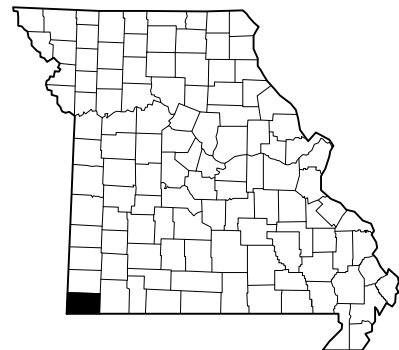


BANK STABILIZATION

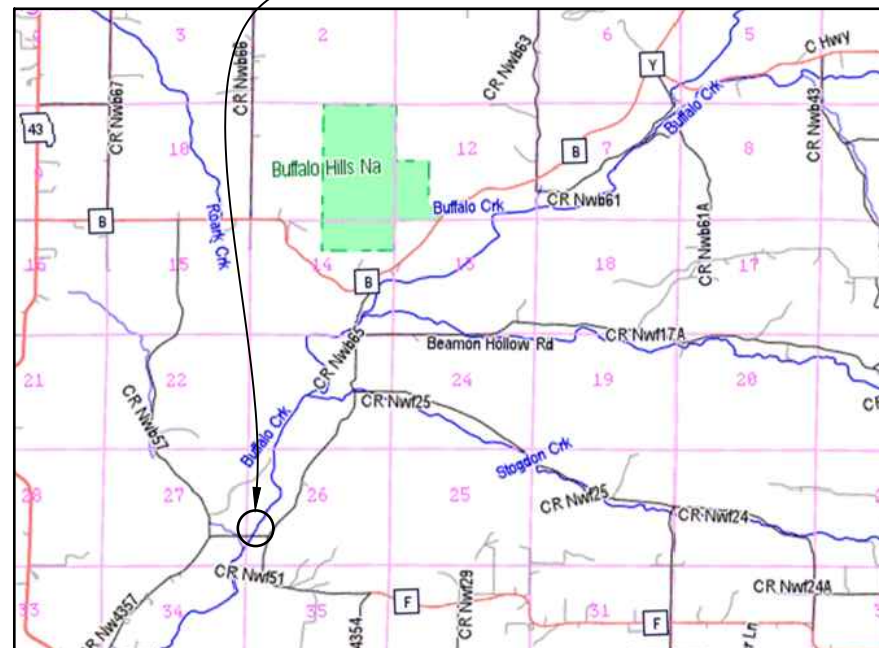
BUFFALO CREEK ABOVE COUNTY ROAD 4357 (BUFFALO CREEK ROAD) BRIDGE MCDONALD COUNTY, MISSOURI MISSOURI NRCS EMERGENCY WATERSHED PROTECTION



McDonald County, Missouri

PROJECT LOCATION: SW $\frac{1}{4}$ of Section 26, Township 23N, Range 34W

Latitude 36.697° N, Longitude 94.580° W



ESTIMATED PROJECT QUANTITIES

DESCRIPTION	BASE DESIGN		ADDITIONAL OPTION	
	LENGTH	QUANTITY	LENGTH	QUANTITY
Stone Toe Protection	500 LF	1,740 TN*	-	-
Stone Weirs	70 LF	310 TN*	35 LF	155 TN*
Stone Tiebacks	280 LF	560 TN*	120 LF	240 TN*
Rock Blanket	-	215 TN*	-	-
Excavation, Wet	-	5,870 CY	-	-
Seeding and Mulching	-	2 ACRES	-	-

* Estimate based on 1.5 tons per cubic yard of placed and compacted rock

NOTES:

- PERMITTING:** All construction shall be completed in compliance with the conditions of the U.S. Army Corps of Engineers Little Rock District General Permit (GP) 41, Application #SWL-2008-00066, Issue Date: April 23, 2018 – Expiration Date: April 23, 2023. The contractor is required to maintain a copy of the permit onsite throughout the duration of the construction period.
- EXCAVATION:** Missouri law requires that any person making or beginning any excavation notify all underground facility owners/operators which may be affected by said excavation at least three but not more than ten working days in advance, except in the case of an emergency. A "working day" is everyday, except Saturday, Sunday, or a legally declared local, state or federal holiday. To make this notification and locate all utilities at the site or on ingress & egress roads prior to excavation, contact the Missouri One Call system and submit a locate request. The phone number for the Missouri One Call System is 800-344-7483 (1-800-DIG-RITE).
- TRANSPORTATION:** Prior to construction, the contractor shall provide a transportation plan to the McDonald County Commission delineating haul routes and intended dates of use. The contractor shall coordinate with the county road district to ensure haul routes and loads conform to tonnage limitations on local bridges.
- TECHNICAL ASSISTANCE:** The contact numbers for technical assistance concerning the plan set are as follows:
- JOBSITE SAFETY:** The contractor and all subcontractors shall perform work on the jobsite in compliance with applicable OSHA standards and abide by all local, state, and federal regulations. The contractor shall submit to the engineer a project Safety Plan (SP) for all work performed by the contractor and all subcontractors prior to commencement of work. The purpose of the SP is to encourage and enable all work to be performed in the safest possible manner and that all parties involved are aware of their individual responsibility for safety on the jobsite. The SP shall outline and detail for all workers, the specific procedures and actions necessary to respond to a jobsite emergency and the measures taken to communicate these requirements to all workers. The SP shall include a list of local emergency contacts including phone numbers. A copy of the emergency contact list shall be accessible to workers. In the case where there is no cellular or land line phone service at the jobsite, the SP shall identify how to reach the nearest available phone service.

