ; | 284 | 46 | J-0 | 702.24 | 28.73 | 135 | 0 | Open | ; |
| 42 | 2954.87 | 228.2 | ; | 285 | J-0 | J-0-1 | 924 | 28.73 | 135 | 0 | Open | ; |

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        44   2953.71      37.8          ;
        45   2953.95      30.1          ;
45-0         2953.01        42          ;
45-1         2952.98         7          ;
J-LAT         2953.1         0          ;J/46/47
        46   2952.63     448.7          ;46/47
J-0          2943.56      27.3          ;
J-0-1        2942.61      10.5          ;
J-1          2942.49      87.5          ;
J-2          2942.18     165.9          ;
J-3          2943.05   1950.76          ;
J-5          2940.57     157.57         ;
J-5-1        2931.59     270.48         ;
J-7          2919.02     514.99         ;
J-8          2919.02        336         ;
J-6          2914.31   1463.63          ;
J-9          2914.71      214.9         ;
J-10         2877.22       98.7         ;
J-11         2864.29      158.9         ;
J-13         2859.17     125.16         ;
J-14            2850        273         ;
J-14-1       2820.19       24.5         ;
J-15         2819.44          0         ;
J-16         2818.07      547.4         ;
J-12         2810.08    2778.44         ;
        48   2950.75      205.8         ;
48-0         2950.97         84         ;
48-1          2950.2         70         ;
        49   2947.45      128.1         ;
49-1         2947.71      44.45         ;
        50   2946.99      107.8         ;
        51   2946.99    2408.14         ;51/K
        53   2933.41      151.9         ;
53-1         2932.72       26.6         ;53-1/54
        55   2928.95       58.1         ;
L-LAT        2929.09          0         ;L/56/57
        56   2928.16      433.3         ;56/57
L-1             2919    2054.36         ;
L-3          2919.16     102.55         ;
L-2          2919.48     240.03         ;
L-5          2916.95         14         ;
L-6          2917.79     130.97         ;
L-6-1           2917         14         ;
L-6-2        2916.76         49         ;
L-7          2915.81    2732.38         ;
        58   2929.48         91         ;
        60   2923.46         98         ;60/61
        63   2917.62         63         ;
65/LP        2903.24   20761.5          ;
NUID         2903.24      22450         ;
RRpipe          3010          0         ;
RRend           3000          0         ;
Hydro1        3407.6          0         ;
JRhyd         3299.5          0         ;
Hyd2            3070          0         ;
Hydro3          3066          0         ;
Hydro4          3020          0         ;
H-12-7       2793.69    3506.37         ;
Hydro6          2912          0         ;
Hydro7          2903          0         ;

[RESERVOIRS]
;ID          Head        Pattern
          1  3550.42               ;

[TANKS]
;ID          Elevation   InitLevel    MinLevel   MaxLevel  Diameter  MinVol     VolCurve

[PUMPS]
;ID          Node1       Node2       Parameters
```

```
286 J-0-1        J-1          686.4   28.73   135   0 Open    ;
287 J-1          J-2         1013.76  28.73   135   0 Open    ;
288 J-2          J-3            528   28.73   135   0 Open    ;
289 J-3          J-5         675.84   25.17   135   0 Open    ;
290 J-5          J-5-1       1816.32  25.17   135   0 Open    ;
291 J-5-1        J-7         1853.28  25.17   135   0 Open    ;
292 J-7          J-8            5.28  25.17   135   0 Open    ;
293 J-8          J-6         1415.04  21.58   135   0 Open    ;
294 J-6          J-9            79.2  21.58   135   0 Open    ;
296 J-10         J-11        1114.08  18.37   135   0 Open    ;
297 J-11         J-13        1186.82  18.37   135   0 Open    ;
298 J-13         J-14         744.48  18.37   135   0 Open    ;
299 J-14         J-14-1       1742.4  17.98   135   0 Open    ;
300 J-14-1       J-15         100.32  17.98   135   0 Open    ;
301 J-15         J-16         100.32  17.98   135   0 Open    ;
302 J-16         J-12         1795.2  16.18   135   0 Open    ;
303 J-LAT                48  1124.64      66  125   0 Open    ;
304          48  48-0           26.4      66  125   0 Open    ;
305 48-0         48-1         1040.16     66  125   0 Open    ;
306 48-1                 49  1103.52      66  125   0 Open    ;
307          49  49-1          380.16     66  125   0 Open    ;
308 49-1                 50   432.96      66  125   0 Open    ;
309          50          51     26.4      66  125   0 Open    ;
310          51          53  1415.04      66  125   0 Open    ;
311          53  53-1         1246.08     66  125   0 Open    ;
312 53-1                 55  1541.76      66  125   0 Open    ;
313          55  L-LAT          31.68     66  125   0 Open    ;
314 L-LAT                56  2150.49      22.44  135   0 Open    ;
315          56  L-1          1552.32     22.44  135   0 Open    ;
316 L-1          L-3            5.28  16.83   135   0 Open    ;
317 L-3          L-2            5.28  16.83   135   0 Open    ;
318 L-2          L-5          718.08  16.83   135   0 Open    ;
319 L-5          L-6          623.04  16.83   135   0 Open    ;
320 L-6          L-6-1        221.76  16.83   135   0 Open    ;
321 L-6-1        L-6-2        586.08  14.96   135   0 Open    ;
322 L-6-2        L-7          623.04  14.96   135   0 Open    ;
323 L-LAT                58    31.68      66  125   0 Open    ;
324          58          60  1446.72      60  125   0 Open    ;
325          60          63   976.8       60  125   0 Open    ;
326          63  65/LP         1404.48     60  125   0 Open    ;
328 E            RRpipe             7     96  125   0 Open    ;
329 RRpipe       RRend           5963     96  125   0 Open    ;
330 RRend                26  1020.72      96  125   0 Open    ;
 11          36951  Hydro1         397     120  125   0 Open    ;
 15 A-12          JRhyd          1000     108  125   0 Open    ;
 82 B-0-3-1       Hyd2        1972.24  32.37   135   0 Open    ;
129 Hydro3        C-2-1          1779  28.04   135   0 Open    ;
147 C-LAT         Hydro4         6700     102  125   0 Open    ;
172 H-12-6        H-12-7           15  18.37   135   0 Open    ;
201 Hydro6        J-10          1764.21  18.7    135   0 Open    ;
295 65/LP         Hydro7          350     43.15  135   0 Open    ;
327 F-0-1         F-0-2        823.68  57.86   135   0 Open    ;
```

[VALVES]
;ID Node1 Node2 Diameter Type Setting MinorLoss
Hydro1 Hydro1 JRI 120 PRV 7.14 0 ;
JRhyd JRhyd JRIend 108 PRV 2 0 ;
150 Hyd2 B-3 32.37 PRV 50 0 ;
Hydro3 C-LAT Hydro3 28.04 PRV 45 0 ;
Hyd4 Hydro4 21 102 PRV 45 0 ;
Hydro5 F-11 H-LAT 57.86 PRV 30 0 ;
331 J-9 Hydro6 18.7 PRV 45 0 ;
Hydro7 Hydro7 NUID 43.15 PRV 1 0 ;

[TAGS]
LINK 154 2148.96

[DEMANDS]
;Junction Demand Pattern Category

[STATUS]
;ID Status/Setting

[PATTERNS]
;ID Multipliers

[CURVES]
;ID X-Value Y-Value

[CONTROLS]

[RULES]

[ENERGY]
Global Eff 75
Global Pri 0
Demand ( 0

[EMITTERS]
;Junction Coefficient

[QUALITY]
;Node InitQual

[SOURCES]
;Node Type Quality Pattern

[REACTIONS]
;Type Pipe/Tank Coefficient

[REACTIONS]
Order Bul 1
Order Tan 1
Order Wa 1
Global Bu 0
Global W 0
Limiting P 0
Roughnes 0

[MIXING]
;Tank Model

[TIMES]
Duration 0
Hydraulic 1:00
Quality Ti 0:05
Pattern Ti 1:00
Pattern St 0:00
Report Tir 1:00
Report St 0:00
Start Cloc 12:00 AM

Statistic None

[REPORT]
Status No
Summary No
Page 0

[OPTIONS]
Units GPM
Headloss H-W
Specific G 1
Viscosity 1
Trials 40
Accuracy 0.001
CHECKFRE 2
MAXCHEC 10
DAMPLIM 0
Unbalanc Continue 10
Pattern 1
Demand M 1
Emitter Ex 0.5
Quality None mg/L
Diffusivity 1
Tolerance 0.01

[COORDINATES]
;Node X-Coord Y-Coord
A-4 10000 10987.68
A-4-2 12000 14250.72
A-4-7 12000 15470.4
A-4-7-1 12000 18369.12
A-4-8-2 12000 18627.84
A-4-9 12000 18765.12
A-4-10 12000 19134.72
3 10000 15333.12
3-1 10000 17534.88
3-1-1 10000 19858.08
JRI 10000 20255.8
A-10 10000 25396.8
3-2 10000 27424.32
A-12 10000 28865.76
JRIend 10000 33723.8
4 10000 39536.64
4-1 10000 40867.2
A-16 10000 45592.8
A-16-2 12000 48913.92
A-16-3 12000 49325.76
A-16-5 12000 52831.68
A-16-6 12000 54426.24
A-16-7 12000 54822.24
A-16-7-1 12000 55012.32
A-16-8-1 12000 55197.12
A-16-9-1 12000 56268.96
A-16-10-0 12000 56284.8
A-16-10-1 12000 57008.16
A-16-10-2 12000 57557.28
A-16-11 12000 57594.24
A-16-11-1 12000 58095.84
A-16-11-0 12000 58201.44
A-16-11-2 12000 59268
A-16-12 12000 59405.28
A-18 10000 48781.92
4-2-1 10000 50323.68
4-3 10000 51216
5 10000 52726.08
5-1 10000 55355.52
A-21 10000 56716.48
6 8000 56791.68
A-21-1 8000 57689.28
A-21-2 8000 57694.56

| | | |
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| A-21-4 | 8000 | 58481.28 |
| A-21-5 | 8000 | 59167.68 |
| A-21-6 | 8000 | 59611.2 |
| A-21-7 | 8000 | 61596.48 |
| A-21-7-1 | 8000 | 61823.52 |
| A-21-7-2 | 8000 | 62525.76 |
| A-21-10-1 | 8000 | 62546.88 |
| A-21-9 | 8000 | 62562.72 |
| A-21-9-0-1 | 8000 | 63196.32 |
| A-21-9-1 | 8000 | 63814.08 |
| 7 | 10000 | 56733.6 |
| 8 | 10000 | 62694.72 |
| 8-1 | 10000 | 66063.36 |
| 8-2 | 10000 | 66300.96 |
| 8-3 | 10000 | 66665.28 |
| 9 | 10000 | 66929.28 |
| B-2 | 10000 | 67420.32 |
| B-2-0 | 4000 | 67515.36 |
| B-2-0-0 | 4000 | 67811.04 |
| B-2-0-1 | 4000 | 68159.52 |
| B-2-1 | 4000 | 68455.2 |
| B-2-2 | 4000 | 68655.84 |
| B-2-2-0 | 4000 | 68935.68 |
| B-2-3 | 4000 | 69331.68 |
| B-2-3-1 | 4000 | 70086.72 |
| B-2-3-2 | 4000 | 71074.08 |
| B-2-5 | 4000 | 71633.76 |
| B-2-5-1 | 4000 | 72124.8 |
| B-2-6 | 4000 | 72293.76 |
| B-2-6-2 | 4000 | 73355.04 |
| B-2-7 | 4000 | 73846.08 |
| B-2-7-1 | 4000 | 73983.36 |
| B-2-8 | 4000 | 74490.24 |
| B-10-2 | 4000 | 76771.2 |
| B-2-11 | 4000 | 77404.8 |
| B-LAT | 10000 | 70055.04 |
| B-0-1 | 6000 | 81238.08 |
| B-0-3-1 | 6000 | 85171.68 |
| B-3 | 6000 | 87352.32 |
| B-4 | 6000 | 89427.36 |
| B-4-1 | 6000 | 89712.48 |
| B-6-1 | 6000 | 90441.12 |
| B-5 | 6000 | 91132.8 |
| B-8-2 | 6000 | 91639.68 |
| B-9 | 6000 | 92220.48 |
| B-12 | 6000 | 92378.88 |
| B-7 | 6000 | 92447.52 |
| B-7-0 | 7000 | 92980.8 |
| B-7-1 | 7000 | 93841.44 |
| B-7-1-0 | 7000 | 94823.52 |
| B-7-2 | 7000 | 97215.36 |
| B-13 | 6000 | 94929.12 |
| B-15-1 | 6000 | 96682.08 |
| B-16 | 6000 | 97495.2 |
