COLE COUNTY DEPARTMENT OF PUBLIC WORKS

Cole County Public Works

Working together to serve

For Information Only, Bidders shall purchase a set of plans and bid documents from ADS.

WILDWOOD DRIVE EXTENSION
Cole County Project No. 2023-701-1

BID DATE: December 15, 2024

CENTRAL MISSOURI PROFESSIONAL SERVICES, INC.
ENGINEERING - SURVEYING - MATERIAL TESTING
Missouri Certificate of Authority #001558
2500 E. McCarty St.
Jefferson City, MO 65101
Phone: (573) 634-3455
Fax: (573) 634-8898
www.cmps-inc.com

STATE OF MISSOURI
CODY ALAN DARR
NUMBER PE-2012018055
PROFESSIONAL ENGINEER
2024-12-10

Cody Alan Darr, PE - Engineer
MO # PE-2012018055

BIDDING DOCUMENTS

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ADVERTISEMENT FOR BIDS

SEALED PROPOSALS consisting of:

WILDWOOD DRIVE EXTENSION
COLE COUNTY PROJECT NO. 2023-701-1

Located from Wildwood Drive and West Edgewood Drive to Frog Hollow Road and Rock Ridge Road in Sec 16, T44N, R12W in Cole County, Missouri

WILL be received and opened publicly at the office of Cole County Commission, Courthouse Annex, Room 200, 311 East High Street, Jefferson City, Missouri 65101 at

9:00 A.M. on Friday, January 17, 2025

Any and all bids received after the time specified above will be returned unopened.

The proposed work consists of grading, excavating, roadways and roundabout, drainage structures, sanitary sewer, utilities, retaining wall, lighting, erosion control, seeding and mulching, and other miscellaneous work necessary to construct approximately 4,700 feet of new road extension and roundabout in Jefferson City, Cole County, Missouri.

Plans and specifications may be viewed online in the bids section at www.colecounty.org. Plans and specifications can also be viewed and purchased from American Documents Solutions, www.adsplanroom.net.

A pre-bid conference will be held on Tuesday January 7, 2025 at 9:00 AM at the Cole County Fire Protection District Administration Building, 5206 Monticello Rd, Jefferson City, Missouri 65109. All bidders are urged to attend.

BID SECURITY: A certified check on a solvent bank or a bid bond by a satisfactory surety in an amount to five percent (5%) of the total amount of the bid must accompany each proposal.

WAGE RATES: All wages paid for work under this contract shall comply with requirements of the prevailing wage law of the State of Missouri, Section 290.210 through 290.340, RSMo. 1986.

WORKER ELIGIBILITY: Execution of the construction contract for this project is dependent upon the awarded bidder providing an E-Verify Memorandum-of-Understanding (MOU) between the bidder and Department of Homeland Security to the Contracting Authority as required by section 285.530 RSMo.

The Owner reserves the right to reject any and all bids and to waive informalities therein. The bid will be awarded to the lowest, responsive, responsible bidder, who's bid conforms with all the material terms and conditions of the Instructions to Bidders. E.O.E.

News Tribune: 12/15/24; 12/22/24 and 12/29/24

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NOTICE TO BIDDERS

Sealed proposals will be received at the office of the Cole County Commission, Courthouse Annex, Room 200, 311 East High Street, Jefferson City, Missouri, 65101, until 9:00 A.M., **Friday, January 17, 2025**. The bids will be opened and read aloud at the Cole County Commission, Courthouse Annex, Room 200, 311 East High Street at 9:00 A.M. on that same day.

The proposed work consists of grading, excavating, roadways and roundabout, drainage structures, sanitary sewer, utilities, retaining wall, lighting, erosion control, seeding and mulching, and other miscellaneous work necessary to construct approximately 4,700 feet of new road extension and roundabout in Jefferson City, Cole County, Missouri.

WILDWOOD DRIVE EXTENSION
COLE COUNTY PROJECT NO. 2023-701-1

All equipment, material, and workmanship must be in accordance with the plans, specifications, and contract documents on file with the Director of Cole County Public Works, 5055 Monticello Road, Jefferson City, Missouri 65109.

Plans and specifications may be viewed online in the bids section at www.colecounty.org. Plans and specifications can also be viewed and purchased from American Documents Solutions, www.adsplanroom.net.

All wages paid for work under this contract shall comply with requirements of the federal Davis-Bacon Act (40 U.S.C. Sec. 3141 et seq. & 29 C.F.R. part 5), and the prevailing wage law of the State of Missouri, Section 290.210 through 290.340, RSMo. 1986.

A certified check on a solvent bank or a bid bond by a satisfactory surety in an amount to five percent (5%) of the total amount of the bid must accompany each proposal.

A Performance and Payment Bond is required.

The County reserves the right to reject any or all bids and to waive informalities therein. The bid will be awarded to the lowest, responsive, responsible bidder who's bid conforms with all the material terms and conditions of the Instructions to Bidders. E.O.E.

COUNTY OF COLE

Mattheuw Prenger, P.E.
County Engineer

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INSTRUCTIONS TO BIDDERS

2-1 Scope of Work

The proposed work consists of grading, excavating, roadways and roundabout, drainage structures, sanitary sewer, utilities, retaining wall, lighting, erosion control, seeding and mulching, and other miscellaneous work necessary to construct approximately 4,700 feet of new road extension and roundabout in Jefferson City, Cole County, Missouri.

2-2 Inspection of Plans, Specifications, and Site of Work

The bidder is required to examine carefully the site of the proposed work, the proposal, plans, specifications, supplemental specifications, special provisions, and contract forms before submitting a proposal.

2-3 Interpretation of Contract Documents

If the bidder has any questions which arise concerning the true meaning or intent of the Plans, Specifications, or any part thereof, which affect the cost, quality, quantity, or character of the project, he shall request in writing that an interpretation be made and an addendum be issued by the Engineer, which shall then be delivered to all bidders to whom Plans and Specifications have been issued. Failure to have requested an addendum covering any questions affecting the interpretations of the Plans and Specifications shall not relieve the Contractor from delivering the completed project in accordance with the intent of the Plans and Specifications to provide a workable project.

2-4 Equivalent Material

Wherever definite reference is made in these Specifications to the use of any particular material or equipment, it is to be understood that any equivalent material or equipment may be used which will perform adequately the duties imposed by the general design, subject to the approval of the Engineer.

2-5 Bid Security

Each bid must be accompanied by a certified check or bid bond made payable to the County of COLE for five percent (5%) of the amount of the base bid. Bid securities will be returned after award of contract except to the successful bidder.

Should the successful bidder or bidders fail or refuse to execute the bond and the contract required within ten (10) days after he has received Notice of Acceptance of his bid, he shall forfeit to the County of COLE as liquidated damages for such failure or refusal, the security deposited with his bid.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

2-6 Preparation of Bids

Bid must be made upon prescribed forms attached at the back of these Specifications. Only sealed bids will be considered, all bids otherwise submitted will be rejected as irregular.

Do NOT include federal excise tax or sales and use taxes in the bid prices. This project will be a **SALES TAX EXEMPT** project. A copy of the federal tax exemption certificate will be furnished if required.

All blank spaces in the bid must be filled in and no change shall be made in the phraseology of the bid or addition to the items mentioned therein. Any conditions, limitation, or provisions attached to bids will render them informal and may be considered cause for their rejection.

2-7 Prices

The price submitted for each item of the work shall include all cost of whatever nature involved in its construction, complete in place, as described in the Specifications.

2-8 Addenda

Addenda may be issued on this project at any time up to 24 hours prior to the bid date and time. Occasionally an addendum may contain information that could affect a contractor's bid. It shall be the responsibility of the contractor to verify if any addenda have been issued prior to submitting their bid. The County assumes no liability if a contractor fails to incorporate addenda into their bid.

2-9 Approximate Quantities

In cases where any part or all of the bidding is to be received on a unit price basis, the quantities stated on which unit prices are so invited, while made from the best information available, are approximate only. Each bidder shall make his own estimate from the plans of the quantities required on each item and calculate his unit price bid for each item accordingly. Bids will be compared on the basis of number of units stated in the bid. Unless otherwise stated, final measurement of unit price items will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity.

2-10 Lump Sum Items

Payment for each lump sum item shall be at the lump sum bid for the item, complete in place, and shall include the costs of all labor, materials, tools, and equipment to construct the item as described herein and to the limits shown on the Plans.

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2-11 Submission of Bids

The Bid and the Bid Security guaranteeing the same shall be placed in a sealed opaque envelope and marked **WILDWOOD DRIVE EXTENSION, PROJECT NO. 2023-701-1**. The envelope shall be clearly marked with the project name, project number, and the bidder's name and address.

2-12 Alternate Bids

In making the award if alternate bids have been requested, that alternate bid will be used which will be to the best interest of the County of COLE.

2-13 Withdrawal of Bids

If a bidder wishes to withdraw his bid, he may do so before the time fixed for the opening, without prejudice to himself. No bidder may withdraw his bid for a period of ninety (90) days after the scheduled closing time for the receipt of bids.

2-14 Right to Reject Bids

The County of COLE reserves the right to reject any or all bids, to waive any informality in the bids received. The bid will be awarded to the lowest, responsive, responsible bidder.

2-15 Award of Contract

If within ten (10) days after he has received Notice of Acceptance of his bid, the successful bidder or bidders shall refuse or neglect to come to the office of the Director of Public Works and to execute the Contract and to furnish the required Contractor's Bond, properly signed by the Contractor and the Surety or Sureties satisfactory to the County of COLE as hereinafter provided, the bidder or bidders shall be deemed to be in default and shall forfeit the deposit.

2-16 Performance and Payment Bond

A Performance and Payment Bond in an amount equivalent to one hundred percent (100%) of the Contract price, must be furnished and executed by the successful bidder or bidders, this bond to be in the form contained in this Contract.

The Surety shall be a corporate Surety Company or companies of recognized standing licensed to do business in the State of Missouri and acceptable to the County of COLE.

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2-17 Indemnification and Insurance

The Contractor agrees to indemnify and hold harmless the County and the Engineer from all claims and suits for loss of or damage to property, including loss of all judgments recovered therefore, and from all expense in defending said claims, or suits, including court costs, attorney fees, and other expense caused by any act or omission of the Contractor and/or his subcontractors, their respective agents, servants, or employees.

Certificate of Insurance

The Contractor shall be required to provide the County of COLE with a "Certificate of Insurance."

2-18 Bid Security Returned to Successful Bidder

Upon the execution of the Contract and approval of Bond, the Bid Security will be returned to the bidder unless the same shall have been presented for collection prior to such time, in which case the amount of the deposit will be refunded by the County of COLE.

2-19 Nondiscrimination in Employment

Contracts for work under this bid will obligate the Contractor and subcontractors not to discriminate in employment practices.

2-20 Prevailing Wage Law

The principal contractor and all subcontractors shall pay not less than the prevailing wage hourly rate for each craft or type of workman required to execute this contract as determined by the U.S. Department of Labor Davis-Bacon Act and related acts, and the Department of Labor and Industrial Relations of Missouri, pursuant to Sections 290.210 through 290.340, RSMo, 1986. (See Determinations herewith included in Section 5.)

2-21 Notice to Proceed

The Contractor's Notice To Proceed is anticipated to be **February 3, 2025**. No direct payment will be made to the contractor for any reason of their compliance with this provision. The contractor shall have no claim, or basis for any claim or suit whatsoever, resulting from this notice to proceed.

2-22 Work Schedule

To insure that the work will proceed continuously through the succeeding operations to its completion with the least possible interference to traffic and inconvenience to the public, the Contractor shall submit for approval a complete schedule of his proposed construction procedure, stating the sequence in which various operations of work are to

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be performed. The Contractor may not change the work sequence without the prior approval of the Engineer. Additional detailed information can be found in the job special provisions.

2-23 Section 292.675 RSMo. Safety Training Requirements

In 2008 the Missouri General Assembly adopted HB 1549, creating additional requirements affecting public works contracts by requiring all contractors and subcontractors doing work on a project to provide and require their on-site employees to complete a ten (10) hour course in construction safety and health that is approved by the federal Occupational Safety and Health Administration ("OSHA") or a similar program approved by the Missouri Department of Labor and Industrial Relations, which is at least as stringent as an approved OSHA program; and

The following items will be required in this contract:

Section One: Any contractor for Cole County for purposes of construction of public works and any subcontractor to such contractor shall comply with the provisions of section 292.675, RSMo. and provide a ten-hour OSHA construction safety program for the on-site employees which includes a course in construction safety and health approved by OSHA or a similar program approved by the Missouri Department of Labor and Industrial Relations that is at least as stringent as an approved OSHA program, unless such employees have previously completed the required program.

Section Two: All employees who have not previously completed this course must do so within sixty (60) days of beginning work on a Cole County construction project.

Section Three: Any employee found on a work site subject to this ordinance without documentation of successfully completing this course shall have twenty (20) days to produce such documentation before being subject to removal from the project.

2-24 Contract Time

The contract shall be completed within **330 calendar days** following the Notice to Proceed, making the anticipated completion date **Wednesday, December 31st, 2025.** Additional information pertaining to the completion date can be found in the Job Special Provisions.

2-25 Liquidated Damages

Liquidated damages shall be assessed at the rate of **Two Thousand Dollars ($2000.00)** per calendar day until the project is complete, should the project not be completed with the specified time period.

In addition, the Director of Public Works may, at his discretion, deduct **One Thousand Dollars ($1000.00)** per calendar day from any amount otherwise due under this contract

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for failure of the Contractor to comply with the provisions specified in the Job Special Provision E.

All information pertaining to the liquidated damages can be found in the Job Special Provisions.

2-26 Pre-Construction Meeting

A pre-construction meeting will be scheduled before construction begins. The contractor's project manager, work zone manager and foreman shall be required to attend.

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PLAN HOLDER CONTACT INFORMATION

COUNTY OF COLE, MISSOURI

WILDWOOD DRIVE EXTENSION
PROJECT NO. 2023-701-1

All potential bidders **SHALL** complete this form and submit it to the Cole County Public Works email address listed below in order to provide contact information required. All other plan holders may submit this form at their own option. Addenda will be posted on the county website. In the event of disruption of website services, all such information will be communicated to all registered plan holders.

Any bids received from individuals/companies that do not submit this form in advance will not be opened.

Project Name:	Wildwood Drive Extension Project No. 2023-701-1
Bid Opening Date/Time:	**January 17, 2025, 9:00am**
Plans and Specifications:	ADS Planroom https://www.adsplanroom.net/

Contact Information: (All Information is Required)

Company Name (If Applicable): _____

Plan Holder Name / Contact: _____

Address: _____

City, State, Zip Code: _____

Phone: _____

Email: _____

Email this completed form to: ccpwprojects@colecounty.org

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PROPOSAL FORM

COUNTY OF COLE, MISSOURI

WILDWOOD DRIVE EXTENSION
COLE COUNTY PROJECT NO. 2023-701-1

Name of Bidder: _____

Address of Bidder: _____

To: Cole County Department of Public Works
5055 Monticello Road
Jefferson City, MO 65109

THE UNDERSIGNED BIDDER, having examined the Plans, Specifications, Regulations of the Contract, Special Conditions and other proposed Contract Documents, and all addenda thereto; and being acquainted with and fully understanding (a) the extent and character of the work covered by this Proposal; (b) the location, arrangement, and specified requirements for the proposed work; (c) the location, character, and condition of existing streets, roads, highways, pavement, surfacing, walks, driveways, curbs, gutters, trees, sewers, utilities, drainage courses and structures, and other installation, both surface and underground which may affect or be affected by the proposed work; (d) the nature and extent of the excavations to be made, and the type, character, and general condition of materials to be excavated; (e) the necessary handling and re-handling of excavated materials; (f) the location and extent of necessary or probable dewatering requirements; (g) storm and flood water; (h) local conditions relative to labor, transportation, hauling, and rail delivery facilities; and (i) all other factors and conditions affecting or which may be affected by the work.

HEREBY PROPOSED to furnish all required materials, supplies, equipment, tools, and plant; to perform all necessary labor and supervision; and to construct, install, erect, and complete all work stipulated in, required by, and in accordance with the proposed Contract Documents and the drawings, Specifications, and other documents referred to therein (as altered, amended, or modified by addenda), in the manner and time prescribed and that he will accept in full payment sums determined by applying to the quantities of the following items, the following unit prices and/or any lump sum payments provided, plus or minus any special payments and adjustments provided in the Specifications and he understands that the estimated quantities herein given are not guaranteed to be the exact or total quantities required for the completion of the work shown on the drawings and described in the Specifications, and that increases or decreases may be made over or under the Contract estimated quantities to provide for needs that are determined during progress of the work and that prices bid shall apply to such increased or decreased quantities as follows:

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WILDWOOD DIRVE EXTENSION
COLE COUNTY PUBLIC WORKS
PROJECT NO. 2023-701-1

BASE BID

ITEM NO.	DESCRIPTION	UNITS	BID QUANTITY	UNIT PRICE	AMOUNT
1.00	MOBILIZATION	LS	1		
2.00	CLEARING & GRUBBING	AC	8.20		
3.00	CLEARING & GRUBBING (WITH MASS TREE REMOVAL)	AC	12.00		
4.00	CLEARING & GRUBBING (FARRER BORROW AREA)	AC	3.45		
5.00	CLEARING & GRUBBING (RACKERS FILL AREA)	AC	0.82		
6.00	EXISTING CONC. REMOVAL	SY	769.0		
7.00	EXISTING ASPH. REMOVAL	SY	3,740.0		
8.00	REMOVALS - MISC	LS	1.0		
9.00	CLASS A EXCAVATION (EXCLUDING FARRER)	CY	45,005		
10.00	COMPACTING EMBANKMENT	CY	68,766		
11.00	CLASS A EXCAVATION (FARRER)	CY	16,387		
12.00	CLASS C EXCAVATION (FARRER)	CY	16,387		
13.00	STOCKPILE MATERIAL ON POPP PROPERTY	CY	4,321		
14.00	FILL AREA ON RACKERS PROPERTY	CY	4,692		
15.00	3" THICK TYPE 5 AGGREGATE BASE (FROG HOLLOW)	SY	1,226.1		
16.00	4" THICK TYPE 5 AGGREGATE BASE	SY	23,055.3		
17.00	4" THICK AGGREGATE DRIVEWAY SURFACE	SY	490.9		
18.00	4" THICK ASPHALT DRIVEWAY SURFACE	SY	0.0		
19.00	5" THICK CONCRETE DRIVEWAY SURFACE	SY	773.4		
20.00	5 1/2" THICK BITUMINOUS BASE	SY	1,250.7		
21.00	3" THICK BITUMINOUS BASE (UNDER C&G)	SY	1,334.6		
22.00	4" THICK BITUMINOUS BASE (BETWEEN C&G)	SY	1,128.9		
23.00	7" THICK BITUMINOUS BASE	SY	18,574.6		
24.00	2" THICK BITUMINOUS PAVEMENT (BP-1)	SY	21,807.1		
25.00	VARIABLE DEPTH SURFACE MILLING, ASPHALT, CONTRACTOR HAUL-OFF	SY	1,167.0		
26.00	TYPE A CURB AND GUTTER	LF	560.5		
27.00	6" SPLITTER ISLAND CURB & GUTTER 6" x 18" WITH CROSSWALK	LF	762.9		
28.00	7" EXPOSED AGGREGATE CONCRETE PAVEMENT WITH INTEGRAL CURB (CENTER APRON)	SY	446.5		
29.00	7" EXPOSED AGGREGATE CONCRETE PAVEMENT WITH INTEGRAL CURB (EXTERIOR APRONS)	SY	219.7		
30.00	4" EXPOSED AGGREGATE CONC. MEDIAN STRIP (SPLITTER ISLANDS)	SY	356.3		
31.00	RESIDENTIAL DRIVE APPROACH	SY	99.4		
32.00	COMMECIAL DRIVE APPROACH	SY	65.7		
33.00	6" PC CONCRETE SIDEWALK APPROACH (EDGEWOOD)	SY	35.1		
34.00	ADA DETECTABLE WARNING PANELS	SF	259.0		

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35.00	TYPE 2 ROCK DITCH LINER	CY	400.3		
36.00	TYPE 3 ROCK DITCH LINER	CY	1,540.4		
37.00	BEDDING MATERIAL FOR ROCK DITCH LINER	CY	560.3		
38.00	GEOTEXTILE FABRIC	SY	4,736.5		
39.00	TYPE 2D EROSION CONTROL BLANKET	SY	3,935.1		
40.00	INTERCEPTION LEVEE	LF	1,078.0		
41.00	ROCK CULVERT OUTLET	CY	21.4		
42.00	TYPE 2 ROCK BLANKET	CY	241.6		
43.00	TEMPORARY TRAFFIC CONTROL	LS	1		
44.00	4" SOLID WHITE PAVEMENT MARKING	LF	1,088.20		
45.00	4" SOLID YELLOW PAVEMENT MARKING	LF	13,017.40		
46.00	4" INTERMITTENT YELLOW PAVEMENT MARKING	LF	0		
47.00	24" SOLID WHITE STOP BAR	LF	42.0		
48.00	24" SOLID YELLOW 45° HATCHING	LF	106.70		
49.00	24" INTERMITTENT WHITE YIELD BAR	LF	92.2		
50.00	6' x 24" WHITE PAVEMENT MARKING PAINT - CROSSWALK	LF	32.0		
51.00	10' x 24" WHITE PAVEMENT MARKING PAINT - CROSSWALK	LF	32.0		
52.00	LEFT PAVEMENT MARKING ARROW	EA	4		
53.00	51'x10'x76' PRECAST CONCRETE ARCH SYSTEM	LS	1		
54.00	5.5'x9'x188.9' REINFORCED CONCRET BOX CULVERT	LS	1		
55.00	48" CLASS III RCP	LF	92.6		
56.00	42" CLASS III RCP	LF	96.2		
57.00	24" CLASS III RCP	LF	216.1		
58.00	24" CLASS V RCP	LF	166.0		
59.00	18" CLASS III RCP	LF	30.30		
60.00	15" CLASS III RCP	LF	142.20		
61.00	15" CMP (DRIVEWAYS)	LF	354.0		
62.00	48" RCP FLARED END SECTION	EA	2		
63.00	42" RCP FLARED END SECTION	EA	2		
64.00	24" RCP FLARED END SECTION	EA	5		
65.00	15" RCP FLARED END SECTION	EA	3		
66.00	18" RCP FLARED END SECTION	EA	2		
67.00	15" CMP FLARED END SECTION	EA	0		
68.00	4'x3' TYPE H/AD DROP INLET	EA	2		
69.00	TRENCH ROCK REMOVAL (ALLOWANCE)	CY	200		
70.00	6'x3' TYPE S-2 DROP INLET WITH GRATE	EA	1		
71.00	PERMANENT SEEDING AND MULCH	AC	15.52		
72.00	TEMPORARY SEEDING AND MULCH	AC	4.14		
73.00	SEDIMENT BARRIER FENCE	LF	7,246		
74.00	INLET BARRIER - EARLY STAGE	EA	3		
75.00	INLET BARRIER - LATE STAGE (CURB INLET CHECK)	EA	2		

