COLORADO STONE QUARRIES, INC.

PROJECT: SPK-2019-00889

YULE CREEK MITIGATION PLAN

MARCH 2021

LOCATION MAP:

Sheet List Table	
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02	OVERALL PLANVIEW
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NOTES:

1. THIS PLAN HAS BEEN PREPARED ON BEHALF OF COLORADO STONE QUARRIES, INC. (CSQ) AS COMPENSATORY MITIGATION ASSOCIATED WITH US ARMY CORPS OF ENGINEERS, SACRAMENTO DISTRICT COLORADO WEST REGULATORY SECTION PERMIT SPK-2019-0089. THIS PLAN AND ALL ACTIVITIES ARE SUBJECT TO CONDITIONS OF THE PERMIT.

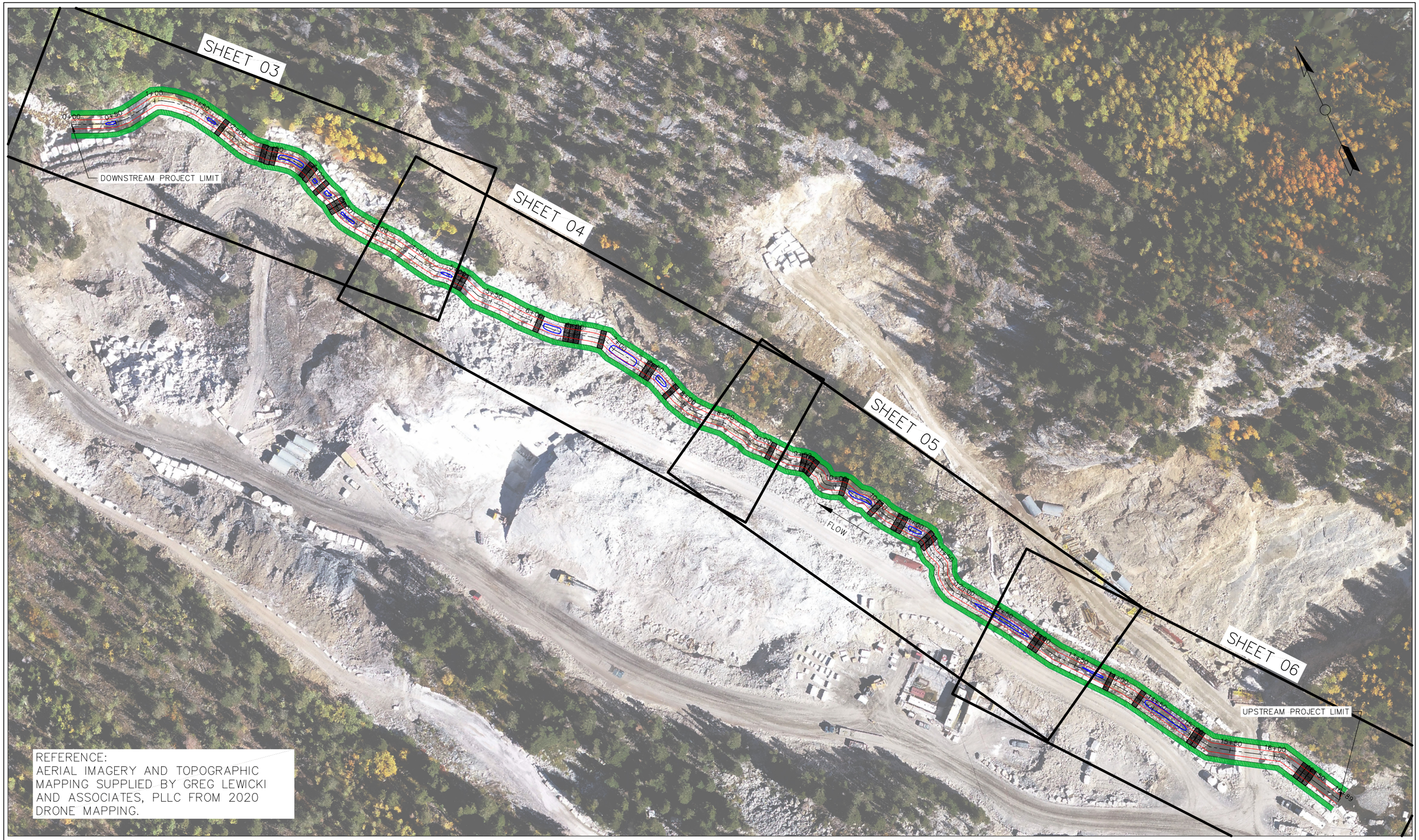
   CONTACTS FOR THIS PLAN:

   - APPLICANT: CSQ-MARCO PEZZICA, 1734 HWY 50E, DELTA, CO 81416 970-874-6118
   - DESIGNER: ECOLOGICAL RESOURCE CONSULTANTS, INC. (ERC) DAVID BLAUCH 303-679-4820.

3. PROJECT IS LOCATED ON YULE CREEK AT THE PRIDE OF AMERICAN MINE, APPROXIMATELY 3 MILES SOUTH OF THE TOWN OF MARBLE, AT LATITUDE 39.036826°, LONGITUDE -107.168673°, GUNNISON COUNTY, COLORADO.
4. COMPENSATORY MITIGATION PRESENTED IN THIS PLAN HAS BEEN DEVELOPED TO PROVIDE ECOLOGICAL FUNCTIONAL UPLIFT IN ACCORDANCE WITH COLORADO STREAM QUANTIFICATION TOOL (VERSION 1) (CSQT) AS PRESENTED IN ERC CSQT DATED 3-19-21 (ERC CSQT).
5. SPECIFIC COMPONENTS OF THIS PLAN THAT MUST BE ACHIEVED TO ENSURE ADEQUATE ECOLOGICAL FUNCTIONAL UPLIFT AS DETERMINED IN ERC CSQT FOLLOW.
   A. CONCENTRATED FLOW PATHS INTO YULE CREEK MUST BE MINIMIZED NOT TO EXCEED 3 LOCATIONS.
   B. ENTRENCHMENT RATIO MUST ACHIEVE A FIELD VALUE OF 1.5.
   C. LARGE WOODY DEBRIS MUST BE PRESENT IN POOLS WITH A MINIMUM OF 2 ROOTWAD LOGS PER POOL AND A MINIMUM TOTAL OF 40.
   D. POOL DEPTH RATIO SHALL BE 2.
   E. STREAM CHANNEL SHALL BE BETWEEN 68% AND 78% RIFFLE (CASCADE) AND BETWEEN 22% AND 32% POOL.
   F. RIPARIAN EXTENT SHALL BE DEVELOPED WITH WOODY VEGETATION COVER (WILLOW PLANTINGS) ALONG 2,600 LINEAR FEET OF YULE CREEK BANKFULL EDGE COVERING APPROXIMATELY 13,000 SQUARE FEET OF THE RIPARIAN PLANTING ZONE.
6. OTHER COMPONENTS OF THIS PLAN WHICH ARE NOT DIRECTLY ACCOUNTED FOR IN ERC CSQT THAT SHOULD ALSO BE IMPLEMENTED FOR OVERALL ECOLOGICAL INTEGRITY FOLLOW.
   A. CASCADES SHALL BE MODIFIED/DEVELOPED FOR A MORE NATURAL, IRREGULAR AND RANDOM CONFIGURATION AS DEPICTED HEREIN.
   B. OUTSIDE OF THE FLOOD PRONE RIPARIAN PLANTING ZONE ERODED UPLAND SIDE SLOPES (TRANSITION STABILIZATION ZONE) SHOULD BE STABILIZED WITH SLOPE GRADING, SEEDING AND EROSION CONTROL BLANKET WHERE APPROPRIATE.
   C. THE EXISTING PIPE CULVERT ROAD CROSSING SHALL BE REPLACED WITH A NATURAL OPEN BOTTOM CULVERT. THE WEIR SHALL BE REMOVED.
7. EXISTING LARGE CUT MARBLE BLOCKS WITHIN THE CHANNEL BOTTOM SHALL BE INCORPORATED INTO CASCADES, BANKS AND BURIED BELOW THE CHANNEL BOTTOM SURFACE AS NEEDED. HOWEVER, REMAINING LARGE BLOCKS SHOULD BE RANDOMLY PLACED OUTSIDE OF THE BANKFULL WIDTH AND NATURAL ON SITE COBBLE/RUBBLE SUBSTRATE USED. EXPOSED PORTIONS OF LARGE BLOCKS THAT ARE USED WHEN FEASIBLE SHALL HAVE SMOOTH SURFACES "ROUGHENED" AND "IRREGULARLY SHAPED" WITH SHARP EDGES ROUNDED OR CHAMFERED.
8. COMPONENTS OF THIS PLAN WILL REQUIRE SITE SPECIFIC FIELD ADJUSTMENTS AND VERIFICATION PRIOR TO IMPLEMENTATION. ERC HIGHLY RECOMMENDS FURTHER COORDINATION, DESIGN LAYOUT AND VERIFICATION PRIOR TO ANY IMPLEMENTATION. ALL DESIGN COMPONENTS, LOCATIONS ELEVATIONS AND TYPICAL DETAILS ARE SUBJECT TO CHANGE UPON FIELD VERIFICATION.