| B-16-1 | 6000 | 98904.96 |
| B-10 | 6000 | 99744.48 |
| B-18 | 6000 | 99913.44 |
| B-19 | 6000 | 99987.36 |
| B-19-0 | 6000 | 100214.4 |
| B-11 | 6000 | 100467.8 |
| B-19-1 | 6000 | 100747.7 |
| B-19-1-1 | 6000 | 102300 |
| B-19-2 | 6000 | 103187 |
| B-19-3 | 6000 | 103704.5 |
| B-19-4 | 6000 | 103825.9 |
| B-21 | 6000 | 104142.7 |
| B-22 | 6000 | 108593.8 |
| B-22-1 | 6000 | 109211.5 |
| B-23 | 6000 | 109633.9 |
| B-23-1 | 6000 | 110167.2 |

| | | | |
|---|---|---|---|
| B-25 | | 6000 | 111518.9 |
| B-24-4 | | 6000 | 111603.4 |
| B-26 | | 6000 | 112147.2 |
| 10/11 | | 10000 | 70060.32 |
| 11-1 | | 10000 | 72483.84 |
| 11-1-0 | | 10000 | 74479.68 |
| 11-1-1 | | 10000 | 75657.12 |
| 11-2 | | 10000 | 75678.24 |
| 11-3 | | 10000 | 76010.88 |
| | 12 | 10000 | 76713.12 |
| | 13 | 10000 | 76998.24 |
| | 14 | 10000 | 79574.88 |
| | 15 | 10000 | 79960.32 |
| C-1 | | 10000 | 81739.68 |
| C-LAT | | 10000 | 82558.08 |
| C-2-1 | | 8000 | 84337.44 |
| C-2-2 | | 8000 | 85689.12 |
| C-3 | | 8000 | 86227.68 |
| C-7 | | 8000 | 87637.44 |
| C-10 | | 8000 | 88492.8 |
| C-5 | | 8000 | 89796.96 |
| C-14-1 | | 8000 | 90229.92 |
| C-14-1-1 | | 8000 | 90768.48 |
| C-14-4 | | 8000 | 92373.6 |
| C-5-1 | | 8000 | 94332.48 |
| C-16 | | 8000 | 94865.76 |
| C-16-1 | | 8000 | 94934.4 |
| C-19 | | 8000 | 96122.4 |
| C-9 | | 8000 | 97595.52 |
| C-9-1 | | 7000 | 98640.96 |
| C-9-3 | | 7000 | 100932.5 |
| C-20 | | 8000 | 105478.6 |
| C-11 | | 8000 | 106339.2 |
| | 21 | 10000 | 89258.4 |
| E | | 10000 | 93588 |
| E-3 | | 12000 | 95958.72 |
| | 26 | 10000 | 100578.7 |
| D | | 10000 | 103150.1 |
| 28-1 | | 10000 | 106122.7 |
| F-LAT | | 10000 | 106381.4 |
| F-0 | | 9000 | 108530.4 |
| F-1 | | 9000 | 109633.9 |
| F-0-1 | | 9000 | 109644.5 |
| F-0-2 | | 9000 | 110468.2 |
| F-4 | | 9000 | 110610.7 |
| F-2 | | 9000 | 110621.3 |
| F-5 | | 9000 | 111946.6 |
| F-7 | | 9000 | 113319.4 |
| F-7-0 | | 2000 | 113868.5 |
| F-7-1 | | 2000 | 114671 |
| F-8 | | 2000 | 115954.1 |
| F-9 | | 2000 | 117659.5 |
| F-9-1 | | 2000 | 118266.7 |
| F-10 | | 2000 | 118942.6 |
| F-10-1 | | 2000 | 119544.5 |
| F-3 | | 2000 | 119549.8 |
| F-11 | | 2000 | 120500.2 |
| H-LAT | | 2000 | 120574.1 |
| F-12 | | 4000 | 121302.7 |
| H-0-1 | | 4000 | 121598.4 |
| H-2 | | 4000 | 122849.8 |
| H-2-1 | | 4000 | 123066.2 |
| H-3 | | 4000 | 124465.4 |
| H-3-1 | | 4000 | 126133.9 |
| H-4 | | 4000 | 126292.3 |
| H-5 | | 4000 | 126308.2 |
| H-6 | | 4000 | 126836.2 |
| H-7 | | 4000 | 129016.8 |
| H-7-0 | | 4000 | 129550.1 |
| H-7-2 | | 4000 | 129845.8 |

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|---|---|---|
| H-7-1 | 4000 | 129866.9 |
| H-7-2-1 | 4000 | 130152 |
| H-7-3 | 4000 | 130891.2 |
| H-7-4 | 4000 | 131577.6 |
| H-7-5 | 4000 | 131699 |
| H-8 | 4000 | 132110.9 |
| H-9 | 4000 | 134809 |
| H-9-1 | 4000 | 134814.2 |
| H-12 | 4000 | 137190.2 |
| H-12-3 | 6000 | 138526.1 |
| H-12-5 | 6000 | 139101.6 |
| H-12-6 | 6000 | 141171.4 |
| H-12-6-1 | 8000 | 144471.4 |
| H-12-6-1- | 8000 | 145221.1 |
| H-12-6-1- | 8000 | 146673.1 |
| H-12-6-2 | 8000 | 148468.3 |
| H-9-2 | 4000 | 137274.7 |
| H-10 | 4000 | 137396.2 |
| H-10-1 | 4000 | 137406.7 |
| H-11 | 4000 | 137670.7 |
| H-13 | 4000 | 138251.5 |
| H-13-0 | 4000 | 138600 |
| H-13-0-1 | 4000 | 138784.8 |
| H-14 | 4000 | 139133.3 |
| H-14-2 | 5000 | 140659.2 |
| H-14-1-3 | 5000 | 143658.2 |
| H-14-1-5 | 5000 | 144033.1 |
| H-14-1-5- | 5000 | 144381.6 |
| H-13-1 | 4000 | 139143.8 |
| H-15 | 4000 | 141081.6 |
| H-15-1 | 4000 | 141345.6 |
| H-16 | 4000 | 143098.6 |
| H-16-1 | 4000 | 143996.2 |
| H-17 | 4000 | 144397.4 |
| H-18 | 4000 | 144962.4 |
| H-18-1 | 6000 | 145680.5 |
| H-18-2 | 6000 | 145865.3 |
| H-18-3 | 6000 | 146393.3 |
| H-19 | 4000 | 144973 |
| H-19-0 | 4000 | 145696.3 |
| H-19-1 | 4000 | 146662.6 |
| H-20-1 | 4000 | 147269.8 |
| H-21 | 4000 | 148906.6 |
| H-22 | 4000 | 150369.1 |
| H-23 | 4000 | 150670.1 |
| H-#3 | 4000 | 151488.5 |
| H-1 | 2000 | 123441.1 |
| H-1-1 | 3000 | 125246.9 |
| H-1-2 | 3000 | 125437 |
| H-1-3 | 3000 | 125679.8 |
| H-1-4 | 3000 | 126603.8 |
| H-1-4-1 | 3000 | 127786.6 |
| H-1-5 | 3000 | 127807.7 |
| H-1-5-1 | 3000 | 128372.6 |
| F-13 | 2000 | 126139.2 |
| F-13-1 | 2000 | 127686.2 |
| F-14 | 2000 | 127728.5 |
| F-6 | 2000 | 129159.4 |
| F-6-1 | 3000 | 130041.1 |
| F-6-2 | 3000 | 130711.7 |
| F-6-4 | 3000 | 131408.6 |
| F-6-6 | 3000 | 131413.9 |
| F-6-7 | 3000 | 133124.6 |
| F-15-1 | 2000 | 129164.6 |
| F-16 | 2000 | 130917.6 |
| F-17 | 2000 | 131429.8 |
| F-18 | 2000 | 132665.3 |
| 32 | 10000 | 110315 |
| 33 | 10000 | 110827.2 |
| G-LAT | 10000 | 111930.7 |

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|---|---|---|---|
| | 34 | 12000 | 112405.9 |
| G-3 | | 12000 | 113472.5 |
| G-4 | | 12000 | 114686.9 |
| G-6 | | 12000 | 115558.1 |
| G-7 | | 12000 | 116719.7 |
| G-8 | | 12000 | 117649 |
| G-9 | | 12000 | 118066.1 |
| G-9-2 | | 12000 | 118150.6 |
| G-9-3 | | 12000 | 118504.3 |
| G-10 | | 12000 | 119137.9 |
| 34-1 | | 10000 | 112606.6 |
| 34-2 | | 10000 | 113741.8 |
| 35-1 | | 10000 | 114116.6 |
| | 35 | 10000 | 114153.6 |
| 35-2 | | 10000 | 114676.3 |
| | 36 | 10000 | 115104 |
| | 37 | 10000 | 117052.3 |
| | 38 | 10000 | 118050.2 |
| | 39 | 10000 | 118889.8 |
| | 40 | 10000 | 120162.2 |
| | 41 | 10000 | 120970.1 |
| | 42 | 10000 | 122591 |
| | 44 | 10000 | 123509.8 |
| | 45 | 10000 | 124576.3 |
| 45-0 | | 10000 | 125173 |
| 45-1 | | 10000 | 125553.1 |
| J-LAT | | 10000 | 125595.4 |
| | 46 | 8000 | 126091.7 |
| J-0 | | 8000 | 126793.9 |
| J-0-1 | | 8000 | 127717.9 |
| J-1 | | 8000 | 128404.3 |
| J-2 | | 8000 | 129418.1 |
| J-3 | | 8000 | 129946.1 |
| J-5 | | 8000 | 130621.9 |
| J-5-1 | | 8000 | 132438.2 |
| J-7 | | 8000 | 134291.5 |
| J-8 | | 8000 | 134296.8 |
| J-6 | | 8000 | 135711.8 |
| J-9 | | 8000 | 135791 |
| J-10 | | 8000 | 137739.4 |
| J-11 | | 8000 | 138853.4 |
| J-13 | | 9000 | 139043.5 |
| J-14 | | 9000 | 139788 |
| J-14-1 | | 9000 | 141530.4 |
| J-15 | | 9000 | 141630.7 |
| J-16 | | 9000 | 141731 |
| J-12 | | 9000 | 143526.2 |
| | 48 | 10000 | 126720 |
| 48-0 | | 10000 | 126746.4 |
| 48-1 | | 10000 | 127786.6 |
| | 49 | 10000 | 128890.1 |
| 49-1 | | 10000 | 129270.2 |
| | 50 | 10000 | 129703.2 |
| | 51 | 10000 | 129729.6 |
| | 53 | 10000 | 131144.6 |
| 53-1 | | 10000 | 132390.7 |
| | 55 | 10000 | 133932.5 |
| L-LAT | | 10000 | 133964.2 |
| | 56 | 12000 | 134112 |
| L-1 | | 12000 | 135664.3 |
| L-3 | | 12000 | 135669.6 |
| L-2 | | 12000 | 135674.9 |
| L-5 | | 12000 | 136393 |
| L-6 | | 12000 | 137016 |
| L-6-1 | | 12000 | 137237.8 |
| L-6-2 | | 12000 | 137823.8 |
| L-7 | | 12000 | 138446.9 |
| | 58 | 10000 | 133995.8 |
| | 60 | 10000 | 135442.6 |
| | 63 | 10000 | 136419.4 |

| | | |
|---|---|---|
| 65/LP | 10000 | 137823.8 |
| NUID | 10000 | 138185.6 |
| RRpipe | 10000 | 93595 |
| RRend | 10000 | 99558 |
| Hydro1 | 10000 | 20200.89 |
| JRhyd | 10000 | 33103.48 |
| Hyd2 | 6000 | 87143.92 |
| Hydro3 | 9702.96 | 82562.96 |
| Hydro4 | 10000 | 88743.87 |
| H-12-7 | 6000 | 141187.2 |
| Hydro6 | 8000 | 135975.2 |
| Hydro7 | 10000 | 138103.2 |
| 1 | 0 | 10987.68 |

[VERTICES]

| ;Link | X-Coord | Y-Coord |
|---|---|---|
| 2 | 11955.78 | 10969.39 |
| 19 | 11955.78 | 45578.23 |
| 41 | 8004.36 | 56716.69 |
| 61 | 3981.52 | 67418.35 |
| 80 | 6011.71 | 70054.41 |
| 91 | 7002.88 | 92447.58 |
| 143 | 7000.23 | 97610.74 |
| 149 | 12001.29 | 93582.26 |
| 154 | 9003.84 | 106379.9 |
| 163 | 2001.6 | 113347.2 |
| 173 | 4001.56 | 120576.5 |
| 194 | 6002.19 | 137194 |
| 197 | 7989.86 | 141169.3 |
| 210 | 5008.35 | 139132.5 |
| 221 | 5935.09 | 144963.3 |
| 233 | 3000.75 | 123434.4 |
| 244 | 3004.74 | 129146.3 |
| 256 | 11998.3 | 111904.8 |
| 283 | 8007.02 | 125608.5 |
| 297 | 8998.53 | 138855.2 |
| 314 | 12009.26 | 133971.1 |
| 129 | 8002.28 | 82562.96 |

[LABELS]

| ;X-Coord | Y-Coord | Label & Anchor Node |
|---|---|---|

[BACKDROP]

| | | | | |
|---|---|---|---|---|
| DIMENSIC | 0 | 0 | 20000 | 200000 |
| UNITS | Feet | | | |
| FILE | | | | |
| OFFSET | 0 | 0 | | |

[END]

EPANET Model - PBC Main Canal w/ 200cfs NUID Option

[JUNCTIONS]

| ;ID | Elev | Demand | Pattern | |
|---|---|---|---|---|
| A-4 | 3484.29 | 0 | | ; |
| A-4-2 | 3473.55 | 330.05 | | ;A-4-2/A-4-3 |
| A-4-7 | 3470.53 | 644.42 | | ; |
| A-4-7-1 | 3433.73 | 45.5 | | ;A-4-7-1/A-4-8 |
| A-4-8-2 | 3431.62 | 18.9 | | ;A-4-8-2/A-4-8-1 |
| A-4-9 | 3429.31 | 140 | | ; |
| A-4-10 | 3429.07 | 2175.88 | | ; |
| 3 | 3461.25 | 488.81 | | ; |
| 3-1 | 3443.93 | 7 | | ; |
| 3-1-1 | 3427.09 | 8.4 | | ; |
| JRI | 3407.6 | 0 | | ; |
| A-10 | 3380 | 1712.13 | | ; |
| 3-2 | 3370 | 25.2 | | ; |
| A-12 | 3357 | 2209.69 | | ; |
| JRIend | 3299.5 | 0 | | ; |
| 4 | 3270.6 | 21 | | ; |
| 4-1 | 3264.95 | 231 | | ;4-1/4-2 |
| A-16 | 3239.26 | 20.3 | | ; |
| A-16-2 | 3232.32 | 128.8 | | ; |
| A-16-3 | 3229 | 267.4 | | ; |
| A-16-5 | 3215.45 | 78.05 | | ; |
| A-16-6 | 3212.43 | 494.2 | | ;A-16-6/A-16-7 |
| A-16-7 | 3209.28 | 147 | | ; |
| A-16-7-1 | 3209.14 | 105 | | ; |
| A-16-8-1 | 3201.6 | 399.7 | | ;A-16-8-1/8-2 |
| A-16-9-1 | 3200.37 | 28 | | ; |
| A-16-10-0 | 3199.97 | 505.61 | | ;A-16-10-0/16-9 |
| A-16-10-1 | 3196.06 | 63 | | ; |
| A-16-10-2 | 3180.71 | 157.5 | | ; |
| A-16-11 | 3177.07 | 181.3 | | ; |
| A-16-11-1 | 3164.61 | 56 | | ; |
| A-16-11-0 | 3164.16 | 28 | | ; |
| A-16-11-2 | 3161.62 | 80.43 | | ; |
| A-16-12 | 3160.75 | 1993.53 | | ; |
| A-18 | 3205.59 | 92.96 | | ; |
| 4-2-1 | 3188.49 | 33.6 | | ; |
| 4-3 | 3180.81 | 14 | | ; |
| 5 | 3172.19 | 231 | | ; |
| 5-1 | 3166.89 | 191.1 | | ; |
| A-21 | 3168.44 | 0 | | ;A-21/6/6-1 |
| 6 | 3168.63 | 189 | | ;6/6-1 |
| A-21-1 | 3168.3 | 168 | | ; |
| A-21-2 | 3168.3 | 0 | | ; |
| A-21-4 | 3166.61 | 42 | | ; |
| A-21-5 | 3168.08 | 748.3 | | ; |
| A-21-6 | 3167.15 | 243.6 | | ; |
| A-21-7 | 3167.05 | 510.51 | | ;A-21-7/A21-6-1 |
| A-21-7-1 | 3166.66 | 72.8 | | ; |
| A-21-7-2 | 3165.98 | 417.34 | | ;A-21-7-2/A-21-8 |
| A-21-10-1 | 3165.5 | 824.81 | | ; |
| A-21-9 | 3165.23 | 98 | | ; |
| A-21-9-0-2 | 3163.98 | 134.4 | | ;A-21-9-0-2/A-21-9-0- |
| A-21-9-1 | 3161.18 | 2610.72 | | ; |
| 7 | 3168.94 | 827.75 | | ; |
| 8 | 3140.05 | 133 | | ; |
| 8-1 | 3118.29 | 98 | | ; |
| 8-2 | 3120.28 | 114.8 | | ; |