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76.00	ALTERNATE DITCH CHECKS	EA	20		
77.00	TYPE II ROCK DITCH CHECKS	EA	106		
78.00	TEMPORARY CONSTRUCTION ENTRANCE	SY	578.70		
79.00	SEDIMENT BASINS	EA	4		
80.00	TEMPORARY SLOPE DRAIN	LF	125		
81.00	TEMPORARY BERM	LF	965		
82.00	SLOPE INTERRUPTION LOG (12")	LF	1,942.00		
83.00	TEMPORARY DITCH CROSSING	EA.	2.00		
84.00	ROUNDABOUT LIGHTING	LS	1		
85.00	CONCRETE SIGN FOOTINGS	CY	3.9		
86.00	SIGN PIPE POST	LB	1,580.4		
87.00	BREAK AWAY ASSEMBLY	EA	15		
88.00	TYPE SHR2L-1 SIGN	SF	261.0		
89.00	36" STOP SIGN	EA	1.0		
90.00	30" CASING (FUTURE RELIEF SEWER)	LF	203		
91.00	8" DUCTILE IRON PIPE	LF	207		
92.00	12" STEEL CASING PIPE (sta 88+50)	LF	56		
93.00	PVC ELBOW AND CAP ASSEMBLY	EA	4		
94.00	CONNECT TO EXISTING MANHOLE	EA.	1		
95.00	8" DIAM STD. SANITARY LAMPHOLE	EA.	1		
96.00	STREET CROSSING (COMPACTED BACKFILL)	EA.	3		
97.00	4' DIAM STD. CONC. SANITARY MANHOLE	EA.	9		
98.00	A-LOK & CAP FUTURE LINES	EA.	5		
99.00	8" RESTRAINED JOINT PVC SEWER PIPE (BORE/DRILLED)	LF	45		
100.00	8" SDR-35 PVC SEWER PIPE	LF	2,306.7		
101.00	MSE RETAINING WALL	SF	3,615		
102.00	CHAIN LINK FENCE (72" WITH BARBED WIRE EXT.)	LF	370		
103.00	REMOVE AND REPLACE FENCE - POPP (2 GATES)	LF	856		
104.00	REMOVE AND REPLACE FENCE - RACKERS (2 GATES)	LF	1,165		
105.00	TEMPORARY FENCE (POPP & RACKERS)	LF	2,021		
106.00	SUBGRADE COMPACTION - TRAIL (TOP 6" SUBGRADE)	CY	390		
107.00	3" THICK TYPE 5 AGGREGATE BASE - TRAIL	SY	2,339.2		
108.00	6" THICK CONCRETE SURFACE - TRAIL	SY	2,339.2		
109.00	CONTRACTOR FURNISHED CONST. STAKING	LS	1		
110.00	Water Main Mobilization / Demobilization	LS	1		
111.00	Water Main Traffic Control and Temporary Construction Signage	LS	1		
112.00	Water Main Repair & Replace Fences Disturbed by Construction	LS	1		
113.00	Line Flushing, Pigging, Pressure Testing, and Disinfection	LS	1		
114.00	Trench Clean-up and Site Restoration	LS	1		

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115.00	8" PR200 PVC - Open Cut	LF	1,800		
116.00	6" PR200 PVC - Open Cut	LF	20		
117.00	12" PR200 Restrained Joint PVC - Open Cut	LF	160		
118.00	8" PR200 Restrained Joint PVC - Open Cut	LF	70		
119.00	4" PR200 Restrained Joint PVC - Open Cut	LF	45		
120.00	1" Service Line	LF	120		
121.00	**8" Road Crossings (C-101, C-102, and C-103)** 15" SDR35 PVC Encasement with 8" PR200 Restrained Joint PVC - Open Cut	LF	175		
122.00	**12" Road Crossings (C-104, and C-105)** 18" SDR35 PVC Encasement with 12" PR200 Restrained Joint PVC - Open Cut	LF	95		
123.00	12" Gate Valve and Box	EA	6		
124.00	8" Gate Valve and Box	EA	8		
125.00	4" Gate Valve and Box	EA	1		
126.00	12" Anchor Coupling	EA	8		
127.00	8" Anchor Coupling	EA	10		
128.00	4" Anchor Coupling	EA	1		
129.00	12" Bend	EA	1		
130.00	8" Bend	EA	14		
131.00	4" Bend	EA	1		
132.00	12" x 12" x 12" Tee	EA	1		
133.00	12" x 12" x 8" Tee	EA	1		
134.00	8" x 8" x 4" Tee	EA	1		
135.00	12" x 12" x 8" Anchor Tee	EA	1		
136.00	12" x 12" x 6" Anchor Tee	EA	1		
137.00	8" x 8" x 8" Anchor Tee	EA	2		
138.00	12" x 8" Reducer	EA	1		
139.00	8" x 6" Reducer	EA	3		
140.00	6" Hymax Solid Sleeve	EA	2		
141.00	4" Hymax Solid Sleeve	EA	1		
142.00	12" Cap	EA	2		
143.00	8" Solid Sleeve	EA	1		
144.00	2" Clean Out	EA	1		
145.00	Furnish and Install Fire Hydrant	EA	2		
146.00	Remove and Salvage Existing Fire Hydrant	EA	1		
147.00	Reconnect Service Meter	EA	5		
148.00	Tie to Existing 6" Asbestos Cement Line (Detail C-101-1)	LS	1		
149.00	Tie to Existing 6" Asbestos Cement Line (Detail C-102-1)	LS	1		
150.00	Cut, Cap, and Abandon Existing 8" Line (Detail C-104-3)	LS	1		
151.00	Tie to Existing 8" Line (Detail C-105-1)	LS	1		
152.00	Tie to Existing 4" Asbestos Cement Line (Detail C-106-2)	LS	1		
				TOTAL - BASE BID	**$**

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

WATER LINE INSTALLATION WORK TO BE REIMBURSED BY PWSD No. 2

ITEM NO.	DESCRIPTION	UNIT	BID QUANTITY	UNIT PRICE	AMOUNT
153.00	Wears Creek - 12" PR200 Restrained Joint PVC - Open Cut	LF	30		
154.00	**Wears Creek Crossing** 20" DR17 HDPE Encasement with 12" PR200 Restrained Joint PVC - Open Cut	LF	170		
155.00	**Wildwood Casing** 18" SDR35 PVC Encasement - Open Cut	LF	110		
156.00	Wears Creek - 12" Gate Valve and Box	EA	1		
157.00	Wears Creek - 12" Anchor Coupling	EA	1		
158.00	Wears Creek - 12" Bend	EA	1		
159.00	Wears Creek - 2" Clean Out	EA	1		
160.00	Tie to Existing 12" Line (Detail C-107-1)	LS	1		
	TOTAL - WATER LINE INSTALLATION WORK FOR PWSD No. 2				**$**

BID PROPOSAL FORM - ADD ALTERNATE #1 - GREENWAY TRAIL

ITEM NO.	DESCRIPTION	UNIT	BID QUANTITY	UNIT PRICE	AMOUNT
161.00	SUBGRADE COMPACTION - TRAIL (TOP 6" SUBGRADE)	CY	365		
162.00	3" THICK TYPE 5 AGGREGATE BASE	SY	2,190.9		
163.00	6" THICK CONCRETE SURFACE	SY	2,190.9		
164.00	PERF. STEEL SQUARE POST (2")	EA	2		
165.00	SIGN (2x each W11-2 & W16-7P)	SF	36		
166.00	10' x 24" WHITE PAVEMENT MARKING PAINT - CROSSWALK	LF	50		
				TOTAL - ALTERNATE #1	**$**

BID PROPOSAL FORM - CHANGE ALTERNATE #2 - CONCRETE PAVEMENT

ITEM NO.	DESCRIPTION	UNIT	BID QUANTITY	UNIT PRICE	AMOUNT
167.00	7" THICK PCC CONCRETE	SY	21,295.1		
				TOTAL - ALTERNATE #2	**$**

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

BIDDER recognizes and acknowledges the receipt of the following Addenda:

DATE	Addendum Number	DATE	Addendum Number

If the Bidder intends to use any subcontractor in the course of the construction, he shall list them. (If necessary, attach additional pages to list all subcontractors.)

Company Name	Address	City, State, Zip	Work To Be Performed	% of Bid

Time of Completion: The undersigned hereby agrees to complete the project by no later than **330 calendar days** following the Notice to Proceed. Based on the anticipated Notice to Proceed date of **February 3, 2025**, the anticipated completion date is **Wednesday, December 31, 2025.** subject to the stipulations of the regulations of the Contract and the Special Conditions.

Specifications: It is understood that the specifications governing the construction of the work contemplated include: Missouri Highway & Transportation Commission “Standard Specifications for Highway Construction" (MSSHC) and “Standard Plans for Highway Construction” (MSPHC); City of Jefferson Standard Drawings and Technical Specifications; as modified or contradicted by the Construction Contract, General Provisions, Special Provisions, and Plans attached to this proposal.

Sales Tax: The County of Cole is a tax exempt entity. The Commission will furnish a tax exempt certificate to the awarded contractor to be used in the purchase of material and supplies incorporated into or utilized during the construction of this project.

Bid Security: The undersigned agrees that the accompanying bid security shall become the property of the County should he fail or refuse to execute the Contract, or furnish Bond as called for in the specifications within the time provided.

Worker Eligibility: Execution of the construction contract for this project is dependent upon the awarded bidder providing an E-Verify Memorandum-of-Understanding (MOU) between the bidder and Department of Homeland Security to the Contracting Authority as required by section 285.530 RSMo. The cover page and signature page of the E-Verify MOU must be submitted prior to award of this contract.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Prevailing Wage: The principal contractor and all subcontractors shall pay not less than the prevailing wage hourly rate for each craft or type of workman required to execute this contract as determined by the U.S. Department of Labor Davis-Bacon Act and related acts, and the Department of Labor and Industrial Relations of Missouri, pursuant to Sections 290.210 through 290.340, RSMo. 1986. (See Determinations herewith included in Section 5.)

Declaration: The undersigned, as Bidder, hereby declares that the only persons or firms interested in the Proposal as principal or principals is or are named herein and that no other persons or firms than herein mentioned have any interest in this Proposal or in the Contract to be entered into; and this Proposal is made without connection with any other person, company, or parties making a bid or proposal; and that it is in all respects fair and in good faith, without collusion or fraud.

The undersigned agrees that the accompanying bid deposit shall become the property of the County should he fail or refuse to execute the Contract or furnish Bond as called for in the specifications within the time provided.

If written notice of the acceptance of this bid is mailed, telegraphed, or delivered to the undersigned within ninety (90) days after the date of opening of bids, or any time thereafter before this bid is withdrawn, the undersigned will, within ten (10) days after the date of such mailing, telegraphing, or delivering of such notice, execute and deliver a Contract in the form of Contract attached.

The undersigned hereby designates as his office to which such notice of acceptance may be mailed, telegraphed, or delivered:

_____

Contact Person Company Name Mailing Address City, State & Zip Code

It is understood and agreed that this bid may be withdrawn at any time prior to the scheduled time for the opening of bids or any authorized postponement thereof.

Attached hereto is a Bid Bond or Cashier's Check, made payable to the County of COLE for the sum of:

_____ Dollars ($_____)

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

SIGNATURE AND IDENTITY OF BIDDER

The undersigned states that the correct LEGAL NAME and ADDRESS of (1) the individual bidder, (2) each partner or joint venturer (whether individuals or corporation, and whether doing business under a fictitious name), or (3) the corporation (with the state in which it is incorporated) are shown below; and that (if not signing with the intention of binding himself to become the responsible and sole contractor) he is the agent of, and duly authorized in writing to sign for the Bidder or Bidders; and that he is signing and executing this (as indicated in the proper spaces below) as the proposal of

AN INDIVIDUAL:

Name of Individual	Residence Street Address
Social Security Number	City, State & Zip Code
Firm Name, If Any	Business Address
Business Telephone Number	City, State & Zip Code
Signature	Date

A PARTNERSHIP:

Name of Partnership	(State Names & Addresses of All Partners)
Partner	Residence Address
Partner	Residence Address
Business Address	
City, State & Zip Code	Business Telephone Number
Signature of At Least One Partner	Date

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

A CORPORATION:

_____ Name of Corporation	Incorporated under the laws of the State of _____
_____ Name and Title of Officer	Corporate License No. _____ (If a corporation organized in state other than Missouri, attach Certificate of Authority to do business in the State of Missouri.)
_____ Business Telephone Number	
_____ Business Address	_____ City, State & Zip Code
_____ Signature of Officer	_____ Date
ATTEST:	
_____ Signature of Secretary (SEAL)	_____ Date

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

ANTI-COLLUSION STATEMENT

STATE OF _____)
)
)
COUNTY OF _____)

_____

_____

being first duly sworn, deposes and says that he is

_____ of _____
Title of Person Signing Name of Bidder

_____
Address of Bidder

that all statements made and facts set out in the proposal for the above project are true and correct; and that the bidder (The person, firm, association, or corporation making said bid) has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with such bid of any contract which result from its acceptance.

Affiant further certifies that bidder is not financially interested in, or financially affiliated with, any other bidder for the above project.

(BY) _____

(BY) _____

Sworn to before me this _____ day of _____, 20_____

_____
Notary Public

My commission expires: _____

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

CONTRACTOR'S AFFIDAVIT

STATE OF _____)
)
)
COUNTY OF _____)

This affidavit is hereby made a part of the Proposal, and an executed copy thereof shall accompany each Proposal submitted.

The undersigned, _____, of

lawful age, being first duly sworn states upon oath that he is _____

_____

_____

the Contractor submitting the attached proposal, that he knows of his own knowledge and states it to be a fact that neither said proposal nor the computation upon which it is based include any amount of monies, estimate or allowance representing wages, moneys or expenses, however designated, proposed to be paid to persons who are not required to furnish material or actually perform services upon or as a part of the proposed project.

_____
AFFIANT

Subscribed and sworn to before me, a Notary Public, in and for the County and State aforesaid, this _____ day of _____, 20_____.

_____
Notary Public

My commission expires _____

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

CONSTRUCTION CONTRACT

THIS CONTRACT, made and entered into this _____ day of _____, 2025, by and between _____, hereinafter called "Contractor," and the **County of Cole, Missouri**, hereinafter called "County."

WITNESSETH: That Whereas, the Contractor has become the lowest responsible bidder for furnishing the supervision, labor, tools, equipment, materials, and supplies and for constructing the following County improvements:

WILDWOOD DRIVE EXTENSION
COLE COUNTY PROJECT NO. 2023-701-1

NOW, THEREFORE, the parties to this contract agree to the following:

1. **Manner and Time for Completion** The Contractor agrees with the County to furnish all supervision, labor, tools, equipment, materials, and supplies; to perform all necessary labor and supervision; and to construct, install, erect and complete all work stipulated in, required by and in accordance with the contract documents and drawings, specifications and other documents referred therein (as altered, amended or modified by addenda) and with any applicable County regulations and state and federal laws, within ten (10) working days from the date Contractor is ordered to proceed, which order shall be issued by the Director of Public Works in accordance with the contract documents.

2. **Prevailing Wages** All labor utilized in the construction of the aforementioned improvements shall be paid a wage of no less than the "prevailing hourly rate of wages" for work of a similar character in this locality, as established by the U.S. Department of Labor Davis-Bacon Act and related acts and the Department of Labor and Industrial Relations of the State of Missouri. Contractor acknowledges that Contractor knows the prevailing hourly rate of wages for this project because Contractor has obtained the prevailing hourly rate of wages from the contents of **GENERAL DECISION NUMBER: MO20240001 08/30/2024, HEAVY AND HIGHWAY, MISSOURI STATEWIDE, and MISSOURI ANNUAL WAGE ORDER NUMBER 31 - COLE COUNTY** in which the rate of wages is set forth. The Contractor further agrees that Contractor will keep an accurate record showing the names and occupations of all workmen employed by Contractor in connection with the work to be performed under the terms of this contract. The record shall show the actual wages paid to the workmen in connection with the work to be performed under the terms of this contract. A copy of the record shall be delivered to the Director of Public Works each week. In accordance with Section 290.250 RSMo., Contractor shall forfeit to the County One Hundred Dollars ($100.00) for each workman employed, for each calendar day or portion thereof that the workman is paid less than the stipulated rates for any work done under this contract, by the Contractor or any subcontractor under the Contractor.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

3. **Contract Sum** The County shall pay the Contractor for the prompt, faithful, and efficient performance of the conditions and undertakings of this contract, subject to additions, and deductions as provided, herein, in current funds the sum of _____ **Dollars.**

TOTAL CONTRACT AMOUNT.....$_____

The County hereby accepts and reserves and the Contractor is hereby bound thereby, Unit Prices of the Proposal submitted as follows:

UNIT PRICES:

For changing specified quantities of work from those indicated by the plans and specifications, upon written instructions of the County, the following unit prices shall prevail. The unit prices include all labor, overhead and profit, materials, equipment, appliances, bailing, shoring, shoring removal, etc., to cover the finished work of the several kinds called for. Only a single unit price shall be given and it shall apply for either MORE or LESS work than shown on the plans and called for in the specifications. In the event of more or less units than so indicated or included, change orders shall be issued for the increased or decreased amount.

Itemized Quantities shall be placed here in awarded contract

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

4. Insurance Contractor shall procure and maintain at its own expense during the life of this contract:

(a) Workers Compensation Insurance for all of its employees to be engaged in work under this contract.

(b) Contractor's Public Liability Insurance in an amount not less than $1,000,000 for all claims arising out of a single occurrence and $100,000 for any one person in a single accident or occurrence, except for those claims governed by the provisions of the Missouri workers compensation law, Chapter 287, RSMo., and Contractor's Property Damage Insurance in an amount not less than $800,000 for all claims arising out of a single accident or occurrence and $100,000 for any one person in a single accident or occurrence.

(c) Automobile Liability Insurance in an amount not less than $1,000,000 for all claims arising out of a single accident or occurrence and $100,000 for any one person in a single accident or occurrence.

(d) Owner's Protective Liability Insurance The Contractor shall also obtain at its own expense and deliver to the County a Owner's Protective Liability Insurance Policy naming the County of Cole as the insured, in an amount not less than $1,000,000 for all claims arising out of a single accident or occurrence and $100,000 for any one person in a single accident or occurrence, except for those claims governed by the provisions of the Missouri workmen's compensation law, Chapter 387, RSMo. No policy will be accepted which excludes liability for damage to underground structures or by reason of blasting, explosion, or collapse.

(e) Subcontracts In case any or all of this work is sublet, the Contractor shall require the Subcontractor to procure and maintain all insurance required in Subparagraphs (a), (b), and (c) hereof and in like amounts.

(f) Scope of Insurance and Special Hazard The insurance required under Sub-paragraphs (b) and (c) hereof shall provide adequate protection for the Contractor and its subcontractors, respectively, against damage claims which may arise from operations under this contract, whether such operations be by the insured or by anyone directly or indirectly employed by it, and also against any special hazards which may be encountered in the performance of this contract.

NOTE: Paragraph (f) is construed to require the procurement of Contractor's protective insurance (or contingent public liability and contingent property damage policies) by a general contractor whose subcontractor has employees working on the project, unless the general public liability and property damage policy (or rider attached thereto) of the general contractor provides adequate protection against claims arising from operations by anyone directly or indirectly employed by the Contractor.

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5. Contractor's Responsibility for Subcontractors It is further agreed that Contractor shall be as fully responsible to the County for the acts and omissions of its subcontractors, and of persons either directly or indirectly employed by them, as Contractor is for the acts and omissions of persons it directly employs. Contractor shall cause appropriate provisions to be inserted in all subcontracts relating to this work, to bind all subcontractors to Contractor by all the terms herein set forth, insofar as applicable to the work of subcontractors and to give Contractor the same power regarding termination of any subcontract as the County may exercise over Contractor under any provisions of this contract. Nothing contained in this contract shall create any contractual relations between any subcontractor and the County or between any subcontractors.

6. Liquidated Damages The Director of Public Works may, at his discretion, deduct **Two Thousand Dollars ($2000.00)** per calendar day from any amount otherwise due under this contract for every day Contractor fails or refuses to prosecute the work, or any separable part thereof, with such diligence as will insure the completion by the time above specified, or any extension thereof, or fails to complete the work by such time, as long as the County does not terminate the right of Contractor to proceed. It is further provided that Contractor shall not be charged with liquidated damages because of delays in the completion of the work due to unforeseeable causes beyond Contractor's control and without fault or negligence on Contractor's part or the part of its agents.

In addition, the Director of Public Works may, at his discretion, deduct **One Thousand Dollars ($1,000.00)** per day from any amount otherwise due under this contract for failure of the Contractor to comply with provisions specified in the **Job Special Provision E**.

7. Termination The County reserves the right to terminate this contract by giving at least five (5) days' prior written notice to the Contractor, without prejudice to any other rights or remedies of the County should the Contractor be adjudged as bankrupt, or if Contractor should make a general assignment for the benefit of its creditors, or if a receiver should be appointed for Contractor or for any of its property, or if Contractor should persistently or repeatedly refuse or fail to supply enough properly skilled workmen or proper material, or if Contractor should refuse or fail to make prompt payment to any person supplying labor or materials for the work under the contract, or persistently disregard instructions of the County or fail to observe or perform any provisions of the contract.

8. County's Right to Proceed In the event this contract is terminated pursuant to Paragraph 7, then the County may take over the work and prosecute the same to completion, by contract or otherwise, and Contractor and its sureties shall be liable to the County for any costs over the amount of this contract thereby occasioned by the County. In any such case the County may take possession of, and utilize in completing the work, such materials, appliance, and structures as may be on the work site and are necessary for completion of the work. The foregoing provisions are in addition to, and not in limitation of, the rights of the County under any other provisions of the contract, County regulations, and state and federal laws.

