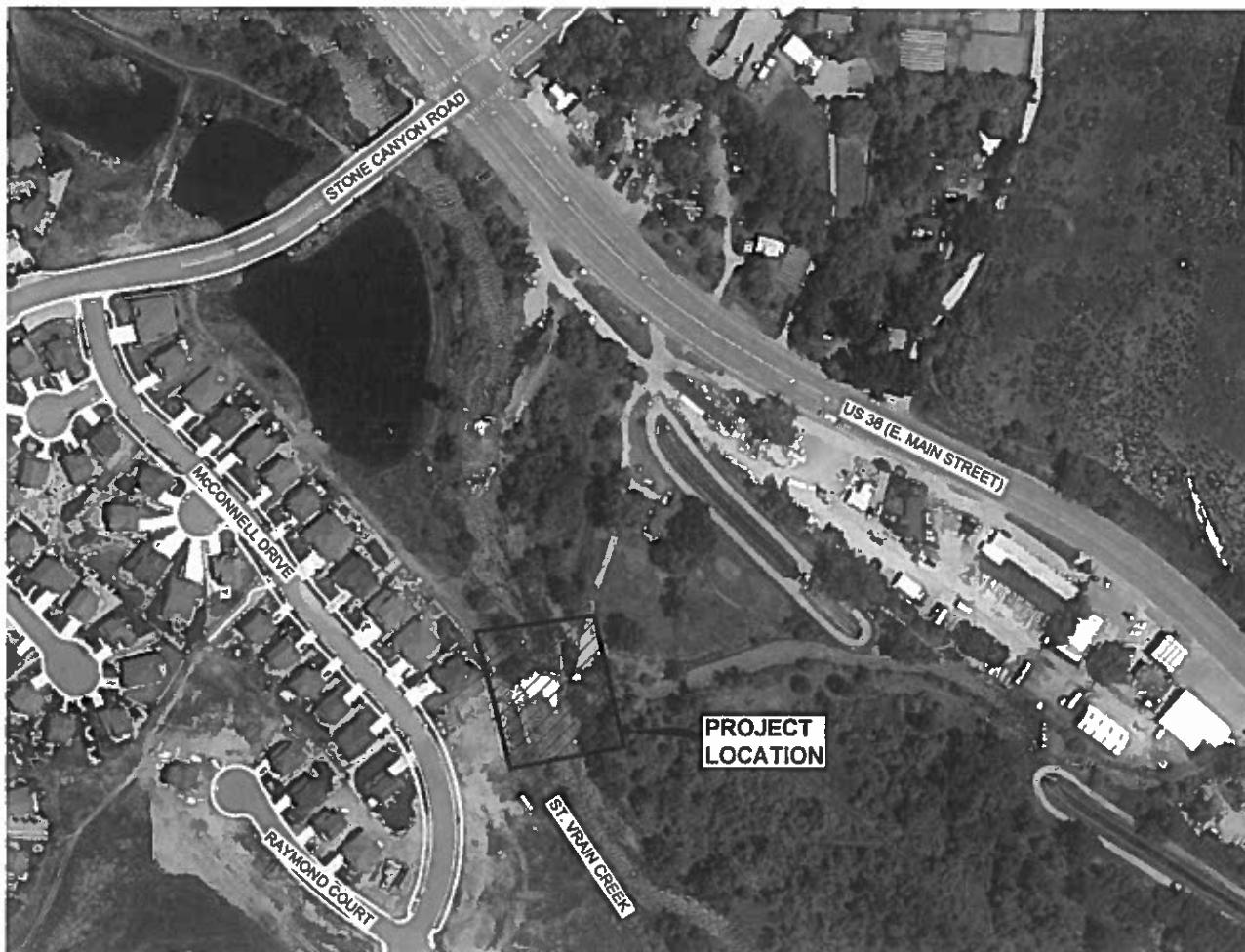


# HIGHLAND DITCH COMPANY ROBERT SCHLAGEL DIVERSION MODIFICATION PROJECT



## VICINITY MAP

## CONTACTS

OWNER:  
HIGHLAND DITCH COMPANY  
WADE GONZALES  
BOX 649  
MEADE, CO 80542  
(303)517-0151

OWNER'S REPRESENTATIVE  
TESSARA WATER, LLC  
TARA SCHUTTER, P.E.  
13101 CAVANAUGH ROAD  
HUDSON, CO 80642  
(303)710-9108

**CIVIL ENGINEER:  
PROVIDENCE INFRASTRUCTURE CONSULTANT  
DANIEL RICE, P.E.  
4901 EAST DRY CREEK ROAD, SUITE 210  
CENTENNIAL, CO 80122  
(303)997-5035**

STRUCTURAL/HYDRAULIC ENGINEER  
ALDEN RESEARCH LABORATORY, INC.  
MARK GRAESER, P.E.  
2000 S. COLLEGE AVE., SUITE 300  
FORT COLLINS, CO 80525  
(303)954-0741 FAX 2251

## SHEET LIST

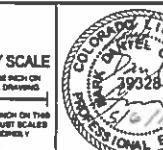
SHEET DWG.		DESCRIPTION
NO.	NO.	
<b>GENERAL</b>		
1	G-101	COVER SHEET
2	G-102	NOTES, ABBREVIATIONS, AND STANDARD DETAIL
3	G-103	PROJECT SITE LOCATION MAP
<b>CIVIL</b>		
4	C-101	PLAN
5	C-102	DIVERSION STRUCTURE BOULDER SECTION (PHASE 1 CONCRETE)
6	C-103	DIVERSION STRUCTURE BOULDER SECTION (PHASE 2 CONCRETE AND BOULDERS)
7	C-104	SIDE SLOPE RIPRAP ENLARGED PLAN AND SECTION

**FINAL  
FOR CONSTRUCTION  
DATE : 6/23/2016**

PROVIDENCE INFRASTRUCTURE CONSULTANTS  
4901 EAST DRY CREEK ROAD, SUITE 210  
CENTENNIAL, CO 80122  
TEL. (303)997-5035  
www.providenceinc.com