Michael Malone, REI Civil Engineer, P.E. (417) 300-2705
Keith Lindquist, McDonald County Presiding Commissioner (417) 223-7530

SHEET INDEX

- G-01: COVER SHEET
- G-02: ABBR., LEGEND, & SYMBOLS
- G-03: CONSTRUCTION NOTES
- C-01: EXISTING CONDITION
- C-02: PLANNED CONSTRUCTION
- C-03: CONSTRUCTION DETAILS
- C-04: CROSS SECTION DATA

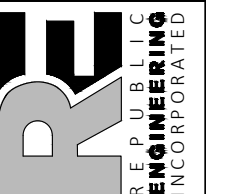


800-344-7483 (1-800-DIG-RITE)



Description	Date
Investigated:	04 JUN 18
Surveyed:	04 JUL 18
Designed:	14 JUL 18
Drafted:	15 JUL 18
Approved:	29 JUL 18

COVER SHEET
BUFFALO CREEK STABILIZATION ABOVE C.R. 4357 BRIDGE
MCDONALD COUNTY COMMISSION
MISSOURI NRCS EMERGENCY WATERSHED PROTECTION



SHEET IDENTIFICATION
G-01
SHEET 1 OF 7

ABBREVIATIONS	
AP	ALIGNMENT PIN
BM	BENCHMARK
C.C.	CENTER TO CENTER
CF	CUBIC FEET
CL	CENTERLINE
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CY	CUBIC YARD
DC	DEGREE OF CURVE
DIA,	DIAMETER
E	EAST
EA	EACH
EL, ELEV	ELEVATION
FL	FLOWLINE
FT, '	FOOT, FEET
GA	GAUGE
GALV	GALVANIZED
H, HORZ	HORIZONTAL
HDWL	HEADWALL
HWY	HIGHWAY
I.D.	INSIDE DIAMETER
IN, "	INCH
LC	LENGTH OF CURVE
LPSTP	LONGITUDINAL PEAKED STONE TOE PROTECTION
LT	LEFT
MAX	MAXIMUM
MIN	MINIMUM
MOTOT	MISSOURI DEPARTMENT OF TRANSPORTATION
N	NORTH
NAD	NORTH AMERICAN DATUM
NAVD	NORTH AMERICAN VERTICAL DATUM
NTS	NOT TO SCALE
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
PC	POINT OF CURVATURE
PI	POINT OF INTERSECTION
PSI	POUNDS PER SQUARE INCH
PVMT	PAVEMENT
R	RADIUS
RC	RADIUS OF CURVE
RCP	REINFORCED CONCRETE PIPE
ROW, RW	RIGHT OF WAY
RT	RIGHT
S	SOUTH
STA	STATION
STL	STEEL
TEMP	TEMPORARY
TN	TON
TYP	TYPICAL
UNK	UNKNOWN
V, VERT	VERTICAL
VC	VERTICAL CURVE
VPC, VPI, VPT	VERTICAL POINT OF CURVATURE, INTERSECTION, OR TANGENCY
W	WEST
X SECT	CROSS SECTION

LEGEND	
	SPOT ELEVATION
	VERTICAL/HORIZONTAL CONTROL POINT
	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
	PLANNED MAJOR CONTOUR
	PLANNED MINOR CONTOUR
	EXISTING TREES
	EXISTING TREE LINE
	EXISTING FENCE
	PLANNED FENCE
	EXISTING PIPE CULVERT (OPENING DIAMETER)
	EXISTING BOX CULVERT (OPENING WIDTH X HEIGHT)
	EXISTING UTILITY POLE
	EXISTING UNDERGROUND UTILITY MARKER
	ROCK RIPRAP
	ONSITE EXCAVATED SPOIL
	MULCH
	GRAVEL
	STABLE BASE
	EXISTING GROUNDLINE
	CENTERLINE
	DEPRESSION
	ROCK BLUFF
	APPROXIMATE FLOWLINE OR RIVER THALWEG
	HIDDEN
	NORTH INDICATOR

SYMBOLS	

Description	Date
	Investigated: 04 JUN 18
	Surveyed: 04 JUL 18
	Designed: 14 JUL 18
	Drafted: 15 JUL 18
	Approved: 29 JUL 18
ABBREVIATIONS, LEGEND, & SYMBOLS BUFFALO CREEK STABILIZATION ABOVE C.R. 4357 BRIDGE McDONALD COUNTY COMMISSION MISSOURI NRCS EMERGENCY WATERSHED PROTECTION	
SHEET IDENTIFICATION	
G-02	
SHEET 2 OF 7	