REV	DATE	DESCRIPTION
A	03-22-21	PLAN FOR SUBMITTAL

PREPARED BY	CLIENT	PROJECT	TITLE	SHEET
ECOLOGICAL RESOURCES CONSULTANTS, INC 225 UNION BLVD. SUITE 325 LAKEWOOD, CO 80228	COLORADO STONE QUARRIES, INC.	PROJECT: SPK-2019-00889 YULE CREEK MITIGATION PLAN	COVER SHEET & LOCATION MAP	01


SHEET 03
SHEET 04
SHEET 05
SHEET 06
DOWNSTREAM PROJECT LIMIT
UPSTREAM PROJECT LIMIT
FLOW
0+00
0+50
1+00
1+50
2+00
2+50
3+00
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4+00
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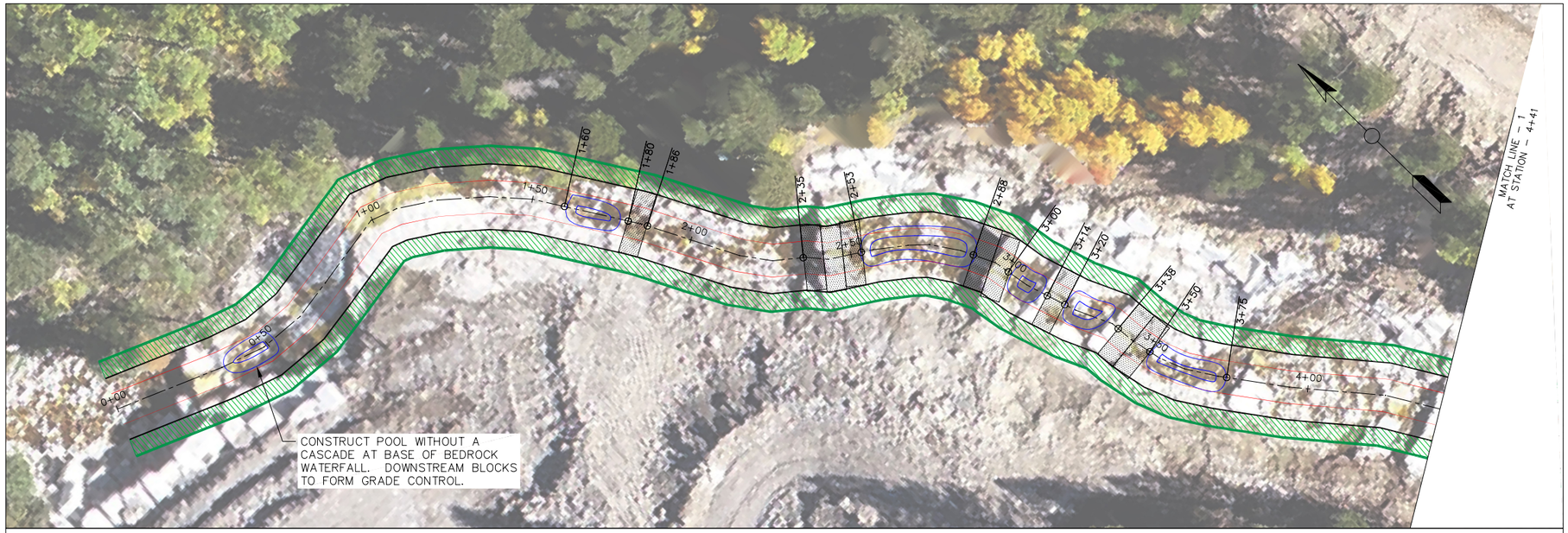
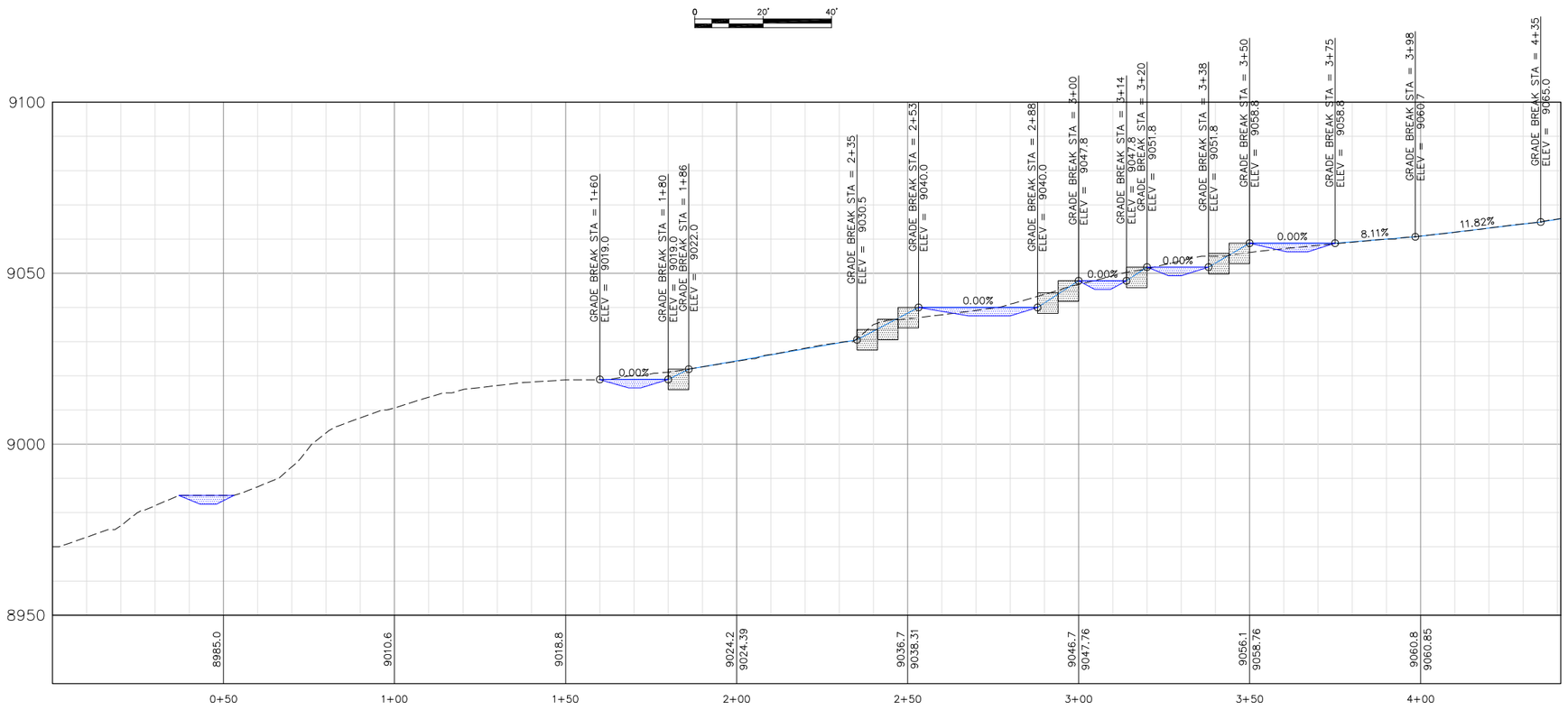