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6/23/2016	FINAL FOR CONSTRUCTION	M. GRAESER
REVISION	DESCRIPTION OF WORK (LTD. 500)	REVISION BY



HIGHLAND DITCH COMPANY  
SCHLAGEL DIVERSION  
MODIFICATION PROJECT

**GENERAL  
COVER SHEET**

PROJECT:	M. PITTMAN	
DRAWN BY:	M. PITTMAN	
DESIGNED BY:	D. PYTLIK	
APPROVED BY:	L. UNDEE	
1		7
DRAWING:	G-101	

**GENERAL NOTES:**

- CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS, DIMENSIONS, AND ELEVATIONS PRIOR TO START OF CONSTRUCTION. NOTIFY ENGINEER OF ANY DISCREPANCIES OR CONFLICTS FOUND IN THE CONTRACT DOCUMENTS AND/OR FIELD CONDITIONS.
- STANDARD DETAILS SHALL BE USED AT ALL APPLICABLE LOCATIONS, UNLESS OTHERWISE NOTED ON THE DRAWINGS.
- ALL DETAILS ARE TYPICAL. INCORPORATE INTO PROJECT AT APPROPRIATE LOCATIONS WHERE CONDITIONS ARE SIMILAR WHETHER SPECIFICALLY INDICATED OR NOT.
- PLANS ON THESE DRAWING ARE TREATED AS HORIZONTAL SECTIONS.
- DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.

**RIPRAP AND BOULDER NOTES:****1. SIDE SLOPE RIPRAP**

- RIPRAP SHALL BE WELL-GRADED.

- RIPRAP SHALL BE TYPE H PER TABLE BELOW:

RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSIONS (INCHES)	$d_{50}$ (INCHES)*
TYPE H	70-100	30	18
	50-70	24	
	35-50	18	
	2-10	6	

\*  $d_{50}$  = MEAN PARTICLE SIZE (INTERMEDIATE DIMENSION) BY WEIGHT.

- PROVIDE 6" LAYER OF SAND AND GRAVEL BEDDING BELOW RIPRAP.

**2. DIVERSION STRUCTURE BOULDERS**

- BOULDERS SHALL BE ROCK OF UNIFORM SIZE.
- BOULDERS SHALL BE B18 PER TABLE BELOW:

BOULDER CLASSIFICATION	NOMINAL SIZE & RANGE IN SMALLEST DIMENSION OF INDIVIDUAL ROCK BOULDERS (INCHES))	MAXIMUM RATIO OF LARGEST TO SMALLEST ROCK DIMENSION OF INDIVIDUAL BOULDERS
B18	18 [17-20]	2.5

- THE BOULDERS USED FOR THE DIVERSION STRUCTURE SHALL MEET ALL OF THE PROPERTIES OF ROCK FOR ORDINARY RIPRAP, AND ROCK OF UNIFORM SIZE SHALL BE USED.
- WASH/CLEAN BOULDERS TO ACHIEVE ADEQUATE BOND WITH CONCRETE.
- THE UPPER ONE-HALF OF THE BOULDERS SHALL BE LEFT EXPOSED AND CLEAN, WITHOUT CONCRETE.
- ALL CONCRETE SPLATTER SHALL BE REMOVED OFF THE EXPOSED BOULDER PORTION IMMEDIATELY AFTER CONCRETE PLACEMENT USING WET BROOMS AND BRUSHES.

**3. RIPRAP AND BOULDER BASIC STONE REQUIREMENTS**

- ROCK SHALL BE HARD, DURABLE, ANGULAR IN SHAPE, AND FREE FROM CRACKS, OVERBURDEN, SHALE, AND ORGANIC MATTER.
- NEITHER BREADTH NOR THICKNESS OF A SINGLE STONE SHOULD BE LESS THAN ONE-THIRD ITS LENGTH, AND ROUNDED STONE SHOULD BE AVOIDED.
- THE ROCK SHOULD SUSTAIN A LOSS OF NOT MORE THAN 40% AFTER 500 REVOLUTIONS IN AN ABRASION TEST (LOS ANGELES MACHINE - ASTM C535) AND SHOULD SUSTAIN A LOSS OF NOT MORE THAN 10% AFTER 12 CYCLES OF FREEZING AND THAWING (AASHTO TEST 103 FOR LEDGE ROCK PROCEDURE A).
- ROCK HAVING A MINIMUM SPECIFIC GRAVITY OF 2.65 IS PREFERRED; HOWEVER, IN NO CASE SHOULD ROCK HAVE A SPECIFIC GRAVITY LESS THAN 2.50.

**CONCRETE NOTES:**

- ELEVATIONS ARE NAVD88 AND ARE TIED TO THE TOWN OF LYONS BENCHMARK "LL1431\_LYONS".
- CONCRETE MIX DESIGN
  - CONFORM TO ASTM C94
  - 6 PERCENT +/- 1 1/2 PERCENT AIR CONTENT AS DETERMINED BY ASTM C231.
  - PROVIDE CONCRETE WITH THE FOLLOWING COMPRESSIVE STRENGTH AT 28 DAYS AND PROPORTION IT FOR STRENGTH AND QUALITY REQUIREMENTS IN ACCORDANCE WITH ACI 318 AND THE TABLE BELOW.