ROCK RIPRAP MATERIAL SOURCE AND SELECTION:

1. Rock riprap shall be obtained from a MoDOT approved source for bulk rock aggregate, and consist of individual rock fragments that are dense, sound, and free from cracks, seams, and other defects conducive to accelerated weathering. Rock fragments shall be angular to subrounded, with the least dimension of an individual rock fragment not less than one-third the greatest dimension of the fragment.
2. Unless otherwise specified, rock riprap shall have a gradation in accordance with MoDOT material specification #609.60.2.4, Type 4 Rock Ditch Liner, consisting of material with a predominant rock size of 19 inches (475 mm), a maximum rock size of 28 inches (700 mm) and a gradation such that no more than 15 percent will be less than 6 inches (150 mm).
3. Rock riprap will consist of clean, uncontaminated materials free from dirt, clay, sand, rock fines and other materials not meeting the required gradation limits to minimize excessive turbidity by leaching of fines, as well as to preclude the entrance of deleterious and/or toxic materials into the waters of the United States by natural runoff or by leaching.
4. Prior to construction, the Contractor shall provide a representative gradation pile of rock at the project location for inspection and approval by the project engineer. The size of the gradation pile shall be a minimum of two (2) tons. The Contractor shall provide documentation from the quarry as to the quality (bulk specific gravity, absorption, soundness) of the source material. Only those materials approved by the engineer shall be used in construction.

ROCK RIPRAP SUBGRADE PREPARATION:

1. The subgrade surfaces on which the rock riprap is to be placed shall be cut or filled and graded to the lines and grades shown on the drawings. Subgrade surfaces shall be reasonably smooth, the condition and depths of which documented by field notes, photograph, or similar method prior to rock placement.
2. During construction, excess spoil will be stockpiled away from concentrated flow areas. After major construction operations are completed, excess spoil shall be spread uniformly in designated areas and along the toe of rock riprap erosion control measures.
3. The rock riprap shall be placed by equipment on subgrade surfaces to the depths specified and shall be constructed to the full course thickness in one operation in such a manner as to avoid serious displacement of the underlying materials. Larger rock shall be placed at the toe of the rock protection measures to form a stable base.
4. Rock shall be placed in a manner that will ensure that the installed measures are reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact one to another with the smaller rocks and spalls filling the voids between the larger rocks. All placed rock ripap shall require mechanical compaction efforts to enhance in-place consolidation that reduces the susceptibility of rock movement during future flood events.

ROCK STABILIZATION DESCRIPTIONS:

1. LPSTP shall be comprised of consolidated rock that is five (5) feet wide at its crest and vary in underlying dimensions according to three separate configurations; heavy, medium, or light. Heavy LPSTP shall be fifteen (15) feet wide at the base, eight (8) feet tall, requiring approximately 3.5 tons of rock per lineal foot to construct. Medium LPSTP shall be thirteen (13) feet wide at the base, six (6) feet tall, requiring approximately 2.3 tons of rock per lineal foot to construct. Light LPSTP shall be eleven (11) feet wide at the base, five (5) feet tall, requiring approximately 1.7 tons of rock per lineal foot to construct. The angle of repose for placed rock shall be no steeper than 1:1 as shown. This stabilization measure shall be placed with sufficient density to achieved the weight to length ratios described.
2. Rock tiebacks shall be comprised of consolidated rock that is three (3) feet wide at the crest, nine (9) feet wide at the base, and five (5) feet tall with an angle of repose no steeper than 1:1 as shown. This stabilization measure shall be placed with sufficient density to require approximately 1.3 tons of rock per linear foot to construct.
3. Rock weirs shall be comprised of consolidated rock that is eight (8) feet wide at the crest, sixteen (16) feet wide at the base, and six (6) feet tall with an angle of repose no steeper than 1:1 as shown. This stabilization measure shall be placed with sufficient density to require approximately 3 tons of rock per linear foot to construct. Rock larger than MoDOT Type 4 is authorized to form the base of this stabilization measure to improve erosion resistance.
4. Rock Blanket shall be a minimum of three (3) feet thick when measured perpendicular to the slope. The slope shall be no steeper than 3.0 H to 1.0 V unless otherwise noted. This stabilization measure shall be placed with sufficient density to require approximately 1.5 tons of rock per square yard to construct.