LEGEND:

- 8+00 — CENTERLINE AND STATIONING
- CHANNEL BOTTOM
- BANKFULL EDGE
- FLOOD PRONE EDGE
- POOL (PROFILE)
- POOL (PLAN)
- CASCADES
- RIPARIAN PLANTING ZONE

REFERENCE:
AERIAL IMAGERY AND TOPOGRAPHIC MAPPING SUPPLIED BY GREG LEWICKI AND ASSOCIATES, PLLC FROM 2020 DRONE MAPPING.



REV	DATE	DESCRIPTION
A	03-22-21	PLAN FOR SUBMITTAL

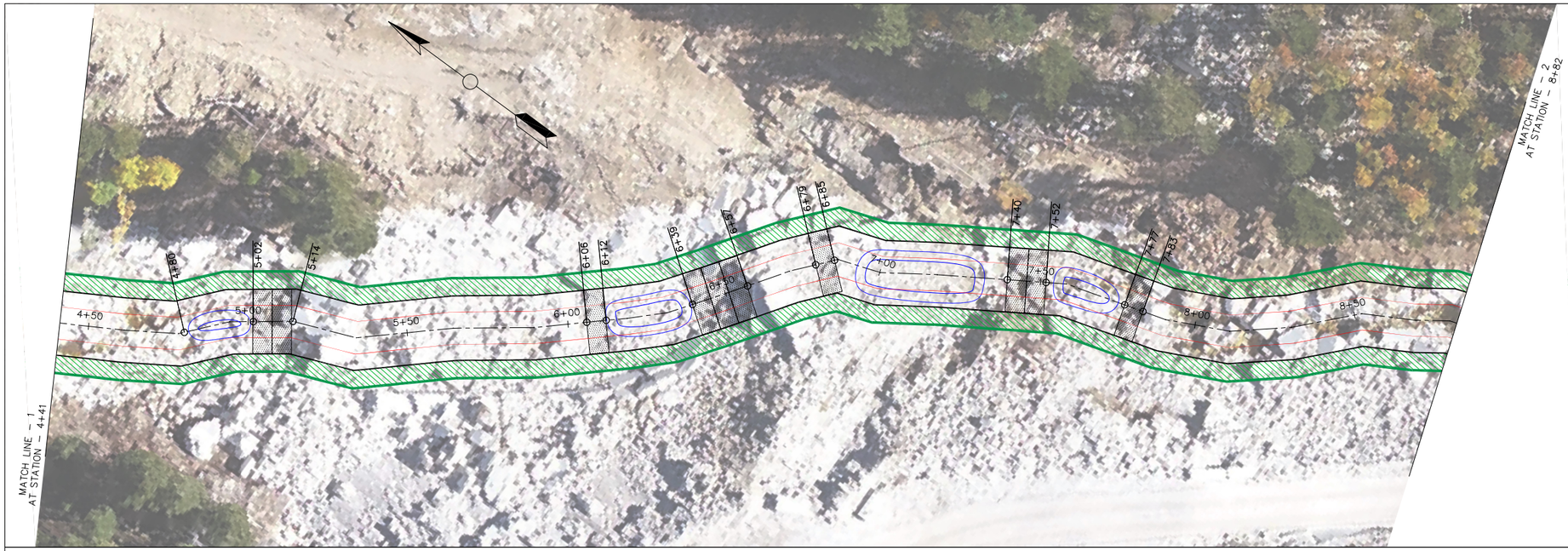
PREPARED BY
ECOLOGICAL RESOURCES CONSULTANTS, INC
225 UNION BLVD. SUITE 325
LAKEWOOD, CO 80228

CLIENT
COLORADO STONE QUARRIES, INC.

PROJECT
PROJECT: SPK-2019-00889 YULE CREEK MITIGATION PLAN

TITLE
PLAN & PROFILE 1

SHEET
03



LEGEND:

- 8+00 — CENTERLINE AND STATIONING
- CHANNEL BOTTOM
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- FLOOD PRONE EDGE
- POOL (PROFILE)
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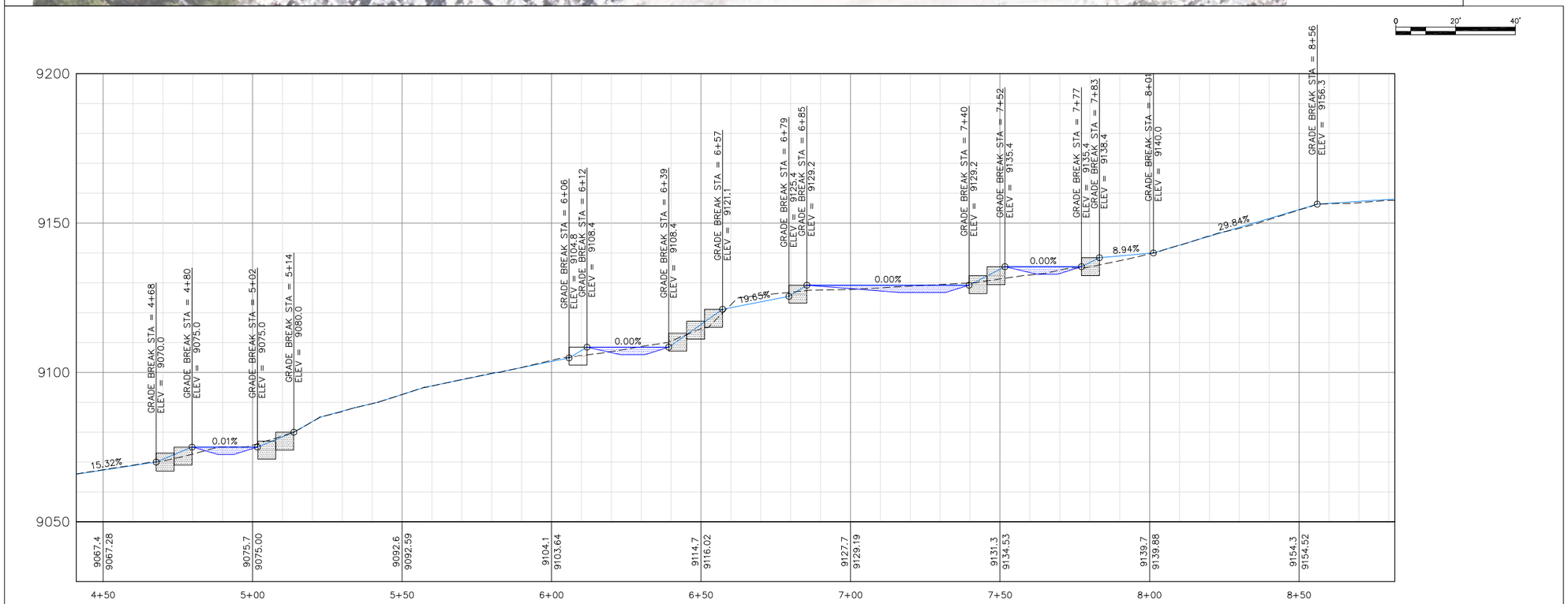

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ECOLOGICAL RESOURCES CONSULTANTS, INC
225 UNION BLVD. SUITE 325
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COLORADO STONE QUARRIES, INC.