CLASS	TYPE OF WORK	28-DAY MINIMUM COMPRESSIVE STRENGTH (PSI)	MINIMUM CEMENTITIOUS CONTENT (LBS PER CY)	MAXIMUM WATER/CEMENT RATIO
A	ALL CONCRETE	4,500	560	0.42

- MEASURE SLUMP IN ACCORDANCE WITH ASTM C143.
- AGGREGATE SIZE SHALL BE 3/4-INCH MAXIMUM. COMBINED AGGREGATE GRADING SHALL BE 67 PER ASTM C33.
- PROVIDE ADEQUATE EQUIPMENT FOR HEATING CONCRETE MATERIALS AND PROTECTING CONCRETE DURING FREEZING OR NEAR-FREEZING WEATHER IN ACCORDANCE WITH ACI 306R.
- CONCRETE WORK SHALL CONFORM TO ACI 301, ACI 318, AND ACI 350.
- REINFORCEMENT STEEL SHALL BE DEFORMED BARS CONFORMING IN QUALITY TO THE REQUIREMENTS OF ASTM A615 OR A706, "SPECIFICATIONS FOR DEFORMED BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT", GRADE 60.
- ALL DETAILING, FABRICATION AND PLACING OF REINFORCING BARS, UNLESS OTHERWISE INDICATED, SHALL BE IN ACCORDANCE WITH ACI-315, "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES", LATEST EDITION.
- ALL REINFORCEMENT BENDS, LAPS AND SPLICES UNLESS OTHERWISE NOTED, SHALL SATISFY THE MINIMUM REQUIREMENTS SHOWN IN THE STANDARD DETAILS.
- DIMENSIONS ARE TO THE CENTERLINES OF THE BARS UNLESS SHOWN OTHERWISE.
- BARS SHOWN WITH BENDS NOT DIMENSIONED SHALL BE ASSUMED TO END WITH A STANDARD HOOK AS SHOWN IN THE STANDARD DETAILS.
- DRILL AND EPOXY DOWEL ADHESIVE SHALL BE HILTI HIT-HY 200 OR APPROVED EQUAL.
- LOCATE CONSTRUCTION JOINTS WHERE SHOWN OR NOTED ON DRAWINGS. CONTRACTOR SHALL SUBMIT FOR REVIEW AND APPROVAL THE LOCATION OF PROPOSED CONSTRUCTION JOINTS.
- DO NOT PLACE ADJACENT CONCRETE SECTIONS UNTIL 7 DAYS AFTER PLACEMENT OF THE FIRST PLACED CONCRETE UNLESS OTHERWISE APPROVED IN WRITING BY THE ENGINEER.

**SUBMITTAL REQUIREMENTS:**

- THE CONTRACTOR SHALL SUBMIT THE FOLLOWING FOR REVIEW PRIOR TO CONSTRUCTION:
  - RIPRAP BEDDING MATERIAL AND GRADATION.
  - SIDE SLOPE RIPRAP SIZE AND STONE PROPERTIES.
  - DIVERSION STRUCTURE BOULDERS SIZE AND STONE PROPERTIES.
  - CONCRETE MIX DESIGN COMPONENTS, ADMIXTURES, PROPORTIONS, AND COMPRESSIVE STRENGTH RESULTS.
  - CONCRETE REINFORCEMENT SHOP DRAWING.
  - CONSTRUCTION JOINT LOCATIONS.
  - PROCEDURES FOR COLD WEATHER CONCRETE PLACEMENT AND PROTECTION.
  - DRILL AND EPOXY ADHESIVE PRODUCT DATA.
  - HYDROPHILIC WATERSTOP PRODUCT DATA.

**GENERAL DESIGN CRITERIA:**

- THE FOLLOWING DESIGN CODES AND STANDARDS WERE USED TO COMPLETE THE HYDRAULIC DESIGN:

URBAN DRAINAGE AND FLOOD CONTROL DISTRICT (UDFCD) CRITERIA MANUAL, VOLUMES 1 AND 2.

U.S. ARMY CORPS OF ENGINEERS (USACE), EM 1110-2-1603, HYDRAULIC DESIGN OF SPILLWAYS.

U.S. ARMY CORPS OF ENGINEERS (USACE), STONE STABILITY: VELOCITY VS. STONE DIAMETER, HYDRAULIC DESIGN CRITERIA 712-1

U.S. BUREAU OF RECLAMATION (USBR), DESIGN OF SMALL DAMS

U.S. BUREAU OF RECLAMATION (USBR), DESIGN STANDARDS NO. 3, CANALS AND RELATED STRUCTURES

- THE FOLLOWING DESIGN CODES, DESIGN CRITERIA AND STRUCTURE LOADS WERE USED TO COMPLETE THE STRUCTURAL DESIGN:

2009 INTERNATIONAL BUILDING CODE

2005 ASCE 7 - MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES

ACI 318-08, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE.

ACI 350-08, CODE REQUIREMENTS FOR ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES.

**GEOTECHNICAL DESIGN CRITERIA:**

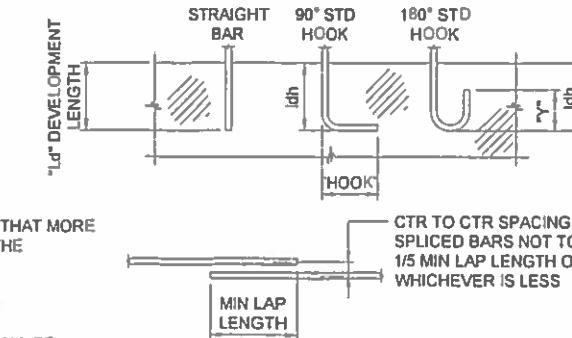
REFERENCE GEOTECHNICAL REPORT BY KUMAR & ASSOCIATES, INC. DATED OCTOBER 18, 2013 REGARDING GEOTECHNICAL DATA AND SOIL PARAMETERS.