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9. Indemnity The Contractor agrees to defend, indemnify, and save the County harmless from and against all claims, suits, and actions of every description, brought against the County and from all damage and costs by reason or on account of any injuries or damages received or sustained by any person or persons, or their property, by Contractor, its servants, agents, or subcontractors in the construction of said work, or by any negligence or carelessness in the performance of the same, or on account of any act or omission of Contractor, its servants, agents, or subcontractors, or arising out of the award of this contract to Contractor.

10. Payment for Labor and Materials The Contractor agrees and binds itself to pay for all labor done, and for all the materials used in the construction of the work to be completed pursuant to this contract. Contractor shall furnish to the County a bond to insure the payment of all materials and labor used in the performance of this contract. The Contractor is aware of, understands and agrees to abide by RSMo. 34.057.

11. Payment The County hereby agrees to pay the Contractor for the work done on a monthly basis pursuant to this contract according as set forth in the Contract Documents upon acceptance of said work by the Director of Public Works and in accordance with the rates and/or amounts stated in the proposal of Contractor dated **January 17, 2025** which are by reference made a part hereof. No partial payment to the Contractor shall operate as approval or acceptance of work done or materials furnished hereunder.

12. Contract Time The project covered under this contract shall be completed by no later than **330 calendar days** following the Notice to Proceed.

13. Contract Documents The contract documents shall consist of the following:

a. This Contract
b. Addenda
c. Notice to Contractors
d. Instructions to Bidders
e. Signed Copy of Bid
f. General Conditions
g. Special Provisions
h. Technical Specifications
i. Drawings and/or Sketches

This contract and the other documents enumerated in this paragraph, form the Contract between the parties. These documents are as fully a part of the contract as if attached hereto or repeated herein.

14. Nondiscrimination The Contractor agrees in the performance of this contract not to discriminate on the ground or because of race, creed, color, national origin, or ancestry, sex, religion, handicap, age, or political opinion, or affiliation, against any employee of Contractor or applicant for employment and shall include a similar provision in all subcontracts let or awarded hereunder.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

15. Anti-Discrimination Against Israel Act The Contractor certifies that it is not currently engaged in and shall not, for the duration of the contract, engage in a boycott of goods or services from the State of Israel; companies doing business in or with Israel or authorized by, licensed by, or organized under the laws of the State of Israel; or persons or entities doing business in the State of Israel.

16. Notices All notices required to be in writing may be given by first class mail addressed to Cole County Commission, Courthouse Annex, Room 200, 301 East High Street, Jefferson City, Missouri 65101, and to the CONTRACTOR at:

_____.

[CONTRACTOR'S NAME AND MAILING ADDRESS]

The date of delivery of any notice shall be the second full day after the day of its mailing.

17. Jurisdiction This agreement and every question arising hereunder shall be interpreted according to the laws and statutes of the State of Missouri.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

IN TESTIMONY WHEREOF, the parties have hereunto set their hands and seals as of the day and year below written.

Executed by the **COUNTY** this _____ day of _____, 2025.

Cole County Commission, Party of the First Part

_____
Cole County Commission

ATTEST:

_____ _____
County Clerk (SEAL) County Auditor
"I certify there is a balance otherwise unencumbered to the credit of the appropriation to which it is to be charged and a cash balance otherwise unencumbered in the treasury to the credit of the fund from which payment is to be incurred."

Executed by the **CONTRACTOR** this _____ day of _____, 2025.

CONTRACTOR, Party of the Second Part

By _____

_____
Title

ATTEST:

_____
Secretary (SEAL)

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

CERTIFICATE OF INSURANCE

Issued at the request of The County of COLE, Missouri

Address: Cole County Commission
Courthouse Annex, Room 200
311 East High Street
Jefferson City, Missouri 65101

THIS IS TO CERTIFY that the insured named below is at this date insured with as described in the following schedule, and in full compliance with the Contract Documents, including all contractual liability coverage.

DESCRIPTIVE SCHEDULE

Name of Insured: _____

Address of Insured: _____

_____

Locations Covered: _____

_____

Description of Work: _____

_____

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

PERFORMANCE, PAYMENT AND ONE-YEAR GUARANTEE BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned _____ _____, hereinafter referred to as "Contractor" and _____ a Corporation organized under the laws of the State of _____, and authorized to transact business in the State of _____, as Surety, are held and firmly bound unto the County of COLE, Missouri hereinafter referred to as "County" in the penal sum of _____ _____ DOLLARS ($_____), lawful money of the United States of America for the payment of which sum, well and truly to be made, we bind ourselves and our heirs, executors, administrators, successors, and assigns jointly and severally by these presents.

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH THAT: WHEREAS, the above bounden Contractor has on the _____ day of _____, 2025, entered into a written contract with the aforesaid County for furnishing all materials, equipment, tools, superintendence, labor, and other facilities and accessories, for the construction of certain improvements as designated, defined, and described in the said Contract and the Conditions thereof, and in accordance with the specifications and plans therefore; a copy of said Contract being attached hereto and made a part hereof:

NOW THEREFORE, if the said Contractor shall and will, in all particulars, well, duly, and faithfully observe, perform, and abide by each and every covenant, condition, and part of the said Contract, and the Conditions, Specifications, Plans, Prevailing Wage Law, and other Contract Documents thereto attached or, by reference, made a part thereof, according to the true intent and meaning in each case, and if said contractor shall replace all defective parts, material and workmanship for a period of one year after acceptance by the County, then this Obligation shall be and become null and void; otherwise it shall remain in full force and effect.

PROVIDED FURTHER, that if the said Contractor fails to duly pay for any labor, materials, sustenances, provisions, provender, gasoline, lubricating oils, fuel oils, greases, coal repairs, equipment, and tools consumed or used in said work, groceries and foodstuffs, and all insurance premiums, compensation liability, and otherwise, or any other supplies or materials used or consumed by such Contractor or his, their, or its subcontractors in performance of the work contracted to be done, the Surety will pay the same in any amount not exceeding the amount of this Obligation, together with interest as provided by law.

PROVIDED FURTHER, that the said Surety, for value received, to be performed thereunder, or the specifications accompanying the same, shall in any way affect its obligation on this bond and it does hereby waive notice of any change, extension of time, alteration, or addition to the terms of the Contract, or to the work, or to the specifications:

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

PROVIDED FURTHER, that if said Contractor fails to pay the prevailing hourly rate of wages, as shown in the attached schedule, to any workman engaged in the construction of the improvements as designated, defined and described in the said Contract, specifications and conditions thereof, the Surety will pay the deficiency and any penalty provided for by law which the Contractor incurs by reason of (his/its) act or omission, in any amount not exceeding the amount of this obligation together with interest as provided by law:

IN TESTIMONY WHEREOF, the said Contractor has hereunto set his hand, and the said Surety has caused these presents to be executed in its name, and its corporate seal to be hereunto affixed, by it attorney-in-fact duly authorized thereunto so to do, at _____

_____ this the _____ day of

_____, 20_____.

_____	_____
SURETY COMPANY	CONTRACTOR
By _____ (SEAL)	By _____ (SEAL)
By _____ (SEAL)	By _____ (SEAL)
Attorney-in-Fact	(State Representative)

(Accompany this bond with Attorney-in-Fact's authority from the Surety Company certified to include the date of the bond.)

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

SECTION 5

MISSOURI DIVISION OF LABOR STANDARDS ANNUAL WAGE ORDER NO. 31
Cole County

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Missouri

Division of Labor Standards

WAGE AND HOUR SECTION

MICHAEL L. PARSON, Governor

Annual Wage Order No. 31

Section 026

COLE COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by
Todd Smith, Director
Division of Labor Standards

Filed With Secretary of State: **March 8, 2024**

Last Date Objections May Be Filed: **April 8, 2024**

Prepared by Missouri Department of Labor and Industrial Relations

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$62.47
Boilermaker	$30.53*
Bricklayer-Stone Mason	$54.17
Carpenter	$50.84
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	$43.74
Plasterer	
Communication Technician	$57.89
Electrician (Inside Wireman)	$58.31
Electrician Outside Lineman	$30.53*
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	$30.53*
Glazier	$56.48
Ironworker	$68.93
Laborer	$43.22
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	$30.53*
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	$67.64
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	$42.11
Plumber	$70.54
Pipe Fitter	
Roofer	$54.75
Sheet Metal Worker	$57.54
Sprinkler Fitter	$52.79
Truck Driver	$30.53*
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

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*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.
**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in RSMo Section 290.210.

Heavy Construction Rates for
COLE County

Section 026

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	$55.19
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$80.11
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	$48.42
General Laborer	
Skilled Laborer	
Operating Engineer	$63.82
Group I	
Group II	
Group III	
Group IV	
Truck Driver	$48.68
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate Sheet.

*The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.

**The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.

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OVERTIME
and
HOLIDAYS

OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, **"overtime work"** shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

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SECTION 6

JOB SPECIAL PROVISIONS

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

JOB SPECIAL PROVISIONS TABLE OF CONTENTS

(Job Special Provisions shall prevail over General Special Provisions whenever in conflict therewith.)

A. General
B. Project Contact for Contractor/Bidder Questions
C. Emergency Provisions and Incident Management
D. Liquidated Damages for Completion Date
E. Liquidated Damages Specified
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G. Utilities
H. Permits
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J. Contractor Furnished Construction Staking
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M. Clearing and Grubbing
N. Removal of Improvements
O. Removal and Replacement Fencing
P. Removal and Replacement of Landscaping Features
Q. Erosion and Sediment Control
R. Earthwork
S. Stormwater Drainage System
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U. Reinforced Concrete Box Culvert
V. Segmental Block Retaining Wall
W. Bituminous Pavement and Bituminous Base
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Y. Sidewalks and Sidewalk Ramps
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DD. Property Corners and Monumentation
EE. Mailboxes
FF. Greenway Trail
GG. Sanitary Sewer

ALTERNATES

HH. Add Alternate Sections
II. Optional Pavements

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Cody Alan Darr, PE
PE-2012018055

Central Missouri Professional Services, Inc.
2500 E. McCarty St.
Jefferson City, MO 65101
573-634-3455
Certificate of Authority: 0001558

A. GENERAL

1.0 The Technical Specification for this project shall consist of the latest effective version of:

- Missouri Standard Specifications for Highway Construction
- City of Jefferson Technical Specifications

except as modified or contradicted by the County's Contract, Special Provisions, General Provisions, and Plans.

2.0 The standard drawings for this project shall consist of the latest effective edition of:

- Missouri Standard Plans for Highway Construction
- City of Jefferson Standard Drawings

except as modified or contradicted by the County's Contract, Special Provisions, General Provisions, and Plans.

2.1 Copies of the Missouri Standard Plans for Highway Construction can be found at: https://www.modot.org/missouri-standard-plans-highway-construction

2.2 Copies of the City of Jefferson Standard Drawings may be found on the City's website at: https://www.jeffersoncitymo.gov/government/developer_resources_forms.php

3.0 The contractor shall familiarize himself with these drawings and specifications prior to bidding. Failure to do so shall not relieve the contractor from delivering the completed project in accordance with the intent of the Plans and Specifications to provide a workable project.

3.1 All construction details included with the plans and attached hereto shall be used in constructing this project.

B. PROJECT CONTACT FOR CONTRACTOR / BIDDER QUESTIONS

1.0 All questions concerning the bidding process for this project shall be forwarded to the project contact listed below.

Mattheuw Prenger, P.E.
County Engineer
Cole County Public Works
5055 Monticello Road
Jefferson City, MO 65109-9182
Telephone Number (573) 636-3614
Email: mprenger@colecounty.org

2.0 All questions concerning the plans and specifications can be directed to the contact below:

Cody Darr, P. E., P.L.S.
Central Missouri Professional Services
2500 E. McCarty St.
Jefferson City, MO 65101
Telephone Number (573) 634-3455 ext. 311
E-mail: cdarr@cmps-inc.com

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C. EMERGENCY PROVISIONS AND INCIDENT MANANGEMENT

1.0 The contractor shall have communication equipment on the construction site or immediate access to other communication systems to request assistance from law enforcement or other emergency agencies for incident management. In case of traffic accidents or the need for law enforcement to direct or restore traffic flow through the job site, the contractor shall notify law enforcement or other emergency agencies immediately as needed. The project contact's office shall also be notified when the contractor requests emergency assistance.

2.0 In addition to the 911 emergency telephone number for ambulance, fire or law enforcement services, the following agencies may also be notified for accident or emergency situation within the project limits.

City of Jefferson Police	(573) 634-6400
Cole County Sheriff	(573) 634-9160
Cole County EMS	(573) 634-2616
Jefferson City Fire Department	(573) 634-6401
Missouri State Highway Patrol	(573) 751-1000

2.1 This list is not all-inclusive. Notification of the need for wrecker or tow truck services will remain the responsibility of the appropriate law enforcement agency.

2.2 The contractor shall notify law enforcement and emergency agencies before the start of construction to request their cooperation and to provide coordination of services when emergencies arise during the construction at the project site. When the contractor completes this notification with law enforcement and emergency agencies, a report shall be furnished to the engineer on the status of incident management.

3.0 No direct pay will be made to the contractor to recover the cost of the communication equipment, labor, materials, or time required to fulfill the above provisions.

D. LIQUIDATED DAMAGES FOR COMPLETION

1.0 **Description.** The Contractor is advised that the project must be substantially complete by **December 31st, 2025**.

1.1 Substantial completion is defined as the completion of all pay items wit hthe exception of final seeding.

1.2 If the project is not substantially complete by **December 31st, 2025**, the County, the traveling public, and local police and governmental authorities will be damaged in various ways including but not limited to potential liability, traffic and traffic flow regulation cost, traffic congestion, and motorist delay, with its resulting cost to the traveling public.

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2.0 **Completion Date. Liquidated Damages for Failure to Complete Work on Time.** These costs are not reasonably capable of being computed or quantified. Therefore, the Contractor will be charged with liquidated damages in the amount of **$2,000 per calendar day for each full calendar day** that the project is not substantially complete after **December 31st, 2025.** This deduction will continue until such time as the project is substantially complete.

2.1 Revise Section 108.8.1.3 (a) and (b) and substitute the following for this project:

(a) Liquidated damages will be assessed from December 15 to March 15.
(b) Liquidated damages will be assessed for Saturdays, Sundays, and Holidays.

E. LIQUIDATED DAMAGES SPECIFIED

1.0 **Description.** The construction of the Roundabout at Wildwood and Rock Ridge Rd. shall take place between **May 26, 2025 and August 22, 2025**. Work may be performed prior to May 26, 2025; however, there shall be no lane closures prior to this date. The construction of the intersection including all curb and gutter, pavement, sidewalks, signing, and striping shall be complete by August 22, 2025. If the construction of the Roundabout, as described above is not complete and open to traffic prior to **August 22, 2025**, the County, the traveling public, and local police and governmental authorities will be damaged in various ways, including but not limited to, increased construction administration cost, potential liability, traffic and traffic flow regulation cost, traffic congestion and motorist delay, with its resulting cost to the traveling public. These damages are not reasonably capable of being computed or quantified. Therefore, the Contractor will be charged with liquidated damages specified in the amount of **$1000 per calendar day for each full calendar day** that the Roundabout is not complete and open to traffic in excess of the limitation as specified elsewhere in this special provision. It shall be the responsibility of the engineer to determine the quantity of excess closure time.

1.1 The said liquidated damages specified will be assessed regardless if whether it would otherwise be charged as liquidated damages under the Missouri Standard Specification for Highway Construction, as amended elsewhere in this contract.

1.2 Revise Section 108.8.1.3 (a) and (b) and substitute the following for this project:

(a) Liquidated damages will be assessed from December 15 to March 15.
(b) Liquidated damages will be assessed for Saturdays, Sundays, and Holidays.

F. PROJECT MANAGEMENT

1.0 **Description**. The contractor shall provide effective project management as specified herein to ensure the project work, materials and coordination with the public meets or exceeds all contract requirements.

1.1 This project will impact several commercial businesses and residents that rely on daily ingress and egress to their properties, as well as the travelling public. The successful completion of this project will depend on how well the contractor can cooperate with all affected parties including but not limited to, the county public works

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department, the property owners within the project limits, individuals leasing property within the property limits, commercial businesses, industrial businesses and motorists traveling through the area.

1.2 The contractor shall be required to designate a Contractor Project Manager and Work Zone Specialist (WZS) for this project in accordance with Job Special Provision 'K'.

1.3 The duties of the Contractor Project Manager shall be at the discretion of the Contractor but shall include at minimum the following basic project related items:

- Project contact for property owners, renters and business owners within or near the project limits.
- Project contact for the County.
- Attend all meetings between the county and/or property owners, renters and business owners.
- Submit all shop drawings for review.
- Handle complaints from county and/or property owners, renters and business owners.
- Review and approve pay estimates.

1.4 Property Owner Management. There are several property owners within the project limits. The contractor shall maintain a good working relationship with all affected property owners.

1.5 Complaint Management. As with all projects, there will be occasional complaints from property owners and the traveling public. The contractor shall be proactive in dealing with potential issues that could result in complaints. If a complaint is directed towards the county and/or contractor, the Contractor Project Manager shall resolve the issue as soon as possible relative to the situation.

1.6 A complaint documentation plan will be created by the county to ensure that all issues are resolved in a timely manner. The plan will include basic documentation of the complaint and the corrective action.

1.7 Weekly Project Status Meetings. A project status meeting shall be held weekly between the County and the Contractor. A review of all project management related issues will be discussed at these meetings as well as traffic management, review of work schedule, and other issues as needed. The Contractor Project Manager and the Work Zone Specialist should make every effort to attend these meetings.

2.0 **Basis of Payment**. There will be no direct payment for this requirement.

G. UTILITIES

1.0 **Utilities Shown on Plans**. The location and extent of the existing underground utilities and other utilities shown on the plans have been determined by field surveyed visible above ground evidence and Missouri On-Call Markings, and available plans. The County and their consultant make no guarantee that the utilities shown on the plans area totally accurate or all inclusive. It shall be the sole responsibility of the contractor to locate, protect, and restore all existing utilities encountered on the project. Notify

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Missouri One Call (1-800-DIG-RITE or 811) for location of the utilities at least five days prior to construction.

1.1 The contractor shall be aware of the presence of utilities above and/or below the ground or in the vicinity of this project that may interfere with their operations. The contractor expressly acknowledges and assumes this risk even though the nature and extent is unknown to both the contractor and the owner at the time of bidding and award of the contract. The effect in cost or time of the presence of utilities above, below or in the vicinity of the contractor's work under this contract shall not be compensable.

1.2 The contractor agrees that any effects of the presence of the utilities, their relocation, contractor's coordination of work with the utilities and any delay in utility relocation shall not be compensable as a suspension of work, extra work, a change in the work, as a differing site condition or otherwise including but, without limitation, delay, impact, incidental or consequential damages. The contractor's sole remedy for the effects of the presence of utilities, delay in their relocation or any other effects shall be an excusable delay as provided in Section 105.7.3. The contractor waives, for itself, its subcontractors and suppliers the compensability of the presence of utilities, delay in their relocation and any cost to the contractor, its subcontractors and suppliers in any claim or action arising out of or in relation to the work under the contract.

1.3 The contractor shall be solely responsible and liable for incidental and consequential damage to any utility facilities or interruption of the service caused by it or its subcontractors operations. The contractor shall hold and save harmless the owner from damages to any utility facilities interruption of service by it or its subcontractor's operation.

1.4 The contractor shall coordinate with utility companies to allow the utilities to inspect any exposed lines that are to remain in place before being backfilled. Any damage to the utilities that occurred during construction shall be repaired or replaced at the expense of the contractor.

2.0 Utility Company Contacts

Ameren Missouri – Electric
Chris Sanzottera, PE
314-630-3652 Cell
csanzottera@ameren.com

Ameren Missouri – Natural Gas
Trent Snodgrass
660-353-1530
tsnodgrass@ameren.com

City of Jefferson – Sanitary Sewer
Eric Seaman
573-634-6443
eseaman@jeffersoncitymo.gov

PWSD #2 – Water

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Jamie Wineland
573-635-7011
pwsd2@socket.net

Mediacom – Fiber/Cable
Derrick Hamilton
660-433-5521 Office
573-268-0896 Cell
Dhamilton1@mediacomcc.com

Brightspeed – Fiber/Telephone
Tonjia Baldwin
573-634-1725
tonjia.baldwin@brightspeed.com

Optimum – Fiber/Telephone/Cable
Tim Goerlitz
816-248-6671
timothy.goerlitz@alticeusa.com
Josh Cubley
816-699-8555
Josh.cubley@alticeusa.com

Socket Telecom – Fiber
Todd Pulis
573-818-4778
tpulis@socket.net

Sho-Me Technologies – Fiber
Brad McGoon
417-830-6717
dmcgoon@shomepower.com

Bluebird – Fiber
Jamie Scott
314-220-8996
james.scott@bluebirdnetwork.com

3.0 Basis of Payment. No direct pay will be made to the contractor to recover the cost of the communication equipment, labor, materials or time required to fulfill the above provisions, unless otherwise noted.

H. PERMITS

1.0 MoDNR Land Disturbance Permit. The County of Cole has obtained a General Operating Permit (Permit No. MO-R100034) from the Missouri Department of Natural Resources, Water Protection for construction and land disturbance activity, which covers the work entailed in the project. The County's associated Storm Water Pollution Prevention Plan (SWPPP), which is a requirement to the General Operating Permit, is attached as part of the contract documents.

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1.1 In signing the contract, the contractor obligates himself to follow the provisions of the permit and the associated Storm Water Pollution Prevention Plan. Specifically, the contractor shall be responsible for:

a) All required inspections of erosion control BMP's.
b) Maintaining records of precipitation.
c) Maintaining logs of BMP Inspections, BMP Maintenance and BMP Corrective Actions taken to correct deficiencies identified during inspections.
d) Documenting any changes made to the Erosion Control Plan.

2.0 **U.S. Army Corps of Engineers**. The County of Cole has obtained Nationwide Permit No. 14 authorization from the U.S. Army Corps of Engineers for impacts to (1) an unnamed tributary of Wear's Creek required to construct the box culvert at approximate Wildwood Station 58+07, (2) Open Cut of Sanitary Sewer Pipe crossing Wear's Creek, and (3) drainage pipe outlet discharge bank reshaping for Pipes C-1 and C-3. The contractor shall be responsible for complying will all provisions of said permit.