| 8-3 | 3115.15 | 200.2 | | ; |
| 9 | 3116.96 | 56 | | ; |
| B-2 | 3115.86 | 0 | | ; |
| B-2-0 | 3116.09 | 42 | | ; |
| B-2-0-0 | 3115.67 | 28 | | ; |
| B-2-0-1 | 3115.28 | 76.3 | | ;B-2-0-1/B-2-0-2 |
| B-2-1 | 3115.35 | 0 | | ; |

[PIPES]

| ;ID | Node1 | Node2 | Length | Diameter | Roughness | MinorLoss | Status | |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | A-4 | 10987.68 | 132 | 130 | 0 | Open | ; |
| 2 | A-4 | A-4-2 | 5237.5 | 16.83 | 135 | 0 | Open | ; |
| 3 | A-4-2 | A-4-7 | 1219.68 | 16.83 | 135 | 0 | Open | ; |
| 4 | A-4-7 | A-4-7-1 | 2898.72 | 14.96 | 135 | 0 | Open | ; |
| 5 | A-4-7-1 | A-4-8-2 | 258.72 | 14.96 | 135 | 0 | Open | ; |
| 6 | A-4-8-2 | A-4-9 | 137.28 | 14.96 | 135 | 0 | Open | ; |
| 7 | A-4-9 | A-4-10 | 369.6 | 14.96 | 135 | 0 | Open | ; |
| 8 | A-4 | 3 | 4345.44 | 120 | 125 | 0 | Open | ; |
| 9 | 3 | 42430 | 2201.76 | 120 | 125 | 0 | Open | ; |
| 10 | 42430 | 36951 | 2323.2 | 120 | 125 | 0 | Open | ; |
| 12 | JRI | A-10 | 5141 | 108 | 125 | 0 | Open | ; |
| 13 | A-10 | 42431 | 2027.52 | 108 | 125 | 0 | Open | ; |
| 14 | 42431 | A-12 | 1441.44 | 108 | 125 | 0 | Open | ; |
| 16 | JRIend | 4 | 5812.84 | 120 | 125 | 0 | Open | ; |
| 17 | 4 | 42461 | 1330.56 | 120 | 125 | 0 | Open | ; |
| 18 | 42461 | A-16 | 4725.6 | 120 | 125 | 0 | Open | ; |
| 19 | A-16 | A-16-2 | 5291.82 | 22.44 | 135 | 0 | Open | ; |
| 20 | A-16-2 | A-16-3 | 411.84 | 22.44 | 135 | 0 | Open | ; |
| 21 | A-16-3 | A-16-5 | 3505.92 | 18.7 | 135 | 0 | Open | ; |
| 22 | A-16-5 | A-16-6 | 1594.56 | 18.7 | 135 | 0 | Open | ; |
| 23 | A-16-6 | A-16-7 | 396 | 18.7 | 135 | 0 | Open | ; |
| 24 | A-16-7 | A-16-7-1 | 190.08 | 18.7 | 135 | 0 | Open | ; |
| 25 | A-16-7-1 | A-16-8-1 | 184.8 | 18.7 | 135 | 0 | Open | ; |
| 26 | A-16-8-1 | A-16-9-1 | 1071.84 | 16.83 | 135 | 0 | Open | ; |
| 27 | A-16-9-1 | A-16-10-0 | 15.84 | 16.83 | 135 | 0 | Open | ; |
| 28 | A-16-10-0 | A-16-10-1 | 723.36 | 14.96 | 135 | 0 | Open | ; |
| 29 | A-16-10-1 | A-16-10-2 | 549.12 | 14.96 | 135 | 0 | Open | ; |
| 30 | A-16-10-2 | A-16-11 | 36.96 | 14.96 | 135 | 0 | Open | ; |
| 31 | A-16-11 | A-16-11-1 | 501.6 | 14.96 | 135 | 0 | Open | ; |
| 32 | A-16-11-1 | A-16-11-0 | 105.6 | 13.09 | 135 | 0 | Open | ; |
| 33 | A-16-11-0 | A-16-11-2 | 1066.56 | 13.09 | 135 | 0 | Open | ; |
| 34 | A-16-11-2 | A-16-12 | 137.28 | 13.09 | 135 | 0 | Open | ; |
| 35 | A-16 | A-18 | 3189.12 | 120 | 125 | 0 | Open | ; |
| 36 | A-18 | 36983 | 1541.76 | 120 | 125 | 0 | Open | ; |
| 37 | 36983 | 42463 | 892.32 | 120 | 125 | 0 | Open | ; |
| 38 | 42463 | 5 | 1510.08 | 120 | 125 | 0 | Open | ; |
| 39 | 5 | 42491 | 2629.44 | 120 | 125 | 0 | Open | ; |
| 40 | 42491 | A-21 | 1360.96 | 120 | 125 | 0 | Open | ; |
| 41 | A-21 | 6 | 2070.76 | 22.44 | 135 | 0 | Open | ; |
| 42 | 6 | A-21-1 | 897.6 | 22.44 | 135 | 0 | Open | ; |
| 43 | A-21-1 | A-21-2 | 5.28 | 22.44 | 135 | 0 | Open | ; |
| 44 | A-21-2 | A-21-4 | 786.72 | 22.44 | 135 | 0 | Open | ; |
| 45 | A-21-4 | A-21-5 | 686.4 | 22.44 | 135 | 0 | Open | ; |
| 46 | A-21-5 | A-21-6 | 443.52 | 22.44 | 135 | 0 | Open | ; |
| 47 | A-21-6 | A-21-7 | 1985.28 | 22.44 | 135 | 0 | Open | ; |
| 48 | A-21-7 | A-21-7-1 | 227.04 | 18.7 | 135 | 0 | Open | ; |
| 49 | A-21-7-1 | A-21-7-2 | 702.24 | 18.7 | 135 | 0 | Open | ; |
| 50 | A-21-7-2 | A-21-10-1 | 21.12 | 18.7 | 135 | 0 | Open | ; |
| 51 | A-21-10-1 | A-21-9 | 15.84 | 16.83 | 135 | 0 | Open | ; |
| 52 | A-21-9 | A-21-9-0-2 | 633.6 | 14.96 | 135 | 0 | Open | ; |
| 53 | A-21-9-0-2 | A-21-9-1 | 617.76 | 14.96 | 135 | 0 | Open | ; |
| 54 | A-21 | 7 | 17.12 | 120 | 135 | 0 | Open | ; |
| 55 | 7 | 8 | 5961.12 | 120 | 125 | 0 | Open | ; |
| 56 | 8 | 42583 | 3368.64 | 120 | 125 | 0 | Open | ; |
| 57 | 42583 | 42584 | 237.6 | 120 | 125 | 0 | Open | ; |
| 58 | 42584 | 42585 | 364.32 | 120 | 125 | 0 | Open | ; |
| 59 | 42585 | 9 | 264 | 120 | 125 | 0 | Open | ; |
| 60 | 9 | B-2 | 491.04 | 120 | 125 | 0 | Open | ; |
| 61 | B-2 | B-2-0 | 95.04 | 21.58 | 135 | 0 | Open | ; |
| 62 | B-2-0 | B-2-0-0 | 295.68 | 21.58 | 135 | 0 | Open | ; |
| 63 | B-2-0-0 | B-2-0-1 | 348.48 | 21.58 | 135 | 0 | Open | ; |
| 64 | B-2-0-1 | B-2-1 | 295.68 | 21.58 | 135 | 0 | Open | ; |
| 65 | B-2-1 | B-2-2 | 200.64 | 21.58 | 135 | 0 | Open | ; |
| 66 | B-2-2 | B-2-2-0 | 279.84 | 21.58 | 135 | 0 | Open | ; |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B-2-2 | 3115.38 | 21 | ; | 67 | B-2-2-0 | B-2-3 | 396 | 21.58 | 135 | 0 | Open ; |
| B-2-2-0 | 3115.4 | 7 | ; | 68 | B-2-3 | B-2-3-1 | 755.04 | 21.58 | 135 | 0 | Open ; |
| B-2-3 | 3115.16 | 0 | ; | 69 | B-2-3-1 | B-2-3-2 | 987.36 | 21.58 | 135 | 0 | Open ; |
| B-2-3-1 | 3117.67 | 32.2 | ; | 70 | B-2-3-2 | B-2-5 | 559.68 | 21.58 | 135 | 0 | Open ; |
| B-2-3-2 | 3109.11 | 36.4 | ; | 71 | B-2-5 | B-2-5-1 | 491.04 | 21.58 | 135 | 0 | Open ; |
| B-2-5 | 3106.9 | 77 | ; | 72 | B-2-5-1 | B-2-6 | 168.96 | 21.58 | 135 | 0 | Open ; |
| B-2-5-1 | 3104.09 | 121.1 | ; | 73 | B-2-6 | B-2-6-2 | 1061.28 | 21.58 | 135 | 0 | Open ; |
| B-2-6 | 3105.21 | 241.5 | ;B-2-6/B-2-6-1 | 74 | B-2-6-2 | B-2-7 | 491.04 | 16.18 | 135 | 0 | Open ; |
| B-2-6-2 | 3096.12 | 1445.01 | ;B-2-6-2/B-2-4 | 75 | B-2-7 | B-2-7-1 | 137.28 | 16.18 | 135 | 0 | Open ; |
| B-2-7 | 3094.65 | 39.9 | ; | 76 | B-2-7-1 | B-2-8 | 506.88 | 16.18 | 135 | 0 | Open ; |
| B-2-7-1 | 3097.22 | 73.5 | ; | 77 | B-2-8 | B-10-2 | 2280.96 | 14.38 | 135 | 0 | Open ; |
| B-2-8 | 3094.79 | 233.8 | ; | 78 | B-10-2 | B-2-11 | 633.6 | 14.38 | 135 | 0 | Open ; |
| B-10-2 | 3087.16 | 195.3 | ; | 79 | B-2 | B-LAT | 2634.72 | 120 | 125 | 0 | Open ; |
| B-2-11 | 3084.49 | 2163.35 | ; | 80 | B-LAT | B-0-1 | 11183.04 | 32.37 | 135 | 0 | Open ; |
| B-LAT | 3104.62 | 0 | ; | 81 | B-0-1 | B-0-3-1 | 3933.6 | 32.37 | 135 | 0 | Open ; |
| B-0-1 | 3085.07 | 50.4 | ; | 83 | B-3 | B-4 | 2075.04 | 31.78 | 135 | 0 | Open ; |
| B-0-3-1 | 3075.15 | 4.9 | ;B-0-3-1/B-0-3-2 | 84 | B-4 | B-4-1 | 285.12 | 31.78 | 135 | 0 | Open ; |
| B-3 | 3070 | 28 | ; | 85 | B-4-1 | B-6-1 | 728.64 | 31.78 | 135 | 0 | Open ; |
| B-4 | 3060.75 | 4.9 | ; | 86 | B-6-1 | B-5 | 691.68 | 31.78 | 135 | 0 | Open ; |
| B-4-1 | 3062 | 336 | ;B-4-1/B-4-6 | 87 | B-5 | B-8-2 | 506.88 | 31.78 | 135 | 0 | Open ; |
| B-6-1 | 3059.5 | 266.84 | ;B-6-1/B-8 | 88 | B-8-2 | B-9 | 580.8 | 31.78 | 135 | 0 | Open ; |
| B-5 | 3055.87 | 973 | ; | 89 | B-9 | B-12 | 158.4 | 31.78 | 135 | 0 | Open ; |
| B-8-2 | 3055.28 | 93.8 | ; | 90 | B-12 | B-7 | 68.64 | 31.23 | 135 | 0 | Open ; |
| B-9 | 3055.05 | 399 | ; | 91 | B-7 | B-7-0 | 533.28 | 14.7 | 135 | 0 | Open ; |
| B-12 | 3051.91 | 804.09 | ; | 92 | B-7-0 | B-7-1 | 860.64 | 14.7 | 135 | 0 | Open ; |
| B-7 | 3034.64 | 0 | ; | 93 | B-7-1 | B-7-1-0 | 982.08 | 14.7 | 135 | 0 | Open ; |
| B-7-0 | 3031.14 | 73.92 | ; | 94 | B-7-1-0 | B-7-2 | 2391.84 | 14.7 | 135 | 0 | Open ; |
| B-7-1 | 3027.38 | 133 | ; | 95 | B-7 | B-13 | 2481.6 | 25.72 | 135 | 0 | Open ; |
| B-7-1-0 | 3020.21 | 21 | ; | 96 | B-13 | B-15-1 | 1752.96 | 23.38 | 135 | 0 | Open ; |
| B-7-2 | 3016.75 | 2305.66 | ; | 97 | B-15-1 | B-16 | 813.12 | 23.38 | 135 | 0 | Open ; |
| B-13 | 2999.95 | 387.31 | ;B-13/B-14 | 98 | B-16 | B-16-1 | 1409.76 | 23.38 | 135 | 0 | Open ; |
| B-15-1 | 2997.91 | 245.84 | ;B-15-1/B-15-2 | 99 | B-16-1 | B-10 | 839.52 | 23.38 | 135 | 0 | Open ; |
| B-16 | 2997.74 | 84 | ; | 100 | B-10 | B-18 | 168.96 | 23.38 | 135 | 0 | Open ; |
| B-16-1 | 2990.26 | 147.7 | ;B-16-1/B-17 | 101 | B-18 | B-19 | 73.92 | 21.58 | 135 | 0 | Open ; |
| B-10 | 2989.79 | 1164.8 | ; | 102 | B-19 | B-19-0 | 227.04 | 21.58 | 135 | 0 | Open ; |
| B-18 | 2990.19 | 73.5 | ; | 103 | B-19-0 | B-11 | 253.44 | 21.58 | 135 | 0 | Open ; |
| B-19 | 2990.51 | 175.21 | ; | 104 | B-11 | B-19-1 | 279.84 | 16.18 | 135 | 0 | Open ; |
| B-19-0 | 2991.43 | 9.87 | ; | 105 | B-19-1 | B-19-1-1 | 1552.32 | 16.18 | 135 | 0 | Open ; |
| B-11 | 2989.37 | 2036.58 | ; | 106 | B-19-1-1 | B-19-2 | 887.04 | 16.18 | 135 | 0 | Open ; |
| B-19-1 | 2973.36 | 176.05 | ; | 107 | B-19-2 | B-19-3 | 517.44 | 16.18 | 135 | 0 | Open ; |
| B-19-1-1 | 2962.97 | 22.4 | ; | 108 | B-19-3 | B-19-4 | 121.44 | 16.18 | 135 | 0 | Open ; |
| B-19-2 | 2961.65 | 178.64 | ; | 109 | B-19-4 | B-21 | 316.8 | 16.18 | 135 | 0 | Open ; |
| B-19-3 | 2962.81 | 84.35 | ; | 110 | B-21 | B-22 | 4451.04 | 14.21 | 135 | 0 | Open ; |
| B-19-4 | 2962.97 | 29.4 | ; | 111 | B-22 | B-22-1 | 617.76 | 14.21 | 135 | 0 | Open ; |
| B-21 | 2962.76 | 229.6 | ; | 112 | B-22-1 | B-23 | 422.4 | 14.21 | 135 | 0 | Open ; |
| B-22 | 2931.99 | 14 | ; | 113 | B-23 | B-23-1 | 533.28 | 14.21 | 135 | 0 | Open ; |
| B-22-1 | 2930.37 | 21 | ; | 114 | B-23-1 | B-25 | 1351.68 | 14.21 | 135 | 0 | Open ; |
| B-23 | 2930.64 | 35 | ; | 115 | B-25 | B-24-4 | 84.48 | 12.44 | 135 | 0 | Open ; |
| B-23-1 | 2930.4 | 35 | ; | 116 | B-24-4 | B-26 | 543.84 | 12.44 | 135 | 0 | Open ; |
| B-25 | 2929.92 | 527.94 | ;B-25/B-24 | 117 | B-LAT | 42654 | 5.28 | 120 | 125 | 0 | Open ; |
| B-24-4 | 2929.64 | 14 | ; | 118 | 42654 | 42675 | 2423.52 | 120 | 125 | 0 | Open ; |
| B-26 | 2926.79 | 1709.33 | ;B-26/B-27 | 119 | 42675 | 36831 | 1995.84 | 120 | 125 | 0 | Open ; |
| 10/11 | 3105.78 | 1154.65 | ;10/11/B-1 | 120 | 36831 | 37196 | 1177.44 | 120 | 125 | 0 | Open ; |
| 11-1 | 3095.18 | 21 | ; | 121 | 37196 | 42676 | 21.12 | 120 | 125 | 0 | Open ; |
| 11-1-0 | 3092.38 | 130.9 | ; | 122 | 42676 | 42677 | 332.64 | 120 | 125 | 0 | Open ; |
| 11-1-1 | 3091.28 | 567 | ; | 123 | 42677 | 12 | 702.24 | 120 | 125 | 0 | Open ; |
| 11-2 | 3091.28 | 296.8 | ; | 124 | 12 | 13 | 285.12 | 120 | 125 | 0 | Open ; |
| 11-3 | 3090.02 | 35 | ; | 125 | 13 | 14 | 2576.64 | 120 | 125 | 0 | Open ; |
| 12 | 3091.7 | 127.05 | ; | 126 | 14 | 15 | 385.44 | 120 | 125 | 0 | Open ; |
| 13 | 3091.26 | 208.25 | ; | 127 | 15 | C-1 | 1779.36 | 120 | 125 | 0 | Open ; |
| 14 | 3091 | 382.34 | ; | 128 | C-1 | C-LAT | 818.4 | 120 | 125 | 0 | Open ; |
| 15 | 3088.82 | 25.2 | ; | 130 | C-2-1 | C-2-2 | 1351.68 | 28.04 | 135 | 0 | Open ; |
| C-1 | 3088.39 | 562.1 | ; | 131 | C-2-2 | C-3 | 538.56 | 28.04 | 135 | 0 | Open ; |
| C-LAT | 3066.42 | 0 | ; | 132 | C-3 | C-7 | 1409.76 | 28.04 | 135 | 0 | Open ; |
| C-2-1 | 3056.12 | 34.51 | ; | 133 | C-7 | C-10 | 855.36 | 28.04 | 135 | 0 | Open ; |