**ABBREVIATIONS:**

AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
ACI	AMERICAN CONCRETE INSTITUTE
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASTM	AMERICAN SOCIETY OF TESTING MATERIALS
BO	BOTTOM OF
CLR	CLEAR/CLEARANCE
CONC	CONCRETE
CONT	CONTINUOUS
CTR	CENTER
DWG	DRAWING
DWL	DOWEL
EA	EACH
EL. ELEV	ELEVATION
EMBED	EMBEDMENT
EW	EACH WAY
IBC	INTERNATIONAL BUILDING CODE
KSI	KIPS PER SQUARE INCH
MAX	MAXIMUM
NO	NUMBER
NTS	NOT TO SCALE
OC	ON CENTERS
REINF	REINFORCEMENT
STD	STANDARD
TO	TOP OF
TYP	TYPICAL
W/	WITH
'	FEET
"	INCHES
&	AND
@	AT

**STRUCTURAL LEGEND & SYMBOLS:**

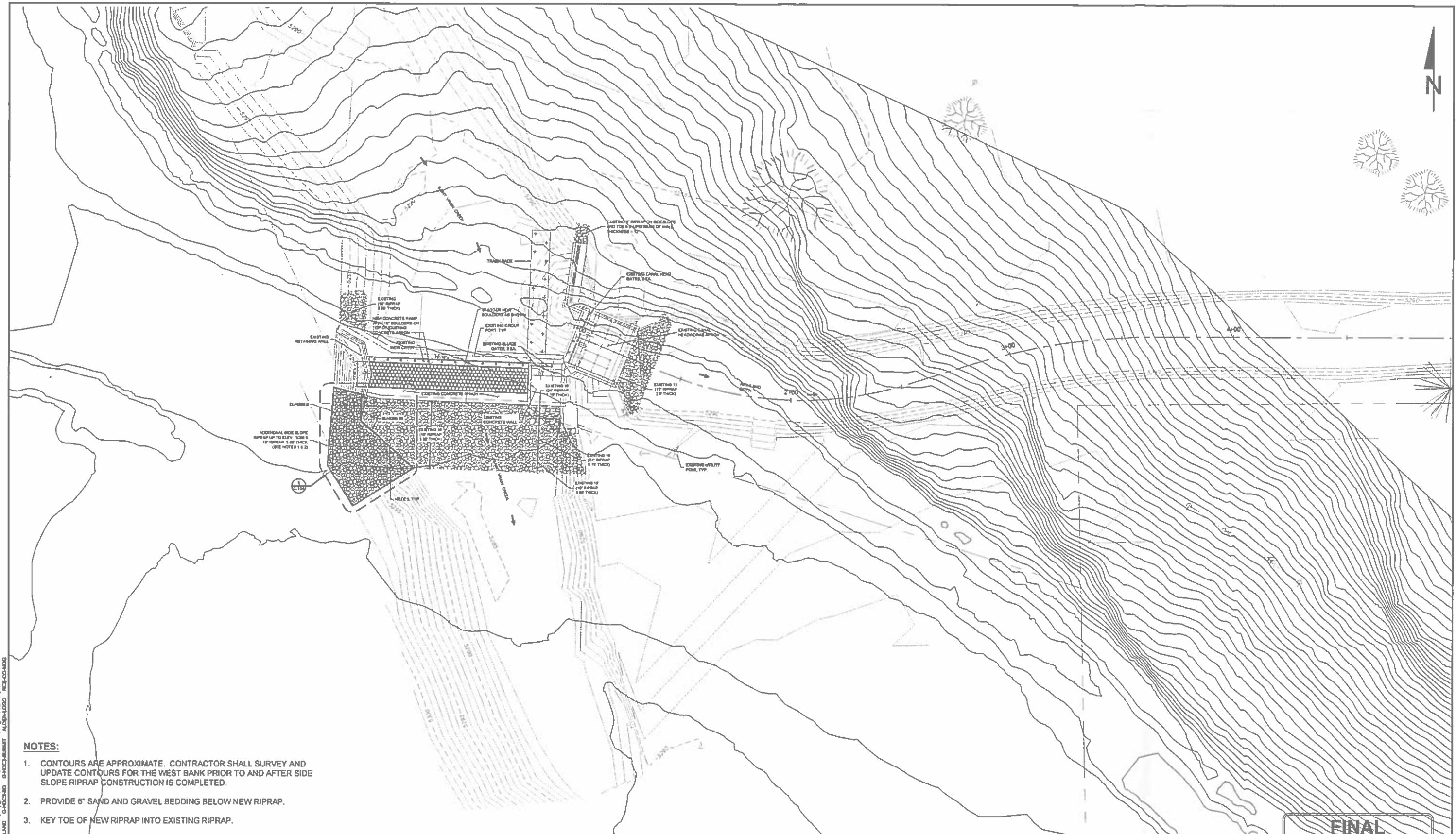
— RAILING	UNDISTURBED SOIL	EXISTING CONCRETE
	BACKFILL	SAND AND GRAVEL BEDDING
	ROCK BASE	NEW CONCRETE
	RIPRAP	

**NOTES:**

- "TOP" BARS SHALL BE HORIZONTAL REINFORCEMENT PLACED SO THAT MORE THAN 12" OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW THE DEVELOPMENT LENGTH OR SPLICE.
- ALL LAP SPLICES SHALL BE CLASS B UNLESS NOTED OTHERWISE.
- WHEN SPLICING BAR OF DIFFERENT SIZE, THE LENGTH OF LAP SHALL BE GOVERNED BY THE LARGER DIAMETER BAR.
- SPLICES ARE TO BE MADE SO THAT THE GIVEN DISTANCES TO FACE OF CONCRETE WILL BE MAINTAINED.
- INCREASE THE VALUES IN THE ABOVE TABLE 20% FOR EPOXY COATED REINFORCING.

1 STANDARD HOOK AND LAP SPLICE  
SCALE: NTS

FINAL  
FOR CONSTRUCTION  
DATE : 6/23/2016



## NOTES

1. CONTOURS ARE APPROXIMATE. CONTRACTOR SHALL SURVEY AND UPDATE CONTOURS FOR THE WEST BANK PRIOR TO AND AFTER SIDE SLOPE RIPRAP CONSTRUCTION IS COMPLETED.
2. PROVIDE 6" SAND AND GRAVEL BEDDING BELOW NEW RIPRAP.
3. KEY TOE OF NEW RIPRAP INTO EXISTING RIPRAP.
4. ELEVATIONS ARE NAVD88 AND ARE TIED TO THE TOWN OF LYONS BENCHMARK "LL1431\_LYONS".