2.1 **Bat Habitat Protection.** The project is within the known range of federally endangered bats. These bats are known to roost in trees when not in winter hibernation. To avoid potential negative impacts to protected bats, removal of trees will only be allowed between October 15 and March 31. See USACE permit documents for additional guidance.

3.0 **Floodplain Development Permit**. Work in designated floodplains shall be done in accordance with the requirements of the Flood hazard Regulations of Jefferson City, Missouri and with all other applicable City, State of Missouri, and Federal laws and regulations.

4.0 **Basis of Payment.** All expenses incurred by the Contractor by reason of their compliance with this provision shall be considered as completely covered by each of the appropriate pay items included in the contract.

I. PRE-CONSTRUCTION CONFERENCE

1.0 Prior to starting work, a pre-construction conference will be held to discuss the project, it's scheduling and it's coordination with the work of others. It is expected that this conference will be attended by representatives of the Owner, the Engineer, the Contractor and his Subcontractors, and the Utilities, as well as representatives of any other affected agencies such as local police, fire, postal, public transportation officials, other emergency services (if necessary), and any school agencies (as necessary).

1.1 It shall be required that all of the contractor's designated foremen that will oversee field operations of the project will attend the conference.

1.2 The work schedule specified in the Instructions to Bidders will be submitted at the conference.

1.3 Notice given of the meeting shall be completed at least one week prior to the meeting date.

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1.4 See SWPPP for additional items to be discussed as necessary at the preconstruction conference.

J. CONTRACTOR FURNISHED CONSTRUCTION STAKING

1.0 Construction staking for this project shall be the responsibility of the Contractor. The Contractor shall provide the necessary surveying and staking necessary for the successful prosecution of the work.

2.0 Contractor Furnished Construction Staking shall be performed in accordance with Section 627.

3.0 **Basis of Payment**: All costs incurred by the Contractor for labor, equipment and materials in compliance with the above requirements, shall be considered completely covered by the unit price for Item "Contractor Furnished Construction Staking", per lump sum.

K. WORK ZONE TRAFFIC MANAGEMENT

1.0 **Description.** Work zone traffic management supplied by the contractor shall be in accordance with applicable portions of Division 100 and Division 600 of the Standard Specifications, and specifically as follows.

1.1 **Maintaining Work Zones and Work Zone Reviews.** The Work Zone Specialist (WZS) shall maintain work zones in accordance with Sec 616.3.3 and as further stated herein. The WZS shall coordinate and implement any changes approved by the engineer or owner. The WZS shall ensure all traffic control devices are maintained in accordance with Sec 616, the work zone is operated within the hours specified by the engineer, and will not deviate from the specified hours without prior approval of the engineer or owner. The WZS is responsible to manage work zone delay in accordance with these project provisions. When requested by the engineer or owner, the WQZS shall submit a weekly report that includes a review of the work zone operations for the week. The report shall identify any problems encountered and corrective actions taken. Work zones are subject to unannounced inspections by the engineer, owner, or their designees to corroborate the validity of the WZS's review and may require immediate corrective measures and/or additional work zone monitoring.

1.2 **Work Zone Deficiencies.** Failure to make corrections on time may result in the owner suspending work. The suspension will be non-excusable and non-compensable.

2.0 **Work Hour Restrictions.** There are no work hour restrictions for this project. It shall be the responsibility of the engineer to determine if work hours may be modified. Working hours for evenings, weekends and holidays will be determined by the owner.

3.0 **Road/Lane Closures.**

3.1 The contractor shall notify the emergency response agencies prior to any road/lane closures. The contractor shall submit a schedule of closure to the engineer **TWO**

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WEEKS prior to a lane closure. The engineer must approve the schedule prior to any work beginning.

3.2 Rock Ridge Road may be closed as required during construction. Allowing traffic through the road closure will not be required provided access can be maintained from either end of Rock Ridge Road. Access to driveways for land owners within the project area shall be maintained throughout construction or as allowed within these Job Special Provisions. The length of time the Rock Ridge Road is completely closed shall be minimized.

3.3 Periodic lane closures will be permitted on W. Edgewood Drive, Frog Hollow Road, and Rock Ridge Road. Lane closures will only be permitted during daylight hours unless approved by the engineer. During periodic lane closures, one lane of traffic shall be maintained at all times.

3.4 The contractor shall be responsible for installing Temporary Traffic Control measures for all road closures and periodic lane closures. Traffic Control measures shall generally comply with the Traffic Control Plan. The contractor shall be responsible for installing additional signage as necessary based on specific construction phasing. All traffic control shall be in accordance with the latest edition of the Missouri Department of Transportation and Manual on Uniform Traffic Control Devices (MUTCD). This shall include, but not be limited to, signing, flagging, cones, etc.

3.5 When a changeable message sign (CMS) is provided, the contractor shall use the CMS to notify motorists of future traffic disruption and possible traffic delays one week before traffic is shifted to a detour or prior to lane closures. The CMS shall be installed at a location as approved or directed by the engineer. If a CMS with Communication Interface is required, then the CMS shall be capable of communication prior to installation on right of way. All messages planned for use in the work zone shall be approved and authorized by the engineer, owner, or its designee prior to deployment.

4.0 Property Owner Coordination. Contractor must coordinate with adjacent property owners to schedule the work, including construction/replacement of drive entrances. Contractor shall provide property owners access to their property at all times by use of phased construction, shared entrances, temporary entrances, or other means necessary. Property access closures may be allowed with permission of property owner and approval of the engineer.

Property owners directly adjacent and within the project limits and nature of work:

- John Farrer: Material borrow, Greenway Trail, Sanitary Sewer, Utilities)
- Chamber of Commerce: Greenway Trail
- Brad & Karen Werner: Rebuild Driveway (maintain driveway access)
- Alvina & Thomas Gottschamer and Julie Ann Clemons: clearing
- David & Lisa Gerbes: Rebuild Driveway (maintain access), utility relocations, demo foundation, tree clearing, etc.
- PWSD #2: Rebuild Driveway (maintain access), retaining wall construction, fence demo and installation.
- Ed & Mary Rackers: Rebuild Driveway to Shed, fill areas on-site, soil stockpile, fence demo and installation, gate installation at roundabout.

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- Gregg & Roma Popp: Regrade shoulder, new driveways, soil stockpile, fence demo and installation.
- William & Betty Jo Emerson: Driveway Rebuild (maintain access)
- Gary Allen: Driveway Rebuild (maintain access)
- Todd Fetters: Driveway Rebuild (maintain access)
- Nathaniel & Elsie Mead: Driveway Rebuild (maintain access)
- Loretta & Joann Wilhelm: Driveway Rebuild (maintain access)

5.0 **Basis of Payment.** All expenses incurred by the Contractor by reason of their compliance with these requirements shall be considered as being included in and completely covered by the contract unit prices for the various items included in the contract

L. QUALITY CONTROL (QC)

1.0 The County or its designee will provide all Quality Control (QC) of the work and material to ensure that it is in compliance with the contract requirements. The Contractor shall provide to the County all the necessary access to the site and materials needed to accomplish this task.

M. CLEARING AND GRUBBING

1.0 This work shall consist of clearing, grubbing, removing and disposing of items, debris and other objectionable matter from within the limits shown on the drawings. Clearing and grubbing shall include removal of all trees, stumps, roots and any objectionable matter resting on or protruding through the surface of the original ground.

2.0 Clearing of deciduous forest to be done between October 15th to March 31st in accordance with USACE/USFWS requirements for endangered bat species protection.

3.0 Clearing shall be performed over the entire area shown on the drawings. Grubbing shall be performed to a minimum depth of 18” below the existing earth grade. Holes created by removals shall be backfilled with suitable material.

4.0 Removal and Disposal of Material. The contractor shall dispose of all trees, stumps, brush, roots and other objectionable matter removed in the clearing and grubbing process. **Open burning shall not be allowed.** Burial of stumps and debris within the project limits will not be permitted. The county will make available an area for the contractor to grind removed material. Ground material shall be placed for erosion control by the contractor as shown on the drawings. Any material in excess of that necessary for erosion control shall be disposed of by the contractor.

5.0 **Basis of Payment**. All expenses incurred by the Contractor by reason of their compliance with this provision shall be considered as completely covered by the contract unit price for “Clearing and Grubbing”, per lump sum.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

N. REMOVAL OF IMPROVEMENTS

1.0 All removal of improvements necessary for the completion of the project in accordance with the plans may not be enumerated within the plans, but shall be considered completely covered by the contract unit price for "Removal of Improvements", per lump sum. These removal items consist of, but are not limited to:

- Asphalt Pavement
- Concrete Pavement (Werner Driveway)
- Existing Signs and posts.
- Existing fences (See JSP Section O "REMOVAL AND REPLACEMENT OF FENCING)

1.2 With the exception of existing road signs and sign posts, all items removed shall become the property of the Contractor and shall be disposed of off-site.

2.0 Pavement Removal.

2.1 The contractor shall remove pavement in a manner approved by the Engineer. Options where asphalt pavement will be replacing asphalt pavement may include milling the existing pavement to a depth that allows for the placement of the new asphalt section as shown on the plans or excavation methods that remove the existing pavement section in its entirety. Where the existing or new pavement is concrete, the pavement shall be replaced in its entirety.

3.0 Pavement Disposal

3.1 Removed pavement (asphalt or concrete) may not be disposed of within 12" of design finished grade. Any removed pavement not incorporated into the project shall be removed from the site and legally disposed of.

3.2 The Contractor may use cold millings for temporary surfacing, or base preparation under approaches, driveways and sidewalks.

3.3 Any removed pavement to be incorporated into roadway fill shall be broken down to a maximum 6" dimension prior to placing the fill.

4.0 Sign Removal

4.1 All road sign sheets and sign posts within existing County Right-of-Way shall remain the property of the County. Sign sheets and sign posts shall be delivered to Cole County Public Works at 5055 Monticello Road.

4.2 All road sign sheets and sign posts within existing City Right-of-Way (W. Edgewood Dr.) shall remain the property of the City. Sign sheets and sign posts shall be delivered to City of Jefferson Public Works at 2310 Hyde Park Rd.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

4.3 The contractor shall use care when removing existing signs and posts to not cause any damage.

5.0 **Basis of Payment**. Any expenses incurred by the contractor by reason of their compliance with this provision shall be considered as completely covered by the contract unit price for "Removal of Improvements", per lump sum.

O. REMOVAL AND REPLACEMENT OF FENCING

1.0 **Description**. This work consists of removing and replacing fencing at various locations throughout the project.

2.0 **Construction Methods**. In locations where fencing is used to contain livestock, new temporary or permanent fencing shall be installed prior to removal of existing fencing. The new permanent fence type shall match the type of fence removed unless specified otherwise on the Plans. New fence material shall conform to Section 1043, Fence Material.

2.1 Removal and Re-setting Fence shall be in compliance with City of Jefferson Technical Specifications TS-17 Fencing.

2.2 Prior to removing any fence the Contractor shall contact the property owners so that they may take necessary steps to confine any animals or make arrangements for children normally kept within the fence.

2.3 Temporary Fencing. Wherever permanent fencing that is used to protect small children or contain animals must be removed to accommodate construction, the Contractor shall erect temporary fencing suitable to perform the function of the permanent fence until the permanent fence can be restored.

2.4 The construction of the temporary fencing shall be coordinated with the property owner to cause as little inconvenience as possible. In no case shall such area be left unfenced over a weekend or for more than one weekday.

2.5 At the Contractor's option, materials from the existing fence may be used for the temporary fencing. However, the Contractor will be fully responsible for restoring the permanent fence in condition at least equal to that prior to construction.

3.0 **Basis of Payment**. All expenses incurred by the Contractor by reason of their compliance with these requirements shall be considered as being included in and completely covered by Item "Removal of Improvements", per lump sum; and Item "Fencing", per linear foot.

P. REMOVAL AND REPLACEMENT OF LANDSCAPING FEATURES

1.0 The Contractor shall contact all property owners concerning the removal of any landscaping features impacted by construction prior to beginning work. Care shall be taken in order to cause the least disruption to yard areas, plants, shrubs, trees, etc. Any landscaping that is necessary to be removed shall be done so in a way such that the property owner can salvage it if desired. The Contractor shall coordinate all removals with the property owner and if necessary, shall assist the property owner

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with relocations. No direct payment will be made to the Contractor for the requirements of this provision.

Q. EROSION AND SEDIMENT CONTROL

1.0 **Description.** The Contractor shall employ all necessary erosion control Best Management Practices (BMP) necessary to limit the amount of sediment entering stormwater inlets, pipes, streams, and adjacent properties.

2.0 The Contractor shall be responsible for complying with all provisions of the County's Missouri Department of Natural Resources General Operating Permit for Land Disturbance including but not limited to BMP installation and maintenance, inspections, record keeping and reporting.

3.0 The Contractor shall install erosion and sediment control measures in accordance with MSPHC 806.10 and the Missouri Department of Natural Resources field guide "Protecting Water Quality" which can be found at www.dnr.mo.gov/env/wpp/wpcp-guide.htm, and in the SWPPP.

4.0 The project is subject to inspection by MoDNR and/or the County at any time. Any deficiencies noted during inspection shall be remedied immediately by the contractor subject to approval by the engineer.

5.0 Any silt or sediment that enters inlets, pipes, ditches or adjacent properties shall be the responsibility of the Contractor to remove. No direct payment for said removal shall be made since silts should not be allowed to leave the project site based on the provisions of this bid item.

6.0 **Basis of Payment.** All expenses incurred by the Contractor by reason of their compliance with these requirements shall be considered as being included in and completely covered by the contract unit prices for the various items included in the contract

R. EARTHWORK

1.0 **Description.** This work shall consist of excavating, compacting, filling, grading, and disposing of all material necessary to achieve the typical subgrade lines and grades in accordance with the plans and specifications. All earthwork shall be performed in accordance with Section 203. In the area of the Arch Span Structure the contractor shall review and be familiar with the Subsurface Investigation, Analysis, and Geotechnical Engineering Recommendations report prepared by Gredell Engineering Resources, Inc.

1.1 Typical earthwork items on this project shall consist of, but not be limited to:

- Excavation and embankment for rough grading the project area
- Preparing subgrades for pavements
- Finish grading for areas to be seeded, and mulched.
- Hauling of waste material off site.

2.0 **Construction Requirements.**

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2.1 Topsoil Stripping: Prior to beginning excavation and embankment operations, top soil and soil containing significant vegetation and/or tree roots shall be removed and stockpiled for use for final grading in areas to be seeded.

2.2 Soil Subgrade Preparation: Following topsoil stripping, existing soils shall be proof-rolled prior to beginning placing embankment. Where embankment subgrade soils are deemed unstable, they may be improved by scarification, aeration, and compaction; by additional stripping to reach stable soils; or by reinforcement with a biaxial geogrid. Areas requiring additional stabilization shall be observed by the engineer to determine stabilization method.

2.3 Rock Excavation (Class C): Excavations on the Farrer Property are expected to encounter rock and shall be completed by blasting. Blasting is expected to irregularly fracture or dislodge some rock strata near the base of the blast zone. Tilted, nested, or similarly disturbed rock shall be excavated, processed for gradation and placed as controlled rock fill. When rock is encountered at or above embankment subgrade, rock shall be undercut 18" and replaced with controlled rock fill. Blasting operations shall comply with MSSHC Section 107.7 and Section 203.4.4

2.4 Embankment Construction: All embankments shall be constructed with shot rock excavated by blasting on-site. Shot rock embankment with a maximum particle size of 18" shall be compacted in maximum 24" thick lifts with a minimum of 4 complete passes with a tracked loader >40,000 lbs operating weight and >9 psi ground contact pressure. Rocks greater than 18" in size shall be reduced by breaking. Shot rock with more than 20% clay or shale shall not be placed within two feet of embankment subgrade elevation.

2.5 Excess Material: All excess or unsuitable excavated material, may be placed on the side slopes of the nearest embankment in a satisfactory manner or shall be disposed of off of the project in areas secured by the contractor.

3.0 Method of Measurement. The total quantity of Class A Excavation, Class C Excavation, and Embankment in Place has been calculated using Autodesk C3D TIN volume surface comparison from the existing ground to the finished grade, or top of subgrade as appropriate (no cut or fill factor applied). The quantities of classified excavation have been estimated for bidding purposes. The County will make measurements necessary to determine existing soil elevations following clearing operations, and existing rock elevations following soil stripping. Pay quantities for Class A Excavation and Class C Excavation will be adjusted by change order based on calculated classified excavation from soil and rock surface measurements.

4.0 Basis of Payment. All costs incurred for equipment, labor, materials, or time required to fulfill this provision, except as noted above, shall be considered completely covered by the contract unit price for "Class A Excavation", "Class C Excavation" and "Embankment" per cubic yard.

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S. STORMWATER DRAINAGE SYSTEM

1.0 Description. This work includes installation of storm drainage systems consisting of pipes, inlets, junction boxes, and flared end sections.

2.0 Requirements. Dimensions and details of the **Type A inlets** shall be according to the City of Jefferson Standard Details. Dimensions and details of the **Type S-2 inlet and for the pipes** shall be in accordance with the plans and specifications and the applicable section of the currently effective Missouri Standard Specifications for Highway Construction (MSSHC) and Missouri Standard Plans for Highway Construction (MSPHC).

2.1 Drainage Structures. The construction and materials for the storm drainage structures shall conform to Sec 731. Drainage structures may be cast-in-place or precast at the contractor's option. Where inlets are to be constructed with curb and gutter, inlet tops shall be cast-in-place.

3.0 Method of Measurement. Measurement of pipe shall be to the nearest 1.0 lineal foot. Flared end sections shall be measured per each. Drainage Structures shall be measured per each. Class 3 Excavation in Rock will only be paid if the rock is encountered. If rock is encountered, the measurement of the excavation quantity will be measured to the nearest cubic yard from within the boundaries described in Section 206.5.2. Allowance quantities of Trench Rock Excavation are included in the bid proposal. Payment will be made only for actual quantity of measured Trench Rock Excavation.

4.0 Basis of Payment: Excavation and backfill shall be included with the contract unit price for the pipes and inlets. There will be no direct payment for excavation and backfill for the drainage structures, unless rock is encountered. If rock is encountered, the Contractor's additional expense will be paid by "Trench Rock Excavation", per cubic yard. This additional payment shall only include the Contractor's cost to chip the rock as typical excavation and backfill procedures will be included in the cost of the drainage structures. Rock shall be considered Class C Excavation material as defined in Section 203.2.

4.1 Drop inlets and manholes shall be paid for per each regardless of depth. The expenses for the manhole frame and cover shall be considered completely covered for the unit price for each drainage structure. There will be no direct payment made for the frame and cover. The gutter pan transition shall be included in the unit price for each drainage structure.

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T. ARCH SPAN STRUCTURE

1. Description

1.1. Type – This work shall consist of furnishing and constructing a CON/SPAN® O-SERIES® bridge system in accordance with these specifications and in reasonably close conformity with the lines, grades, design and dimensions shown on the plans or as established by the Engineer. In situations where two or more specifications apply to this work, the most stringent requirements shall govern.

1.2. Designation – Precast reinforced concrete CON/SPAN® O-SERIES bridge units manufactured in accordance with this specification shall be designated by span and rise. Precast reinforced concrete wingwalls and headwalls manufactured in accordance with this specification shall be designated by length, height, and deflection angle. Precast Reinforced Concrete Express™ foundation units manufactured in accordance with this specification shall be designated by length, height and width.

1.3. Additional Support – The precast arch supplier must directly employ a minimum of two (2) registered professional engineers licensed in the State of Missouri with at least 15 years of experience. Design calculations for precast concrete elements and foundations sealed by a registered professional engineer in the State of Missouri. The Professional Engineer signing the shop drawings and calculations must have at least 5 years' experience designing Soil Interactive structures utilizing a public domain software.

Precast arch supplier shall attend pre-bid meeting and shall also conduct a precast arch system pre-installation meeting with installing contractor prior to setting any arch components. Owner and engineer of record shall be notified in advance to allow for attendance if desired. Precast arch supplier shall provide a direct employee for the technical instruction and onsite technical consultation to the contractor during the installation and or setting of the precast bridge elements.

1.4. Alternates – Precast reinforced concrete CON/SPAN® O-SERIES Bridge System as supplied by Contech Engineered Solutions (C. Todd Black / 913-216-3818 / todd.black@conteches.com) is the basis of this design. Proposed alternates must be of equal or greater span and distance between inside faces of foundations. Documentation listed below must be provided to engineer and owner for consideration.

- Bridge drawings including a plan view showing total bridge length and end treatment wall length and angles, upstream and downstream end elevations showing precast span, clear span, precast rise, clear rise, headwall height and wall thickness dimensions of bridge members and bridge end treatments.
- Product specific foundation design detailing foundation width, thickness, required reinforcement and concrete compressive strength.
- Hydraulic analysis demonstrating no increase in headwater elevation, tailwater elevation or velocity. Contact engineer for acceptable hydraulic software list.
- The precast arch supplier of proposed alternates to a CON/SPAN® O-SERIES Bridge System as supplied by Contech Engineered Solutions must directly employ a minimum of two (2) registered professional engineers in the state of Missouri.

2. Design

2.1. Specifications – The precast elements are designed in accordance with the "AASHTO LRFD Bridge Specification" 8th Edition, adopted by the American Association of State Highway and Transportation Officials, 2017. A minimum of one foot of cover above the crown of the bridge units is required in the installed condition unless noted otherwise on the shop drawings and designed accordingly.

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3. Materials

3.1. Concrete – The concrete for the precast elements shall be air-entrained when installed in areas subject to freeze-thaw conditions, composed of Portland cement, fine and coarse aggregates, admixtures and water. Air-entrained concrete shall contain 6 ± 2% air. The air-entraining admixture shall conform to AASHT0 M154. The minimum concrete compressive strength shall be as shown on the shop drawings.

3.1.1. Portland Cement - Shall conform to the requirements of ASTM Specifications C150-Type I, Type II, or Type III cement.

3.1.2. Coarse Aggregate - Shall consist of stone having a maximum size of 1 inch. Aggregate shall meet requirements for ASTM C33.