EROSION CONTROL MEASURES:

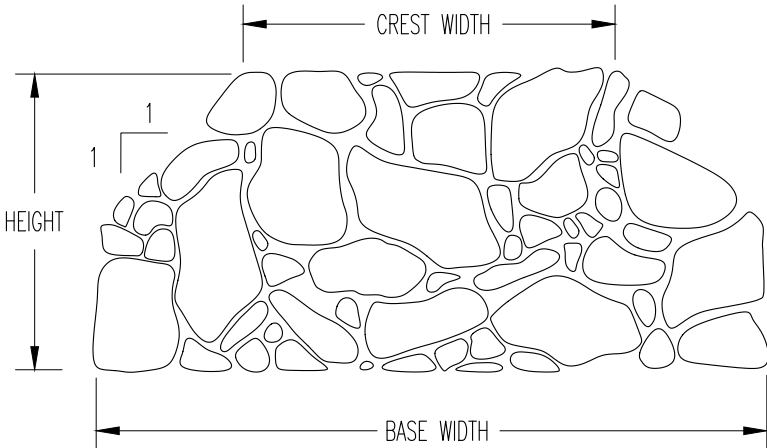
1. Prior to commencement of work, the contractor shall submit to the engineer an erosion control plan for all phases of work performed by the contractor and all subcontractors.
2. Any excavation and/or moving of soil materials shall be scheduled to minimize the size of areas disturbed and unprotected from erosion for the shortest reasonable time. All stripping, clearing, grubbing and earthwork activities will be staged to ensure no greater than 1/2 acre is disturbed at any one time.
3. For disturbed areas above the normal highwater mark of the watercourse, seeding and mulching shall be conducted as soon as reasonably possible following completion of that earthwork activity to provide protection of exposed soil surfaces from erosion in accordance with GP-41 Special Condition #13. Separate topsoil from all on-site excavate. Use separated topsoil as a final cover over disturbed and low bank areas to provide a sufficient substrate for seed.
4. In-stream diversions and sediment basins constructed to divert water or treat water from the work areas are temporary and shall be removed and restored to the near original condition when they are no longer required to enable major construction operations.
5. Sediment filters consisting of straw bales or geotextile sediment fences to trap sediment from runoff into waters of the U.S. shall be sufficiently anchored to prevent subsequent undermining or flanking. These erosion control measures shall be removed once major construction operations are complete.

PRESERVATION AND MANAGEMENT OF WOODY VEGETATION:

1. Trees and other vegetation designated to remain undisturbed shall be protected from damage throughout the duration of the construction period as supported by GP-41 Special Condition #12. Any damages resulting from the contractor's operations or neglect shall be repaired by the contractor.
2. Any cleared vegetation or in-channel post-flood vegetative debris (trees, logs, brush) that must be removed to enable placement of stabilization works shall relocated as indicated in the plans or disposed in an approved location away from the project site.

ACCESS AND EGRESS:

1. The contractor shall provide a plan of equipment ingress/egress as well as equipment staging areas within the work limits to the McDonald County Commission prior to mobilization to the site to minimize disturbances to adjacent businesses and private residences.
2. The contractor shall, at his/her own expense, remove and replace all fences, posts, culverts, street signs, and the like as required within the work limits as shown on Plate C-01.



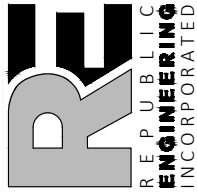
Description	Date
	Investigated: 04 JUN 18
	Surveyed: 04 JUL 18
	Designed: 14 JUL 18
	Drafted: 15 JUL 18
Approved: 29 JUL 18	