**SITE PLAN**



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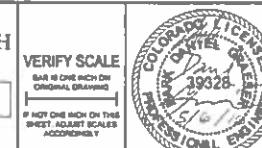
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Alden Research Laboratory, Inc.  
2000 S. College Ave., #300 Fort Collins, CO 80525  
(425) 581-7700

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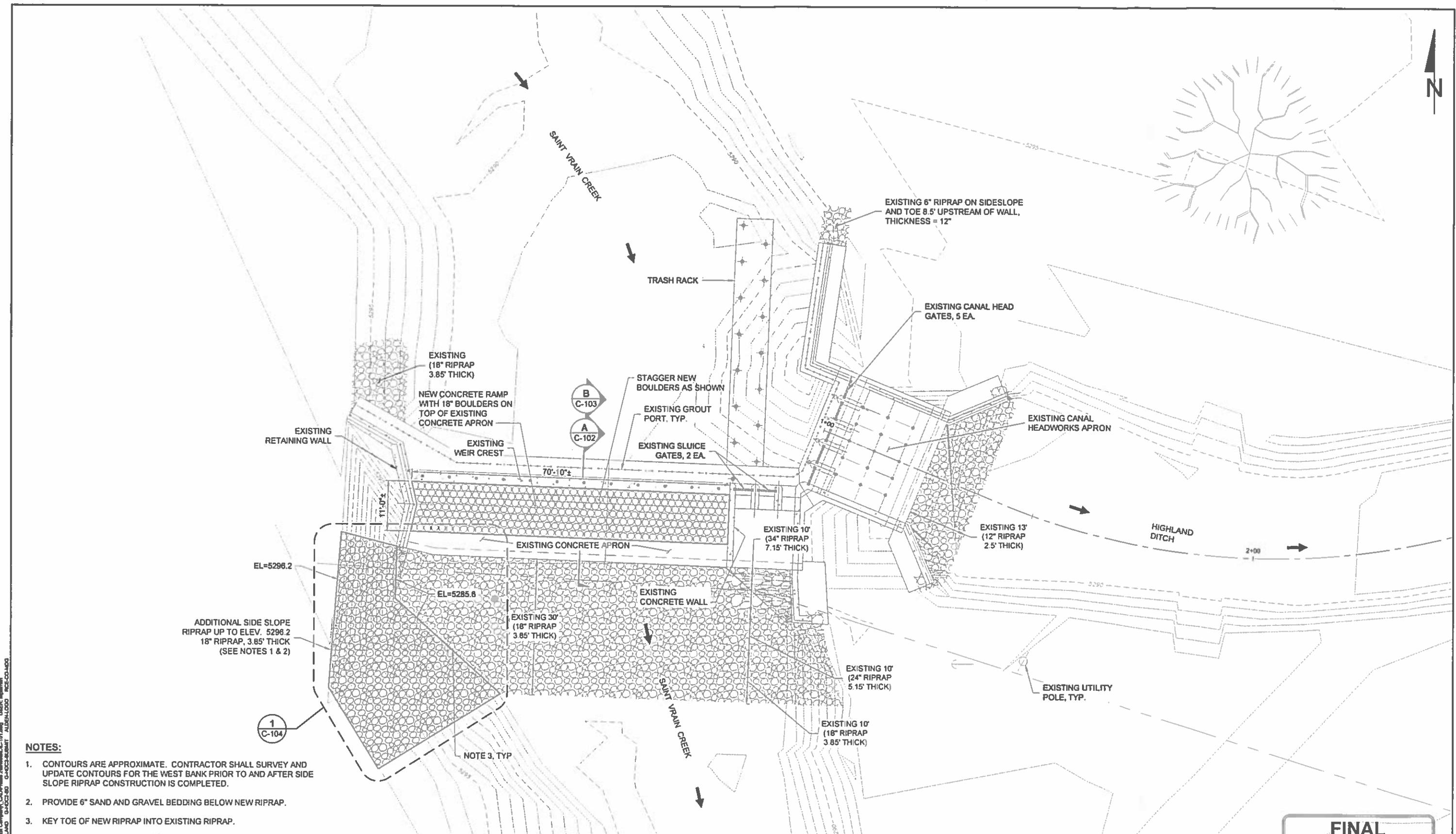
HIGHLAND DITCH  
COMPANY



HIGHLAND DITCH COMPANY  
SCHLAGEL DIVERSION  
MODIFICATION PROJECT

**GENERAL**  
**PROJECT SITE LOCATION MAP**

PROJECT: M. PITTMAN  
DRAWN BY: M. GRAESER  
DESIGNED BY: L. LINDEEN  
APPROVED BY: 3 7



## NOTES

1. CONTOURS ARE APPROXIMATE. CONTRACTOR SHALL SURVEY AND UPDATE CONTOURS FOR THE WEST BANK PRIOR TO AND AFTER SIDE SLOPE RIPRAP CONSTRUCTION IS COMPLETED.
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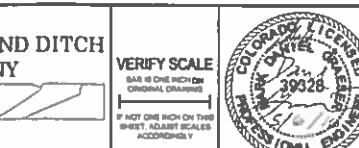
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[www.drycreek.com](http://www.drycreek.com)