| C-2-2 | 3052.61 | 5.6 | ; | 134 | C-10 | C-5 | 1304.16 | 28.04 | 135 | 0 | Open ; |
| C-3 | 3051.47 | 6.3 | ; | 135 | C-5 | C-14-1 | 432.96 | 28.04 | 135 | 0 | Open ; |
| C-7 | 3040 | 36.4 | ; | 136 | C-14-1 | C-14-1-1 | 538.56 | 27.55 | 135 | 0 | Open ; |
| C-10 | 3030.13 | 9.8 | ; | 137 | C-14-1-1 | C-14-4 | 1605.12 | 25.72 | 135 | 0 | Open ; |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C-5 | 3028.88 | 725.55 | ;C-5/C-13/C-14 | 138 | C-14-4 | C-5-1 | 1958.88 | 25.72 | 135 | 0 | Open | ; |
| C-14-1 | 3027.72 | 68.6 | ; | 139 | C-5-1 | C-16 | 533.28 | 25.72 | 135 | 0 | Open | ; |
| C-14-1-1 | 3020.39 | 52.29 | ; | 140 | C-16 | C-16-1 | 68.64 | 25.72 | 135 | 0 | Open | ; |
| C-14-4 | 3011.07 | 16.31 | ; | 141 | C-16-1 | C-19 | 1188 | 25.72 | 135 | 0 | Open | ; |
| C-5-1 | 3005.02 | 6.58 | ; | 142 | C-19 | C-9 | 1473.12 | 23.38 | 135 | 0 | Open | ; |
| C-16 | 3003.48 | 21 | ; | 143 | C-9 | C-9-1 | 2030.11 | 16.18 | 135 | 0 | Open | ; |
| C-16-1 | 3003.6 | 397.39 | ;C-16-1/C-6 | 144 | C-9-1 | C-9-3 | 2291.52 | 14.38 | 135 | 0 | Open | ; |
| C-19 | 2998.12 | 1047.97 | ;C-19/C-8 | 145 | C-9 | C-20 | 7883.04 | 17.98 | 135 | 0 | Open | ; |
| C-9 | 2985.24 | 0 | ; | 146 | C-20 | C-11 | 860.64 | 15.99 | 135 | 0 | Open | ; |
| C-9-1 | 2980.57 | 907.76 | ;C-9-1/C-9-2 | 148 | | 21 E | 4329.6 | 120 | 125 | 0 | Open | ; |
| C-9-3 | 2965.14 | 1904.91 | ; | 149 | E | E-3 | 2370.72 | 26.26 | 135 | 0 | Open | ; |
| C-20 | 2938.57 | 308 | ; | 151 | | 26 D | 2571.36 | 120 | 125 | 0 | Open | ; |
| C-11 | 2930.42 | 3086.51 | ;C-11/C-21 | 152 | D | 28-1 | 2972.64 | 120 | 125 | 0 | Open | ; |
| 21 | 3020.27 | 132.51 | ;21/23 | 153 | 28-1 | F-LAT | 258.72 | 120 | 125 | 0 | Open | ; |
| E | 3010 | 0 | ; | 154 | F-LAT | F-0 | 3146.69 | 57.86 | 135 | 0 | Open | ; |
| E-3 | 3004.11 | 2649.43 | ; | 155 | F-0 | F-1 | 1103.52 | 57.86 | 135 | 0 | Open | ; |
| 26 | 2988.04 | 119.7 | ; | 157 | F-1 | F-0-1 | 10.56 | 57.86 | 135 | 0 | Open | ; |
| D | 2983.57 | 913.29 | ;D/27 | 159 | F-0-2 | F-4 | 142.56 | 57.86 | 135 | 0 | Open | ; |
| 28-1 | 2980 | 14 | ; | 160 | F-4 | F-2 | 10.56 | 57.86 | 135 | 0 | Open | ; |
| F-LAT | 2978.28 | 0 | ; | 161 | F-2 | F-5 | 1325.28 | 57.86 | 135 | 0 | Open | ; |
| F-0 | 2971.95 | 74.9 | ; | 162 | F-5 | F-7 | 1372.8 | 57.86 | 135 | 0 | Open | ; |
| F-1 | 2967.74 | 1281.35 | ; | 163 | F-7 | F-7-0 | 7519.71 | 57.86 | 135 | 0 | Open | ; |
| F-0-1 | 2967.74 | 81.9 | ; | 164 | F-7-0 | F-7-1 | 802.56 | 57.86 | 135 | 0 | Open | ; |
| F-0-2 | 2962.33 | 28 | ; | 165 | F-7-1 | F-8 | 1283.04 | 57.86 | 135 | 0 | Open | ; |
| F-4 | 2962.32 | 247.1 | ; | 166 | F-8 | F-9 | 1705.44 | 57.86 | 135 | 0 | Open | ; |
| F-2 | 2962.16 | 49 | ; | 167 | F-9 | F-9-1 | 607.2 | 57.86 | 135 | 0 | Open | ; |
| F-5 | 2955.46 | 133 | ; | 168 | F-9-1 | F-10 | 675.84 | 57.86 | 135 | 0 | Open | ; |
| F-7 | 2953.07 | 49 | ; | 169 | F-10 | F-10-1 | 601.92 | 57.86 | 135 | 0 | Open | ; |
| F-7-0 | 2951.67 | 105 | ; | 170 | F-10-1 | F-3 | 5.28 | 57.86 | 135 | 0 | Open | ; |
| F-7-1 | 2950.79 | 58.1 | ; | 171 | F-3 | F-11 | 950.4 | 57.86 | 135 | 0 | Open | ; |
| F-8 | 2949.51 | 167.3 | ; | 173 | H-LAT | F-12 | 728.64 | 44.86 | 135 | 0 | Open | ; |
| F-9 | 2948 | 18.9 | ; | 174 | F-12 | H-0-1 | 295.68 | 44.86 | 135 | 0 | Open | ; |
| F-9-1 | 2946.96 | 543.06 | ; | 175 | H-0-1 | H-2 | 1251.36 | 44.86 | 135 | 0 | Open | ; |
| F-10 | 2945.98 | 306.6 | ; | 176 | H-2 | H-2-1 | 216.48 | 44.86 | 135 | 0 | Open | ; |
| F-10-1 | 2945.51 | 185.5 | ; | 177 | H-2-1 | H-3 | 1399.2 | 44.86 | 135 | 0 | Open | ; |
| F-3 | 2945.51 | 157.5 | ; | 178 | H-3 | H-3-1 | 1668.48 | 44.86 | 135 | 0 | Open | ; |
| F-11 | 2908.07 | 343 | ; | 179 | H-3-1 | H-4 | 158.4 | 44.86 | 135 | 0 | Open | ; |
| H-LAT | 2904.6 | 0 | ;H/F-12 | 180 | H-4 | H-5 | 15.84 | 44.86 | 135 | 0 | Open | ; |
| F-12 | 2895.4 | 21 | ; | 181 | H-5 | H-6 | 528 | 44.86 | 135 | 0 | Open | ; |
| H-0-1 | 2891.82 | 23.8 | ; | 182 | H-6 | H-7 | 2180.64 | 44.86 | 135 | 0 | Open | ; |
| H-2 | 2892.82 | 87.5 | ; | 183 | H-7 | H-7-0 | 533.28 | 44.86 | 135 | 0 | Open | ; |
| H-2-1 | 2891.18 | 382.9 | ; | 184 | H-7-0 | H-7-2 | 295.68 | 44.86 | 135 | 0 | Open | ; |
| H-3 | 2881.32 | 58.1 | ; | 185 | H-7-2 | H-7-1 | 21.12 | 44.86 | 135 | 0 | Open | ; |
| H-3-1 | 2881.95 | 14 | ; | 186 | H-7-1 | H-7-2-1 | 285.12 | 44.86 | 135 | 0 | Open | ; |
| H-4 | 2880.88 | 220.36 | ; | 187 | H-7-2-1 | H-7-3 | 739.2 | 44.86 | 135 | 0 | Open | ; |
| H-5 | 2880.88 | 303.52 | ; | 188 | H-7-3 | H-7-4 | 686.4 | 44.86 | 135 | 0 | Open | ; |
| H-6 | 2879.8 | 702.1 | ; | 189 | H-7-4 | H-7-5 | 121.44 | 44.86 | 135 | 0 | Open | ; |
| H-7 | 2865.46 | 4.76 | ; | 190 | H-7-5 | H-8 | 411.84 | 44.86 | 135 | 0 | Open | ; |
| H-7-0 | 2865.34 | 8.89 | ; | 191 | H-8 | H-9 | 2698.08 | 44.86 | 135 | 0 | Open | ; |
| H-7-2 | 2864.16 | 45.01 | ; | 192 | H-9 | H-9-1 | 5.28 | 44.86 | 135 | 0 | Open | ; |
| H-7-1 | 2864.16 | 4.9 | ; | 193 | H-9-1 | H-12 | 2376 | 44.86 | 135 | 0 | Open | ; |
| H-7-2-1 | 2862.78 | 45.01 | ; | 194 | H-12 | H-12-3 | 3334.32 | 25.72 | 135 | 0 | Open | ; |
| H-7-3 | 2863.27 | 37.66 | ; | 195 | H-12-3 | H-12-5 | 575.52 | 25.72 | 135 | 0 | Open | ; |
| H-7-4 | 2862.59 | 96.25 | ; | 196 | H-12-5 | H-12-6 | 2069.76 | 23.88 | 135 | 0 | Open | ; |
| H-7-5 | 2861.88 | 28.91 | ; | 197 | H-12-6 | H-12-6-1 | 5291.94 | 23.38 | 135 | 0 | Open | ; |
| H-8 | 2861.36 | 1391.88 | ; | 198 | H-12-6-1 | H-12-6-1-2 | 749.76 | 23.38 | 135 | 0 | Open | ; |
| H-9 | 2844.74 | 332.36 | ; | 199 | H-12-6-1-2 | H-12-6-1-3 | 1452 | 21.58 | 135 | 0 | Open | ; |
| H-9-1 | 2844.74 | 68.6 | ; | 200 | H-12-6-1-3 | H-12-6-2 | 1795.2 | 21.58 | 135 | 0 | Open | ; |
| H-12 | 2827.14 | 0 | ; | 202 | H-12 | H-9-2 | 84.48 | 33.06 | 135 | 0 | Open | ; |
| H-12-3 | 2814.61 | 1381.66 | ; | 203 | H-9-2 | H-10 | 121.44 | 33.06 | 135 | 0 | Open | ; |
| H-12-5 | 2814.33 | 545.16 | ; | 204 | H-10 | H-10-1 | 10.56 | 33.06 | 135 | 0 | Open | ; |
| H-12-6 | 2793.67 | 0 | ; | 205 | H-10-1 | H-11 | 264 | 33.06 | 135 | 0 | Open | ; |
| H-12-6-1 | 2771.26 | 609.84 | ; | 206 | H-11 | H-13 | 580.8 | 33.06 | 135 | 0 | Open | ; |
| H-12-6-1-2 | 2767.82 | 182.35 | ; | 207 | H-13 | H-13-0 | 348.48 | 33.06 | 135 | 0 | Open | ; |
| H-12-6-1-3 | 2766.39 | 25.2 | ; | 208 | H-13-0 | H-13-0-1 | 184.8 | 33.06 | 135 | 0 | Open | ; |
| H-12-6-2 | 2765.12 | 1731.87 | ; | 209 | H-13-0-1 | H-14 | 348.48 | 33.06 | 135 | 0 | Open | ; |
| H-9-2 | 2826.12 | 215.25 | ; | 210 | H-14 | H-14-2 | 1525.92 | 18.37 | 135 | 0 | Open | ; |
| H-10 | 2826.17 | 98 | ; | 211 | H-14-2 | H-14-1-3 | 2999.04 | 18.37 | 135 | 0 | Open | ; |
| H-10-1 | 2826.16 | 157.5 | ; | 212 | H-14-1-3 | H-14-1-5 | 374.88 | 14.7 | 135 | 0 | Open | ; |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| H-11 | 2826.24 | 642.6 | ;H-11/H-10-2 | 213 | H-14-1-5 | H-14-1-5-1 | 348.48 | 14.7 | 135 | 0 | Open | ; |
| H-13 | 2825.37 | 0 | ; | 214 | H-14 | H-13-1 | 10.56 | 27.55 | 135 | 0 | Open | ; |
| H-13-0 | 2825.39 | 7 | ; | 215 | H-13-1 | H-15 | 1937.76 | 27.55 | 135 | 0 | Open | ; |
| H-13-0-1 | 2825.21 | 10.5 | ; | 216 | H-15 | H-15-1 | 264 | 27.55 | 135 | 0 | Open | ; |
| H-14 | 2823.97 | 0 | ; | 217 | H-15-1 | H-16 | 1752.96 | 25.72 | 135 | 0 | Open | ; |
| H-14-2 | 2814.93 | 593.6 | ; | 218 | H-16 | H-16-1 | 897.6 | 25.72 | 135 | 0 | Open | ; |
| H-14-1-3 | 2810 | 784.77 | ; | 219 | H-16-1 | H-17 | 401.28 | 25.72 | 135 | 0 | Open | ; |
| H-14-1-5 | 2808 | 63 | ; | 220 | H-17 | H-18 | 564.96 | 23.88 | 135 | 0 | Open | ; |
| H-14-1-5-1 | 2805 | 2192.05 | ; | 221 | H-18 | H-18-1 | 718.08 | 16.18 | 135 | 0 | Open | ; |
| H-13-1 | 2824.56 | 297.08 | ; | 222 | H-18-1 | H-18-2 | 184.8 | 14.38 | 135 | 0 | Open | ; |
| H-15 | 2822.86 | 497 | ; | 223 | H-18-2 | H-18-3 | 528 | 14.38 | 135 | 0 | Open | ; |
| H-15-1 | 2821.86 | 74.34 | ; | 224 | H-18 | H-19 | 10.56 | 18.37 | 135 | 0 | Open | ; |
| H-16 | 2818.36 | 148.4 | ; | 225 | H-19 | H-19-0 | 723.36 | 17.98 | 135 | 0 | Open | ; |
| H-16-1 | 2805.12 | 222.95 | ; | 226 | H-19-0 | H-19-1 | 966.24 | 17.98 | 135 | 0 | Open | ; |
| H-17 | 2805.25 | 677.88 | ; | 227 | H-19-1 | H-20-1 | 607.2 | 17.98 | 135 | 0 | Open | ; |
| H-18 | 2797.58 | 0 | ; | 228 | H-20-1 | H-21 | 1636.8 | 17.98 | 135 | 0 | Open | ; |
| H-18-1 | 2793.88 | 307.72 | ; | 229 | H-21 | H-22 | 1462.56 | 15.99 | 135 | 0 | Open | ; |
| H-18-2 | 2793.35 | 0 | ; | 230 | H-22 | H-23 | 300.96 | 15.99 | 135 | 0 | Open | ; |
| H-18-3 | 2793.4 | 2313.5 | ;H-18-3/H-18-4 | 231 | H-23 | H-#3 | 818.4 | 15.99 | 135 | 0 | Open | ; |
| H-19 | 2797.87 | 0 | ; | 232 | H-LAT | H-1 | 2867.04 | 25.72 | 135 | 0 | Open | ; |
| H-19-0 | 2792.08 | 14 | ; | 233 | H-1 | H-1-1 | 2813.27 | 16.53 | 135 | 0 | Open | ; |
| H-19-1 | 2791.06 | 49 | ; | 234 | H-1-1 | H-1-2 | 190.08 | 14.7 | 135 | 0 | Open | ; |
| H-20-1 | 2786.73 | 45.22 | ; | 235 | H-1-2 | H-1-3 | 242.88 | 14.7 | 135 | 0 | Open | ; |
| H-21 | 2763.77 | 435.4 | ; | 236 | H-1-3 | H-1-4 | 924 | 14.7 | 135 | 0 | Open | ; |
| H-22 | 2745.34 | 21 | ; | 237 | H-1-4 | H-1-4-1 | 1182.72 | 14.38 | 135 | 0 | Open | ; |
| H-23 | 2745.16 | 12.6 | ; | 238 | H-1-4-1 | H-1-5 | 21.12 | 14.38 | 135 | 0 | Open | ; |
| H-#3 | 2739.99 | 2947 | ; | 239 | H-1-5 | H-1-5-1 | 564.96 | 14.38 | 135 | 0 | Open | ; |
| H-1 | 2835.8 | 0 | ;H-1/F-#2 | 240 | H-1 | F-13 | 2698.08 | 22.04 | 135 | 0 | Open | ; |
| H-1-1 | 2827.91 | 14 | ; | 241 | F-13 | F-13-1 | 1547.04 | 22.04 | 135 | 0 | Open | ; |
| H-1-2 | 2825.82 | 40.6 | ; | 242 | F-13-1 | F-14 | 42.24 | 22.04 | 135 | 0 | Open | ; |
| H-1-3 | 2822.04 | 52.5 | ; | 243 | F-14 | F-6 | 1430.88 | 22.04 | 135 | 0 | Open | ; |
| H-1-4 | 2814.63 | 151.97 | ; | 244 | F-6 | F-6-1 | 881.76 | 18.37 | 135 | 0 | Open | ; |
| H-1-4-1 | 2795.65 | 21 | ; | 245 | F-6-1 | F-6-2 | 670.56 | 18.37 | 135 | 0 | Open | ; |
| H-1-5 | 2795.35 | 147 | ; | 246 | F-6-2 | F-6-4 | 696.96 | 16.18 | 135 | 0 | Open | ; |
| H-1-5-1 | 2794.08 | 2265.41 | ; | 247 | F-6-4 | F-6-6 | 5.28 | 16.18 | 135 | 0 | Open | ; |
| F-13 | 2817.73 | 79.8 | ; | 248 | F-6-6 | F-6-7 | 1710.72 | 16.18 | 135 | 0 | Open | ; |
| F-13-1 | 2812.14 | 130.2 | ; | 249 | F-6 | F-15-1 | 5.28 | 12.86 | 135 | 0 | Open | ; |