PROJECT
PROJECT: SPK-2019-00889 YULE CREEK MITIGATION PLAN

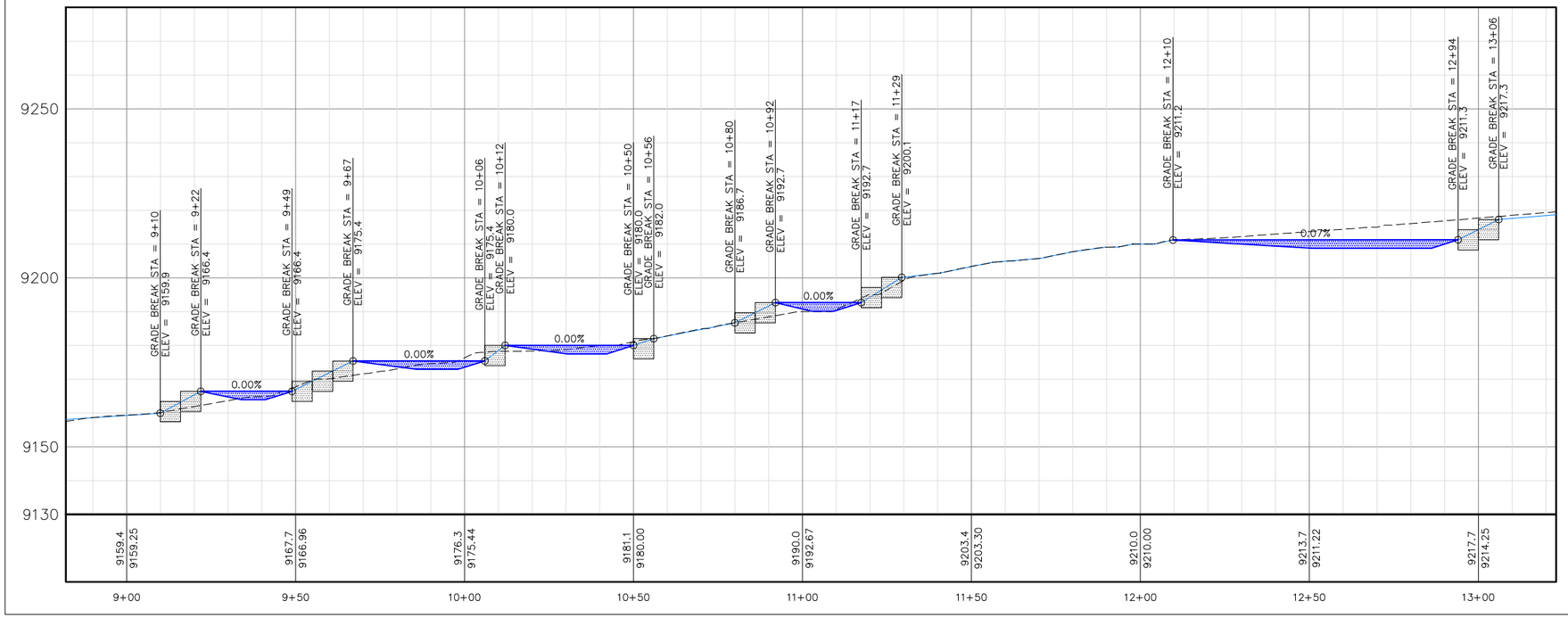
TITLE
PLAN & PROFILE 2

SHEET
04

LEGEND:

- 8+00 — CENTERLINE AND STATIONING
- CHANNEL BOTTOM
- BANKFULL EDGE
- FLOOD PRONE EDGE
- POOL (PROFILE)
- POOL (PLAN)
- CASCADES
- RIPARIAN PLANTING ZONE

REFERENCE:
AERIAL IMAGERY AND TOPOGRAPHIC MAPPING SUPPLIED BY GREG LEWICKI AND ASSOCIATES, PLLC FROM 2020 DRONE MAPPING.



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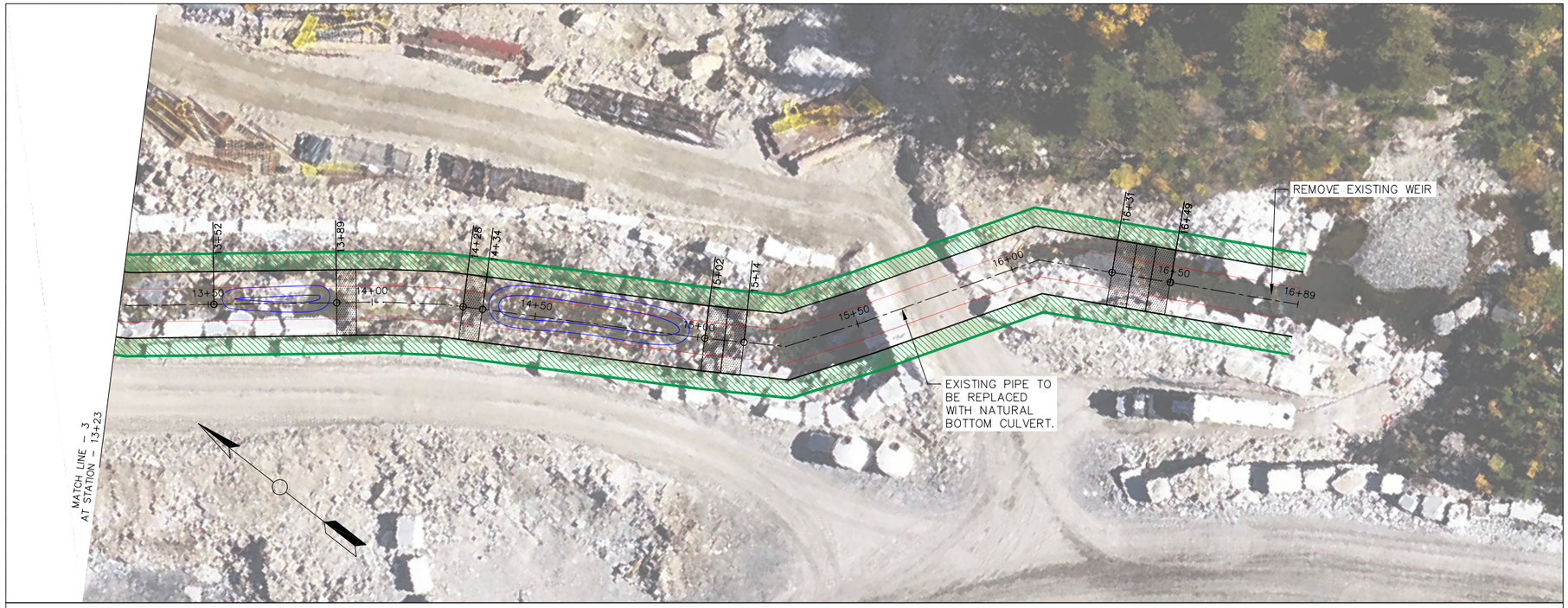
COLORADO STONE QUARRIES, INC.