3.1.3. Water Reducing Admixture - The manufacturer may submit, for approval by the Engineer, a water-reducing admixture for the purpose of increasing workability and reducing the water requirement for the concrete.

3.1.4. Calcium Chloride - The addition to the mix of calcium chloride or admixtures containing calcium chloride will not be permitted.

3.1.5. Mixture - The aggregates, cement and water shall be proportioned and mixed in a batch mixer to produce a homogeneous concrete meeting the strength requirements of this specification. The proportion of Portland cement in the mixture shall not be less than 564 pounds (6 sacks) per cubic yard of concrete.

3.2. Steel Reinforcement

3.2.1. The minimum steel yield strength shall be 60,000 psi, unless otherwise noted on the shop drawings.

3.2.2. All reinforcing steel for the precast elements shall be fabricated and placed in accordance with the detailed shop drawings submitted by the manufacturer.

3.2.3. Reinforcement shall consist of welded wire fabric conforming to ASTM Specification A185 or A497, or deformed billet steel bars conforming to ASTM Specification A615, Grade 60. Longitudinal distribution reinforcement may consist of welded wire fabric or deformed billet-steel bars.

3.3. Steel Hardware

3.3.1. Bolts and threaded rods for wingwall connections shall conform to ASTM A307. Nuts shall conform to AASHTO M292 (ASTM A194) Grade 2H. All bolts, threaded rods and nuts used in wingwall connections shall be mechanically zinc coated in accordance with ASTM B695 Class 50.

3.3.2. Structural Steel for wingwall connection plates and plate washers shall conform to AASHTO M270 (ASTM A709) Grade 36 and shall be hot dip galvanized as per AASHTO M111 (ASTM A123).

3.3.3. Inserts for wingwalls shall be 1" diameter Two-Bolt Preset Wingwall Anchors as manufactured by Dayton Superior Concrete Accessories and shall be mechanically zinc coated in accordance with ASTM B695 Class 50.

3.3.4. Ferrule Loop Inserts shall be F-64 Ferrule Loop Inserts as manufactured by Dayton Superior Concrete Accessories.

3.3.5. Hook Bolts used in attached headwall connections shall be ASTM A307.

3.3.6. Inserts for detached headwall connections shall be AISI Type 304 stainless steel, F-58 Expanded Coil inserts as manufactured by Dayton Superior Concrete Accessories. Coil rods and nuts used in headwall connections shall be AISI Type 304 stainless steel. Washers used in headwall connections shall be either AISI Type 304 stainless steel plate washers or AASHTO M270 (ASTM

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A709) Grade 36 plate washers hot dip galvanized as per AASHTO M111 (ASTM A123).

3.3.7. Reinforcing bar splices shall be made using the Dowel Bar Splicer System as manufactured by Dayton Superior Concrete Accessories and shall consist of the Dowel Bar Splicer (DB-SAE) and Dowel-In (DI).

4. Manufacture of Precast Elements

Subject to the provisions of Section 5, below, the precast element dimension and reinforcement details shall be as prescribed in the plan and shop drawings provided by the manufacturer.

4.1. Forms – The forms used in manufacture shall be sufficiently rigid and accurate to maintain the required precast element dimensions within the permissible variations given in Section 5 of these specifications. All casting surfaces shall be of a smooth material.

4.2. Placement of Reinforcement

4.2.1. Placement of Reinforcement in Precast Bridge Units - The cover of concrete over the outside circumferential reinforcement shall be 2" minimum. The cover of concrete over the inside circumferential reinforcement shall be 1 1/2" minimum, unless otherwise noted on the shop drawings. The clear distance of the end circumferential wires shall not be less than one inch nor more than two inches from the ends of each section. Reinforcement shall be assembled utilizing single or multiple layers of welded wire fabric (not to exceed 3 layers), supplemented with a single layer of deformed billet-steel bars, when necessary. Welded wire fabric shall be composed of circumferential and longitudinal wires meeting the spacing requirements of 4.3, below, and shall contain sufficient longitudinal wires extending through the bridge unit to maintain the shape and position of the reinforcement. Longitudinal distribution reinforcement may be welded wire fabric or deformed billet-steel bars and shall meet the spacing requirements of 4.3, below. The ends of the longitudinal distribution reinforcement shall be not more than 3" and not less than 1 1/2" from the ends of the bridge unit.

4.2.2. Bending of Reinforcement for Precast Bridge Units – The outside and inside circumferential reinforcing steel for the corners of the bridge shall be bent to such an angle that is approximately equal to the configuration of the bridge's outside corner.

4.2.3. Placement of Reinforcement for Precast Wingwalls and Headwalls - The cover of concrete over the longitudinal and transverse reinforcement shall be 2" minimum. The clear distance from the end of each precast element to the end of reinforcing steel shall not be less than ½" nor more than 3". Reinforcement shall be assembled utilizing a single layer of welded wire fabric, or a single layer of deformed billet-steel bars. Welded wire fabric shall be composed of transverse and longitudinal wires meeting the spacing requirements of 4.3, below, and shall contain sufficient longitudinal wires extending through the element to maintain the shape and position of the reinforcement. Longitudinal reinforcement may be welded wire fabric or deformed billet-steel bars and shall meet the spacing requirements of 4.3, below.

4.2.4. Placement of Reinforcement for Precast Foundation Units – The cover of concrete over the bottom reinforcement shall be 3" minimum. The cover of concrete for all other reinforcement shall be 2" minimum. The clear distance from the end of each precast element to the end of reinforcing steel shall not be less than 2" nor more than 3". Reinforcement shall be assembled utilizing a single layer of welded wire fabric or a single layer of deformed billet-steel bars. Welded wire fabric shall be composed of transverse and longitudinal wires meeting the spacing requirements of 4.3, below, and shall contain sufficient

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longitudinal wires extending through the element to maintain the shape and position of the reinforcement. Longitudinal reinforcement may be welded wire fabric or deformed billet-steel bars and shall meet the spacing requirements of 4.3, below.

4.3. Laps, Welds, Spacing

4.3.1. Laps, Welds, and Spacing for Precast Bridge Units - Tension splices in the circumferential reinforcement shall be made by lapping. Laps may be tack welded together for assembly purposes. For smooth welded wire fabric, the overlap shall meet the requirements of AASHTO 8.30.2 and 8.32.6. For deformed welded wire fabric, the overlap shall meet the requirements of AASHTO 8.30.1 and 8.32.5. The overlap of welded wire fabric shall be measured between the outer-most longitudinal wires of each fabric sheet. For deformed billet-steel bars, the overlap shall meet the requirements of AASHTO 8.25. For splices other than tension splices, the overlap shall be a minimum of 12" for welded wire fabric or deformed billet-steel bars. The spacing center to center of the circumferential wires in a wire fabric sheet shall be not less than 2" nor more than 4". The spacing center to center of the longitudinal wires shall not be more than 8". The spacing center to center of the longitudinal distribution steel for either line of reinforcing in the top slab shall be not more than 1'-4.

4.3.2. Laps, Welds, and Spacing for Precast Wingwalls, Headwalls and Foundations - Splices in the reinforcement shall be made by lapping. Laps may be tack welded together for assembly purposes. For smooth welded wire fabric, the overlap shall meet the requirements of AASHTO 8.30.2 and 8.32.6. For deformed welded wire fabric, the overlap shall meet the requirements of AASHTO 8.30.1 and 8.32.5. For deformed billet-steel bars, the overlap shall meet the requirements of AASHTO 8.25. The spacing center-to-center of the wires in a wire fabric sheet shall be not less than 2" nor more than 8".

4.4. Curing – The precast concrete elements shall be cured for a sufficient length of time so that the concrete will develop the specified compressive strength in 28 days or less. Any one of the following methods of curing or combinations thereof shall be used:

4.4.1. Steam Curing - The precast elements may be low-pressure steam cured by a system that will maintain a moist atmosphere.

4.4.2. Water Curing - The precast elements may be water cured by any method that will keep the sections moist.

4.4.3. Membrane Curing - A sealing membrane conforming to the requirements of ASTM Specification C309 may be applied and shall be left intact until the required concrete compressive strength is attained. The concrete temperature at the time of application shall be within +/- 10° F of the atmospheric temperature. All surfaces shall be kept moist prior to the application of the compounds and shall be damp when the compound is applied.

4.5. Storage, Handling & Delivery

4.5.1. Storage – Precast concrete bridge elements shall be lifted and stored in "as-cast" position. Precast concrete headwall and wingwall units are cast, stored and shipped in a flat position. The precast elements shall be stored in such a manner to prevent cracking or damage. Store elements using timber supports as appropriate. The units shall not be moved until the concrete compressive strength has reached a minimum of 2500 psi, and they shall not be stored in an upright position.

4.5.2. Handling – Handling devices shall be permitted in each precast element for the purpose of handling and setting. Spreader beams may be required for the lifting of precast concrete bridge elements to preclude damage from bending or torsion forces.

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4.5.3. Delivery – Precast concrete elements must not be shipped until the concrete has attained the specified design compressive strength, or as directed by the design Engineer. Precast concrete elements may be unloaded and placed on the ground at the site until installed. Store elements using timber supports as appropriate.

4.6. Quality Assurance – The Precaster shall demonstrate adherence to the standards set forth in the NPCA Quality Control Manual. The Precaster shall meet either Section 4.6.1 or 4.6.2.

4.6.1. Certification - The Precaster shall be certified by the Precast/Prestressed Concrete Institute Plant Certification Program or the National Precast Concrete Association's Plant Certification Program prior to and during production of the products covered by this specification.

4.6.2. Qualifications, Testing and Inspection

4.6.2.1. The Precaster shall have been in the business of producing precast concrete products similar to those specified for a minimum of three years. He shall maintain a permanent quality control department or retain an independent testing agency on a continuing basis. The agency shall issue a report, certified by a licensed engineer, detailing the ability of the Precaster to produce quality products consistent with industry standards.

4.6.2.2. The Precaster shall show that the following tests are performed in accordance with the ASTM standards indicated. Tests shall be performed as indicated in Section 6 of these specifications.

4.6.2.2.1. Air Content: C231 or C173

4.6.2.2.2. Compressive Strength: C31, C39, C497

4.6.2.3. The Precaster shall provide documentation demonstrating compliance with this section to Contech® Engineered Solutions at regular intervals or upon request.

4.6.2.4. The Owner may place an inspector in the plant when the products covered by this specification are being manufactured.

4.6.3. Documentation - The Precaster shall submit Precast Production Reports to Contech® Engineered Solutions as required.

5. Permissible Variations

5.1. Bridge Units

5.1.1. Internal Dimensions - The internal dimension shall vary not more than 1% from the design dimensions nor more than 1 $^1/_2$" whichever is less.

5.1.2. Slab and Wall Thickness - The slab and wall thickness shall not be less than that shown in the design by more than $^1/_4$". A thickness more than that required in the design shall not be cause for rejection.

5.1.3. Length of Opposite Surfaces - Variations in laying lengths of two opposite surfaces of the bridge unit shall not be more than $^1/_2$" in any section, except where beveled ends for laying of curves are specified by the purchaser.

5.1.4. Length of Section - The underrun in length of a section shall not be more than $^1/_2$" in any bridge unit.

5.1.5. Position of Reinforcement - The maximum variation in position of the reinforcement shall be ± $^1/_2$". In no case shall the cover over the reinforcement be less than 1 $^1/_2$" for the outside circumferential steel or be less than 1 inch for the inside circumferential steel as measured to the external or internal surface of the

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bridge. These tolerances or cover requirements do not apply to mating surfaces of the joints.

5.1.6. Area of Reinforcement - The areas of steel reinforcement shall be the design steel areas as shown in the manufacturer's shop drawings. Steel areas greater than those required shall not be cause for rejection. The permissible variation in diameter of any reinforcement shall conform to the tolerances prescribed in the ASTM Specification for that type of reinforcement.

5.2. Wingwalls & Headwalls

5.2.1. Wall Thickness - The wall thickness shall not vary from that shown in the design by more than 1/2".

5.2.2. Length/ Height of Wall sections - The length and height of the wall shall not vary from that shown in the design by more than 1/2".

5.2.3. Position of Reinforcement - The maximum variation in the position of the reinforcement shall be ± 1/2". In no case shall the cover over the reinforcement be less than 1 1/2".

5.2.4. Size of Reinforcement - The permissible variation in diameter of any reinforcing shall conform to the tolerances prescribed in the ASTM Specification for that type of reinforcing. Steel area greater than that required shall not be cause for rejection.

5.3. Foundation Units

5.3.1. Wall Thickness - The wall thickness shall not vary from that shown in the design by more than 1/2".

5.3.2. Length/ Height/Width of Foundation sections - The length, height and width of the foundation units shall not vary from that shown in the design by more than 1/2".

5.3.3. Position of Reinforcement - The maximum variation in the position of the reinforcement shall be ± 1/2". In no case shall the cover over the reinforcement be less than 1 1/2".

5.3.4. Size of Reinforcement - The permissible variation in diameter of any reinforcing shall conform to the tolerances prescribed in the ASTM Specification for that type of reinforcing. Steel area greater than that required shall not be cause for rejection.

6. Testing / Inspection

6.1. Testing

6.1.1. Type of Test Specimen - Concrete compressive strength shall be determined from compression tests made on cylinders or cores. For cylinder testing, a minimum of 4 cylinders shall be taken for each bridge element. Each element shall be considered separately for the purpose of testing and acceptance.

6.1.2. Compression Testing - Cylinders shall be made and tested as prescribed by the ASTM C 39 Specification. Cylinders shall be cured in the same environment as the bridge elements. Cores shall be obtained and tested for compressive strength in accordance with the provisions of the ASTM C42 specification.

6.1.3. Acceptability of Cylinder Tests - When the average compressive strength of all cylinders tested is equal to or greater than the design compressive strength, and not more than 10% of the cylinders tested have a compressive strength less than the design concrete strength, and no cylinder tested has a compressive

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strength less than 80% of the design compressive strength, then the element shall be accepted. When the compressive strength of the cylinders tested does not conform to these acceptance criteria, the acceptability of the element may be determined as described in section 6.1.4, below.

6.1.4. Acceptability of Core Tests - The compressive strength of the concrete in a bridge element is acceptable when the average core test strength is equal to or greater than the design concrete strength. When the compressive strength of a core tested is less than the design concrete strength, the precast element from which that core was taken may be re-cored. When the compressive strength of the re-core is equal to or greater than the design concrete strength, the compressive strength of the concrete in that bridge element is acceptable.

6.1.4.1. When the compressive strength of any re-core is less than the design concrete strength, the precast element from which that core was taken shall be rejected.

6.1.4.2. Plugging Core Holes - The core holes shall be plugged and sealed by the manufacturer in a manner such that the elements will meet all of the test requirements of this specification. Precast elements so sealed shall be considered satisfactory for use.

6.1.4.3. Test Equipment - Every manufacturer furnishing precast elements under this specification shall furnish all facilities and personnel necessary to carry out the test required.

6.2. Inspection – The quality of materials, the process of manufacture, and the finished precast elements shall be subject to inspection by the purchaser.

7. Joints

The bridge units shall be produced with flat butt ends. The ends of the bridge units shall be such that when the sections are laid together they will make a continuous line with a smooth interior free of appreciable irregularities, all compatible with the permissible variations in section 5, above. The joint width between adjacent precast units shall not exceed $^{3}/_{4}$".

8. Workmanship / Finish

The bridge units, wingwalls, headwalls and foundation units shall be substantially free of fractures. The ends of the bridge units shall be normal to the walls and centerline of the bridge section, within the limits of the variations given in section 5, above, except where beveled ends are specified. The faces of the wingwalls and headwalls shall be parallel to each other, within the limits of variations given in section 5, above. The surface of the precast elements shall be a smooth steel form or troweled surface. Trapped air pockets causing surface defects shall be considered as part of a smooth steel form finish.

9. Repairs

Precast elements may be repaired, if necessary, because of imperfections in manufacture or handling damage and will be acceptable if, in the opinion of the purchaser, the repairs are sound, properly finished and cured, and the repaired section conforms to the requirements of this specification.

10. Rejection

The precast elements shall be subject to rejection on account of any of the specification requirements. Individual precast elements may be rejected because of any of the following:

10.1. Fractures or cracks passing through the wall, except for a single end crack that does not exceed one half the thickness of the wall.

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10.2. Defects that indicate proportioning, mixing, and molding not in compliance with section 4 of these specifications.

10.3. Honeycombed or open texture.

10.4. Damaged ends, where such damage would prevent making a satisfactory joint.

11. Marking

Each bridge unit shall be clearly marked by waterproof paint. The following shall be shown on the inside of the vertical leg of the bridge section:

Bridge Span X Bridge Rise
Date of Manufacture
Name or trademark of the manufacturer

12. Installation Preparation

To ensure correct installation of the precast concrete bridge system, care and caution must be exercised in forming the support areas for bridge units, headwall, and wingwall elements. Exercising special care will facilitate the rapid installation of the precast components.

12.1. Footings –

Do not over excavate foundations unless directed by site soil engineer to remove unsuitable soil.

The site soils engineer shall certify that the bearing capacity meets or exceeds the footing design requirements, prior to the contractor pouring of the footings.

The bridge units and wingwalls shall be installed on either precast or cast-in-place concrete footings. The size and elevation of the footings shall be as designed by the Engineer.

A keyway shall be formed in the top surface of the bridge footing as specified on the plans. No keyway is required in the wingwall footings, unless otherwise specified on the plans.

The footings shall be given a smooth float finish and shall reach a compressive strength of 2,000 psi before placement of the bridge and wingwall elements.

Backfilling shall not begin until the footing has reached the full design compressive strength.

The footing surface shall be constructed in accordance with grades shown on the plans. When tested with a 10-foot straight edge, the surface shall not vary more than ¼" in 10'.

The foundations for precast concrete bridge elements and wingwalls must be connected by reinforcement to form one monolithic body.

Expansion joints shall not be used.

The contractor shall be responsible for the construction of the foundations per the plans and specifications.

If a precast concrete footing is used, the contractor shall prepare a 4" thick base layer of compacted granular material the full width of the footing prior to placing the precast footing.

13. Installation

13.1. General – The installation of the precast concrete elements shall be as explained in the publication *CON/SPAN Bridge Installation Guide*.

13.1.1. Lifting - It is the responsibility of the contractor to ensure that a crane of the correct lifting capacity is available to handle the precast concrete units. This can be accomplished by using the weights given for the precast concrete

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components and by determining the lifting reach for each crane unit. Site conditions must be checked well in advance of shipping to ensure proper crane location and to avoid any lifting restrictions. The lift anchors or holes provided in each unit are the only means to be used to lift the elements. The precast concrete elements must not be supported or raised by other means than those given in the manuals and drawings without written approval from Contech® Engineered Solutions.

13.1.2. Construction equipment weight restrictions - In no case shall equipment operating in excess of the design load (HL-93) be permitted over the bridge units unless approved by Contech® Engineered Solutions.

13.1.2.1. In the immediate area of the bridge units, the following restrictions for the use of heavy construction machinery during backfilling operations apply:

- No construction equipment shall cross the bare precast concrete bridge unit.
- After the compacted fill level has reached a minimum of 4” over the crown of the bridge, construction equipment with a weight of less than 10 tons may cross the bridge.
- After the compacted fill level has reached a minimum of 1’ over the crown of the bridge, construction equipment with a weight of less than 30 tons may cross the bridge.
- After the compacted fill level has reached the design cover, or 2’ minimum, over the crown of the precast concrete bridge, construction equipment within the design load limits for the road may cross the precast concrete bridge.

13.2. Leveling Pad/ Shims – The bridge units and wingwalls shall be set on hardboard shims conforming to ASTM D1037 or plastic shims (Dayton Superior P-80, P-81 or approved equal) measuring 5" x 5", minimum, unless shown otherwise on the plans. A minimum gap of ½” shall be provided between the footing and the bottom of the bridge's vertical legs or the bottom of the wingwall. Also, a supply of ¼”, ½” & 1/8” thick hardboard or plastic shims for various shimming purposes shall be on site.

13.3. Placement of Bridge Units

The bridge units shall be placed as shown on the Engineer's plan drawings. Special care shall be taken in setting the elements to the true line and grade. The joint width between adjacent precast units shall not exceed ¾”.

13.4. Tie Rods

It is the contractor’s responsibility to maintain the structure span during all phases of installation. Due to the arch shape, bridge elements will tend to spread under self-weight. It is imperative that any lateral spreading of the bridge elements be avoided during and after their placement. Generally, horizontal tie rods are shipped in the larger bridge elements to assist in preventing this spreading. Tie rods shall not be removed until bridge units are grouted and grout has cured. It is recommended that temporary hardwood blocks be used in conjunction with the cable/tie rods to maintain span. If, however, due to site restrictions, these cable ties/tie rods must be removed prior to placement of the bridge elements, the contractor must notify Contech (manufacturer) and request a suggested installation procedure.

In addition, if the cable ties/tie rods must be removed prior to setting arch units, the following quality control procedure must be followed:

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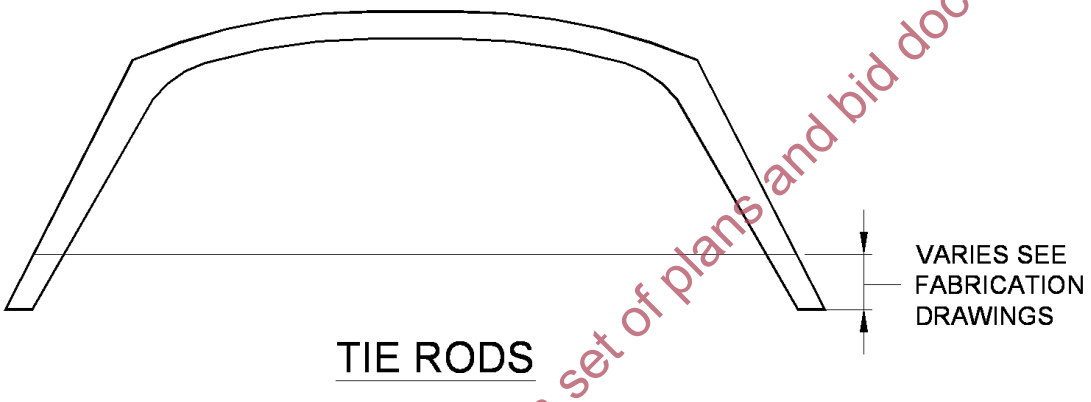
1) Find “measured span” upon arch unit’s delivery to site, prior to lifting from truck and removing cable ties/tie rods. “Measured span” shall be the average of (3) span measurements along the lay length of the arch unit.