CONSTRUCTION NOTES

BUFFALO CREEK STABILIZATION ABOVE C.R. 4357 BRIDGE

MCDONALD COUNTY COMMISSION

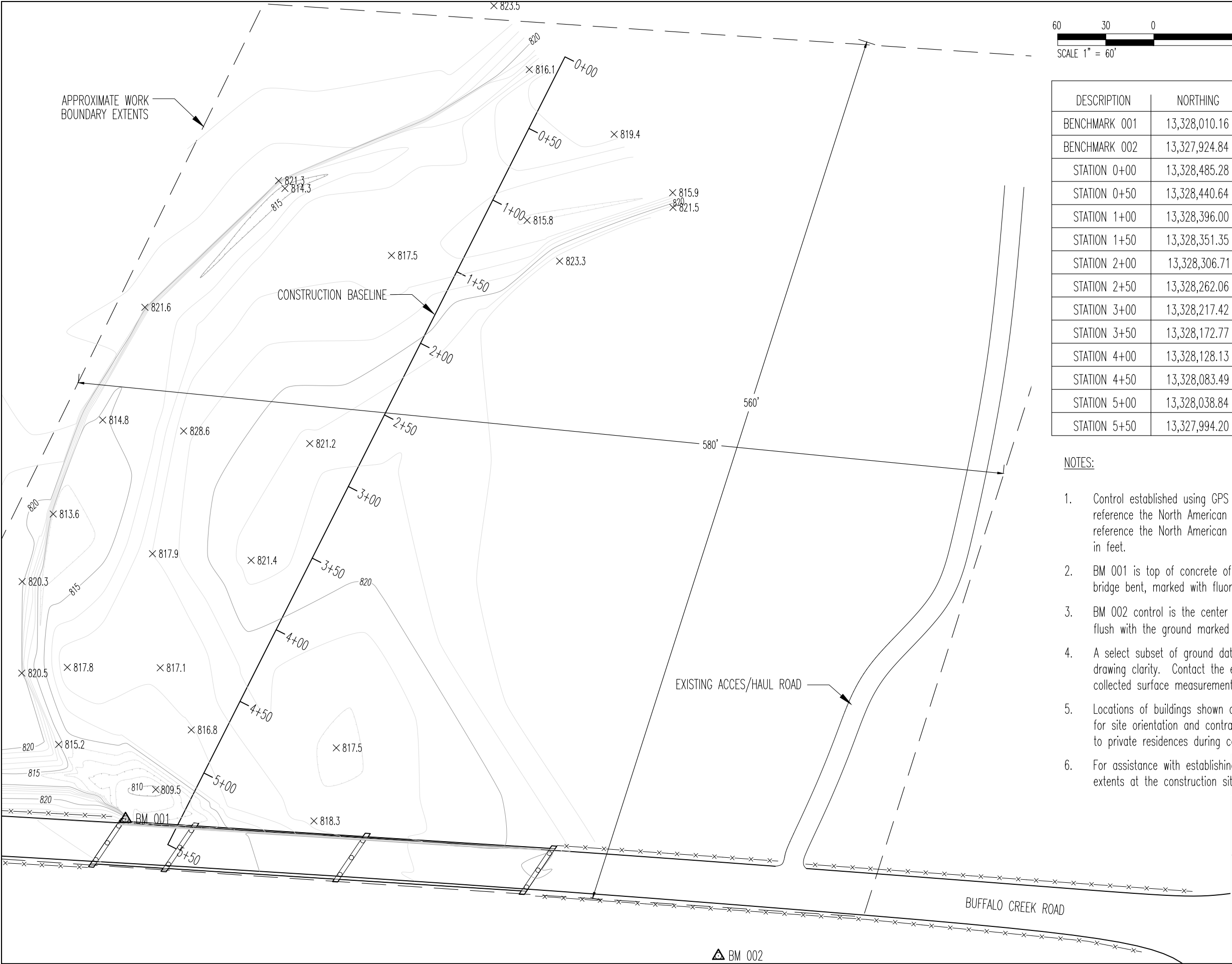
MISSOURI NRCS EMERGENCY WATERSHED PROTECTION



SHEET IDENTIFICATION

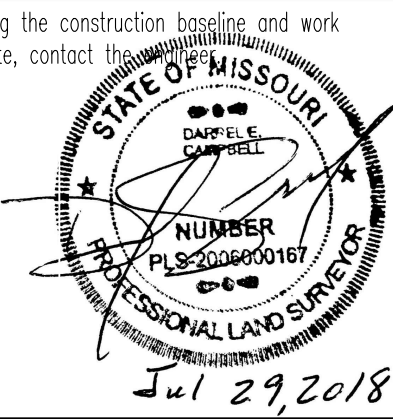
G-03

SHEET 3 OF 7



DESCRIPTION	NORTHING	EASTING	ELEVATION
BENCHMARK 001	13,328,010.16	1,177,203.54	823.71
BENCHMARK 002	13,327,924.84	1,177,573.04	828.09
STATION 0+00	13,328,485.28	1,177,477.39	---
STATION 0+50	13,328,440.64	1,177,454.87	---
STATION 1+00	13,328,396.00	1,177,432.36	---
STATION 1+50	13,328,351.35	1,177,409.84	---
STATION 2+00	13,328,306.71	1,177,387.33	---
STATION 2+50	13,328,262.06	1,177,364.82	---
STATION 3+00	13,328,217.42	1,177,342.30	---
STATION 3+50	13,328,172.77	1,177,319.79	---
STATION 4+00	13,328,128.13	1,177,297.27	---
STATION 4+50	13,328,083.49	1,177,274.76	---
STATION 5+00	13,328,038.84	1,177,252.25	---
STATION 5+50	13,327,994.20	1,177,229.73	---

- NOTES:
- Control established using GPS survey method. Horizontal control is reference the North American Datum 83. Vertical control is reference the North American Vertical Datum 88. All displayed units in feet.
 - BM 001 is top of concrete of the north corner of the westernmost bridge bent, marked with fluorescent point.
 - BM 002 control is the center top of a 3/4" dia. steel pin driven flush with the ground marked with fluorescent point.
 - A select subset of ground data point elevations are shown for drawing clarity. Contact the engineer for a complete listing of all collected surface measurements.
 - Locations of buildings shown on this drawing are approximate and for site orientation and contractor awareness. Do not block drives to private residences during construction.
 - For assistance with establishing the construction baseline and work extents at the construction site, contact the engineer.