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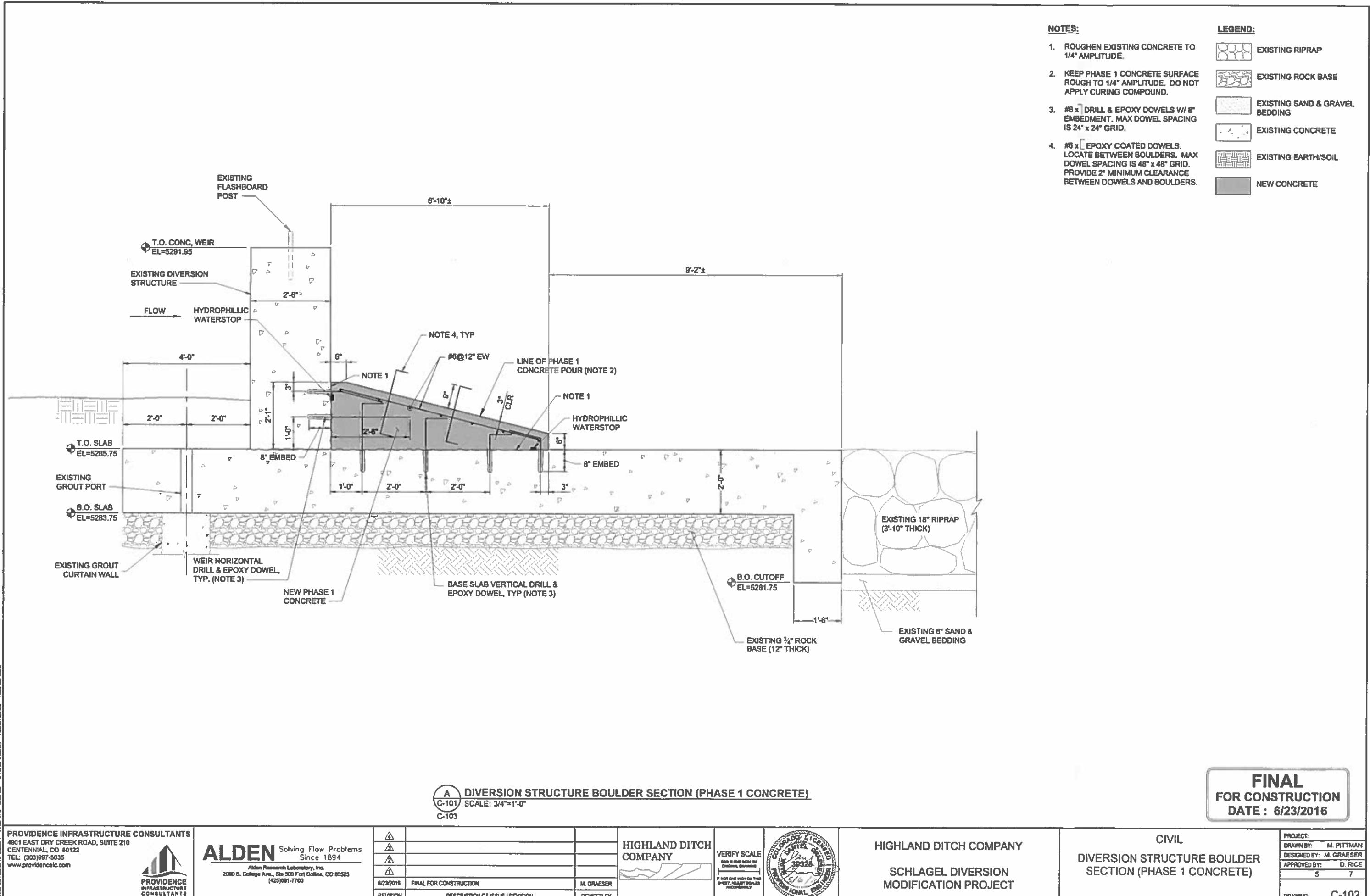
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(425)881-7700



HIGHLAND DITCH COMPANY  
SCHLAGEL DIVERSION  
MODIFICATION PROJECT

**FINAL  
FOR CONSTRUCTION  
DATE : 6/23/2016**

<b>PROJECT:</b>	
<b>DRAWN BY:</b>	<b>M. PITTMAN</b>
<b>DESIGNED BY:</b>	<b>D. PYTLIK</b>
<b>APPROVED BY:</b>	<b>L. LINDEEN</b>
4                    7	
<b>DRAWING:</b> <b>C-101</b>	