2) After setting of bridge unit on the foundation, verify the span. This “installed span measurement” shall not exceed the maximum of

   A) The nominal span + ½” OR

   B) The “measured span”.

If the “installed span measurement” exceeds this amount, the arch unit shall be lifted and re-set until the “installed span measurement” meets the limits.



TIE RODS

13.5. Placement of Wingwalls, Headwalls & Foundation Units – The wingwalls, headwalls and foundations shall be placed as shown on the plan drawings. Special care shall be taken in setting the elements to the true line and grade.

13.6. Waterproofing/ Joint protection and Subsurface Drainage

13.6.1. External Protection of Joints - The butt joint made by two adjoining bridge units shall be covered with a $^{7}/_{8}$" x 1 $^{3}/_{8}$" preformed bituminous joint sealant and a minimum of a 9” wide joint wrap. The surface shall be free of dirt before applying the joint material. A primer compatible with the joint wrap to be used shall be applied for a minimum width of nine inches on each side of the joint. The external wrap shall be either EZ-Wrap Rubber by Press-Seal Gasket Corporation, Seal Wrap by Mar Mac Manufacturing Co. Inc. or approved equal. The joint shall be covered continuously from the bottom of one bridge section leg, across the top of the bridge and to the opposite bridge section leg. Any laps that result in the joint wrap shall be a minimum of six inches long with the overlap running downhill.

13.6.2. In addition to the joints between bridge units, the joint between the end bridge unit and the headwall shall also be sealed as described above. If precast wingwalls are used, the joint between the end bridge unit and the wingwall shall be sealed with a 2" strip of filter fabric. Also, if lift holes are formed in the bridge units, they shall be primed and covered with a 9" x 9" square of joint wrap.

13.6.3. During the backfilling operation, care shall be taken to keep the joint wrap in its proper location over the joint.

13.6.4. Subsoil drainage shall be as directed by the engineer.

13.7. Grouting

13.7.1. Grouting shall not be performed when temperatures are expected to go below 35° for a period of 72 hours. Fill the bridge-foundation keyway with

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cement grout (Portland cement and water or cement mortar composed of Portland cement, sand and water) with a minimum 28-day compressive strength of 3000 psi. Vibrate as required to ensure that the entire key around the bridge element is completely filled. If bridge elements have been set with temporary ties (cables, bars, etc.) grout must attain a minimum compressive strength of 1500 psi before ties may be removed.

13.7.2. All grout shall have a maximum aggregate size of ¼".

13.7.3. Lifting and erection anchor recesses shall be filled with grout.

13.7.4. After grout has reached its design strength the temporary hardwood wedges shall be removed and their holes filled with grout.

13.8. Backfill

13.8.1. Do not perform backfilling during wet or freezing weather.

13.8.2. No backfill shall be placed against any structural elements until they have been approved by the Engineer.

13.8.3. Backfill shall be considered as all replaced excavation and new embankment adjacent to the precast concrete elements. The project construction and material specifications, which include the specifications for excavation for structures and roadway excavation and embankment construction, shall apply except as modified in this section.

13.8.4. Backfill Zones

- In-situ soil
- Zone A: constructed embankment or overfill.
- Zone B: fill that is directly associated with precast concrete bridge installation.
- Zone C: road structure.

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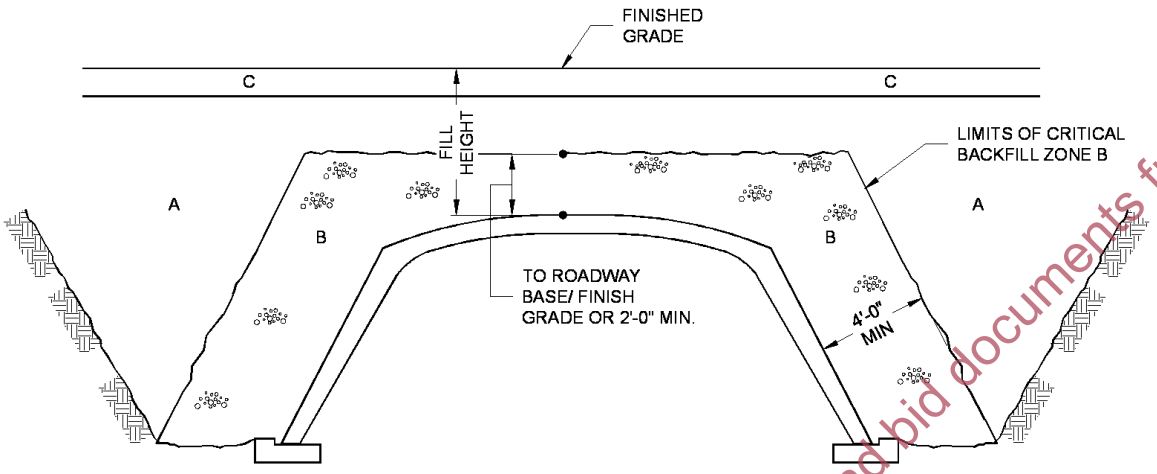
13.8.5. Required Backfill Properties



SPAN	FILL HEIGHT	ACCEPTABLE MATERIAL INSIDE ZONE B
≤ 24'-0"	≥ 12'-0"	A1, A3
≤ 24'-0"	< 12'-0"	A1, A2, A3, A4
> 24'-0"	all	A1, A3

13.8.5.1. In-situ soil

Natural ground is to be sufficiently stable to allow effective support to the precast concrete bridge units. As a guide, the existing natural ground should be of similar quality and density to Zone B material for minimum lateral dimension of one bridge span outside of the bridge footing.

13.8.5.2. Zone A

Zone A requires fill material with specifications and compacting procedures equal to that for normal road embankments.

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13.8.5.3. Zone B

Generally, soils shall be reasonably free of organic matter, and, near concrete surfaces, free of stones larger than 3 inches in diameter. See charts for detailed descriptions of acceptable soils.

Acceptable Soils for use in Zone B Backfill

Typical USCS Materials	AASHTO Group	AASHTO Subgroup	Percent passing US Sieve No.			Character of Fraction passing No. 40 Sieve		Soil Description
			#10	#40	#200	Liquid Limit	Plasticity Index	
GW, GP, SP	A-1	A-1a	50 max	30 max	15 max		6 max	Largely gravel but can include sand and fines
GM, SW, SP, SM		A-1b		50 max	25 max		6 max	Gravelly sand or graded sand, may include fines
GM, SM, ML, SP, GP	A-2	A-2-4			35 max	40 max	10 max	Sands, gravels with low-plasticity silt fines
SC, GC, GM		A-2-5			35 max	41 min	10 max	Sands, gravels with plastic silt fines
SP, SM, SW	A-3			51 min	10 max		non-plastic	Fine sands
ML, SM, SC	A-4				36 min	40 max	10 max	Low-compressibility silts

13.8.5.4. Zone C

Zone C is the road section of gravel, asphalt or concrete built in compliance with local engineering practices.

13.8.5.5. Geotechnical engineer shall review gradations of all interfacing materials and, if necessary, recommend geotextile filter fabric (provided by contractor).

13.8.6. Placing and Compacting Backfill

Dumping for backfilling is not allowed any nearer than 3' from the bridge leg.

The fill must be placed and compacted in layers not exceeding 8". The maximum difference in the surface levels of the fill on opposite sides of the bridge must not exceed 2'.

The fill behind wingwalls must be placed at the same time as that of the bridge fill. It must be placed in progressively placed horizontal layers not exceeding 8" per layer.

The backfill of Zone B shall be compacted to a minimum density of 95% of the Standard Proctor, as required by AASHTO T-99.

Soil within 1' of concrete surfaces shall be hand-compacted. Elsewhere, use of rollers is acceptable. If vibrating roller-compactors are used, they shall not be started or stopped within Zone B and the vibration frequency should be at least 30 revolutions per second.

The backfill material and compacting behind wingwalls shall satisfy the criteria for the bridge backfill, Zone B.

Backfill against a waterproofed surface shall be placed carefully to avoid damage to the waterproofing material.

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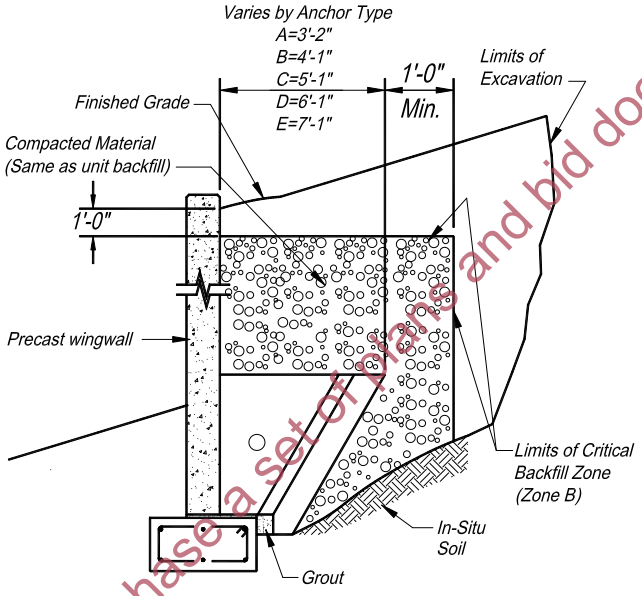
13.8.7. Bridge Units

For fill heights over 12' (as measured from top crown of bridge to finished grade), no backfilling may begin until a backfill compaction testing plan has been coordinated with and approved by Contech® Engineered Solutions.

13.8.8. Wingwalls

Backfill in front of wingwalls shall be carried to ground lines shown in the plans.



13.8.9. Monitoring

The contractor shall check settlements and horizontal displacement of foundation to ensure that they are within the allowable limit provided by the engineer. These measurements should give an indication of the settlements and deformations along the length of the foundations.

The first measurement should take place after the erection of all precast bridge system elements, a second after completion of backfilling, and a third before opening of the bridge to traffic. Further measurements may be made according to local conditions.

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U. REINFORCED CONCRETE BOX CULVERT

1.0 General. This work shall consist of constructing cast-in-place or pre-cast box culvert as shown on the plans. If the contractor opts to install pre-cast box culvert sections, installation shall be in accordance with Section 733.

2.0 Construction Requirements.

2.1 Subgrade Preparation. The plan dimension of the box culvert plus a minimum of 4 feet in all dimensions shall be excavated to a depth of 3 feet below bottom of slab elevation. Biaxial geogrid of Tensar BX1200 or equal shall be placed on excavated subgrade. 3' of dense graded shot rock shall be placed and compacted in accordance with the Earthwork requirements. The upper 4" shall be leveled with fine graded shot rock or compacted aggregate base.

2.2 The material and construction requirements shall meet the requirements of Section 733 latest version of the Missouri Standard Specifications for Highway Construction if the box culvert is precast. The material and construction requirements shall meet the requirements of Section 703 and 706 of the Missouri Standard Specifications for Highway Construction for Concrete and Steel respectively, except that no measurement shall be made.

2.3 Box Culvert Construction. Box culvert shall be constructed in accordance with the detailed plans and specifications.

2.4 Any variation from the standard MoDOT plans may be considered upon submittal by contractor of shop drawings, manufacturer cut sheets and supporting structural calculations as necessary.

3.0 Basis of Payment. All expenses incurred by the Contractor by reason of their compliance with this provision shall be considered as completely covered by the contract unit price for "Reinforced Concrete Box Culvert", per lump sum.

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V. SEGMENTAL BLOCK RETAINING WALL

1.0 Description. This work shall consist of furnishing and constructing mechanically stabilized earth wall systems in accordance with these specifications, as shown on the plans or as directed by the engineer.

2.0 Material. All material shall be in accordance with Division 1000, Material Details, and specifically as follows:

Item	Modot Section
Concrete	501
Select Granular Backfill for Structural Systems	1010
Geotextile	1011
Miscellaneous Drainage Material	1013
Reinforcing Steel for Concrete	1036
Resin Anchor Systems	1039
MSE Wall System Components	1052

2.4 The unit fill that is used for small block wall systems shall consist of a granular backfill in accordance with Gradation D or E of Sec 1005.

2.5 Class B or B-1 air entrained concrete shall be used for the coping or top cap units used for the wall system. Class B or B-1 concrete shall be used for cast-in-place concrete leveling pads used for the wall system.

3.0 Design Requirements.

3.1 Only the mechanically stabilized earth wall systems shown in the bridge prequalified products listing will be allowed for use by the contractor. The bridge prequalified products list may be obtained through Bridge or MoDOT's web site: https://www.modot.org/bridge-pre-qualified-products-list. Any deviations from the prequalified wall system details previously submitted to Bridge shall be specifically outlined in the cover letter submitted with the design plans, details and computations.

3.2 Small block wall systems will be permitted for uses where the wall height does not exceed **15** feet. The height of the wall will be determined by measuring from the top of the concrete leveling pad to the top of the cap on the wall.

3.3 The contractor shall submit **three** complete sets of the manufacturer's design plans, details and computations for each individual wall structure to the engineer. All submitted information shall be clear and complete, and thoroughly checked before the information is submitted. All submitted information shall be legible.

3.4 The contractor will be solely responsible for the content of the design plans, details and computations that are submitted, and for the performance of the wall system. The contractor shall be solely responsible for ensuring that the information submitted by the manufacturer is in accordance with all contract plans and specifications and with the wall system used. Completed design plans shall contain all material, fabrication and construction requirements for erecting the wall system complete in place. The completed design plans shall show the longitudinal and lateral layout of the drainage systems used for the wall system. The contractor shall be responsible for the internal and external stability of the structure including compound stability. Overall global stability will be the responsibility of the engineer.

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3.5 All design plans, details and computations submitted for distribution shall be signed, sealed and stamped in accordance with the laws relating to architects and professional engineers (Chapter 327, RSMo).

3.6 Mechanically stabilized earth wall systems shall be designed in accordance with the AASHTO specifications shown on the plans and in accordance with additional publications or specifications referenced within the AASHTO specifications. The seismic performance category, angle of internal friction for the selected granular backfill for structural systems and other design requirements shown on the plans shall be incorporated into the design of the wall system.

4.0 Construction Requirements.

4.1 Small Block Wall Systems.

4.1.1 The contractor shall use a unit fill to fill the voids of the blocks for the wall system. This unit fill shall extend a minimum distance of 12 inches beyond the extreme back face of the wall system. Each course of the wall system shall have the unit fill in place before the next course of the wall system is placed.

4.1.2 Precast top cap units shall be used on small block wall systems. The top cap units shall be permanently attached as shown on the plans, utilizing either a resin anchor system or an equivalent detail.

4.1.3 Any equivalent details used shall be part of the prequalified mechanically stabilized earth wall system details on file for the manufacturer of the wall system.

4.1.4 Drainage Requirements. A drainage system shall be provided at the base of the wall system near the facing elements and at the interface of the select granular backfill for structural systems and the retained backfill. The drainage system shall consist of a perforated pipe wrapped in a Class 2 geotextile to prevent clogging of the perforations. The pipe shall be placed in such a manner that water drains freely from the pipe. When the wall length is such that the slope of the pipe becomes excessive in the engineer's judgment, lateral drain pipes shall be installed underneath the leveling pad.

4.1.5 Foundation Preparation. The foundation for the wall system shall be graded level for a width equal to or exceeding the length of the reinforcing strips, or as shown on the plans. Prior to wall construction the foundation, if not on rock, shall be proof-rolled or compacted as directed by the engineer. Any foundation soils found to be unsuitable shall be removed and replaced, as directed by the engineer.

4.1.6 Leveling Pad. The Leveling pad shall be concrete in accordance with Section 720.4.1.6.1 or granular in accordance with Section 720.4.1.6.2. The leveling pad shall be provided at the foundation level for each base unit of the wall system. The leveling pad shall be built to the elevations shown on the plans and shall not be raised in elevation to allow for the use of a particular wall system. The leveling pad shall be built a minimum width of 12 inches and a minimum depth of 6 inches.

4.1.6.1 Concrete Leveling Pad. An unreinforced cast-in-place concrete leveling pad shall be cured a minimum of 12 hours before any of the wall system panels are placed. Class B or B-1 concrete shall be used for cast-in-place concrete leveling pads for the wall system.

4.1.6.2 Granular Leveling Pad. A granular leveling pad shall be well graded, crushed limestone, 1" gravel with fines. Sand or granular base shall be compacted with 3 passes of a vibratory compactor to provide a firm, level bearing pad.

4.1.7 Batter Requirements. Wall systems shall be built with some inward batter, as determined by the wall system manufacturer, to accommodate the horizontal movement created by the placement and compaction of selected granular backfill for structural systems. Facing elements out of alignment shall not be pulled or pushed into proper place, as that may cause

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damage to the facing element or soil reinforcement strips. If misalignment occurs, the select granular backfill for structural systems and the soil reinforcement strips shall be removed and the facing elements reset to the proper alignment.

4.8 Select Granular Backfill for Structural Systems Placement.

4.8.1 Select granular backfill for structural systems shall be placed concurrently with the placement of the retained backfill. The placement of the select granular backfill for structural systems shall closely follow the erection of each course of the wall system and shall be placed in such a manner to avoid any damage or disturbance to the wall material or any misalignment of the facing elements of the wall system. Any wall system material that becomes damaged or disturbed during the installation of the wall system shall be removed, replaced or corrected at the contractor's expense, as directed by the engineer. Whenever placement of the select granular backfill for structural systems results in the wall facing system being misaligned or distorted outside the limits of this specification, the contractor shall correct the misalignment or distortion as directed by the engineer.

4.8.2 The select granular backfill for structural systems shall be compacted in accordance with Sec 203, with the following exceptions:

(a) The minimum density shall be no less than 95 percent of maximum density, determined in
accordance with AASHTO T 99.
(b)When the material used contains more than 30 percent retained on the 3/4-inch sieve, a method of compaction consisting of at least four passes by a heavy roller shall be used.
(c) The moisture content of the material prior to and during compaction shall be uniformly distributed throughout each layer. The placement moisture content shall be no lower than three percentage points
less than the optimum moisture content and shall be no more than the optimum moisture content.
(d) Compaction within 3 feet of the back face of the wall system shall be achieved by at least three passes of a lightweight mechanical tamper, roller or vibratory system.
(e) The contractor shall ensure that runoff within the wall system construction site is directed away from the wall facing during construction, and that runoff from adjacent areas of the general
construction site is directed such that runoff does not enter the wall system construction site.
(f) Class 1 geotextile material shall be placed between the select granular backfill for structural
systems, and the retained backfill and over the top of the select granular backfill for structural systems to prevent piping of in-situ soil into the wall system.
(g) Tamping-type (sheep's foot) rollers shall not be used for compaction of the select granular backfill for structural systems.

4.8.3 The select granular backfill for structural systems shall be initially placed parallel to the wall system, and at the rear and middle of the soil reinforcement strips, and then moved toward the facing elements of the wall system. Construction equipment shall at no time come in direct contact with the soil reinforcement strips. Each course or layer shall be compacted up to or slightly above the location of the next connection for the reinforcement strips prior to placing the next layer of reinforcement strips as designated in the erection sequence provided by the manufacturer of the wall system.

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4.9 Construction Tolerances.

4.9.1 Wall systems shall be built in accordance with the dimensions and elevations specified on the plans and in accordance with the requirements of the system manufacturer. Alignments shall be maintained within the following dimensional tolerances:

Item	Tolerance
Final Joint Gaps Between Adjacent Modular Block Units (Small Block Walls)	± 1/4 in.
Vertical and Horizontal Alignment of Facing Elements (All Wall Systems)	± 1/16 in. per ft
Soil Reinforcement Strip Elevations (All Wall Systems)	± 1 in.

4.9.2 Vertical alignments shall be measured along a theoretical vertical line established from the top of the wall system to the base of the wall system. For small block walls that have a built-in setback, the alignment shall be measured along the theoretical vertical line and the straight line that describes the horizontal setback.

4.10 Technical Assistance. The contractor shall be responsible for having a technical advisor from the wall system manufacturer available for assistance during the installation of the wall system.

5.0 Method of Measurement.

5.1 Measurement of mechanically stabilized earth wall systems will be made to the nearest square foot. The quantity to be paid will be measured from the wall outline as shown on the plans. No adjustments in the measured quantity will be permitted for additional wall area required to meet the minimum wall elevations shown on the plans for any particular wall system.

5.3 Final measurement will not be made except for authorized changes during construction or where
appreciable errors are found in the contract quantity. The revision or correction will be computed and added to or deducted from the contract quantity.

5.4 No measurement will be made for required excavation for placement of the leveling pad for the wall system. All other excavation required for the construction of the wall system will be included in roadway items.

6.0 Basis of Payment. The accepted quantity of mechanically stabilized earth wall systems, complete in place, will be paid for at the contract unit price for each of the pay items included in the contract.

6.1 Versa-Lok Square Foot Wall blocks were used for the basis of design for retaining wall details and calculation of wall quantities shown in the plans. Retaining wall payment quantities will not be adjusted for variances due to wall system selection.

6.2 Basis of Payment: Any expenses incurred by the contractor by reason of their compliance with this provision shall be considered as completely covered by Item “MSE Retaining Wall”, per square foot.

W. BITUMINOUS PAVEMENT AND BITUMINOUS BASE

1.0 Description. Bituminous Pavement and Bituminous Base shall be constructed in accordance with Section 401.

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2.0 Field Laboratory per 401.6 shall not be required.

3.0 Bituminous Pavement shall be profilographed immediately behind the finish roller in accordance with Section 502.

4.0 The asphalt binder for the asphalt mixes for this project shall performance graded. The grade shall be PG 64-22 and shall be in compliance with the Section 1015 of the Specifications.

5.0 The asphalt mix design shall be submitted to the County for verification and approval at least 30 days prior to placing any mixture on the project. The contractor shall not begin work until approval of the mix design has been given by the County.

6.0 Prior to paving, all bituminous base layers shall be swept free of all dust, loose material, grease or other foreign material and tacked in accordance with Section 407. All tacked surfaces shall be overlaid with a bituminous mixture within the same day. At no time shall a tacked surface be left in an unpaved condition overnight. In addition, the tack distribution vehicle shall not tack beyond the limits of the traffic control.