| F-14 | 2812.9 | 502.6 | ; | 250 | F-15-1 | F-16 | 1752.96 | 12.86 | 135 | 0 | Open | ; |
| F-6 | 2810.36 | 0 | ; | 251 | F-16 | F-17 | 512.16 | 6.08 | 135 | 0 | Open | ; |
| F-6-1 | 2800 | 350 | ; | 252 | F-17 | F-18 | 1235.52 | 4.05 | 135 | 0 | Open | ; |
| F-6-2 | 2779.16 | 412.65 | ; | 253 | F-LAT | 32 | 3933.6 | 114 | 125 | 0 | Open | ; |
| F-6-4 | 2775.85 | 308 | ; | 254 | 32 | 33 | 512.16 | 114 | 125 | 0 | Open | ; |
| F-6-6 | 2775.85 | 222.6 | ; | 255 | 33 | G-LAT | 1103.52 | 114 | 125 | 0 | Open | ; |
| F-6-7 | 2769.45 | 2574.25 | ; | 256 | G-LAT | 34 | 2499.63 | 27.55 | 135 | 0 | Open | ; |
| F-15-1 | 2810.36 | 332.5 | ; | 257 | 34 | G-3 | 1066.56 | 25.72 | 135 | 0 | Open | ; |
| F-16 | 2808.27 | 49 | ; | 258 | G-3 | G-4 | 1214.4 | 25.72 | 135 | 0 | Open | ; |
| F-17 | 2805.67 | 146.3 | ; | 259 | G-4 | G-6 | 871.2 | 18.37 | 135 | 0 | Open | ; |
| F-18 | 2769.07 | 186.55 | ; | 260 | G-6 | G-7 | 1161.6 | 18.37 | 135 | 0 | Open | ; |
| 32 | 2975.02 | 520.1 | ; | 261 | G-7 | G-8 | 929.28 | 17.98 | 135 | 0 | Open | ; |
| 33 | 2972.33 | 481.39 | ; | 262 | G-8 | G-9 | 417.12 | 16.18 | 135 | 0 | Open | ; |
| G-LAT | 2971.89 | 0 | ; | 263 | G-9 | G-9-2 | 84.48 | 14.38 | 135 | 0 | Open | ; |
| 34 | 2971.01 | 91.7 | ; | 264 | G-9-2 | G-9-3 | 353.76 | 14.38 | 135 | 0 | Open | ; |
| G-3 | 2969.1 | 113.75 | ; | 265 | G-9-3 | G-10 | 633.6 | 14.38 | 135 | 0 | Open | ; |
| G-4 | 2961.61 | 3822.35 | ;G-4/G-5/G-2 | 266 | G-LAT | 34-1 | 675.84 | 114 | 125 | 0 | Open | ; |
| G-6 | 2951.45 | 11.9 | ; | 267 | 34-1 | 34-2 | 1135.2 | 108 | 125 | 0 | Open | ; |
| G-7 | 2950.2 | 187.6 | ; | 268 | 34-2 | 35-1 | 374.88 | 108 | 125 | 0 | Open | ; |
| G-8 | 2947.56 | 204.4 | ; | 269 | 35-1 | 35 | 36.96 | 108 | 125 | 0 | Open | ; |
| G-9 | 2944.3 | 659.4 | ; | 270 | 35 | 35-2 | 522.72 | 108 | 125 | 0 | Open | ; |
| G-9-2 | 2943.4 | 14 | ; | 271 | 35-2 | 36 | 427.68 | 108 | 125 | 0 | Open | ; |
| G-9-3 | 2940.8 | 34.3 | ; | 272 | 36 | 37 | 1948.32 | 108 | 125 | 0 | Open | ; |
| G-10 | 2940.02 | 2340.17 | ; | 273 | 37 | 38 | 997.92 | 108 | 125 | 0 | Open | ; |
| 34-1 | 2970.32 | 56 | ; | 274 | 38 | 39 | 839.52 | 108 | 125 | 0 | Open | ; |
| 34-2 | 2968.47 | 62.02 | ; | 275 | 39 | 40 | 1272.48 | 108 | 125 | 0 | Open | ; |
| 35-1 | 2969.63 | 14 | ; | 276 | 40 | 41 | 807.84 | 108 | 125 | 0 | Open | ; |
| 35 | 2969.62 | 200.2 | ; | 277 | 41 | 42 | 1620.96 | 108 | 125 | 0 | Open | ; |
| 35-2 | 2969.1 | 24.5 | ; | 278 | 42 | 44 | 918.72 | 108 | 125 | 0 | Open | ; |
| 36 | 2965.45 | 129.5 | ; | 279 | 44 | 45 | 1066.56 | 108 | 125 | 0 | Open | ; |
| 37 | 2960.98 | 245 | ; | 280 | 45 | 45-0 | 596.64 | 108 | 125 | 0 | Open | ; |
| 38 | 2959.87 | 2015.58 | ;38/I | 281 | 45-0 | 45-1 | 380.16 | 108 | 125 | 0 | Open | ; |

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|---|---|---|---|---|
| | 39 | 2959.27 | 251.72 | ; |
| | 40 | 2956.7 | 44.8 | ; |
| | 41 | 2956.26 | 123.2 | ; |
| | 42 | 2954.87 | 228.2 | ; |
| | 44 | 2953.71 | 37.8 | ; |
| | 45 | 2953.95 | 30.1 | ; |
| 45-0 | | 2953.01 | 42 | ; |
| 45-1 | | 2952.98 | 7 | ; |
| J-LAT | | 2953.1 | 0 | ;J/46/47 |
| | 46 | 2952.63 | 448.7 | ;46/47 |
| J-0 | | 2943.56 | 27.3 | ; |
| J-0-1 | | 2942.61 | 10.5 | ; |
| J-1 | | 2942.49 | 87.5 | ; |
| J-2 | | 2942.18 | 165.9 | ; |
| J-3 | | 2943.05 | 1950.76 | ; |
| J-5 | | 2940.57 | 157.57 | ; |
| J-5-1 | | 2931.59 | 270.48 | ; |
| J-7 | | 2919.02 | 514.99 | ; |
| J-8 | | 2919.02 | 336 | ; |
| J-6 | | 2914.31 | 1463.63 | ; |
| J-9 | | 2914.71 | 214.9 | ; |
| J-10 | | 2877.22 | 98.7 | ; |
| J-11 | | 2864.29 | 158.9 | ; |
| J-13 | | 2859.17 | 125.16 | ; |
| J-14 | | 2850 | 273 | ; |
| J-14-1 | | 2820.19 | 24.5 | ; |
| J-15 | | 2819.44 | 0 | ; |
| J-16 | | 2818.07 | 547.4 | ; |
| J-12 | | 2810.08 | 2778.44 | ; |
| | 48 | 2950.75 | 205.8 | ; |
| 48-0 | | 2950.97 | 84 | ; |
| 48-1 | | 2950.2 | 70 | ; |
| | 49 | 2947.45 | 128.1 | ; |
| 49-1 | | 2947.71 | 44.45 | ; |
| | 50 | 2946.99 | 107.8 | ; |
| | 51 | 2946.99 | 2408.14 | ;51/K |
| | 53 | 2933.41 | 151.9 | ; |
| 53-1 | | 2932.72 | 26.6 | ;53-1/54 |
| | 55 | 2928.95 | 58.1 | ; |
| L-LAT | | 2929.09 | 0 | ;L/56/57 |
| | 56 | 2928.16 | 433.3 | ;56/57 |
| L-1 | | 2919 | 2054.36 | ; |
| L-3 | | 2919.16 | 102.55 | ; |
| L-2 | | 2919.48 | 240.03 | ; |
| L-5 | | 2916.95 | 14 | ; |
| L-6 | | 2917.79 | 130.97 | ; |
| L-6-1 | | 2917 | 14 | ; |
| L-6-2 | | 2916.76 | 49 | ; |
| L-7 | | 2915.81 | 2732.38 | ; |
| | 58 | 2929.48 | 91 | ; |
| | 60 | 2923.46 | 98 | ;60/61 |
| | 63 | 2917.62 | 63 | ; |
| 65/LP | | 2903.24 | 20761.5 | ; |
| NUID | | 2903.24 | 89800 | ; |
| RRpipe | | 3010 | 0 | ; |
| RRend | | 3000 | 0 | ; |
| Hydro1 | | 3407.6 | 0 | ; |
| JRhyd | | 3299.5 | 0 | ; |
| Hyd2 | | 3070 | 0 | ; |
| Hydro3 | | 3066 | 0 | ; |
| Hydro4 | | 3020 | 0 | ; |
| H-12-7 | | 2793.69 | 3506.37 | ; |
| Hydro6 | | 2912 | 0 | ; |
| Hydro7 | | 2903 | 0 | ; |

[RESERVOIRS]

| ;ID | Head | Pattern |
|---|---|---|
| 1 | 3550.42 | ; |

[PIPES]

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 282 | 45-1 | J-LAT | 42.24 | 108 | 125 | 0 | Open | ; |
| 283 | J-LAT | 46 | 2476.23 | 29.39 | 135 | 0 | Open | ; |
| 284 | 46 | J-0 | 702.24 | 28.73 | 135 | 0 | Open | ; |
| 285 | J-0 | J-0-1 | 924 | 28.73 | 135 | 0 | Open | ; |
| 286 | J-0-1 | J-1 | 686.4 | 28.73 | 135 | 0 | Open | ; |
| 287 | J-1 | J-2 | 1013.76 | 28.73 | 135 | 0 | Open | ; |
| 288 | J-2 | J-3 | 528 | 28.73 | 135 | 0 | Open | ; |
| 289 | J-3 | J-5 | 675.84 | 25.17 | 135 | 0 | Open | ; |
| 290 | J-5 | J-5-1 | 1816.32 | 25.17 | 135 | 0 | Open | ; |
| 291 | J-5-1 | J-7 | 1853.28 | 25.17 | 135 | 0 | Open | ; |
| 292 | J-7 | J-8 | 5.28 | 25.17 | 135 | 0 | Open | ; |
| 293 | J-8 | J-6 | 1415.04 | 21.58 | 135 | 0 | Open | ; |
| 294 | J-6 | J-9 | 79.2 | 21.58 | 135 | 0 | Open | ; |
| 296 | J-10 | J-11 | 1114.08 | 18.37 | 135 | 0 | Open | ; |
| 297 | J-11 | J-13 | 1186.82 | 18.37 | 135 | 0 | Open | ; |
| 298 | J-13 | J-14 | 744.48 | 18.37 | 135 | 0 | Open | ; |
| 299 | J-14 | J-14-1 | 1742.4 | 17.98 | 135 | 0 | Open | ; |
| 300 | J-14-1 | J-15 | 100.32 | 17.98 | 135 | 0 | Open | ; |
| 301 | J-15 | J-16 | 100.32 | 17.98 | 135 | 0 | Open | ; |
| 302 | J-16 | J-12 | 1795.2 | 16.18 | 135 | 0 | Open | ; |
| 303 | J-LAT | 48 | 1124.64 | 108 | 125 | 0 | Open | ; |
| 304 | 48 | 48-0 | 26.4 | 108 | 125 | 0 | Open | ; |
| 305 | 48-0 | 48-1 | 1040.16 | 102 | 125 | 0 | Open | ; |
| 306 | 48-1 | 49 | 1103.52 | 102 | 125 | 0 | Open | ; |
| 307 | 49 | 49-1 | 380.16 | 102 | 125 | 0 | Open | ; |
| 308 | 49-1 | 50 | 432.96 | 102 | 125 | 0 | Open | ; |
| 309 | 50 | 51 | 26.4 | 102 | 125 | 0 | Open | ; |
| 310 | 51 | 53 | 1415.04 | 102 | 125 | 0 | Open | ; |
| 311 | 53 | 53-1 | 1246.08 | 102 | 125 | 0 | Open | ; |
| 312 | 53-1 | 55 | 1541.76 | 102 | 125 | 0 | Open | ; |
| 313 | 55 | L-LAT | 31.68 | 102 | 125 | 0 | Open | ; |
| 314 | L-LAT | 56 | 2150.49 | 22.44 | 135 | 0 | Open | ; |
| 315 | 56 | L-1 | 1552.32 | 22.44 | 135 | 0 | Open | ; |
| 316 | L-1 | L-3 | 5.28 | 16.83 | 135 | 0 | Open | ; |
| 317 | L-3 | L-2 | 5.28 | 16.83 | 135 | 0 | Open | ; |
| 318 | L-2 | L-5 | 718.08 | 16.83 | 135 | 0 | Open | ; |
| 319 | L-5 | L-6 | 623.04 | 16.83 | 135 | 0 | Open | ; |
| 320 | L-6 | L-6-1 | 221.76 | 16.83 | 135 | 0 | Open | ; |
| 321 | L-6-1 | L-6-2 | 586.08 | 14.96 | 135 | 0 | Open | ; |
| 322 | L-6-2 | L-7 | 623.04 | 14.96 | 135 | 0 | Open | ; |
| 323 | L-LAT | 58 | 31.68 | 102 | 125 | 0 | Open | ; |
| 324 | 58 | 60 | 1446.72 | 102 | 125 | 0 | Open | ; |
| 325 | 60 | 63 | 976.8 | 102 | 125 | 0 | Open | ; |
| 326 | 63 | 65/LP | 1404.48 | 102 | 125 | 0 | Open | ; |
| 328 | E | RRpipe | 7 | 114 | 125 | 0 | Open | ; |
| 329 | RRpipe | RRend | 5963 | 96 | 125 | 0 | Open | ; |
| 330 | RRend | 26 | 1020.72 | 120 | 125 | 0 | Open | ; |
| 11 | 36951 | Hydro1 | 397 | 120 | 125 | 0 | Open | ; |
| 15 | A-12 | JRhyd | 1000 | 108 | 125 | 0 | Open | ; |
| 82 | B-0-3-1 | Hyd2 | 1972.24 | 32.37 | 135 | 0 | Open | ; |
| 129 | Hydro3 | C-2-1 | 1779 | 28.04 | 135 | 0 | Open | ; |
| 147 | C-LAT | Hydro4 | 6700 | 120 | 125 | 0 | Open | ; |
| 172 | H-12-6 | H-12-7 | 15 | 18.37 | 135 | 0 | Open | ; |
| 201 | Hydro6 | J-10 | 1764.21 | 18.7 | 135 | 0 | Open | ; |
| 295 | 65/LP | Hydro7 | 350 | 102 | 125 | 0 | Open | ; |
| 327 | F-0-1 | F-0-2 | 823.68 | 57.86 | 135 | 0 | Open | ; |

[TANKS]
;ID Elevation InitLevel MinLevel MaxLevel Diameter MinVol VolCurve

[PUMPS]
;ID Node1 Node2 Parameters

[VALVES]
;ID Node1 Node2 Diameter Type Setting MinorLoss
Hydro1 Hydro1 JRI 120 PRV 7.14 0 ;
JRhyd JRhyd JRIend 108 PRV 2 0 ;
150 Hyd2 B-3 32.37 PRV 50 0 ;
Hydro3 C-LAT Hydro3 28.04 PRV 45 0 ;
Hyd4 Hydro4 21 120 PRV 45 0 ;
Hydro5 F-11 H-LAT 57.86 PRV 30 0 ;
331 J-9 Hydro6 18.7 PRV 45 0 ;
Hydro7 Hydro7 NUID 102 PRV 1 0 ;

[TAGS]
LINK 154 2148.96

[DEMANDS]
;Junction Demand Pattern Category

[STATUS]
;ID Status/Setting

[PATTERNS]
;ID Multipliers

[CURVES]
;ID X-Value Y-Value

[CONTROLS]

[RULES]

[ENERGY]
Global Effi 75
Global Pri 0
Demand C 0

[EMITTERS]
;Junction Coefficient

[QUALITY]
;Node InitQual

[SOURCES]
;Node Type Quality Pattern

[REACTIONS]
;Type Pipe/Tank Coefficient

[REACTIONS]
Order Bull 1
Order Tan 1
Order Wa 1
Global Bul 0
Global Wa 0
Limiting P 0
Roughnes 0

[MIXING]
;Tank Model

[TIMES]
Duration 0
Hydraulic 0.041667

```
 Quality Ti  0.003472
 Pattern Ti  0.041667
 Pattern St          0
 Report Tir  0.041667
 Report Sta          0
 Start Cloc          0
 Statistic   None

[REPORT]
 Status      No
 Summary     No
 Page                0

[OPTIONS]
 Units       GPM
 Headloss    H-W
 Specific G          1
 Viscosity           1
 Trials             40
 Accuracy        0.001
 CHECKFRE            2
 MAXCHEC            10
 DAMPLIM             0
 Unbalance  Continue 10
 Pattern             1
 Demand M            1
 Emitter Ex        0.5
 Quality     None mg/L
 Diffusivity         1
 Tolerance        0.01

[COORDINATES]
;Node        X-Coord     Y-Coord
 A-4              10000   10987.68
 A-4-2            12000   14250.72
 A-4-7            12000    15470.4
 A-4-7-1          12000   18369.12
 A-4-8-2          12000   18627.84
 A-4-9            12000   18765.12
 A-4-10           12000   19134.72