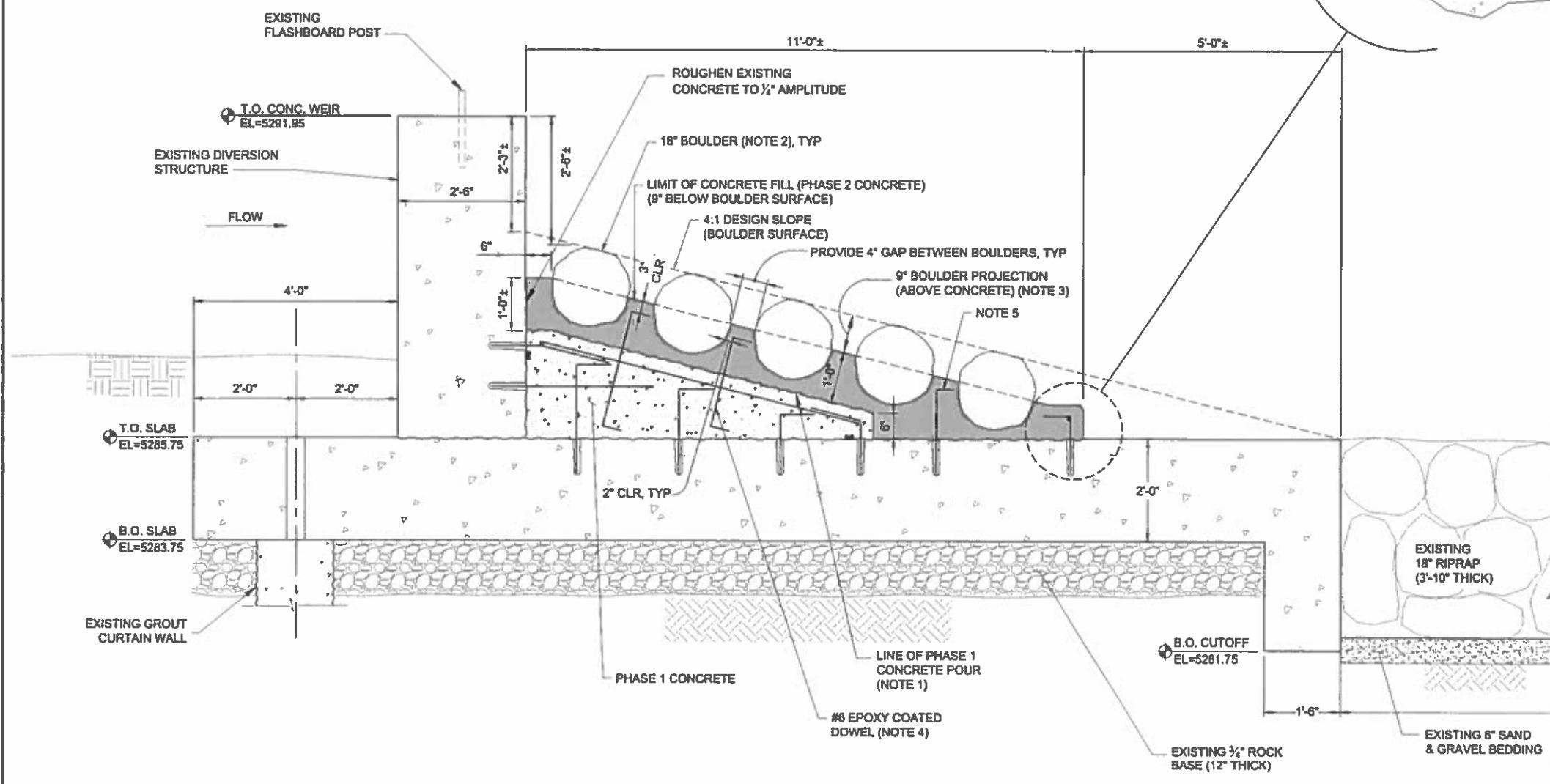
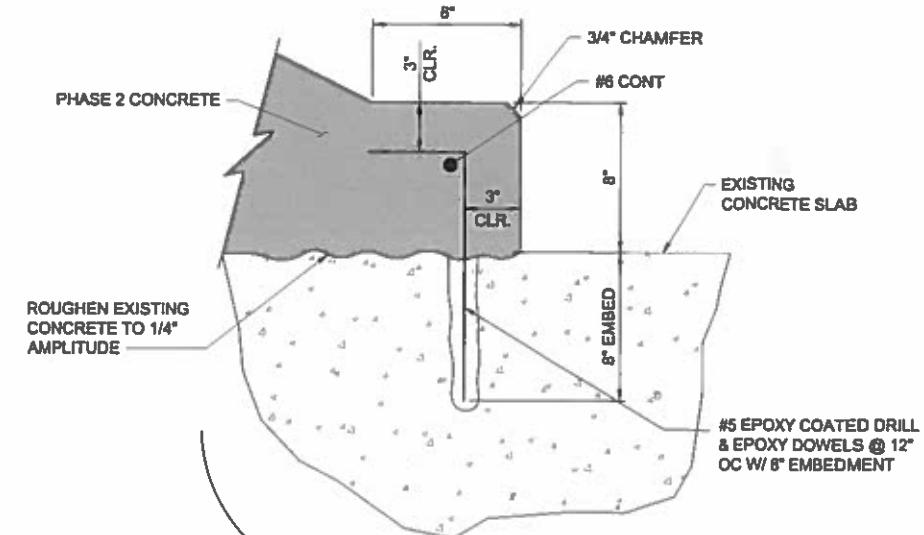