7.0 In accordance with Sec. 401.5 (d), the quantity of asphalt binder introduced into the mixer shall be the quantity specified in the job-mix formula. No changes shall be made to the quantity of asphalt binder without written approval from the engineer. The contractor shall furnish verification of the asphalt binder content in the mixer at any time immediately upon request.

8.0 Reclaimed asphalt shingles will be allowed per MoDOT Specifications with the following exception: No Reclaimed Asphalt Shingles (RAS) shall be included in any Plant Mix Bituminous Pavement (BP-1) mixture used on this project.

9.0 Reclaimed asphalt pavement will be allowed per MoDOT Specifications with the following exception: No Reclaimed Asphalt Pavement (RAP) shall be included in any Plant Mix Bituminous Pavement (BP-1) mixture used on this project.

10.0 Transverse joints or headers, except at coldmilled butt joints, shall not be allowed in a continuous lane unless prior approval is authorized by the Engineer at least two (2) days in advance.

11.0 When paving a road or location requiring more than one lane pass of the paver, the centerline joint between the two lanes shall be reasonably straight as determined by the Engineer. Joints will be checked by a straight edge or string line. Any major deviations as determined by the Engineer shall be immediately corrected prior to the first pass of the breakdown roller.

12.0 **Construction Methods.** For each phase of construction, newly constructed roadways may be open to through traffic following placing the top lift of Bituminous Base. Temporary Pavement Marking per Section 620.2.5 shall be placed prior to opening roadway to through traffic. Edge-line marking shall not be required.

13.0 **Method of Measurement.** The quantities of bituminous pavement and bituminous base are calculated from the top width of the pavement, and will be made to the nearest 0.1 square yard. No additional payment will be made for bituminous pavement

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quantities to construct the required safety edge along the edge of pavement. Final measurement of the completed pavement will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity.

14.0 Basis of Payment. All expenses incurred by the Contractor by reason of their compliance with this provision shall be considered as completely covered by the unit prices bid for:

- Item No., "3" Bituminous Base (Under C&G), PG64-22, per sq. yd.
- Item No., "4" Bituminous Base (Between C&G), PG64-22, per sq. yd.
- Item No., "7" Bituminous Base, PG64-22, per sq. yd.
- Item No., 2" Bituminous Pavement, PG64-22 (BP-1 Mix), per sq. yd.
- Item No. 401-30.10, Variable Depth Bituminous Base, PG64-22, per ton.

X. CURB AND GUTTER

1.0 Description. This work consists of constructing Jefferson City Type 'A' Curb and Gutter from Station 35+30 to 38+05.

2.0 Construction Methods. Dimensions and details of the Curb & Gutter shall be according to the City of Jefferson Standard Details as specified.

2.1 The construction and materials for the curb and gutter shall conform to Jefferson City Standard Detail 20.08.

3.0 Method of Measurement: Curb and gutter shall be measured along the back of curb. Curb and gutter is not quantified in front of commercial approaches or through inlet gutter transitions.

4.0 Basis of Payment. All expenses incurred by the Contractor by reason of their compliance with this provision shall be considered as completely covered by the unit prices bid for:

- Item "Type A Curb and Gutter", per linear foot

Y. SIDEWALKS AND SIDEWALK RAMPS

1.0 Description. This work consists of constructing two Sidewalk Ramps on the south side of W. Edgewood Drive, and the installation of Truncated Dome Panels at median pedestrian refuges at the Roundabout.

2.0 Construction Methods. Dimensions and details of the sidewalks, sidewalk ramps, and truncated dome panels shall be according to the City of Jefferson Standard Details as specified.

2.1 The construction and materials for the sidewalk shall conform to Jefferson City Standard Details 23.06 thru 23-15 and as specified on the plans.

2.2 All detectable panels shall be installed such that they match the slope of the ramp, with no vertical displacement from concrete, and in accordance with all manufacturer & ADA recommendations and standards.

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2.3 All detectable warning panels used on this project shall be **RED** in color, be cast in place panels, be in compliance with current ADA standards, and from this list:

- Wet-Set High-Impact Polymer Ties; Produced by TufTile (TufTile.com, 888-960-8897)
- Wet-Set Cast-iron Tiles; Produced by TufTile (TufTile.com, 888-960-8897)
- TekWay High Performance ADA domes; Produced by StrongGO (Stronggo.com, 866-439-3216)
- Cast in place removal tactile panels produced by DA Solutions (ADATile.com, 800-372-0519)
- Other cast panels that are compliant with ADA standards & are approved by the project engineer

3.0 **Method of Measurement**: Concrete sidewalk will be made to the nearest 1/10 square yard. Sidewalk shall not be quantified through residential or commercial approaches. Separate measurement shall be made for Sidewalk Ramps and for Truncated Dome Panels.

4.0 **Basis of Payment**: All expenses incurred by the Contractor by reason of their compliance with this provision shall be considered as completely covered by the unit prices bid for:

- Item No., "6" PC Concrete Sidewalk Approach", per square yard.
- Item No., "ADA Detectable Warning Panels", per square foot.

Z. ACCESS TO AND PROTECTION OF ADJACENT PROPERTIES

1.0 Prior to the removal of the driveways to any dwellings or buildings, the Contractor shall notify the inhabitants of such structures that the use of the driveways or access will be temporarily affected. Notice shall be of sufficient length to allow the persons affected to remove vehicles and other items that may be inaccessible during construction activities.

2.0 Pedestrian access shall be maintained at all times. Suitable access shall be provided across trenches, ditches or other barriers and obstacles for pedestrian traffic. Appropriate devices shall be used to warn the public of the dangers that may be present.

3.0 Surface water shall be diverted and otherwise prevented from entering or damaging adjacent property as a result of precipitation during construction.

4.0 **Basis of Payment**: All expenses incurred by the Contractor by reason of their compliance with these requirements shall be considered as being included in and completely covered by the contract unit prices for the various items included in the contract

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AA. APPROACHES AND DRIVES

1.0 **Description**. This work consists of constructing approaches and tying the drives into the existing drive along the project length

2.0 Construction Methods. Dimensions and details of the approaches and drives shall be according to the details on the plans.

2.1 The construction and materials shall conform to the following:

- Concrete Approaches and Drives shall conform to Section 608.
- Asphalt Approaches and Drives shall conform to JSP Section W
- Aggregate Drives shall conform to Section 310.

3.0 **Basis of Payment**: All expenses incurred by the Contractor by reason of their compliance with this provision shall be considered as completely covered by the unit prices bid for:

- Item No., "4" Thick Aggregate Driveway Surface, per square yard
- Item No., "4" Thick Asphalt Driveway Surface, per square yard
- Item No., "5" Thick Concrete Driveway Surface, per square yard
- Item No., "Residential Drive Approach", per square yard
- Item No., "Commercial Drive Approach", per square yard

BB. TEMPORARY SEEDING AND MULCH

1.0 Temporary seeding shall be used on any areas that have ceased soil disturbing activities temporarily and will not resume for a period exceeding 14 calendar days, or as instructed by the Engineer. Temporary seeding may be used on rough grade to prevent erosion. Temporary seeding may also be used on final grade if outside the typical growing season for permanent seeding.

1.1 Temporary seeding mixtures of cereal grains shall be applied at a rate of 100 pounds per acre. Vegetative Mulch placed over temporary seed mixtures shall be applied at a rate of 1 ½ tons per acre. Fertilizer shall be applied at a rate of 40 pounds nitrogen (N) per acre. Lime will not be required for temporary seeding.

2.0 Quantity of Temporary Seeding and Mulch based on leaving Farrer borrow area and Popp stockpile as temporary seeding and mulch as final state. Additional temporary seeding and mulch may be required as described above.

3.0 **Basis of Payment**: Any expenses incurred by the Contractor by reason of their compliance with this provision shall be considered as completely covered by Item No., "Temporary Seeding and Mulch", per acre.

CC. FINISH GRADING, FERTILIZER, SEEDING, AND MULCH

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

1.0 Description. This work shall consist of finish grading, placing topsoil as needed, fertilizing, seeding and mulching as specified in the contract. All disturbed areas shall be seeded except for surfaced areas, solid rock, and slopes consisting primarily of broken rock.

2.0 Construction Requirements.

2.1 Finish Grading. The top six (6) inches of all areas of the project to be vegetated shall be free of rocks, stones and clods prior to seeding. This may require the contractor to utilize a mechanical rock rake, hand picking of stones, and/or placement of six (6) inches of clean topsoil in those areas to be vegetated. All areas to be vegetated shall be inspected prior to seeding and any deficiency shall be correct prior to application.

2.2 Fertilizer shall be a standard commercial product which, when applied at the proper rates, shall supply the quantity of total nitrogen (N), available phosphoric acid (P_2O_5) and soluble potash (K_2O) to provide a final mixture of 13-13-13. The rate of application shall be 500 pounds per acre of 13-13-13 fertilizer. Material may be accepted on the basis of bag label analysis or supplier's certification, or on the basis of samples tested in the laboratory. For samples tested in the laboratory, tolerances in the nominal composition as shown by label or certification of 10 percent up to the maximum of two units (2% plant food) for the individual constituents, and minus 3 percent for the sum of the constituents will be permitted. There is no limit on the plus tolerances for such samples.

2.3 Seeding. The seed mixture shall be 80% Millennium Fescue, 10% Pizzaz Rye, and 10% Brooklawn Bluegrass or other commercial seed mixture approved by the Engineer. The seeding rate shall be 350 lbs./acre.

2.4 Vegetative mulch shall be prairie hay or straw from oats, rye, wheat, or barley. Mulch shall be clean, bright and dry. The mulch shall be relatively free of foreign material, noxious and undesirable seed and shall be free of prohibited weed seed. Vegetative mulch shall be applied at the rate of 2.50 tons/acre.

2.5 Mulch overspray shall be either virgin wood cellulose fibers or recycled paper mulch. The mulch shall non be water soluble and shall have a maximum moisture content of 15% by weight, a minimum organic matter-wood fiber content of 80% by weight and pH of 4.3-8.5. The contractor shall submit manufacturers certification that mulch overspray material is meets these specifications. Mulch overspray shall be applied at a minimum rate of 750 pounds/acre.

3.0 Basis of Payment. All costs associated with the work specified under this provision shall be considered completely covered by the contract unit price for "Permanent Seeding and Mulch", per lump sum.

3.1 Payment for seeding work will be made on the following schedule:

- 50% paid after seeding, fertilizer and mulch is placed
- 50% paid after seeding has been established and is accepted by the County.

DD. PROPERTY CORNERS AND MONUMENTATION

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1.0 The Contractor shall be responsible for protecting all U.S. Land Survey Corners, Property Corners, Right-of-Way Monuments and Survey Control Points whether shown on the drawings or not.

2.0 Should it be necessary to disturb any such corner or monument, the Contractor shall have such corner or monument referenced prior to removal and reset after construction is complete. This work shall be completed by a Professional Land Surveyor registered in the State of Missouri.

3.0 Set new Permanent Survey Marker along Rock Ridge Rd.

3.1 **Description**. This work shall consist of the construction of a permanent survey marker at a location in the vicinity of the old monument once construction is significantly done in the area. Contractor to contact the Land Survey Program, 6 weeks prior to the anticipated construction of the mark and they will determine the location once the area has been fully graded. The contractor shall call in locates at the time of digging to make sure no utilities are in the immediate area.

3.2 **Materials**. The contractor shall furnish all materials and labor to install the monument, except the Aluminum disk and the magnet which will be supplied by the Land Survey Program.

3.3 **Construction**. The size and shape of the marker shall conform to Drawing "Monument B" attached to this specification. Excavation for the marker shall be made by hand or machine drill. The concrete shall be poured and tamped in a single pour and the disk set flush with the surface and centered in the concrete. The surface of the monument shall be finished in a professional looking manner. The disk shall be installed and made to read from the south side.

- Contact information: Jess Moss, Geodetic Section Chief
  Missouri Dept. of Agriculture Land Survey Program
  Email: jess.moss@mda.mo.gov
  Phone: (573) 368-2300 or
  (573) 368-2570

4.0 **Basis of Payment.** All expenses incurred by the Contractor by reason of their compliance with this provision shall be considered as completely covered by the various items of work in the contract.

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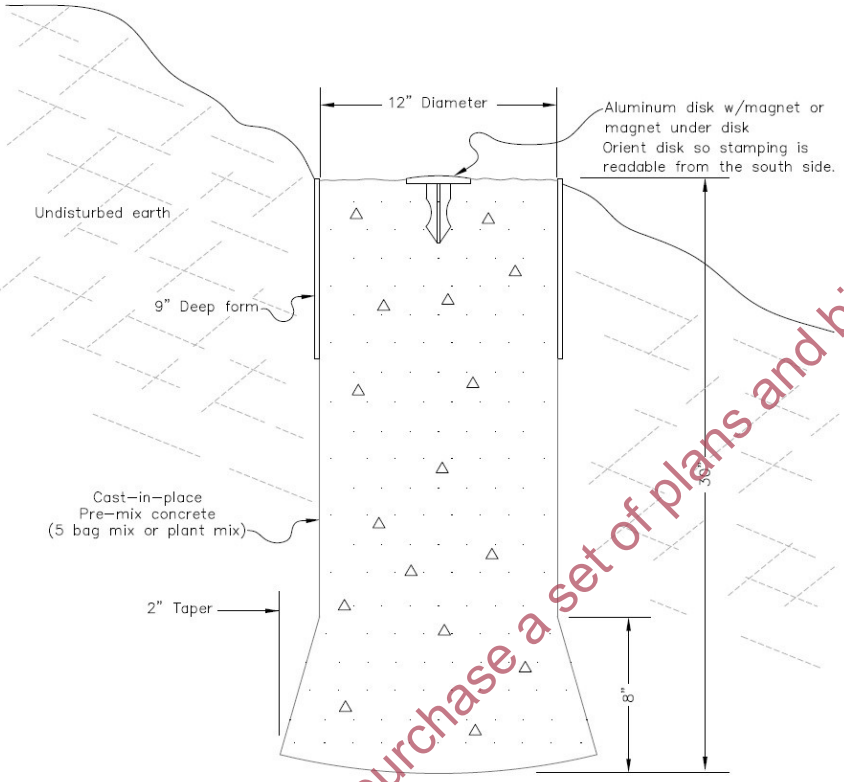
Monument "B"
Sloping Ground Installation



EE. MAILBOXES

1.0 If U.S. Postal Service access to any mailboxes will be interrupted during construction, the Contractor shall contact the U.S. Postal Service to determine where the mailboxes should be set during construction.

1.1 Any mailboxes that need to be removed during construction shall be temporarily relocated to ensure that mail delivery is uninterrupted.

1.2 Mailboxes shall be reset at appropriate locations by the Contractor once work is complete. The Contractor shall reset in the locations as directed by the engineer and to the standards required by the U.S. Postal Service and the plans.

1.3 Any materials damaged by the Contractor shall be replaced with material of equal or better type and quality at the Contractor's expense.

2.0 **Basis of Payment**: All expenses incurred by the Contractor by reason of their compliance with these requirements shall be considered as being included in and completely covered by the contract unit prices for the various items included in the contract

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FF. GREENWAY TRAIL

1.0 **Subgrade Stabilization.** This item shall include all labor, material, equipment, and services necessary to identify and stabilize unsuitable soil encountered within the project limits. In a case where unsuitable material is found, the contractor, under the direction of the engineer shall furnish and place stone (the size of which will be determined by the engineer based on the conditions) as required to provide a stable sub-grate. Where possible, a portion of the stone shall be mixed with existing soil to create a stable sub grated. This item shall also include the removal of the unsuitable material and its disposal off-site, or on site in a location approved by the engineer. The work provided herein will be measured by the ton of stone provided based on tickets submitted to the City at the time the work is undertaken, with payment being made by the ton at the bid price.

2.0 **3" Thick Rolled Stone Base.** This item shall include all labor, material, equipment, and services necessary for the placement and compaction of a 3" lift of stone base as shown in the standard cross sections. The work provided herein will be measured by the square yard, and will be paid in a like fashion at the unit price.

3.0 **6" Thick PCC Trail.** This item shall include all labor, material, equipment, and services necessary for the construction of the 6" thick Portland cement concrete trail as shown on the Plans and detailed in the City of Jefferson Standard Details and specifications. Sawed contraction joints shall be spaced at 10 feet and expansion joints at not more than 300 feet. The work provided herein will be measured by t he square yard, and will be paid in like fashion at the unit price.

GG. SANITARY SEWER

1.0 Where feasible sanitary sewer pipes shall be a minimum of three feet (3.0') under the finished grade surface, with exceptions as noted in these plans and as approved by the engineer. All sanitary sewer main pipes shall be SDR 26 as specified on these plans and special provisions or approved equal product. All sanitary sewer lateral pipes shall be schedule forty (Sch 40) PVC as specified on these plans and special provision, or approved equal product. All piping passing under concrete, asphalted, or traffic bearing surface shall be backfilled with one-inch (1") clean rock, road rock, base rock or as approved to the underside of said surface or required sub-grade per city standards and technical specification.

2.0 Testing is required as specified under MO Code of State Regulations (10 CSR 20-8; Chapter 8 – Design Guides) & Jefferson City Technical Specifications (SS2 and SS9). Testing includes vacuum testing, manufactures certified testing, inspection spot testing; and mandrel testing.

3.0 All new full pipe runs, on this project, should be mandrel tested. Minimal mandrel testing such as 25% will not be allowed.

4.0 All piping passing under concrete, asphalted, or traffic bearing surface shall be backfilled as follows:

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4.1 When total backfill (between pipe bedding and bottom of surfaces) is less than four-foot (<4'), it should be free draining stone aggregate, compacted in max six-inch (6") lifts.

4.2 When total backfill (between pipe bedding and bottom of surface) is four-foot or greater (4' +), it should b an approved fill up to one-foot (1') below the bottom of the surface, then topped with free draining stone aggregate, compacted in 2 or 3 lifts.

5.0 The contractor may opt to use precast manholes. A contractor choosing to use precast manholes agrees that any alteration to the precast structure will b done so at the contractors' sole expense. If modifications to a precast manhole are excessive, as determined by a City representative, then the contractor will be required to supply a new precast manhole or cast the manholes in place.

6.0 **Basis of Payment**: All expenses incurred by the Contractor by reason of their compliance with these requirements shall be considered as being included in and completely covered by the contract unit prices for the various items included in the contract

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ALTERNATES:

HH. ADD ALTERNATE SECTIONS

1.0 Description. This contract requires bidders to bid on additional contract work that will be considered for award. The award of this project does not guarantee work for any add alternate sections

2.0 Consideration of Bids. The Contractor shall submit a bid for each add alternate section. The County reserves the right to award, to the lowest responsible bidder the base bid plus any combination of add alternate sections.

3.0 Description of Add Alternates.

3.1 Alternate 1: 8' Greenway Trail. The county is contemplating constructing an 8' wide, 6" thick greenway trail sidewalk from approximately Station 157+50 Left to Station 179+00 Left. The sidewalk would be located 2' behind the curb and gutter. There are no design plans for this greenway trail sidewalk at this time, however approximate quantities of required items have been calculated. The Contractor shall submit unit prices for each bid item under Alternate 1. If Alternate 1 is accepted, design plans will be completed and payment will be made for final plan quantities.

4.0 Basis of Payment. The accepted quantities of the chosen combination of base bid plus add alternate sections will be paid for by the contract unit bid price fir item numbers found within the schedule of items for each section.

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II. OPTIONAL PAVEMENTS

1.0 Description. This work shall consist of a pavement composed of either Portland cement concrete or bituminous pavement and base constructed on a prepared subgrade in accordance with the standard specifications and in conformity with the lines, grades, thickness and typical cross sections shown on the plans.

2.0 Bid Preparation.

2.1 Optional Pavements. Separate pay items, descriptions, and quantities are included in the itemized proposal for optional pavement.

2.2 The quantities shown for each option reflect the total square yards at the top of each pavement surface designated for optional pavement types as computed and shown on the plans.

2.3 In preparing the bid, the Contractor may submit unit prices for the following optional items:

OPTIONAL PAVEMENT – 7" Non-Reinforced Concrete Pavement

2.3 The grading shown on the plans was designed for the 2" bituminous pavement option on 7" thick stabilized base. There will be no adjustment of the earthwork quantities or unit price due to adjusting the roadway subgrade for optional pavements.

2.4 Pavement options composed of Portland cement concrete shall have contrast pavement markings for intermittent markings, dotted lines, and solid intersection lane lines. The pavement markings shall conform to Section 620. No additional payment will be made for the contrast pavement markings.

2.4 The Contractor shall comply with Sections 501 and 502 for the concrete option.

3.0 Method of Measurement. The quantities of concrete pavement are calculated at the top of the pavement surface, and will be made to the nearest 0.1 square yard. Final measurement of the completed pavement will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity.

4.0 Basis of Payment. The accepted quantity of the chosen option and other associated items will be paid for at the contract unit bid price for each of the appropriate pay items included in the contract.

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SECTION 7

GENERAL SPECIAL PROVISIONS
OF THE CONSTRUCTION CONTRACT

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GENERAL SPECIAL PROVISIONS

The General Special Provisions for this particular Cole County project shall consist of the currently corrected (2022) version of the *Missouri Standard Specifications for Highway Construction*, Sections 101 through 110, except as modified or contradicted herein.

SECTION 101.2 - DEFINITION OF TERMS

Delete definition for "Commission" and substitute the following:

If the words "Commission" or "The Missouri Highway and Transportation Commission" are used in the *Missouri Standard Specifications for Highway Construction*, the word "Owner" shall be substituted, and shall mean the County of COLE acting by and through any of its authorized representatives.

Delete definition for "Contract" and substitute the following:

Contract. The written agreement between the Owner and the Contractor covering the performance of the work for the proposed construction. The contract shall include Notice to Contractors, Instruction to Bidders, Plans, Proposal, Addenda, Contract Bond, Contract Agreement, Acknowledgment, Special Provisions, Standard Specifications, Notice to Proceed, and all Supplemental Contracts and Change Orders. It may cover a single project, or a combination of projects awarded as a single unit.

Delete definition for "Engineer" and substitute the following:

If the words "Engineer" or "Chief Engineer" are used in the *Missouri Standard Specifications for Highway Construction*, the word "Engineer" shall be substituted, and shall mean the County Engineer acting by and through any of his authorized representatives.

Delete definition for "Laboratory" and substitute the following:

Laboratory. Any testing laboratory which may be designated by the Engineer, for inspecting and determining the suitability of materials.