PROJECT
PROJECT: SPK-2019-00889 YULE CREEK MITIGATION PLAN

TITLE
PLAN & PROFILE 3

SHEET
05

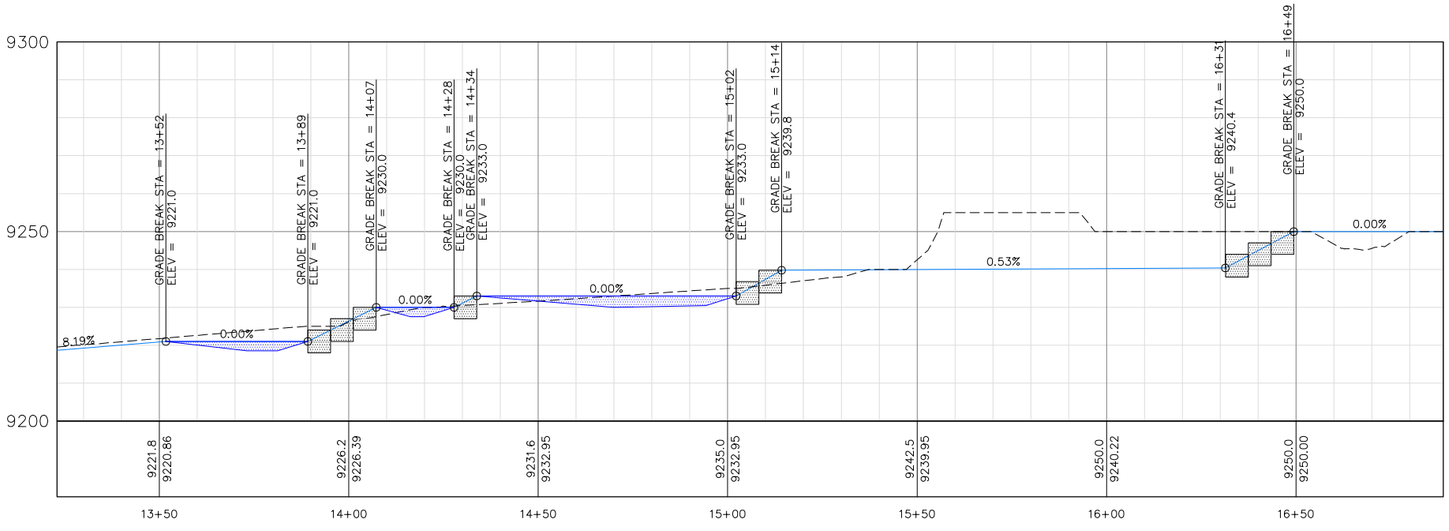


LEGEND:

- 8+00 — CENTERLINE AND STATIONING
- CHANNEL BOTTOM
- BANKFULL EDGE
- FLOOD PRONE EDGE
- POOL (PROFILE)
- POOL (PLAN)
- CASCADES
- RIPARIAN PLANTING ZONE

REFERENCE:
AERIAL IMAGERY AND TOPOGRAPHIC MAPPING SUPPLIED BY GREG LEWICKI AND ASSOCIATES, PLLC FROM 2020 DRONE MAPPING.

0 40' 80'



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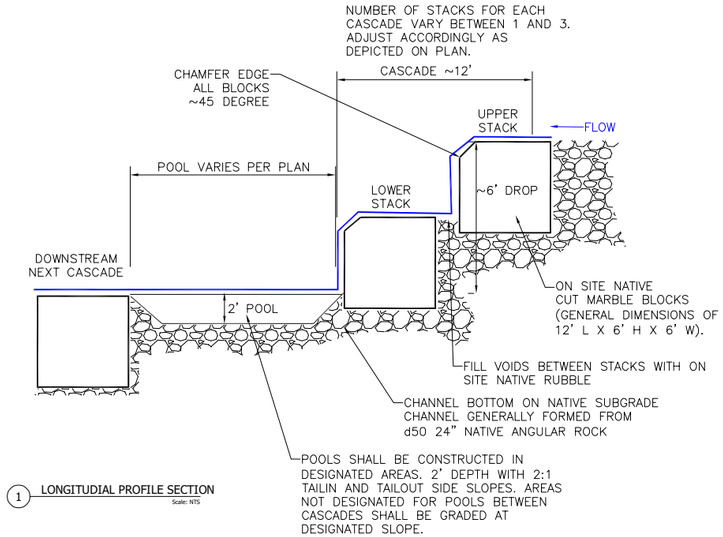
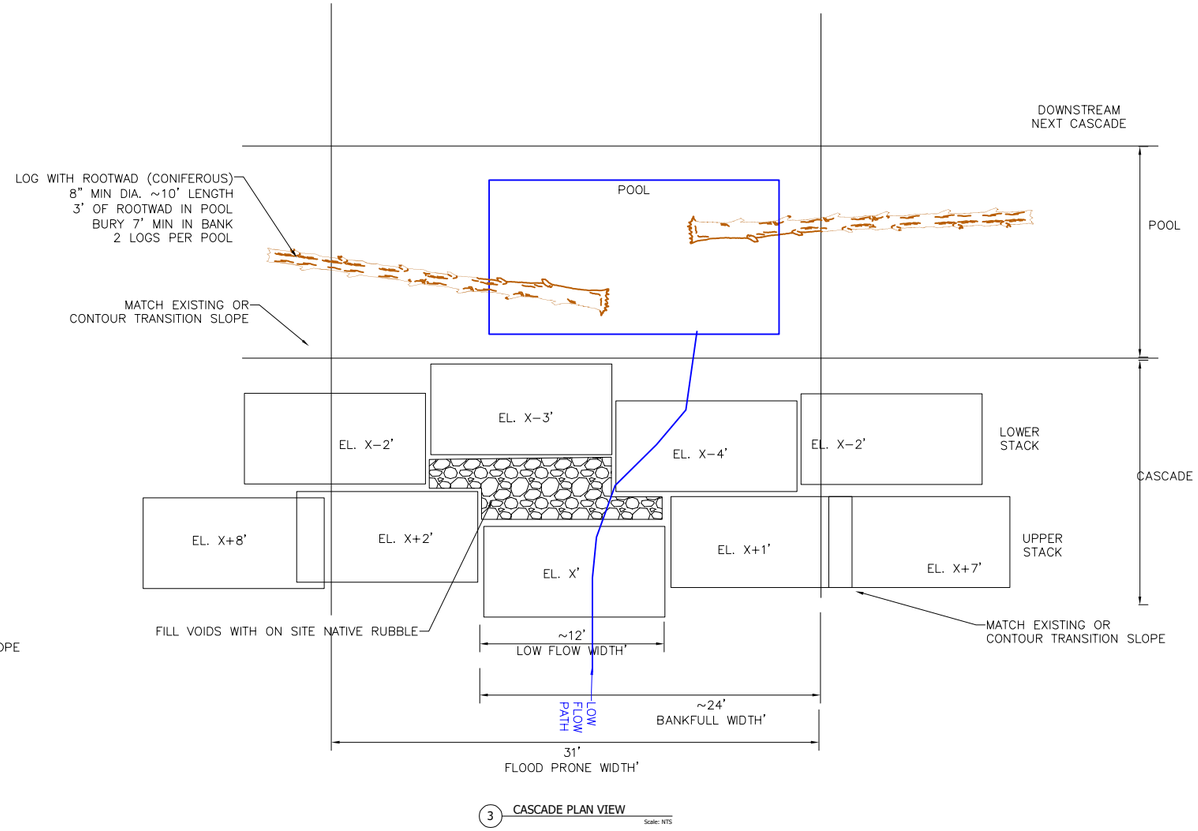
TITLE
PLAN & PROFILE 4