DESCRIPTION

DATE

Investigated: 04 JUN 18

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EXISTING CONDITION

BUFFALO CREEK STABILIZATION ABOVE C.R. 4357 BRIDGE

MCDONALD COUNTY COMMISSION

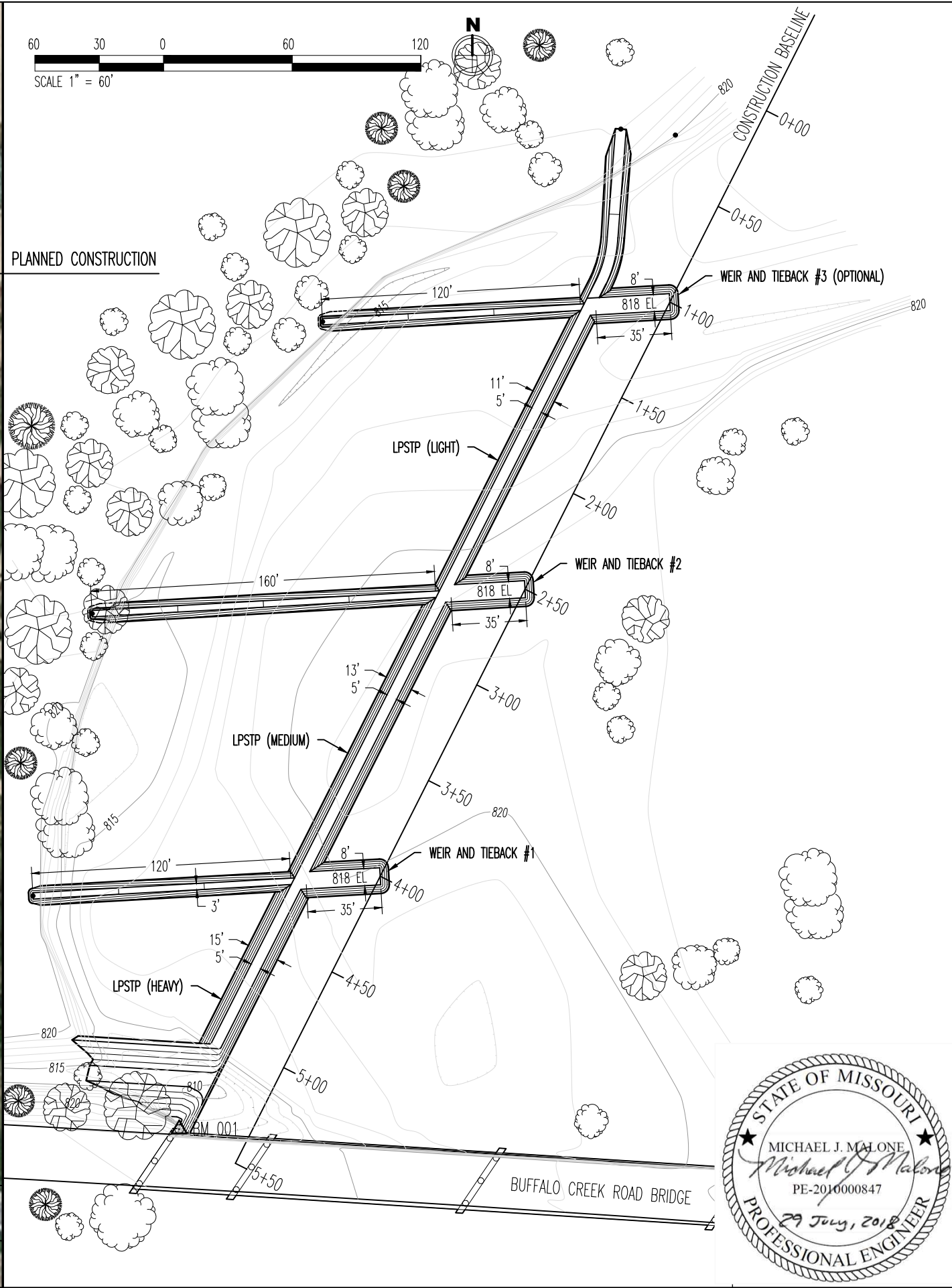
MISSOURI NRCS EMERGENCY WATERSHED PROTECTION

REPUBLIC ENGINEERING INCORPORATED

SHEET IDENTIFICATION

C-01

SHEET 4 OF 7



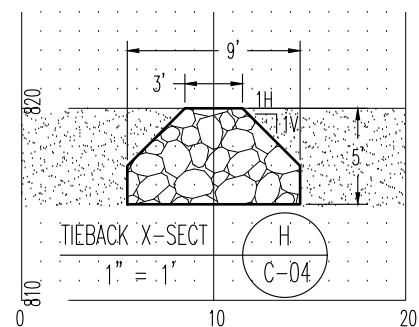
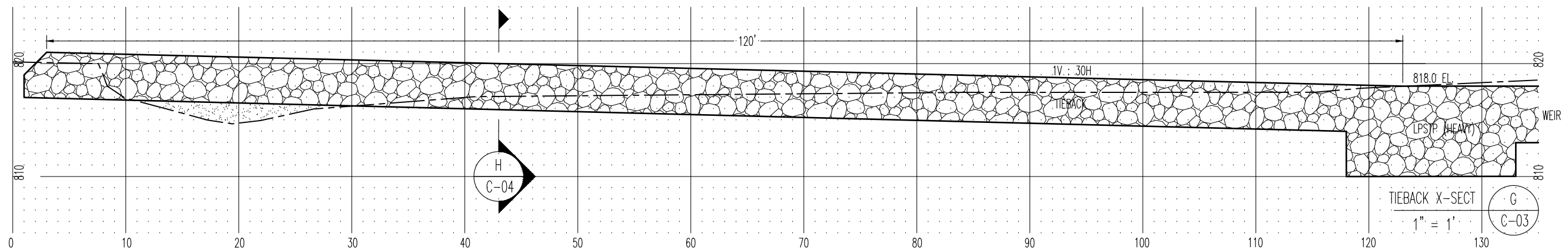
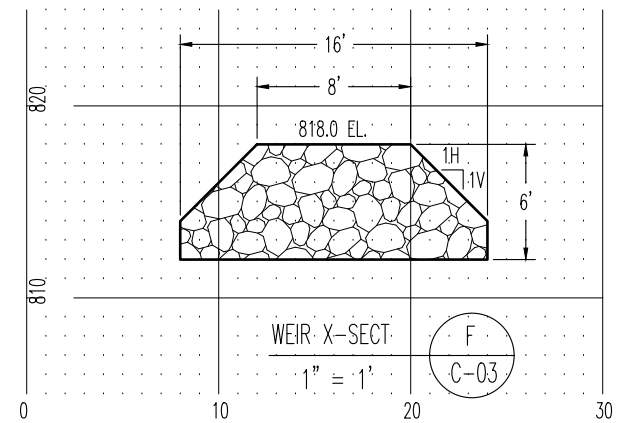