          3       10000   15333.12
 3-1              10000   17534.88
 3-1-1            10000   19858.08
 JRI              10000    20255.8
 A-10             10000    25396.8
 3-2              10000   27424.32
 A-12             10000   28865.76
 JRIend           10000    33723.8
          4       10000   39536.64
 4-1              10000    40867.2
 A-16             10000    45592.8
 A-16-2           12000   48913.92
 A-16-3           12000   49325.76
 A-16-5           12000   52831.68
 A-16-6           12000   54426.24
 A-16-7           12000   54822.24
 A-16-7-1         12000   55012.32
 A-16-8-1         12000   55197.12
 A-16-9-1         12000   56268.96
 A-16-10-0        12000    56284.8
 A-16-10-1        12000   57008.16
 A-16-10-2        12000   57557.28
 A-16-11          12000   57594.24
 A-16-11-1        12000   58095.84
 A-16-11-0        12000   58201.44
 A-16-11-2        12000      59268
 A-16-12          12000   59405.28
 A-18             10000   48781.92
 4-2-1            10000   50323.68
```

| | | | |
|---|---|---|---|
| 4-3 | | 10000 | 51216 |
| | 5 | 10000 | 52726.08 |
| 5-1 | | 10000 | 55355.52 |
| A-21 | | 10000 | 56716.48 |
| | 6 | 8000 | 56791.68 |
| A-21-1 | | 8000 | 57689.28 |
| A-21-2 | | 8000 | 57694.56 |
| A-21-4 | | 8000 | 58481.28 |
| A-21-5 | | 8000 | 59167.68 |
| A-21-6 | | 8000 | 59611.2 |
| A-21-7 | | 8000 | 61596.48 |
| A-21-7-1 | | 8000 | 61823.52 |
| A-21-7-2 | | 8000 | 62525.76 |
| A-21-10-1 | | 8000 | 62546.88 |
| A-21-9 | | 8000 | 62562.72 |
| A-21-9-0-1 | | 8000 | 63196.32 |
| A-21-9-1 | | 8000 | 63814.08 |
| | 7 | 10000 | 56733.6 |
| | 8 | 10000 | 62694.72 |
| 8-1 | | 10000 | 66063.36 |
| 8-2 | | 10000 | 66300.96 |
| 8-3 | | 10000 | 66665.28 |
| | 9 | 10000 | 66929.28 |
| B-2 | | 10000 | 67420.32 |
| B-2-0 | | 4000 | 67515.36 |
| B-2-0-0 | | 4000 | 67811.04 |
| B-2-0-1 | | 4000 | 68159.52 |
| B-2-1 | | 4000 | 68455.2 |
| B-2-2 | | 4000 | 68655.84 |
| B-2-2-0 | | 4000 | 68935.68 |
| B-2-3 | | 4000 | 69331.68 |
| B-2-3-1 | | 4000 | 70086.72 |
| B-2-3-2 | | 4000 | 71074.08 |
| B-2-5 | | 4000 | 71633.76 |
| B-2-5-1 | | 4000 | 72124.8 |
| B-2-6 | | 4000 | 72293.76 |
| B-2-6-2 | | 4000 | 73355.04 |
| B-2-7 | | 4000 | 73846.08 |
| B-2-7-1 | | 4000 | 73983.36 |
| B-2-8 | | 4000 | 74490.24 |
| B-10-2 | | 4000 | 76771.2 |
| B-2-11 | | 4000 | 77404.8 |
| B-LAT | | 10000 | 70055.04 |
| B-0-1 | | 6000 | 81238.08 |
| B-0-3-1 | | 6000 | 85171.68 |
| B-3 | | 6000 | 87352.32 |
| B-4 | | 6000 | 89427.36 |
| B-4-1 | | 6000 | 89712.48 |
| B-6-1 | | 6000 | 90441.12 |
| B-5 | | 6000 | 91132.8 |
| B-8-2 | | 6000 | 91639.68 |
| B-9 | | 6000 | 92220.48 |
| B-12 | | 6000 | 92378.88 |
| B-7 | | 6000 | 92447.52 |
| B-7-0 | | 7000 | 92980.8 |
| B-7-1 | | 7000 | 93841.44 |
| B-7-1-0 | | 7000 | 94823.52 |
| B-7-2 | | 7000 | 97215.36 |
| B-13 | | 6000 | 94929.12 |
| B-15-1 | | 6000 | 96682.08 |
| B-16 | | 6000 | 97495.2 |
| B-16-1 | | 6000 | 98904.96 |
| B-10 | | 6000 | 99744.48 |
| B-18 | | 6000 | 99913.44 |
| B-19 | | 6000 | 99987.36 |
| B-19-0 | | 6000 | 100214.4 |
| B-11 | | 6000 | 100467.8 |
| B-19-1 | | 6000 | 100747.7 |
| B-19-1-1 | | 6000 | 102300 |

| | | | |
|---|---|---|---|
| B-19-2 | | 6000 | 103187 |
| B-19-3 | | 6000 | 103704.5 |
| B-19-4 | | 6000 | 103825.9 |
| B-21 | | 6000 | 104142.7 |
| B-22 | | 6000 | 108593.8 |
| B-22-1 | | 6000 | 109211.5 |
| B-23 | | 6000 | 109633.9 |
| B-23-1 | | 6000 | 110167.2 |
| B-25 | | 6000 | 111518.9 |
| B-24-4 | | 6000 | 111603.4 |
| B-26 | | 6000 | 112147.2 |
| 10/11 | | 10000 | 70060.32 |
| 11-1 | | 10000 | 72483.84 |
| 11-1-0 | | 10000 | 74479.68 |
| 11-1-1 | | 10000 | 75657.12 |
| 11-2 | | 10000 | 75678.24 |
| 11-3 | | 10000 | 76010.88 |
| | 12 | 10000 | 76713.12 |
| | 13 | 10000 | 76998.24 |
| | 14 | 10000 | 79574.88 |
| | 15 | 10000 | 79960.32 |
| C-1 | | 10000 | 81739.68 |
| C-LAT | | 10000 | 82558.08 |
| C-2-1 | | 8000 | 84337.44 |
| C-2-2 | | 8000 | 85689.12 |
| C-3 | | 8000 | 86227.68 |
| C-7 | | 8000 | 87637.44 |
| C-10 | | 8000 | 88492.8 |
| C-5 | | 8000 | 89796.96 |
| C-14-1 | | 8000 | 90229.92 |
| C-14-1-1 | | 8000 | 90768.48 |
| C-14-4 | | 8000 | 92373.6 |
| C-5-1 | | 8000 | 94332.48 |
| C-16 | | 8000 | 94865.76 |
| C-16-1 | | 8000 | 94934.4 |
| C-19 | | 8000 | 96122.4 |
| C-9 | | 8000 | 97595.52 |
| C-9-1 | | 7000 | 98640.96 |
| C-9-3 | | 7000 | 100932.5 |
| C-20 | | 8000 | 105478.6 |
| C-11 | | 8000 | 106339.2 |
| | 21 | 10000 | 89258.4 |
| E | | 10000 | 93588 |
| E-3 | | 12000 | 95958.72 |
| | 26 | 10000 | 100578.7 |
| D | | 10000 | 103150.1 |
| 28-1 | | 10000 | 106122.7 |
| F-LAT | | 10000 | 106381.4 |
| F-0 | | 9000 | 108530.4 |
| F-1 | | 9000 | 109633.9 |
| F-0-1 | | 9000 | 109644.5 |
| F-0-2 | | 9000 | 110468.2 |
| F-4 | | 9000 | 110610.7 |
| F-2 | | 9000 | 110621.3 |
| F-5 | | 9000 | 111946.6 |
| F-7 | | 9000 | 113319.4 |
| F-7-0 | | 2000 | 113868.5 |
| F-7-1 | | 2000 | 114671 |
| F-8 | | 2000 | 115954.1 |
| F-9 | | 2000 | 117659.5 |
| F-9-1 | | 2000 | 118266.7 |
| F-10 | | 2000 | 118942.6 |
| F-10-1 | | 2000 | 119544.5 |
| F-3 | | 2000 | 119549.8 |
| F-11 | | 2000 | 120500.2 |
| H-LAT | | 2000 | 120574.1 |
| F-12 | | 4000 | 121302.7 |
| H-0-1 | | 4000 | 121598.4 |
| H-2 | | 4000 | 122849.8 |

| | | |
|---|---|---|
| H-2-1 | 4000 | 123066.2 |
| H-3 | 4000 | 124465.4 |
| H-3-1 | 4000 | 126133.9 |
| H-4 | 4000 | 126292.3 |
| H-5 | 4000 | 126308.2 |
| H-6 | 4000 | 126836.2 |
| H-7 | 4000 | 129016.8 |
| H-7-0 | 4000 | 129550.1 |
| H-7-2 | 4000 | 129845.8 |
| H-7-1 | 4000 | 129866.9 |
| H-7-2-1 | 4000 | 130152 |
| H-7-3 | 4000 | 130891.2 |
| H-7-4 | 4000 | 131577.6 |
| H-7-5 | 4000 | 131699 |
| H-8 | 4000 | 132110.9 |
| H-9 | 4000 | 134809 |
| H-9-1 | 4000 | 134814.2 |
| H-12 | 4000 | 137190.2 |
| H-12-3 | 6000 | 138526.1 |
| H-12-5 | 6000 | 139101.6 |
| H-12-6 | 6000 | 141171.4 |
| H-12-6-1 | 8000 | 144471.4 |
| H-12-6-1-2 | 8000 | 145221.1 |
| H-12-6-1-3 | 8000 | 146673.1 |
| H-12-6-2 | 8000 | 148468.3 |
| H-9-2 | 4000 | 137274.7 |
| H-10 | 4000 | 137396.2 |
| H-10-1 | 4000 | 137406.7 |
| H-11 | 4000 | 137670.7 |
| H-13 | 4000 | 138251.5 |
| H-13-0 | 4000 | 138600 |
| H-13-0-1 | 4000 | 138784.8 |
| H-14 | 4000 | 139133.3 |
| H-14-2 | 5000 | 140659.2 |
| H-14-1-3 | 5000 | 143658.2 |
| H-14-1-5 | 5000 | 144033.1 |
| H-14-1-5-1 | 5000 | 144381.6 |
| H-13-1 | 4000 | 139143.8 |
| H-15 | 4000 | 141081.6 |
| H-15-1 | 4000 | 141345.6 |
| H-16 | 4000 | 143098.6 |
| H-16-1 | 4000 | 143996.2 |
| H-17 | 4000 | 144397.4 |
| H-18 | 4000 | 144962.4 |
| H-18-1 | 6000 | 145680.5 |
| H-18-2 | 6000 | 145865.3 |
| H-18-3 | 6000 | 146393.3 |
| H-19 | 4000 | 144973 |
| H-19-0 | 4000 | 145696.3 |
| H-19-1 | 4000 | 146662.6 |
| H-20-1 | 4000 | 147269.8 |
| H-21 | 4000 | 148906.6 |
| H-22 | 4000 | 150369.1 |
| H-23 | 4000 | 150670.1 |
| H-#3 | 4000 | 151488.5 |
| H-1 | 2000 | 123441.1 |
| H-1-1 | 3000 | 125246.9 |
| H-1-2 | 3000 | 125437 |
| H-1-3 | 3000 | 125679.8 |
| H-1-4 | 3000 | 126603.8 |
| H-1-4-1 | 3000 | 127786.6 |
| H-1-5 | 3000 | 127807.7 |
| H-1-5-1 | 3000 | 128372.6 |
| F-13 | 2000 | 126139.2 |
| F-13-1 | 2000 | 127686.2 |
| F-14 | 2000 | 127728.5 |
| F-6 | 2000 | 129159.4 |
| F-6-1 | 3000 | 130041.1 |
| F-6-2 | 3000 | 130711.7 |

| | | | |
|---|---|---|---|
| F-6-4 | | 3000 | 131408.6 |
| F-6-6 | | 3000 | 131413.9 |
| F-6-7 | | 3000 | 133124.6 |
| F-15-1 | | 2000 | 129164.6 |
| F-16 | | 2000 | 130917.6 |
| F-17 | | 2000 | 131429.8 |
| F-18 | | 2000 | 132665.3 |
| | 32 | 10000 | 110315 |
| | 33 | 10000 | 110827.2 |
| G-LAT | | 10000 | 111930.7 |
| | 34 | 12000 | 112405.9 |
| G-3 | | 12000 | 113472.5 |
| G-4 | | 12000 | 114686.9 |
| G-6 | | 12000 | 115558.1 |
| G-7 | | 12000 | 116719.7 |
| G-8 | | 12000 | 117649 |
| G-9 | | 12000 | 118066.1 |
| G-9-2 | | 12000 | 118150.6 |
| G-9-3 | | 12000 | 118504.3 |
| G-10 | | 12000 | 119137.9 |
| 34-1 | | 10000 | 112606.6 |
| 34-2 | | 10000 | 113741.8 |
| 35-1 | | 10000 | 114116.6 |
| | 35 | 10000 | 114153.6 |
| 35-2 | | 10000 | 114676.3 |
| | 36 | 10000 | 115104 |
| | 37 | 10000 | 117052.3 |
| | 38 | 10000 | 118050.2 |
| | 39 | 10000 | 118889.8 |
| | 40 | 10000 | 120162.2 |
| | 41 | 10000 | 120970.1 |
| | 42 | 10000 | 122591 |
| | 44 | 10000 | 123509.8 |
| | 45 | 10000 | 124576.3 |
| 45-0 | | 10000 | 125173 |
| 45-1 | | 10000 | 125553.1 |
| J-LAT | | 10000 | 125595.4 |
| | 46 | 8000 | 126091.7 |
| J-0 | | 8000 | 126793.9 |
| J-0-1 | | 8000 | 127717.9 |
| J-1 | | 8000 | 128404.3 |
| J-2 | | 8000 | 129418.1 |
| J-3 | | 8000 | 129946.1 |
| J-5 | | 8000 | 130621.9 |
| J-5-1 | | 8000 | 132438.2 |
| J-7 | | 8000 | 134291.5 |
| J-8 | | 8000 | 134296.8 |
| J-6 | | 8000 | 135711.8 |
| J-9 | | 8000 | 135791 |
| J-10 | | 8000 | 137739.4 |
| J-11 | | 8000 | 138853.4 |
| J-13 | | 9000 | 139043.5 |
| J-14 | | 9000 | 139788 |
| J-14-1 | | 9000 | 141530.4 |
| J-15 | | 9000 | 141630.7 |
| J-16 | | 9000 | 141731 |
| J-12 | | 9000 | 143526.2 |
| | 48 | 10000 | 126720 |
| 48-0 | | 10000 | 126746.4 |
| 48-1 | | 10000 | 127786.6 |
| | 49 | 10000 | 128890.1 |
| 49-1 | | 10000 | 129270.2 |
| | 50 | 10000 | 129703.2 |
| | 51 | 10000 | 129729.6 |
| | 53 | 10000 | 131144.6 |
| 53-1 | | 10000 | 132390.7 |
| | 55 | 10000 | 133932.5 |
| L-LAT | | 10000 | 133964.2 |
| | 56 | 12000 | 134112 |

```
 L-1              12000  135664.3
 L-3              12000  135669.6
 L-2              12000  135674.9
 L-5              12000    136393
 L-6              12000    137016
 L-6-1            12000  137237.8
 L-6-2            12000  137823.8
 L-7              12000  138446.9
         58       10000  133995.8
         60       10000  135442.6
         63       10000  136419.4
 65/LP            10000  137823.8
 NUID             10000  138185.6
 RRpipe           10000     93595
 RRend            10000     99558
 Hydro1           10000  20200.89
 JRhyd            10000  33103.48
 Hyd2              6000  87143.92
 Hydro3         9702.96  82562.96
 Hydro4           10000  88743.87
 H-12-7            6000  141187.2
 Hydro6            8000  135975.2
 Hydro7           10000  138103.2
          1           0  10987.68

[VERTICES]
;Link         X-Coord    Y-Coord
          2  11955.78  10969.39
         19  11955.78  45578.23
         41   8004.36  56716.69