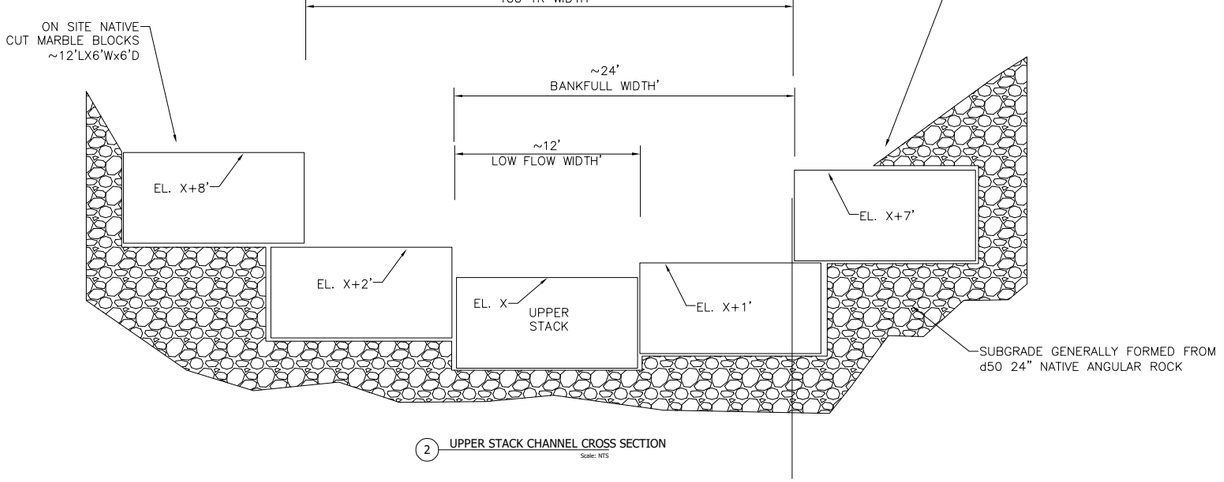
SHEET
06



1 LONGITUDIAL PROFILE SECTION
Scale: NTS



3 CASCADE PLAN VIEW
Scale: NTS



2 UPPER STACK CHANNEL CROSS SECTION
Scale: NTS

EXPOSED PORTIONS OF LARGE BLOCKS THAT ARE USED WHEN FEASIBLE SHALL HAVE SMOOTH SURFACES "ROUGHENED" AND "IRREGULARLY SHAPED" WITH SHARP EDGES ROUNDED OR CHAMFERED. CASCADES SHALL BE MODIFIED/DEVELOPED FOR A MORE NATURAL, IRREGULAR AND RANDOM CONFIGURATION AS DEPICTED HEREIN.

FUNCTIONAL UPLIFT REQUIREMENT
IN ORDER TO ACHIEVE MITIGATION FUNCTIONAL UPLIFT, STREAM CHANNEL SHALL BE BETWEEN 68% AND 78% RIFFLE (CASCADE) AND BETWEEN 22% AND 32% POOL.

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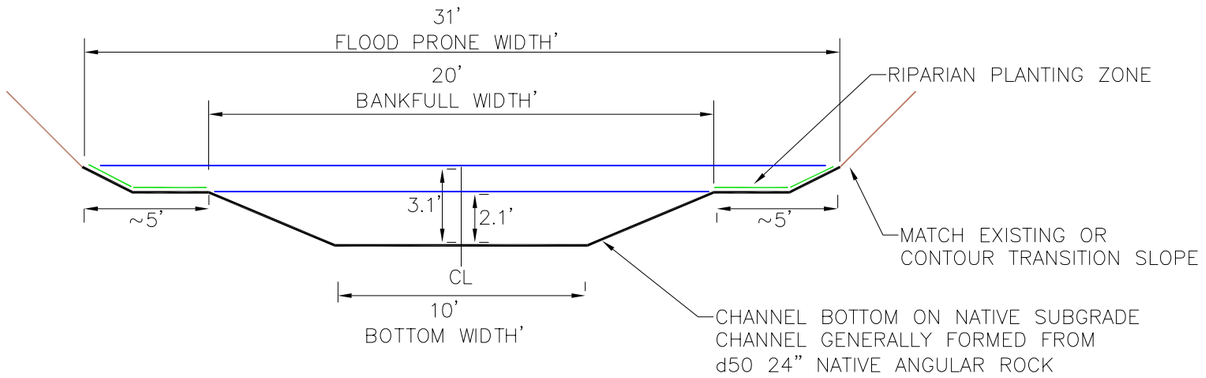
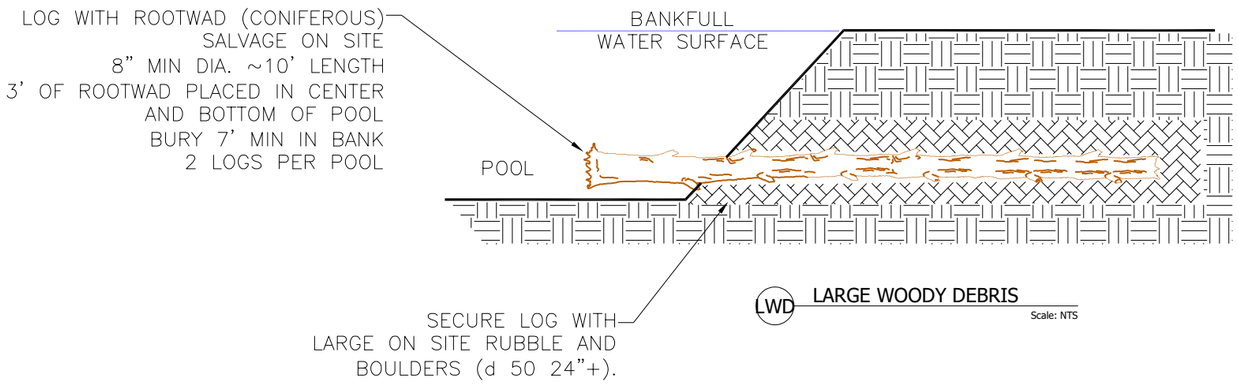
TITLE
SECTION & DETAILS 1

SHEET
07



XS TYPICAL CHANNEL CROSS SECTION

Scale: NTS



LWD LARGE WOODY DEBRIS

Scale: NTS

FUNCTIONAL UPLIFT REQUIREMENT

IN ORDER TO ACHIEVE MITIGATION FUNCTIONAL UPLIFT,
A MINIMUM OF TWO ROOTWAD LOGS MUST BE INSTALLED IN EACH POOL.
A MINIMUM OF 40 ROOTWAD LOGS HAVE BEEN ASSUMED INSTALLED.

PROFILE LAYOUT TABLE

STATION	ELEVATION	FEATURE
38	9019.0	POOL
52	9019.0	
MATCH EXISTING GRADE		
160	9019.0	POOL
180	9019.0	
180	9019.0	SINGLE
186	9022.0	STACKED BLOCKS
MATCH EXISTING GRADE		
235	9030.5	TRIPLE
253	9040.0	STACKED BLOCKS
MATCH EXISTING GRADE		
253	9040.0	POOL
288	9040.0	
288	9040.0	DOUBLE
300	9047.8	STACKED BLOCKS
300	9047.8	POOL
314	9047.8	
314	9047.8	SINGLE
320	9051.8	STACKED BLOCKS
320	9051.8	POOL
338	9051.8	
338	9051.8	DOUBLE
350	9058.8	STACKED BLOCKS
MATCH EXISTING GRADE		
468	9070.0	DOUBLE
480	9075.0	STACKED BLOCKS
480	9075.0	POOL
502	9075.0	
502	9075.0	DOUBLE
514	9080.0	STACKED BLOCKS
MATCH EXISTING GRADE		
606	9104.8	SINGLE
612	9108.5	STACKED BLOCKS
612	9108.5	POOL
639	9108.5	
639	9108.5	TRIPLE
657	9121.1	STACKED BLOCKS
MATCH EXISTING GRADE		
679	9125.4	SINGLE
685	9129.2	STACKED BLOCKS
685	9129.2	POOL
740	9129.2	
740	9129.2	DOUBLE
752	9135.4	STACKED BLOCKS