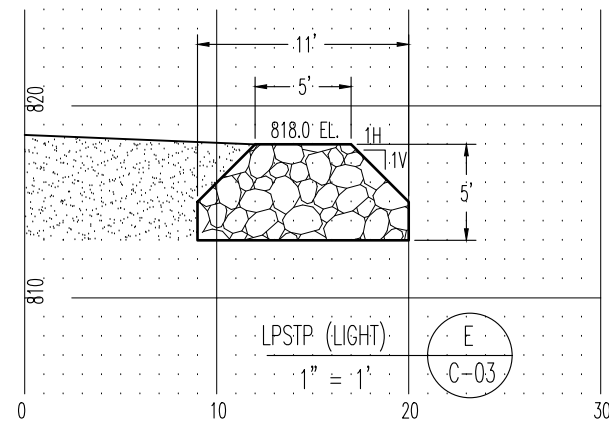
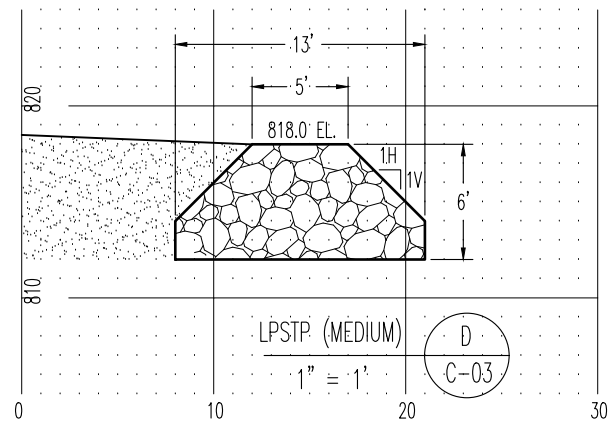
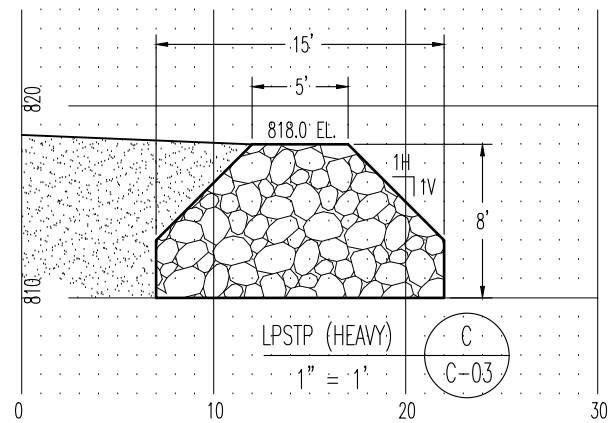
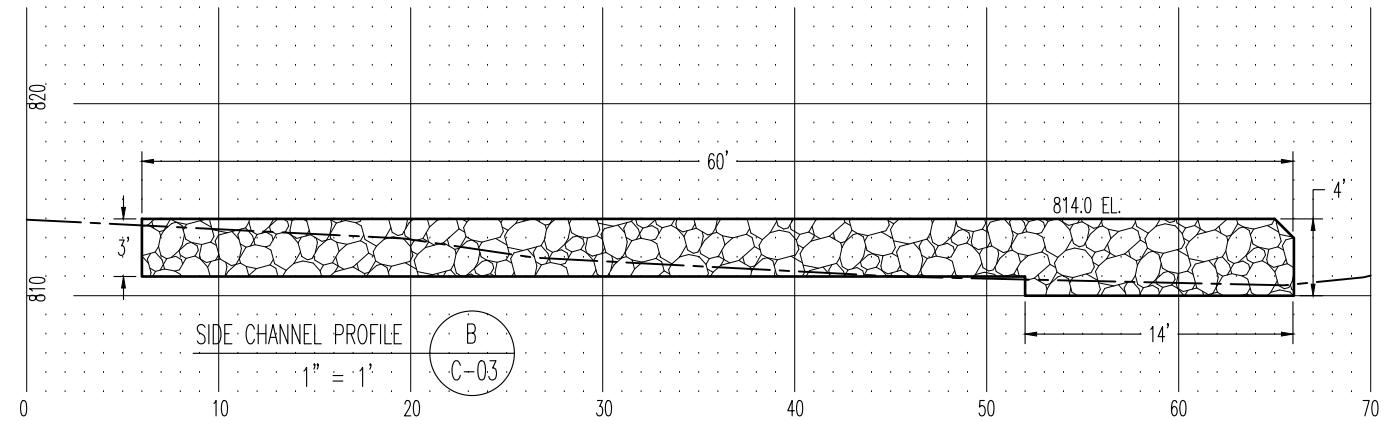
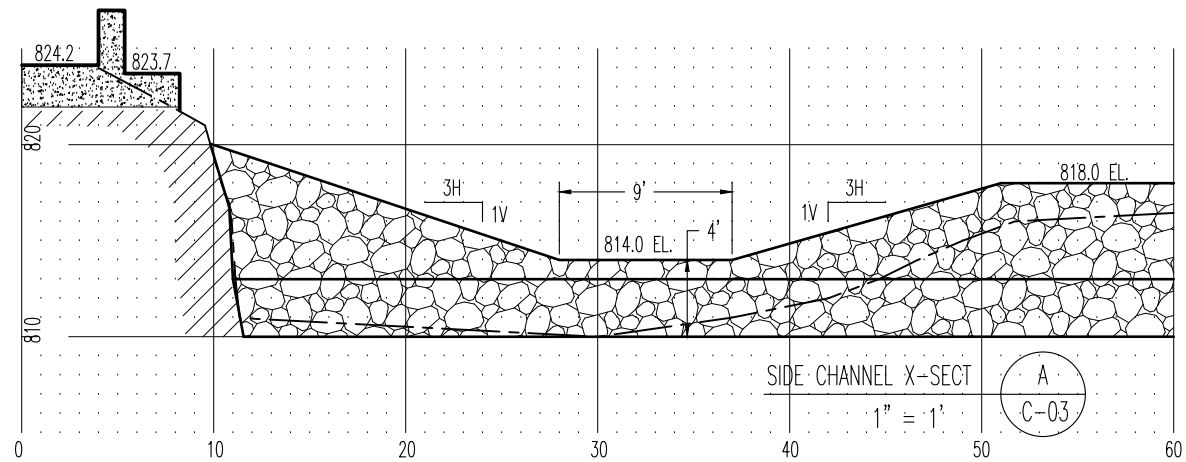
Description	Date
Investigated:	04 JUN 18
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Drafted:	15 JUL 18
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PLANNED CONSTRUCTION
BUFFALO CREEK STABILIZATION ABOVE C.R. 4357 BRIDGE
MCDONALD COUNTY COMMISSION
MISSOURI NRCS EMERGENCY WATERSHED PROTECTION