## NOTES:

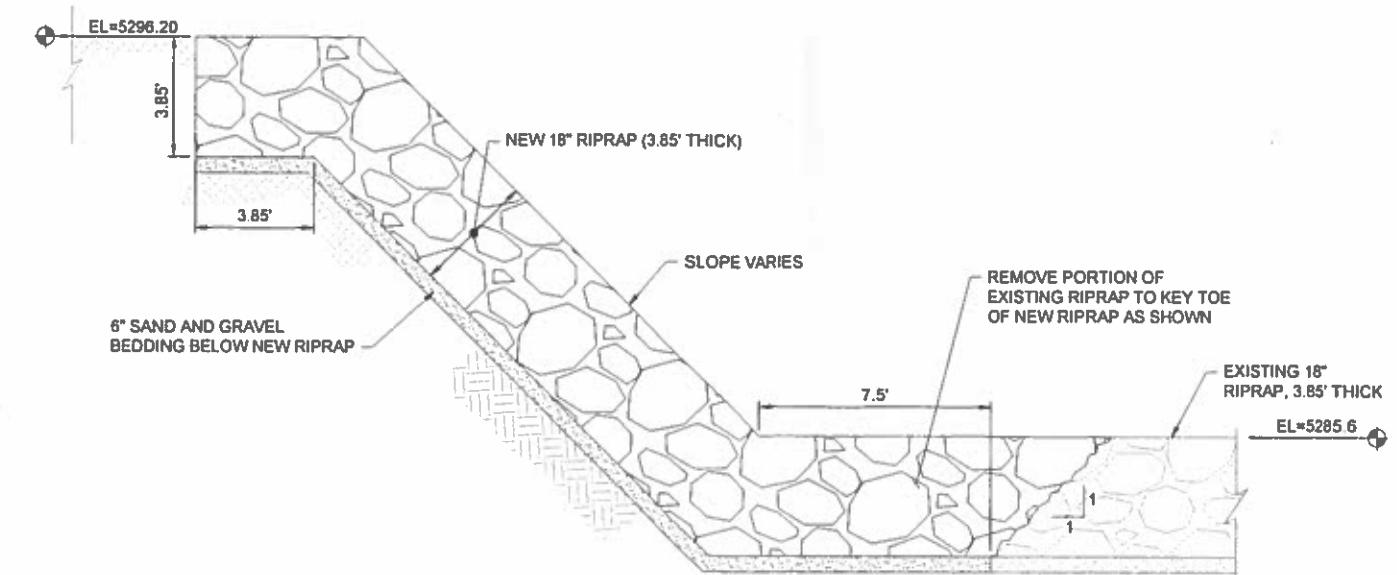
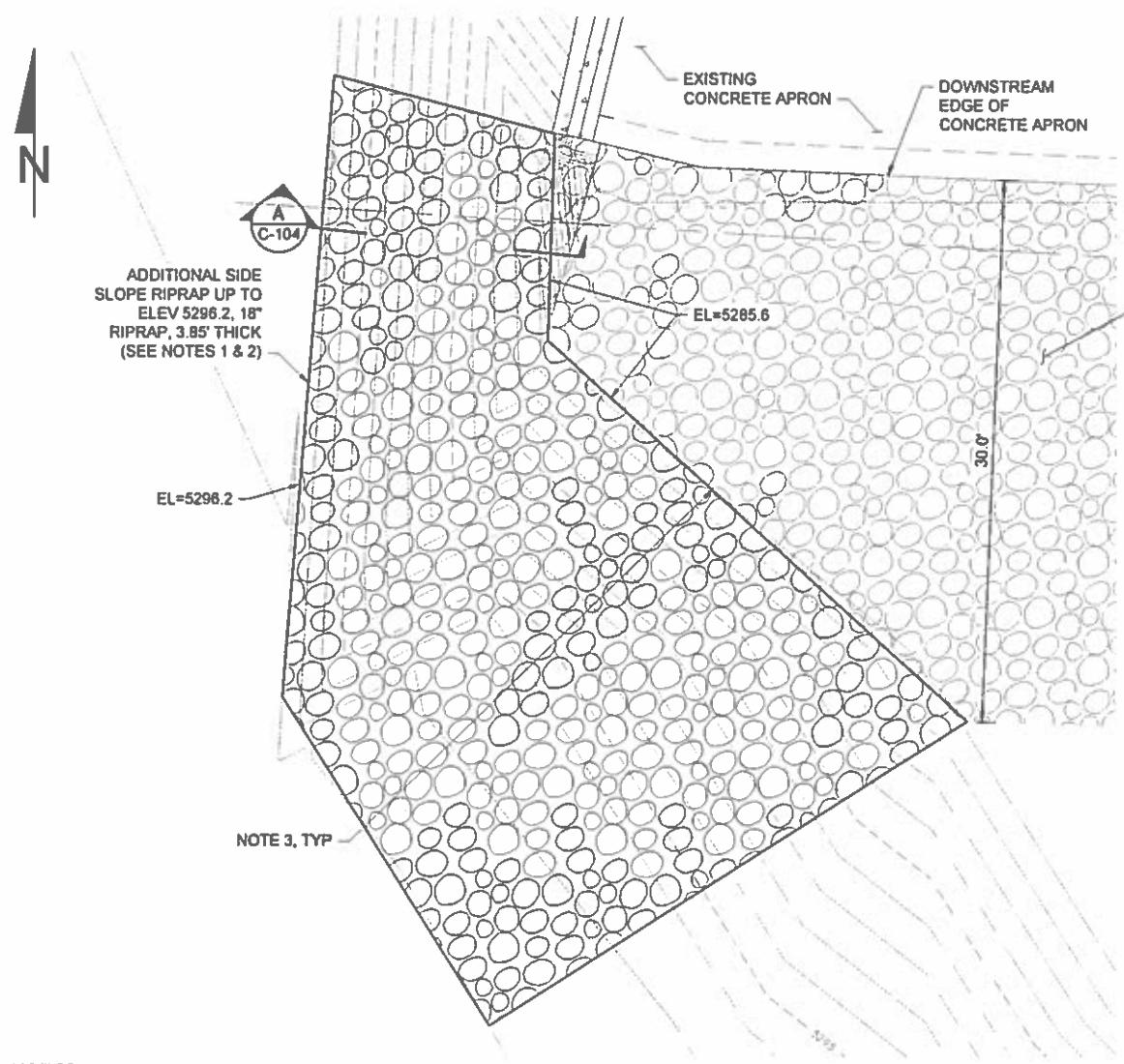
1. PHASE 1 CONCRETE SURFACE SHALL BE ROUGH TO  $\frac{1}{4}$ " AMPLITUDE.
2. WASH/CLEAN BOULDERS TO ACHIEVE ADEQUATE BOND WITH PHASE 2 CONCRETE.
3. ALL CONCRETE SPATTER SHALL BE REMOVED OFF THE EXPOSED BOULDER PORTION IMMEDIATELY AFTER CONCRETE PLACEMENT USING WET BROOMS AND BRUSHES.
4. #8 x 1" EPOXY COATED DOWELS. LOCATE BETWEEN BOULDERS. MAX DOWEL SPACING IS 48" x 48" GRID. PROVIDE 2" MINIMUM CLEARANCE BETWEEN DOWELS AND BOULDERS.
5. CONTRACTOR MAY PROVIDE ADDITIONAL #5 x 1" EPOXY COATED DRILL AND EPOXY DOWELS (W/ 6" EMBEDMENT) AS REQUIRED TO PREVENT THE BOULDERS FROM SLIDING DURING CONCRETE PLACEMENT.

## LEGEND:

- EXISTING RIPRAP
- EXISTING ROCK BASE
- EXISTING SAND & GRAVEL BEDDING
- EXISTING CONCRETE
- EXISTING EARTH/SOIL
- PHASE 1 CONCRETE
- PHASE 2 CONCRETE



A DIVERSION STURCTURE BOULDER SECTION (PHASE 2 CONCRETE AND BOULDERS)  
C-201 SCALE: 3/4"=1'-0"



**A SIDE SLOPE RIPRAP SECTION**  
C-104 SCALE: NTS

**NOTES:**

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**1 SIDE SLOPE RIPRAP (ENLARGED PLAN)**  
C-101 SCALE: 1"=5'

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