PROFILE LAYOUT TABLE

STATION	ELEVATION	FEATURE
752	9135.4	POOL
777	9135.4	
777	9135.4	SINGLE
783	9138.4	STACKED BLOCKS
910	9159.9	DOUBLE
922	9166.4	STACKED BLOCKS
922	9166.4	POOL
949	9166.4	
949	9166.4	TRIPLE
967	9175.4	STACKED BLOCKS
967	9175.4	POOL
1006	9175.4	
1006	9175.4	SINGLE
1012	9180.0	STACKED BLOCKS
1012	9180.0	POOL
1050	9180.0	
1050	9180.0	SINGLE
1056	9182.0	STACKED BLOCKS
MATCH EXISTING GRADE		
1080	9186.7	DOUBLE
1092	9192.7	STACKED BLOCKS
1092	9192.7	POOL
1117	9192.7	
1117	9192.7	DOUBLE
1129	9200.1	STACKED BLOCKS
MATCH EXISTING GRADE		
1210	9211.2	POOL
1294	9211.3	
1294	9211.3	DOUBLE
1306	9217.3	STACKED BLOCKS
MATCH EXISTING GRADE		
1352	9221.0	POOL
1389	9221.0	
1389	9221.0	TRIPLE
1407	9230.0	STACKED BLOCKS
1407	9230.0	POOL
1428	9230.0	
1428	9230.0	SINGLE
1434	9233.0	STACKED BLOCKS
1434	9233.0	POOL
1502	9233.0	
1502	9233.0	DOUBLE
1514	9239.8	STACKED BLOCKS

REV	DATE	DESCRIPTION
A	03-22-21	PLAN FOR SUBMITTAL

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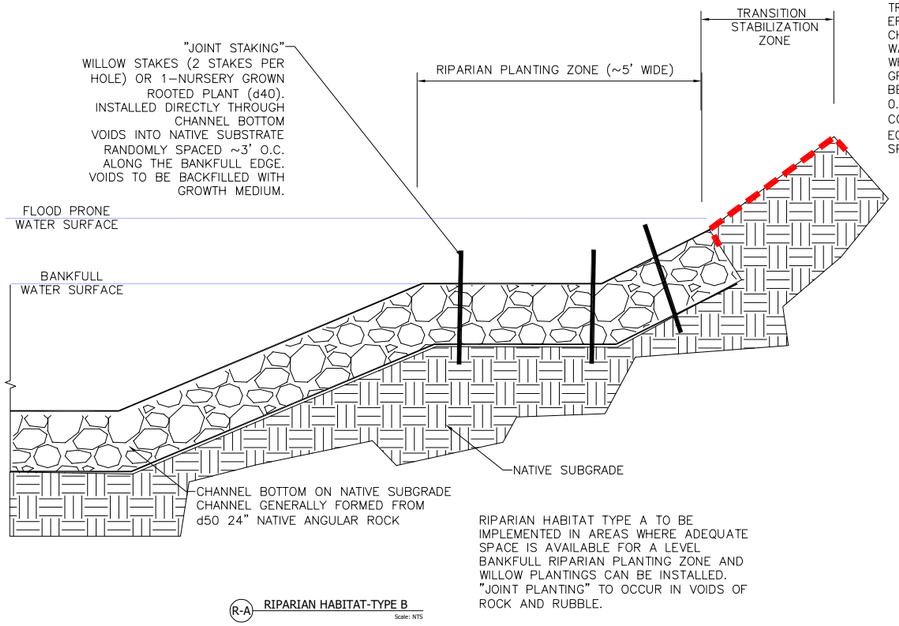
CLIENT
COLORADO STONE QUARRIES, INC.

PROJECT
PROJECT: SPK-2019-00889 YULE CREEK MITIGATION PLAN

TITLE
SECTION & DETAILS 2

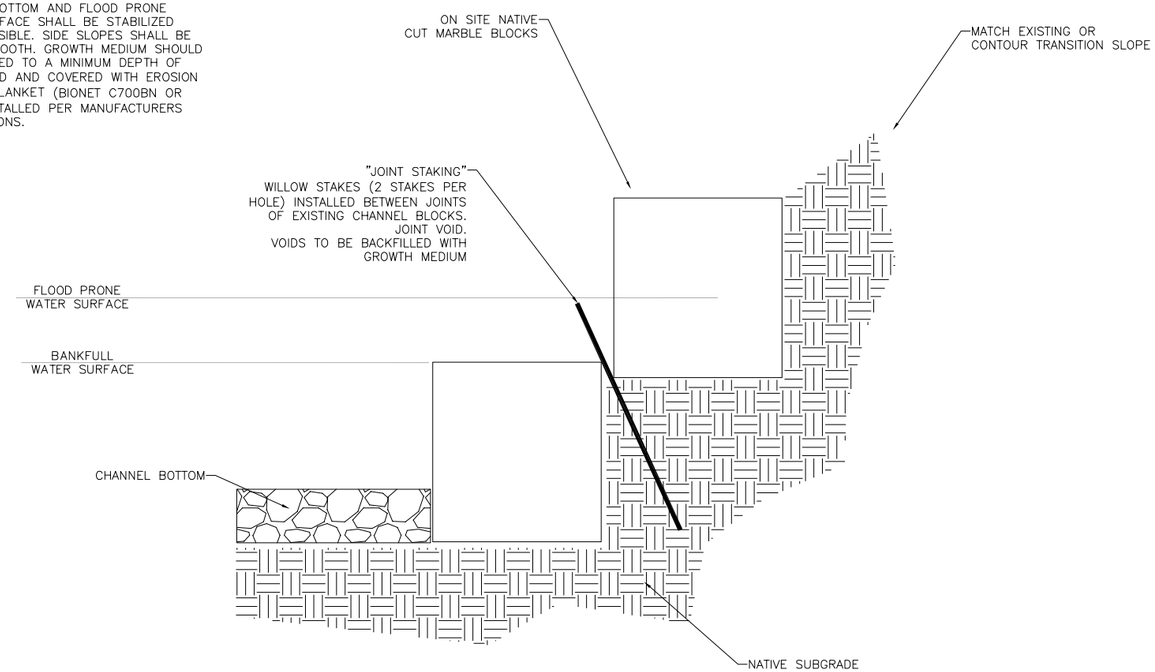
SHEET
08



TRANSITION STABILIZATION ZONE.
ERODED UPLAND SIDE SLOPES ABOVE THE CHANNEL BOTTOM AND FLOOD PRONE WATER SURFACE SHALL BE STABILIZED WHERE FEASIBLE. SIDE SLOPES SHALL BE GRADED SMOOTH. GROWTH MEDIUM SHOULD BE PREPARED TO A MINIMUM DEPTH OF 0.5', SEEDED AND COVERED WITH EROSION CONTROL BLANKET (BIONET C700BN OR EQUIV.) INSTALLED PER MANUFACTURERS SPECIFICATIONS.

RIPARIAN HABITAT TYPE A TO BE IMPLEMENTED IN AREAS WHERE ADEQUATE SPACE IS AVAILABLE FOR A LEVEL BANKFULL RIPARIAN PLANTING ZONE AND WILLOW PLANTINGS CAN BE INSTALLED. "JOINT PLANTING" TO OCCUR IN VOIDS OF ROCK AND RUBBLE.