REPUBLIC ENGINEERING INCORPORATED

SHEET IDENTIFICATION
C-02

SHEET 5 OF 7



NOTES:

- The weir AP coordinates enable proper layout of each respective tieback by visual alignment of each AP with its corresponding station on the construction baseline. For weir and tieback 1, 2, and 3, the APs align with stations 4+00, 2+50, and 1+00 respectively.
- The centerline of all LPSTP lies in alignment with AP 4 and the northern support of the westernmost bridge bent. Note the relationship as shown on Plate C-3. For assistance with layout, contact the engineer.
- Construction of the Weir and Tieback #3 is an optional component of the design. This weir and tieback will only be installed if funding is sufficient to enable their construction, and the contractor is specifically instructed to install these aspects of the design under contract with the McDonald County Commission.

DESCRIPTION	NORTHING	EASTING
WEIR AP 1	13,328,118.94	1,177,135.32
WEIR AP 2	13,328,250.64	1,177,162.92
WEIR AP 3	13,328,386.83	1,177,270.40
LPSTP AP 4	13,328,476.75	1,177,409.52
LPSTP AP 5	13,328,473.93	1,177,434.98



CROSS SECTION DATA

BUFFALO CREEK STABILIZATION ABOVE C.R. 4357 BRIDGE
MCDONALD COUNTY COMMISSION
MISSOURI NRCS EMERGENCY WATERSHED PROTECTION

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