         61   3981.52  67418.35
         80   6011.71  70054.41
         91   7002.88  92447.58
        143   7000.23  97610.74
        149  12001.29  93582.26
        154   9003.84  106379.9
        163    2001.6  113347.2
        173   4001.56  120576.5
        194   6002.19    137194
        197   7989.86  141169.3
        210   5008.35  139132.5
        221   5935.09  144963.3
        233   3000.75  123434.4
        244   3004.74  129146.3
        256   11998.3  111904.8
        283   8007.02  125608.5
        297   8998.53  138855.2
        314  12009.26  133971.1
        129   8002.28  82562.96

[LABELS]
;X-Coord        Y-Coord        Label & Anchor Node

[BACKDROP]
 DIMENSIC            0            0      20000     200000
 UNITS      Feet
 FILE
 OFFSET              0            0

[END]
```

# APPENDIX C
# PIPE BUDGET ESTIMATES FROM VENDORS

Northwest Pipe Company

Jeffrey S. Curl

Northwest Pipe Company

16585 Samuels Road
Zachary, LA 70791
Tel: 225-658-6166
Fax: 225-658-0947

# DELIVERED PRICE

| | |
|---|---|
| **Project Name:** | **Central Oregon Irrigation District- COC** |
| **Delivery Location:** | **Bend, OR** |

| | |
|---|---|
| **QUOTATION NO.:** | **0316-0116** |
| **DATE:** | **3/24/16** |

| Item # | Bid Item | QTY (Ft/Pcs) | Size [DN] (inch) | Description | Pressure Class [PN] (psi) | Stiffness Class [SN] (psi) | Pipe Length (ft) | DELIVERED Unit Price (USD) | Value (USD) |
|---|---|---|---|---|---|---|---|---|---|
| | | 17,553 | 48 | Flowtite FRP Pipe DN48 with Pressure Coupling, L=40ft Budgetary Pricing | 150 | 46 | 40 | $ 145.00 | $ 2,545,185.00 |
| | | 5,877 | 54 | Flowtite FRP Pipe DN54 with Pressure Coupling, L=40ft Budgetary Pricing | 150 | 46 | 40 | $ 215.00 | $ 1,263,555.00 |
| | | 10,312 | 64 | Flowtite FRP Pipe DN64 with Pressure Coupling, L=40ft Budgetary Pricing | 150 | 46 | 40 | $ 299.00 | $ 3,083,288.00 |
| | | 13,080 | 72 | Flowtite FRP Pipe DN72 with Pressure Coupling, L=40ft Budgetary Pricing | 150 | 46 | 40 | $ 339.00 | $ 4,434,120.00 |
| | | 3,934 | 84 | Flowtite FRP Pipe DN84 with Pressure Coupling, L=40ft Budgetary Pricing | 150 | 46 | 40 | $ 439.00 | $ 1,727,026.00 |
| | | 66,505 | 96 | Flowtite FRP Pipe DN96 with Pressure Coupling, L=40ft Budgetary Pricing | 150 | 46 | 40 | $ 489.00 | $ 32,520,945.00 |
| | | 14,398 | 102a | Flowtite FRP Pipe DN102 with Pressure Coupling, L=40ft, Budgetary Pricing | 150 | 72 | 40 | $ 595.00 | $ 8,566,810.00 |
| | | 31,417 | 108a | Flowtite FRP Pipe DN108 with Pressure Coupling, L=40ft, Budgetary Pricing | 150 | 72 | 40 | $ 650.00 | $ 20,421,050.00 |
| | | 28,344 | 114a | Flowtite FRP Pipe DN114 with Pressure Coupling, L=40ft, Budgetary Pricing | 150 | 72 | 40 | $ 689.00 | $ 19,529,016.00 |
| | | 28,629 | 120a | Flowtite FRP Pipe DN120 with Pressure Coupling, L=40ft, Budgetary Pricing | 150 | 72 | 40 | $ 725.00 | $ 20,756,025.00 |
| | | | | | | | | 40ft Option Pipe Subtotal | $ 114,847,020.00 |
| | **Option** | 17,553 | 48 | Flowtite FRP Pipe DN48 with Pressure Coupling, L=24ft Budgetary Pricing | 150 | 46 | 24 | $ 169.00 | $ 2,966,457.00 |
| | **Option** | 5,877 | 54 | Flowtite FRP Pipe DN54 with Pressure Coupling, L=24ft Budgetary Pricing | 150 | 46 | 24 | $ 269.00 | $ 1,580,913.00 |
| | **Option** | 10,312 | 64 | Flowtite FRP Pipe DN64 with Pressure Coupling, L=24ft Budgetary Pricing | 150 | 46 | 24 | $ 285.00 | $ 2,938,920.00 |
| | **Option** | 13,080 | 72 | Flowtite FRP Pipe DN72 with Pressure Coupling, L=24ft Budgetary Pricing | 150 | 46 | 24 | $ 319.00 | $ 4,172,520.00 |
| | **Option** | 3,934 | 84 | Flowtite FRP Pipe DN84 with Pressure Coupling, L=24ft Budgetary Pricing | 150 | 46 | 24 | $ 419.00 | $ 1,648,346.00 |
| | **Option** | 66,505 | 96 | Flowtite FRP Pipe DN96 with Pressure Coupling, L=24ft Budgetary Pricing | 150 | 46 | 24 | $ 475.00 | $ 31,589,875.00 |
| | **Option** | 14,398 | 102a | Flowtite FRP Pipe DN102 with Pressure Coupling, L=24ft, Budgetary Pricing | 150 | 72 | 24 | $ 575.00 | $ 8,278,850.00 |
| | **Option** | 31,417 | 108a | Flowtite FRP Pipe DN108 with Pressure Coupling, L=24ft, Budgetary Pricing | 150 | 72 | 24 | $ 625.00 | $ 19,635,625.00 |
| | **Option** | 28,344 | 114a | Flowtite FRP Pipe DN114 with Pressure Coupling, L=24ft, Budgetary Pricing | 150 | 72 | 24 | $ 675.00 | $ 19,132,200.00 |
| | **Option** | 28,629 | 120a | Flowtite FRP Pipe DN120 with Pressure Coupling, L=24ft, Budgetary Pricing | 150 | 72 | 24 | $ 705.00 | $ 20,183,445.00 |
| | | | | | | | | 24ft Option Pipe Subtotal | $ 112,127,151.00 |
| | | | | **FITTINGS AND ACCESSORIES** | | | | | |
| | | | | Flowtite FRP Fitting DN48 1-Miter (1-30 Deg) Bend | 150 | 46 | | $ 3,082.83 | |
| | | | | Flowtite FRP Fitting DN48 2-Miter (31-60 Deg) Bend | 150 | 46 | | $ 4,872.98 | |
| | | | | Flowtite FRP Fitting DN48 3-Miter (61-90 Deg) Bend | 150 | 46 | | $ 6,672.78 | |
| | | | | Flowtite FRP Fitting DN54 1-Miter (1-30 Deg) Bend | 150 | 46 | | $ 4,001.74 | |
| | | | | Flowtite FRP Fitting DN54 2-Miter (31-60 Deg) Bend | 150 | 46 | | $ 6,252.67 | |
| | | | | Flowtite FRP Fitting DN54 3-Miter (61-90 Deg) Bend | 150 | 46 | | $ 8,653.55 | |
| | | | | Flowtite FRP Fitting DN64 1-Miter (1-30 Deg) Bend | 150 | 46 | | $ 4,890.30 | |
| | | | | Flowtite FRP Fitting DN64 2-Miter (31-60 Deg) Bend | 150 | 46 | | $ 7,690.13 | |
| | | | | Flowtite FRP Fitting DN64 3-Miter (61-90 Deg) Bend | 150 | 46 | | $ 10,590.12 | |
| | | | | Flowtite FRP Fitting DN72 1-Miter (1-30 Deg) Bend | 150 | 46 | | $ 6,138.36 | |
| | | | | Flowtite FRP Fitting DN72 2-Miter (31-60 Deg) Bend | 150 | 46 | | $ 9,748.41 | |
| | | | | Flowtite FRP Fitting DN72 3-Miter (61-90 Deg) Bend | 150 | 46 | | $ 13,544.27 | |
| | | | | Flowtite FRP Fitting DN84 1-Miter (1-30 Deg) Bend | 150 | 46 | | $ 9,103.32 | |
| | | | | Flowtite FRP Fitting DN84 2-Miter (31-60 Deg) Bend | 150 | 46 | | $ 14,774.60 | |
| | | | | Flowtite FRP Fitting DN84 3-Miter (61-90 Deg) Bend | 150 | 46 | | $ 20,699.39 | |
| | | | | Flowtite FRP Fitting DN96 1-Miter (1-30 Deg) Bend | 150 | 46 | | $ 11,134.43 | |
| | | | | Flowtite FRP Fitting DN96 2-Miter (31-60 Deg) Bend | 150 | 46 | | $ 17,916.31 | |
| | | | | Flowtite FRP Fitting DN96 3-Miter (61-90 Deg) Bend | 150 | 46 | | $ 25,049.25 | |
| | | | | Flowtite FRP Fitting DN102 1-Miter (1-30 Deg) Bend | 150 | 46 | | $ 11,283.37 | |
| | | | | Flowtite FRP Fitting DN102 2-Miter (31-60 Deg) Bend | 150 | 46 | | $ 22,957.36 | |
| | | | | Flowtite FRP Fitting DN102 3-Miter (61-90 Deg) Bend | 150 | 46 | | $ 34,236.52 | |
| | | | | Flowtite FRP Fitting DN108 1-Miter (1-30 Deg) Bend | 150 | 46 | | $ 12,340.77 | |
| | | | | Flowtite FRP Fitting DN108 2-Miter (31-60 Deg) Bend | 150 | 46 | | $ 26,076.46 | |
| | | | | Flowtite FRP Fitting DN108 3-Miter (61-90 Deg) Bend | 150 | 46 | | $ 40,025.66 | |
| | | | | Flowtite FRP Fitting DN114 1-Miter (1-30 Deg) Bend | 150 | 46 | | $ 13,264.57 | |
| | | | | Flowtite FRP Fitting DN114 2-Miter (31-60 Deg) Bend | 150 | 46 | | $ 29,080.79 | |
| | | | | Flowtite FRP Fitting DN114 3-Miter (61-90 Deg) Bend | 150 | 46 | | $ 43,818.28 | |
| | | | | Flowtite FRP Fitting DN120 1-Miter (1-30 Deg) Bend | 150 | 46 | | $ 15,044.12 | |
| | | | | Flowtite FRP Fitting DN120 2-Miter (31-60 Deg) Bend | 150 | 46 | | $ 30,260.93 | |
| | | | | Flowtite FRP Fitting DN120 3-Miter (61-90 Deg) Bend | 150 | 46 | | $ 46,604.27 | |

**NOTES:** **Shop drawings will be provided in 2-4 weeks upon signed purchase order or quotation. The anticipated lead time for pipe is 8-12 weeks from receipt of approved submittal and shop drawings. Standard fittings available within 12-14 weeks. Flanges and third party items available within 14-16 weeks.**

**PRICE CALCULATION:**
1. Carriage Insurance Paid (CIP) "Inco terms 2000" Buyer to unload. Sales taxes or Customs Charges associated with export shipments are not included in the prices quoted. Where applicable such taxes will be charged in addition to the prices quoted.
2. Freight is subject to a rate pass-through, which will adjust for incremental rate increases due to increasing fuel costs.
3. The items quoted above are not for separate acceptance. Changes to the above items and quantities require revised unit prices.

**TERMS OF PAYMENT:** Terms - Net 30 calendar days from the date of invoice and no retainage. Interest on late payments at 1-½% (one and the half percent) each month. Condition of Sale in accordance with attached "Thompson Pipe Group - Flowtite. TERMS and CONDITION of SALE" (Thompson Pipe Group - Flowtite TCS).

**OFFERS VALID THRU:** This proposal expires in **30 days**.

**DELIVERY DATES:**
1. Delivery schedule to be mutually agreed upon at receipt of signed purchase order. Final delivery schedule has to be confirmed in writing by Thompson Pipe Group - Flowtite
2. The prices for deliveries exceeding (90) days are subject to adjustment.

**NOTES:**
1. All GRP Pipe material meets or exceeds the requirements of **ASTM D3262**, **D3517**, **D3754, or AWWA C950**.
2. All GRP joints (couplings) meet or exceed the requirements of **ASTM D 4161**.

**ACCEPTANCE:** Signature of Buyer constitutes acceptance of this quotation and all Thompson Pipe Group - Flowtite Terms and Conditions of sale. By accepting this proposal, Buyer agrees to b thereby contingent upon award of the applicable project.

**SPECIAL TESTINGS:** No special testing outside of the ASTM or standard production procedures are allowed unless explicitly outline in this quotation.

This quotation and the acceptance thereof by Buyer, for the supply and delivery of Thompson Pipe Group - Flowtite, goods and services and the subsequent acceptance and/or receipt of their goods and services are subject to "Thompson Pipe Group - Flowtite TERMS and CONDITIONS of SALE" (Thompson Pipe Group - Flowtite TCS), a summary of which is attached hereto as an integrated part of this Quotation. Thompson Pipe Group – Flowtite shall govern the contract of sale between suppliers: Thompson Pipe Group - Flowtite. and Buyer in respect of the Quotation save and except where Thompson Pipe Group - Flowtite, has expressly and specifically agreed, in writing, to any modification or addition thereto.