R-A **RIPARIAN HABITAT-TYPE B**
Scale: NTS



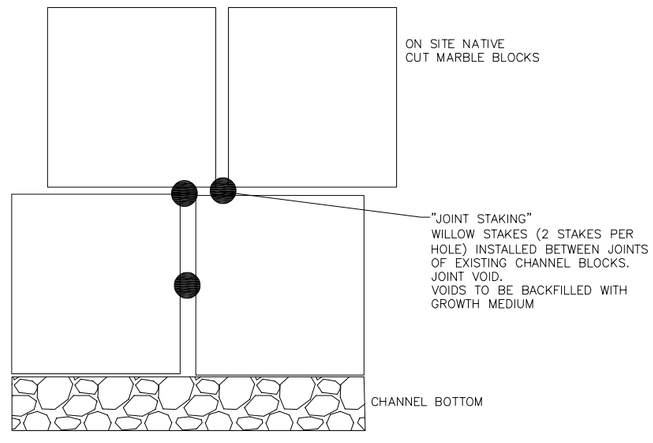
TYPICAL CROSS-SECTION

R-B **RIPARIAN HABITAT-TYPE B**
Scale: NTS

RIPARIAN HABITAT TYPE B TO BE IMPLEMENTED IN AREAS WHERE NO HORIZONTAL SPACE IS AVAILABLE FOR A LEVEL BANKFULL PLANTING ZONE AND BLOCK WALLS MUST BE USED. "JOINT PLANTING" TO OCCUR IN VOIDS BETWEEN BLOCKS.

EXPOSED PORTIONS OF LARGE BLOCKS THAT ARE USED WHEN FEASIBLE SHALL HAVE SMOOTH SURFACES "ROUGHENED" AND "IRREGULARLY SHAPED" WITH SHARP EDGES ROUNDED OR CHAMFERRED.

FUNCTIONAL UPLIFT REQUIREMENT
IN ORDER TO ACHIEVE MITIGATION FUNCTIONAL UPLIFT, 2,600 LINEAR FEET OF BANK STABILIZATION (TYPE A OR B) APPROXIMATELY 5 FEET WIDE MUST BE ACHIEVED. APPROXIMATELY 13,000 SQUARE FEET ALONG THE 2,600' LINEAR BANKFULL EDGE MUST BE DOMINATED BY WOODY PLANT COVER (WILLOWS).



TYPICAL PLAN VIEW

REV	DATE	DESCRIPTION
A	03-22-21	PLAN FOR SUBMITTAL

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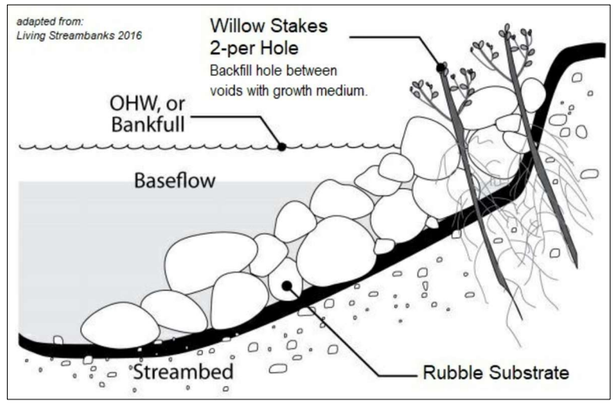
TITLE
SECTION & DETAILS 4

SHEET
09

WILLOW STAKES- JOINT STAKING



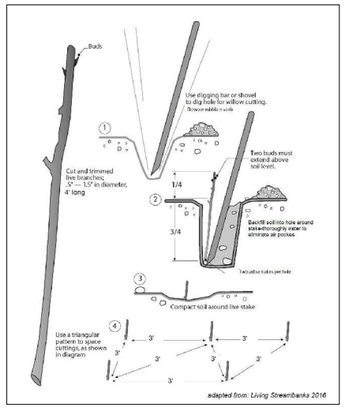


Table 1. Transition Stabilization Zone Seed Mix			
Scientific Name	Common Name	% of Mix	PLS per Acre
Bromus marginatus	Mountain brome	15	21
Festuca saximontana	Rocky Mountain fescue	15	3
Elymus elymoides	Squirrel-tail bottlebrush	10	5
Elymus trachycaulus	Slender wheatgrass	15	9
Koeleria macrantha	Junegrass	10	1
Poa fendleriana	Muttongrass	15	2
Poa secunda	Big bluegrass	10	1
Trisetum spicatum	Spiked trisetum	10	1
Total		***100***	**42**

Notes:
Quantity assumes 200 seeds per square foot broadcast seeded.
Quantity assumes 1.0 acre of upland reclamation, adjust as needed.
Intended for transition side slope stabilization areas above the channel bottom and rubble/cobble areas.

Table 2. Willow Stakes		
Scientific Name	Common Name	Stakes (2 per hole)
	Spacing	3 ft. on center
Salix boothii	Booth's willow	2888
	Total	2888

Notes:
Willow stakes harvest assumed available on site.
Quantity assumes 2,600 linear ft along the bankfull edge and 13,000 sq. ft. of riparian habitat.

Table 3. Nursery Potted Willows (Alternate to Stakes)		
Scientific Name	Common Name	D60 (1 per hole)
	Spacing	3 ft. on center
Salix boothii	Booth's willow	1444
	Total	1444

Notes:
Nursery potted willows available at Colorado native plant nurseries or contract grown.
Quantity assumes 2,600 linear ft along the bankfull edge and 13,000 sq. ft. of riparian habitat.

Willow Stakes:

1. On site willows have been identified as Booth's willow *(Salix boothii*).
2. Willow stakes shall be harvested during the dormant season (before leaf-out).
3. Willow stakes shall be harvested on site or at other local pre-approved locations.
4. Willow stakes shall be approximately 4' long and 0.5”-1" diameter, healthy (green-live) stems.
5. The bottom 6-8 inches of the willow stakes shall be installed below the expected dry-season water table with 50-80% of the cutting below ground depending on the presence and depth of topsoil.
6. All branches and leaves shall be trimmed.
7. Willow stakes shall be pre-soaked completely submerged for 48 (minimum)-96 hours.
8. Willow stakes shall be kept in water until installation without freezing.
9. Willow stake are intended to be installed through cobble/rubble and in between rock slabs with a mechanical stinger (dibble bar or similar) creating a hole to accommodate two stakes to a depth of 2-3 feet.
10. Each hole shall be backfilled to the surface with native soils around the stake and water compacted (saturated) to eliminate air pockets (filling all voids around the stake).
11. Approximately 1' of the stake shall extend above the ground surface. Trim willow stake accordingly.

Nursery Potted Willows:

1. Nursery Potted Willows (*Salix boothii*) (d60 pot size) can be substituted as an alternative for Willow Stakes. Potted willows have a well developed rootball and typically have better survivability at higher elevation project sites.
2. Nursery Potted Willows can be secured and obtained from a Colorado native plant nursery.
3. The rootball shall be installed flush with the ground surface and above ground parts extending upwards.
4. Nursery Potted Willows shall be installed in designated locations along the bankfull edge within the riparian planting zone approximately at 3' on center spacing . Backfill as needed with growth medium around rootball and thoroughly water upon installation to ensure no air pockets.

Growth Medium:

1. Growth Medium can be developed from salvaged on site fine grain mineral soil generally screened to ¾” minus or existing in place soil. Soil shall be placed loose and clod free to a minimum depth of 0.5'. Soil amendments shall be added to growth medium (dry top dressing). Soil amendments should include 2000 pounds per acre of Biosol Forte, 200 pounds per acre of Humates and 60 pounds per acre of mycorrhizae. Adjust as needed based on soil nutrient analysis.

REV	DATE	DESCRIPTION
A	03-22-21	PLAN FOR SUBMITTAL

PREPARED BY
ECOLOGICAL RESOURCES CONSULTANTS, INC
225 UNION BLVD. SUITE 325
LAKEWOOD, CO 80228

CLIENT
COLORADO STONE QUARRIES, INC.

PROJECT
PROJECT: SPK-2019-00889 YULE CREEK MITIGATION PLAN

TITLE
SECTION & DETAILS 3

SHEET
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