**Acceptance from Buyer**

Name: _____

Title: _____

Company: _____

Date: _____

**U.S. COMPOSITE PIPE SOUTH, LLC.**

Name: _____

Name: _____

**For additional information and quesitons regarding this quotation, please contact:**

**USCPS Regional Sales Manager**

THOMPSON PIPE GROUP FLOWTITE

18585 Samuels Road
Zachary, LA 70791
Tel: 225-658-6166
Fax: 225-658-0947

# DELIVERED PRICE

| | |
|---|---|
| **Project Name:** | **Central Oregon Irrigation District- PBC** |
| **Delivery Location:** | **Bend, OR** |

| | |
|---|---|
| **QUOTATION NO.:** | **0316-0115** |
| **DATE:** | **3/24/16** |

| Item # | Bid Item | QTY (Ft/Pcs) | Size [DN] (inch) | Description | Pressure Class [PN] (psi) | Stiffness Class [SN] (psi) | Pipe Length (ft) | DELIVERED Unit Price (USD) | Value (USD) |
|---|---|---|---|---|---|---|---|---|---|
| | | 16,617 | 48 | Flowtite FRP Pipe DN48 with Pressure Coupling, L=40ft | 150 | 46 | 40 | $ 145.00 | $ 2,409,465.00 |
| | | 22,088 | 64 | Flowtite FRP Pipe DN64 with Pressure Coupling, L=40ft | 150 | 46 | 40 | $ 299.00 | $ 6,604,312.00 |
| | | 5,963 | 96 | Flowtite FRP Pipe DN96 with Pressure Coupling, L=40ft | 150 | 46 | 40 | $ 499.00 | $ 2,975,537.00 |
| | | 11,428 | 102 | Flowtite FRP Pipe DN102 with Pressure Coupling, L=40ft, Budgetary Pricing | 150 | 72 | 40 | $ 599.00 | $ 6,845,372.00 |
| | | 23,750 | 108 | Flowtite FRP Pipe DN108 with Pressure Coupling, L=40ft, Budgetary Pricin | 150 | 72 | 40 | $ 650.00 | $ 15,437,500.00 |
| | | 6,233 | 114 | Flowtite FRP Pipe DN114 with Pressure Coupling, L=40ft, Budgetary Pricing | 150 | 72 | 40 | $ 695.00 | $ 4,331,935.00 |
| | | 75,955 | 120 | Flowtite FRP Pipe DN120 with Pressure Coupling, L=40ft, Budgetary Pricing | 150 | 72 | 40 | $ 725.00 | $ 55,067,375.00 |
| | | 10,988 | 132 | Flowtite FRP Pipe DN13 with Pressure Coupling, L=40ft, Budgetary Pricing | 250 | 72 | 40 | $ 850.00 | $ 9,339,800.00 |
| | | | | | | | 40ft Option Pipe Subtotal | | $ 103,011,296.00 |
| | **Option** | 16,617 | 48 | Flowtite FRP Pipe DN48 with Pressure Coupling, L=24ft | 150 | 46 | 24 | $ 159.00 | $ 2,642,103.00 |
| | **Option** | 22,088 | 64 | Flowtite FRP Pipe DN64 with Pressure Coupling, L=24ft | 150 | 46 | 24 | $ 296.00 | $ 6,538,048.00 |
| | **Option** | 5,963 | 96 | Flowtite FRP Pipe DN96 with Pressure Coupling, L=24ft | 150 | 46 | 24 | $ 489.00 | $ 2,915,907.00 |
| | **Option** | 11,428 | 102 | Flowtite FRP Pipe DN102 with Pressure Coupling, L=24ft, Budgetary Pricing | 150 | 72 | 24 | $ 575.00 | $ 6,571,100.00 |
| | **Option** | 23,750 | 108 | Flowtite FRP Pipe DN108 with Pressure Coupling, L=24ft, Budgetary Pricing | 150 | 72 | 24 | $ 625.00 | $ 14,843,750.00 |
| | **Option** | 6,233 | 114 | Flowtite FRP Pipe DN114 with Pressure Coupling, L=24ft, Budgetary Pricing | 150 | 72 | 24 | $ 675.00 | $ 4,207,275.00 |
| | **Option** | 75,955 | 120 | Flowtite FRP Pipe DN120 with Pressure Coupling, L=24ft, Budgetary Pricing | 150 | 72 | 24 | $ 699.00 | $ 53,092,545.00 |
| | **Option** | 10,988 | 132 | Flowtite FRP Pipe DN13 with Pressure Coupling, L=24ft, Budgetary Pricing | 250 | 72 | 24 | $ 825.00 | $ 9,065,100.00 |
| | | | | | | | 24ft Option Pipe Subtotal | | $ 99,875,828.00 |
| | | | | **FITTINGS AND ACCESSORIES** | | | | | |
| | | | | Flowtite FRP Fitting DN48 1-Miter (1-30 Deg) Bend | 150 | 46 | | $ 3,082.83 | |
| | | | | Flowtite FRP Fitting DN48 2-Miter (31-60 Deg) Bend | 150 | 46 | | $ 4,872.98 | |
| | | | | Flowtite FRP Fitting DN48 3-Miter (61-90 Deg) Bend | 150 | 46 | | $ 6,672.78 | |
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| | | | | Flowtite FRP Fitting DN64 3-Miter (61-90 Deg) Bend | 150 | 46 | | $ 10,590.12 | |
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| | | | | Flowtite FRP Fitting DN120 2-Miter (31-60 Deg) Bend | 150 | 46 | | $ 30,260.93 | |
| | | | | Flowtite FRP Fitting DN120 3-Miter (61-90 Deg) Bend | 150 | 46 | | $ 46,604.27 | |

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**Acceptance from Buyer**

Name: _____

Title: _____

Company: _____

Date: _____

**U.S. COMPOSITE PIPE SOUTH, LLC.**

Name: _____

Name: _____

**For additional information and quesitons regarding this quotation, please contact:**

**USCPS Regional Sales Manager**

COI

| Pipe Dia (IN) | Type/DR | Pipe ID (IN) | Pipe Length (FT) | LBS per ft | Total pounds | Cost per ft | Cost Per LBS | |
|---|---|---|---|---|---|---|---|---|
| 4 | 21 | 4.05 | 1235.52 | 1.26 | 1,556.76 | $2.67 | $2.12 | 3,298.84 |
| 6 | 26 | 6.08 | 512.16 | 2.23 | 1,142.12 | $5.65 | $2.53 | 2,893.70 |
| 14 | 19 | 12.44 | 628.32 | 13.49 | 8,476.04 | $13.67 | $1.01 | 8,589.13 |
| 14 | 26 | 12.86 | 1758.24 | 9.96 | 17,512.07 | $10.64 | $1.07 | 18,707.67 |
| 14 | 32.5 | 13.09 | 1309.44 | 8.05 | 10,540.99 | $8.99 | $1.12 | 11,771.87 |
| 16 | 19 | 14.21 | 7376.16 | 17.61 | 129,894.18 | $18.09 | $1.03 | 133,434.73 |
| 16 | 21 | 14.38 | 8759.52 | 15.96 | 139,801.94 | $16.32 | $1.02 | 142,955.37 |
| 16 | 26 | 14.7 | 6848.16 | 13.01 | 89,094.56 | $13.49 | $1.04 | 92,381.68 |
| 16 | 32.5 | 14.96 | 7935.84 | 10.5 | 83,326.32 | $11.14 | $1.06 | 88,405.26 |
| 18 | 19 | 15.99 | 3442.56 | 22.29 | 76,734.66 | $23.10 | $1.04 | 79,523.14 |
| 18 | 21 | 16.18 | 12183.55 | 20.19 | 245,985.87 | $20.80 | $1.03 | 253,417.84 |
| 18 | 26 | 16.53 | 2813.27 | 16.47 | 46,334.56 | $17.60 | $1.07 | 49,513.55 |
| 18 | 32.5 | 16.83 | 9134.14 | 13.3 | 121,484.06 | $14.54 | $1.09 | 132,810.40 |
| 20 | 21 | 17.98 | 14688.96 | 24.93 | 366,195.77 | $25.70 | $1.03 | 377,506.27 |
| 20 | 26 | 18.37 | 11181.02 | 20.34 | 227,421.95 | $21.35 | $1.05 | 238,714.78 |
| 20 | 32.5 | 18.7 | 8585.97 | 16.41 | 140,895.77 | $17.51 | $1.07 | 150,340.33 |
| 24 | 21 | 21.58 | 11230.56 | 35.97 | 403,963.24 | $36.80 | $1.02 | 413,284.61 |
| 24 | 26 | 22.04 | 5718.24 | 29.3 | 167,544.43 | $30.52 | $1.04 | 174,520.68 |
| 24 | 32.5 | 22.44 | 16282.03 | 23.62 | 384,581.55 | $24.86 | $1.05 | 404,771.27 |
| 26 | 21 | 23.38 | 12499.14 | 42.14 | 526,713.76 | $44.25 | $1.05 | 553,086.95 |
| 26 | 26 | 23.88 | 2634.72 | 34.39 | 90,608.02 | $36.83 | $1.07 | 97,036.74 |
| 28 | 21 | 25.17 | 4350.72 | 48.86 | 212,576.18 | $50.84 | $1.04 | 221,190.60 |
| 28 | 26 | 25.72 | 19945.2 | 39.88 | 795,414.58 | $42.10 | $1.06 | 839,692.92 |
| 30 | 17 | 26.26 | 2370.72 | 68.45 | 162,275.78 | $70.13 | $1.02 | 166,258.59 |
| 30 | 26 | 27.55 | 5250.51 | 45.78 | 240,368.35 | $47.84 | $1.04 | 251,184.40 |
| 30 | 32.5 | 28.04 | 7671.48 | 36.93 | 283,307.76 | $39.39 | $1.07 | 302,179.60 |
| 32 | 21 | 28.73 | 3854.4 | 63.84 | 246,064.90 | $65.36 | $1.02 | 251,923.58 |
| 32 | 26 | 29.39 | 2476.23 | 52.1 | 129,011.58 | $54.16 | $1.04 | 134,112.62 |
| 34 | 26 | 31.23 | 68.64 | 58.81 | 4,036.72 | $80.11 | $1.36 | 5,498.75 |
| 34 | 32.5 | 31.78 | 5026.56 | 47.43 | 238,409.74 | $51.17 | $1.08 | 257,209.08 |
| 36 | 21 | 32.37 | 17088.88 | 80.78 | 1,380,439.73 | $86.00 | $1.06 | 1,469,643.68 |
| 36 | 26 | 33.06 | 1943.04 | 65.94 | 128,124.06 | $71.85 | $1.09 | 139,607.42 |
| 48 | 32.5 | 44.86 | 16616.16 | 94.98 | 1,578,202.88 | $101.66 | $1.07 | 1,689,198.83 |
| 63 | 26 | 57.86 | 22087.04 | 202.72 | 4,477,484.75 | $238.49 | $1.18 | 5,267,538.17 |
| | 100PSI min | | 96 | 5963 | 13,155,525.61 | | | 14,422,203.04 |
| | 100PSI min | | 102 | 11427.44 | | | | |
| | 100PSI min | | 108 | 23749.8 | | | | |
| | 100PSI min | | 114 | 6232.12 | | | | |
| | 100PSI min | | 120 | 75954.72 | | | | |
| | 22PSI min | | 132 | 10987.68 | price includes frt w | $1,098.86 | | 12,073,922.04 |

Pilot Butte Alternate

| Pipe Dia (IN) | Type/DR | Pipe ID (IN) | Pipe Length (FT) | LBS per ft | Total pounds | Cost per ft | Cost Per LBS | |
|---|---|---|---|---|---|---|---|---|
| 48 | 21 | 43.15 | 350 | 144.25 | 50,487.50 | $172.95 | $1.20 | 60,532.50 |
| 48 | 32.5 | 44.86 | 16616.16 | 94.98 | 1,578,202.88 | $115.94 | $1.22 | 1,926,477.59 |
| 63 | 26 | 57.86 | 22087.04 | 202.72 | 4,477,484.75 | $150.38 | $0.74 | 3,321,449.08 |
| | 100PSI min | | 60 | 3828 | | | | 5,308,459.17 |

COC

| Pipe Dia (IN) | Type/DR | Pipe ID (IN) | Pipe Length (FT) | LBS per ft | Total pounds | Cost per ft | Cost Per LBS | |
|---|---|---|---|---|---|---|---|---|
| 16.00 | 17.00 | 14.01 | 1,620.96 | 19.45 | 31,527.67 | $19.77 | $1.02 | 32,046.38 |
| 16.00 | 19.00 | 14.21 | 1,599.84 | 17.61 | 28,173.18 | $21.00 | $1.19 | 33,596.64 |
| 16.00 | 21.00 | 14.38 | 1,990.61 | 15.96 | 31,770.14 | $17.01 | $1.07 | 33,860.28 |
| 16.00 | 26.00 | 14.70 | 9,914.97 | 13.01 | 128,993.76 | $14.16 | $1.09 | 140,395.98 |
| 18.00 | 17.00 | 15.75 | 2,772.00 | 24.64 | 68,302.08 | $25.52 | $1.04 | 70,741.44 |
| 18.00 | 19.00 | 15.99 | 7,930.22 | 22.29 | 176,764.60 | $22.93 | $1.03 | 181,839.94 |
| 18.00 | 21.00 | 16.18 | 8,078.42 | 20.19 | 163,103.30 | $20.88 | $1.03 | 168,677.41 |
| 18.00 | 26.00 | 16.53 | 2,661.12 | 16.47 | 43,828.65 | $17.28 | $1.05 | 45,984.15 |
| 20.00 | 19.00 | 17.77 | 7,744.60 | 27.52 | 213,131.39 | $32.90 | $1.20 | 254,797.34 |
| 20.00 | 21.00 | 17.98 | 12,579.93 | 24.93 | 313,617.65 | $25.72 | $1.03 | 323,555.80 |
| 20.00 | 26.00 | 18.37 | 9,292.91 | 20.34 | 189,017.79 | $21.35 | $1.05 | 198,403.63 |
| 20.00 | 32.50 | 18.70 | 2,872.32 | 16.41 | 47,134.77 | $17.51 | $1.07 | 50,294.32 |
| 24.00 | 19.00 | 21.32 | 5,201.14 | 39.63 | 206,121.18 | $47.26 | $1.19 | 245,805.88 |
| 24.00 | 21.00 | 21.58 | 14,530.60 | 35.91 | 521,793.85 | $36.76 | $1.02 | 534,144.86 |
| 24.00 | 26.00 | 22.04 | 33,046.85 | 29.30 | 968,272.71 | $30.32 | $1.03 | 1,001,980.49 |
| 24.00 | 32.50 | 22.44 | 8,132.10 | 23.62 | 192,080.20 | $24.96 | $1.06 | 202,977.22 |
| 26.00 | 21.00 | 23.38 | 3,094.09 | 42.74 | 132,241.41 | $44.29 | $1.04 | 137,037.25 |
| 26.00 | 26.00 | 23.88 | 3,474.24 | 34.39 | 119,479.11 | $36.87 | $1.07 | 128,095.23 |
| 26.00 | 32.50 | 24.30 | 1,841.97 | 27.40 | 50,469.98 | $31.10 | $1.14 | 57,285.27 |
| 28.00 | 19.00 | 24.88 | 4,514.40 | 53.94 | 243,506.74 | $65.15 | $1.21 | 294,113.16 |
| 28.00 | 21.00 | 25.17 | 6,800.64 | 48.46 | 329,559.01 | $50.92 | $1.05 | 346,288.59 |
| 30.00 | 19.00 | 26.65 | 2,075.04 | 61.92 | 128,486.48 | $74.18 | $1.20 | 153,926.47 |
| 30.00 | 21.00 | 26.97 | 10,285.29 | 56.12 | 577,210.47 | $57.75 | $1.03 | 593,975.50 |
| 32.00 | 21.00 | 28.73 | 4,651.69 | 63.84 | 296,963.89 | $65.41 | $1.02 | 304,267.04 |
| 32.00 | 26.00 | 29.39 | 992.64 | 52.10 | 51,716.54 | $55.41 | $1.06 | 55,002.18 |
| 32.00 | 32.50 | 29.91 | 5,090.06 | 42.04 | 213,986.12 | $44.34 | $1.05 | 225,693.26 |
| 34.00 | 21.00 | 30.57 | 2,244.00 | 72.06 | 161,702.64 | $75.25 | $1.04 | 168,861.00 |
| 34.00 | 32.50 | 31.78 | 7,603.20 | 47.43 | 360,619.78 | $51.23 | $1.08 | 389,511.94 |
| 36.00 | 21.00 | 32.37 | 22,777.93 | 80.78 | 1,840,001.19 | $85.96 | $1.06 | 1,957,990.86 |
| 36.00 | 26.00 | 33.06 | 5,808.00 | 65.94 | 382,979.52 | $71.08 | $1.08 | 412,832.64 |
| 36.00 | 32.50 | 33.65 | 374.88 | 53.20 | 19,943.62 | $59.86 | $1.13 | 22,440.32 |
| 42.00 | 21.00 | 37.76 | 5,343.50 | 109.97 | 587,624.70 | $114.70 | $1.04 | 612,899.45 |
| 42.00 | 26.00 | 38.57 | 2,349.60 | 89.71 | 210,782.62 | $94.75 | $1.06 | 222,624.60 |
| 42.00 | 32.50 | 39.26 | 2,520.48 | 72.37 | 182,407.14 | $78.08 | $1.08 | 196,799.08 |
| 48.00 | 26.00 | 44.08 | 14,943.12 | 117.68 | 1,758,506.36 | $121.59 | $1.03 | 1,816,933.96 |
| 54.00 | 19.00 | 47.95 | 930.79 | 200.63 | 186,744.40 | $209.63 | $1.04 | 195,121.51 |
| 54.00 | 21.00 | 48.55 | 1,679.04 | 182.51 | 306,441.59 | $192.12 | $1.05 | 322,577.16 |
| 54.00 | 32.50 | 50.48 | 5,876.64 | 120.20 | 706,372.13 | $131.94 | $1.10 | 775,363.88 |
| 63.00 | 21.00 | 56.64 | 10,311.84 | 248.46 | 2,562,079.77 | $284.23 | $1.14 | 2,930,934.28 |
| | 100PSI min | | 66.00 | 3,860.26 | | | | |
| | 100PSI min | | 72.00 | 9,218.88 | | | | |
| | 100PSI min | | 84.00 | 3,933.60 | | | | |
| | 100PSI min | | 90.00 | 26,118.20 | | | | |
| | 100PSI min | | 96.00 | 40,386.16 | | | | |
| | 100PSI min | | 102.00 | 14,397.25 | | | | |
| | 100PSI min | | 108.00 | 31,416.71 | | | | |
| | 100PSI min | | 114.00 | 28,343.05 | | | | |
| | 100PSI min | | 120.00 | 28,628.16 | | | | |

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