Delete definition for "Plans" and substitute the following:

Plans. Drawings or reproductions thereof approved by the Owner, which show the location, character, and details of the work. Plans shall prevail over standard specifications, general special provisions, and job special provisions when in conflict therewith.

Insert the following definition for "Job Special Provision" where none currently exists:

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Job Special Provisions. Directions or requirements, peculiar to the work and not otherwise thoroughly or satisfactorily detailed or set forth in the standard specifications. Job special provisions shall prevail over general special provisions, and general special provisions shall prevail over standard specifications whenever in conflict therewith.

Delete definition for "State" and substitute the following:

If the words "State" or "State of Missouri" are used in such a manner which implies ownership of the project, the word "Owner" shall be substituted and shall mean the County of COLE acting by and through any of its authorized representatives.

SECTION 102 - BIDDING REQUIREMENTS AND CONDITIONS

Delete Sec. 102.1 and substitute the following:

102.1 Notice of Bid Opening. After the date is fixed for the receipt of bids, the Owner may, in addition to the notice required by law, give notice of such date by mail directly to interested Contractors. The Notice of Letting will contain a description of the proposed work, together with instructions and information to the potential bidder regarding proposal forms, plans, specifications, and the reservation of the right of the Owner to reject any and all bids.

Delete Sec. 102.2 thru Sec. 102.2.1 and substitute the following:

102.2 Bidder's Qualifications. To demonstrate his qualifications for the project, each bidder must be prepared to submit within seven (7) calendar days of the Owner's request, written evidence as to the Contractor's financial status, equipment, previous experience and personnel.

Delete Sec. 102.2.2 and substitute the following:

102.2.2 Each prospective bidder shall execute the affidavit of labor standards compliance, stating that such bidder will fully comply with all written requests by the Missouri Department of Labor and Industrial Relations, Division of Labor Standards, to provide information for the purpose of establishing a prevailing wage.

Delete Sec. 102.2.3 and substitute the following:

102.2.3 The prospective bidder, if a corporation, shall submit a copy of its current annual registration report, or initial registration report if a new corporation, on file with the Corporation Division of the Missouri Secretary of State's Office. Each corporation which is a party to a joint venture shall submit the same required report with its joint venture contractor.

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Delete 102.6 and substitute the following:

102.6 Sales and Use Taxes. The sales tax exemption for public works contractors of certain entities, enacted in 1994 in Section 144.062 RSMo, may apply to contractors for the Owner or their subcontractors or suppliers. This exemption is for materials consumed in the construction of, or incorporated into this project. The Owner will judge each project and determine if the sales tax exemption of the Owner will apply. If sales tax exemption is allowed on a project, it will be duly noted on the proposal form. The Owner will make the tax exemption certificate available, if applicable, to the successful bidder upon award of this contract. If the Owner does not allow the use of sales tax exemption, the contractor, subcontractor or suppliers shall pay all applicable state and local sales taxes or state use taxes on all material and supplies used on a project and should include those taxes in their bid.

Delete 102.7.2 in its entirety.

Delete Sec. 102.7.3 and substitute the following:

102.7.3 A bid of an individual, including those doing business under a fictitious name, shall include the signature and address of the individual.

Delete Sec. 102.7.4 and substitute the following:

102.7.4 A bid by a partnership or joint venture, including individuals doing business under fictitious names, or corporations, shall be executed by at least one of the partners followed by the title "Partner", or one of the joint venturers followed by the title "Joint Venturer" and the business address of the partnership or joint venturer shown. The true legal name and address of each partner and joint venturer shall also be shown.

Delete Sec. 102.7.5 and substitute the following:

102.7.5 A bid by a corporation whether acting alone or as a joint venturer, shall show the address and name of the corporation and shall include the signature and title of a person authorized by its board of directors to bind the corporation.

Add Section 102.7.9

102.7.9 All names must be typed or printed in ink below all signatures.

Add Section 102.7.10

102.7.10 The bid shall contain an acknowledgement of receipt of all addenda (the number and dates of which shall be filled in on the Proposal Form).

Add Section 102.7.11

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102.7.11 All bidders shall complete and submit with their proposal the following forms included in the bid documents.

(a) Proposal
(b) Signature and Identity of Bidder
(c) Bid Guaranty
(d) Contractor's Affidavit
(e) Anti-Collusion Statement

Delete Sec. 102.9 and substitute the following:

102.9 Bid **Guaranty.** No proposal will be considered unless accompanied by a certified check or cashier's check, on any bank or trust company, insured by the Federal Deposit Insurance Corporation, payable to the Owner, for not less than 5 percent of the amount of the bid, or by a bond secured by a qualified surety, or sureties, for not less than 5 percent of the amount of the bid. Surety companies shall furnish a Certificate of Authority in accordance with Section 103.4.2. Bid bonds may be submitted on forms furnished in these Contract documents. The proposal Guaranty shall be attached to the back of the bid proposal form.

Delete Sec. 102.10 and substitute the following:

102.10 Delivery of Proposals. Each proposal shall be submitted in a sealed, opaque envelope marked clearly "Construction Bid" and shall also be clearly marked with project title, project number, bid date, bid time and bidder's name and address. If sent by mail, the sealed bid shall be addressed to the Cole County Commission, Courthouse Annex, Room 200, 311 East High Street, Jefferson City, Missouri, 65101. All proposals shall be filed prior to the time and at the place specified in the Notice To Bidders. Proposals received after the time for opening of bids will be returned to the bidder unopened. No bids which are submitted by fax will be accepted.

SECTION 103 - AWARD AND EXECUTION OF CONTRACT

Delete Sec. 103.2.1 and substitute the following:

103.2.1 The contract will be awarded by the Owner to the lowest, responsive, responsible bidder as soon as practicable after the opening of the bids. The responsibility of the Contractor will be determined by the Owner based upon, but not limited to the Contractor's previous work, financial standing, and record for the payment of local bills incurred by the Contractor, his employees, and subcontractors. The successful bidder will be notified by letter mailed to the address shown on the proposal that his bid has been accepted and that he has been awarded the contract.

Delete Sec. 103.4.1 and substitute the following:

103.4.1 The successful bidder shall, at the time of the execution of the contract, furnish a contract bond in a sum equal to the contract price. The bond shall be to the

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Owner, in a form and with surety, or sureties, acceptable to the Owner, to insure the proper and prompt completion of the work in accordance with the provisions of the contract, and to insure payment for all labor performed and materials consumed or used in the work. The bond, if executed by a surety which is a corporation organized in a state other than Missouri, shall be signed by an agent or broker licensed by the Missouri Division of Insurance. All proposals shall be submitted on the basis of furnishing a contract bond executed by an approved surety, or sureties, as herein set out.

SECTION 104 - SCOPE OF WORK

Add Sec. 104.6.3.5

104.6.3.5 All proposals shall be submitted to the Engineer. If so desired, the Contractor may submit a conceptual proposal for approval stating the basic proposal and approximate cost savings. The conceptual proposal will give the Contractor the opportunity to submit his idea without large initial development costs should the proposal be rejected.

Delete Sec. 104.11.2 and substitute the following:

104.11.2 The Contractor shall open and clean all existing channels and culverts leaving them free from all excess mud or silt, drift, brush, and debris of any kind. This work shall be considered incidental to the work, and no direct payment shall be made for work covered by this section.

Delete Sec. 104.13 in its entirety and substitute the following:

104.13 Warranty.

104.13.1 The Contractor shall warranty that the equipment, materials, and workmanship furnished under this contract will be as specified and will be free from defects for a period of one (1) year from the date of final acceptance. In addition, the equipment furnished by the Contractor shall be warranted to be free from defects in design.

104.13.2 Within the warranty period and upon notification of the Contractor by the Owner, the Contractor shall promptly make all needed adjustments, repairs, or replacements arising out of defects which, in the judgment of the Engineer, or the County, become necessary during such period.

104.13.3 The cost of all materials, parts, labor, transportation, supervision, special tools, and supplies required for replacement of parts, repair of parts, or correction of abnormalities shall be paid by the Contractor, or by his surety under the terms of the bond.

104.13.4 The Contractor shall extend the terms of this warranty to cover repaired parts and all replacement parts furnished under the guarantee provisions for a period of

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one (1) year from the date of installation thereof.

104.13.5 If within ten (10) days after the Owner gives the Contractor notice of a defect, failure, or abnormality of the work, the Contractor neglects to make, or undertake with due diligence to make, the necessary repairs or adjustments themselves or order the work to be done by a third party, the Owner may complete the work and the costs of the work shall be paid by the Contractor.

104.13.6 In the event of an emergency where, in the judgment of the Owner, delays would cause serious loss or damage, repairs or adjustments may be made by the Owner, or a third party chosen by the Owner, without giving notice to the Contractor, and the cost of the work shall be paid by the Contractor, or by his surety under the terms of the bond.

104.13.7 No direct payment will be made for complying with the requirements of this section.

SECTION 105 - CONTROL OF WORK

Delete Sec. 105.5 and substitute the following:

105.5 Cooperation by Contractor. The Contractor will be supplied with four (4) sets of approved plans and contract assemblies including special provisions. Additional sets of approved plans and contract assemblies including special provisions may be purchased as provided in the notice to bidders. One (1) set of approved plans and contract documents including special provisions shall be kept available on the job at all times.

Add Sec. 105.5.3:

105.5.3 The Contractor shall notify the Engineer not less than four (4) working days prior to closing the road.

Delete Sec. 105.7.1 and substitute the following:

105.7.1 The Contractor shall cooperate with utility owners and the Engineer in the location and relocation of utility facilities to minimize effects upon Contractor's work, interruption to utility service and duplication of work by utility owners. The Contractor shall perform the necessary clearing and grubbing as soon as practicable after the notice to proceed is issued to allow the utilities to locate or relocate their facilities. Facilities or appurtenances that are to remain in place during construction shall be accounted for and protected by the Contractor's work procedures. Utility location and relocation shall be made in accordance with 7 CSR Division 10, Chapter 3, Utility Location and Relocation.

Add Section 105.7.7

105.7.7 The Contractor shall make suitable and timely verbal and written requests to all utility locating agencies, all railroad and utility owners, all pipe owners, and other

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parties affected, and endeavor to have all necessary locates and adjustments of public or private utility fixtures, pipe lines, and other appurtenances within or adjacent to the limits of construction, made as soon as practicable. One (1) copy of all requests shall be submitted to the Engineer.

Delete Sec. 105.8 thru Sec. 105.8.2 and substitute the following:

105.8 Construction Stakes, Lines and Grades. The Engineer will set initial field control consisting of bench marks and control monuments.

105.8.1 The Contractor shall be responsible for the preservation of all bench marks and control monuments, and if any of these bench marks or control monuments are carelessly or willfully destroyed or disturbed, the cost of replacing them may be charged to the Contractor.

105.8.2 These bench marks and control monuments will constitute the initial field control by and in accordance with which the Contractor shall establish all other necessary controls and perform the work in the correct position to correspond to the information shown on the plans and given by the Engineer during the progress of the work. Elevations shown on the drawings and referred to in the specifications are based on the bench marks shown.

105.8.3 The Contractor shall employ competent personnel for making position, gradient and alignment determinations and measurements.

Delete Sec. 105.10.2 and substitute the following:

105.10.2 Inspections and job control tests will generally be made by the Engineer on the following items of work. It shall be the responsibility of the Contractor to notify the Engineer by 1:00 P.M. of the day preceding any operation which affects these items.

- Initial Layout
- Removal of Existing Structure
- Pile Driving
- Footing Excavation
- Reinforcing Steel Placement
- All Concrete Operations
- All Asphalt Operations
- Girder Erection
- Requests for Compaction Testing
- All Base Rock Operations
- All Earthwork Operations
- All Roadway Surfacing Operations
- Post-Tensioning Material Placement
- Post-Tensioning Stressing
- Cutting of Tendon Ends
- Grouting of Stressing Pockets

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If any operation which affects the above mentioned items is to be performed on a Monday, notification must be made to the Engineer by 1:00 P.M. of the preceding Friday. The lack of supervision or inspection by the Engineer shall not relieve the Contractor of the responsibility to construct the project according to the plans and specifications. Any work performed or materials used without authorization by the Engineer may be ordered removed and replaced at the Contractor's expense.

Delete Sec. 105.11.2 and substitute the following:

105.11.2 All changes in the work or departures from the plans, will be considered unauthorized, and the Engineer may order such work removed and replaced at the expense of the Contractor unless, before proceeding with the work, the Contractor has a copy of an Order Record signed by the Engineer, or a Change Order signed by all parties whose signatures are provided for, except the Federal Engineer. These forms will contain complete detailed instructions regarding the proposed changes. Any departure from the instructions contained in such written order shall be considered unauthorized.

Delete Sec. 105.11.3 and substitute the following:

105.11.3 All construction and materials which have been rejected or declared unsatisfactory shall be remedied or removed and replaced in an acceptable manner by the Contractor at his expense. All expense incurred by the Engineer due to corrections or removal and replacement of construction and materials shall be born by the Contractor, and will be deducted from any payment which is or may become due the Contractor. Upon failure of the Contractor to remedy or remove and properly dispose of rejected materials or work, or to replace them immediately after receiving written notice from the Engineer, the Engineer may employ labor to rectify the work, and the cost of rectification will be deducted from any payment due or which may become due the Contractor.

Delete Sec. 105.16.5 and Sec. 105.16.6 and substitute the following:

105.16.6 If the claim is against the Owner, the notice of claim shall be personally delivered or sent by certified mail to the Owner. If the claim is against the Contractor, the notice of the claim will be personally delivered or sent by certified mail to the Contractor at the address shown under the signature on the proposal. If the claim is against an assignee, notice of the claim will be personally delivered or sent by certified mail to the assignee at the address shown on the accepted notice of assignment. The party against whom a claim is filed shall file any counter claims within sixty (60) days after receipt of such notice. All notices of claims shall contain an itemized statement showing completely and fully the items and amounts forming the basis of the claim.

SECTION 106 - CONTROL OF MATERIAL

Add Sec. 106.1.4.1:

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106.1.4.1 Unless otherwise specified, all materials shall be subject to visual inspection and job control tests, as determined by the Engineer, and shall be certified by the material supplier that the material supplied conforms to the requirements of these specifications. All certifications shall make reference to the specific project, and shall contain the supplier's name and address.

Delete Sec. 106.2.2 and substitute the following:

106.2.2 Contractor Furnished Sources. If sources of material are not designated in the plans or described in the contrast, or if the Contractor desires to use material from sources other than those designated, the Contractor shall acquire the necessary rights to take materials from the sources and shall pay all costs related thereto, including any which may result from testing of samples by an approved laboratory as required by the Engineer and for an increase in length of haul. All costs of exploring, meeting environmental requirements and developing such other sources shall be borne by the Contractor. The use of material from other than designated sources which have not had prior approval of the Engineer shall be used at the Contractor's risk and may be considered as unacceptable and unauthorized and, if so considered, will not be paid for. Where practicable, borrow areas, gravel pits, and quarry sites shall be located so that they will not be plainly visible from the state highway or county road.

Delete Sec. 106.3 and substitute the following:

106.3 Samples, Tests, and Cited Specifications. The Contractor shall submit certifications and substantiating test reports, furnished by the supplier or fabricator, certifying that material and manufacturing procedures conform to the specifications. There shall be no direct charge to the Owner for materials taken as samples, either for field tests or for laboratory tests. If a specification of a recognized national standard agency (ASTM, AASHTO, AWWA, AWS, etc.) is designated, the material may, unless otherwise specified, meet either the designated specification or the latest revision thereof in effect at the time of letting of the contract. Unless otherwise specified, all sampling and testing required by the specifications shall be performed by the supplier or fabricator at no cost to the Owner in accordance with the methods specified in the contract or in accordance with the latest methods in effect at the time of letting of the contact, as prescribed by the national standard agency, and the results shall be signed, sealed and stamped according to laws related to professional Engineers. If appropriate methods have not been so prescribed, tests shall be performed in a manner determined by the Engineer.

Delete Sec. 106.8 and substitute the following:

106.8 Material Furnished by the Owner. If any material is to be furnished by the Owner, special provisions designating such materials and their locations will be included in the proposal. The cost of handling and placing all materials shall be considered as included in the contract price for the item in connection with which they are used. The Contractor will be responsible for all material provided to him, and deductions will be made

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from any monies due him to make good any shortages and deficiencies, from any cause whatsoever, and for any damage which may occur, and for any demurrage charges.

SECTION 107 – LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

Delete Sec. 107.13 and substitute the following:

107.13 Insurance Requirements. The Contractor shall procure and maintain at its own expense, until acceptance by the Engineer, liability insurance for all damages and losses imposed by law and assumed under the contract, of the kinds and in the amounts specified in Secs 107.13.1 through 107.13.3. Before the Contractor commences the work, the Contractor shall require the insurance company or companies to furnish to the Engineer evidence of such insurance showing compliance with these specifications. All insurance required in Sec 107.13 shall be occurrence policies in a form acceptable to the Engineer, and shall remain in form until all work required to be performed under the terms of the contract is satisfactorily completed as evidenced by its formal acceptance by the Engineer. Each policy or its declaration pages shall provide that the policy shall not materially changed or canceled until the Engineer has been given at least 30 days advance notice in writing. If any policy is canceled before the contract work is complete, a satisfactory replacement policy must be in force, with notice and evidence of insurance submitted to the Engineer, prior to the effective date of cancellation of the former policy. All evidence of insurance and notices shall be submitted to the Engineer. Upon request, the Contractor shall promptly furnish the Engineer with a complete copy of the policy. Failure to furnish evidence of proper insurance, or complete insurance policies when requested, will result in the temporary suspension of work as provided in Sec 108.6, and may result in order claims or actions for breach of contract or otherwise, as may be recognized at law or in equity.

Delete Sec. 107.13.2.3 and substitute the following:

107.13.2.3 Additional Insureds. Each policy of commercial general liability insurance shall name the Owner, Engineer and its members, agents and employees as additional insureds. Each commercial general liability insurance policy shall also contain a separation of insured conditions. The insurance afforded by the Contractor shall be primary insurance.

Delete Sec. 107.15 and substitute the following:

107.15 Personal Liability of Public Officials. There shall be no personal liability upon the public officials, or any member, employee or agent of the Owner in carrying out any of the provisions of the contract or in exercising any power or authority granted to them, it being understood that in such matters they acted as agents and representatives of the Owner with official and public duty doctrine immunity. If any provision of the contract appears to impose a duty on such an individual, the duty remains exclusively that of the Owner and is not a personal duty or obligation of the individual.

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SECTION 108 - PROSECUTION AND PROGRESS

Delete Sec. 108.1.1 and substitute the following:

108.1.1 The Contractor shall not sublet, sell, transfer, assign, or otherwise dispose of the contract or contracts or any portion thereof, or of his right, title, or interest therein, without written consent of the Engineer. Requests for permission to sublet, assign, or otherwise dispose of any portion of the contract shall be in writing and shall be accompanied by evidence that the organization which will perform the work is particularly experienced and equipped for such work. In case such consent is given, the Contractor will be permitted to sublet a portion thereof, but shall perform with his own organization work amounting to not less than forty percent (40%) of the total contract cost, except that any items designated by the Engineer as specialty items may be performed by subcontract and the contract value of any such specialty items so performed by subcontract may be deducted from the total contract cost before computing the amount of work required to be performed by the Contractor with his own organization. The subcontractor shall not sublet, sell, transfer, assign, or otherwise dispose of the subcontract. Consent to a subcontract shall constitute the Owner's endorsement of the qualifications of the subcontractor.

Delete Sec. 108.4 and substitute the following:

108.4 Progress Schedules. The Contractor shall, if requested by the Engineer, submit a progress schedule for review and approval. The progress schedule shall be submitted to the Engineer within three (3) days of the receipt of the request. The progress schedule shall be used to establish the construction operations and to monitor the progress of the work although the Engineer's determination of the then major operation or controlling item of work shall always prevail. The progress schedule shall be in the form specified in Sec 108.4.1, unless the contract contains a different requirement. The progress schedule shall be based on the number of working days, calendar days or other increments as set forth in the contract that the Contractor expects to require in completing the project recognizing the capabilities of labor, equipment, arrangements for materials, mobilization, shop drawing preparation and approvals, and other relevant items.

Delete Sec. 108.4.2 and substitute the following:

108.4.2 Preparation of Initial Schedule. The Contractor shall, if requested by the Engineer, complete development of the initial activities schedule chart and written narrative and present a copy to the Engineer at least seven (7) days prior to the pre-construction conference.

Delete Sec. 108.7.2.2 and substitute the following:

108.7.2.2 The count of working days will start on the date the Contractor starts construction operations, or the authorization date in the Notice to Proceed, whichever is earlier. The Engineer will be the judge of the number of working days to be charged under

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the contract. In computing the working days charged against the Contractor in the execution of the work, allowance will be made for days that are not working days and for days during which work is suspended with the written approval of the Engineer. The Engineer may make allowance for working days lost due to causes he deems justified for the elimination of the count of working days. No allowance will be made for delay or suspension of the prosecution of the work due to fault of the Contractor. On or about the first of each month, the Engineer will give the Contractor written notice of the number of working days charged to the contract for the preceding time period. Any objection by the Contractor to the number of working days so charged shall be made in writing within five (5) days, setting forth his objections and specifying the reasons therefore, or those objections shall be forever waived and may not constitute the basis for an excusable or compensable delay.

SECTION 109 - MEASUREMENT AND PAYMENT

Delete Sec. 109.1 and substitute the following:

109.1 Measurement of Quantities. Unless otherwise specified hereinafter, all work performed under the contract will be paid for on contract quantity basis as set forth in these specifications. When the quantity of any item that is to be paid for on a contract quantity basis is found to include errors, or when an authorized revision of the plan is made, the quantity will be corrected before making final payment. The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

Add Sec. 109.5.9:

109.5.9 The Contractor shall not begin any work for which price payments are not provided in the contract without first bringing the matter to the attention of the Engineer, and no bills or charges for extra or force account work will be allowed except for that ordered in writing and approved by the Engineer.

Delete Sec 109.6 and substitute the following:

109.6 Method of Payment. Payment to the Contractor for furnishing all material and performing all work under the contract shall be made by check.

Delete Sec. 109.7 in its entirety and substitute the following:

109.7 Partial Payments

109.7.1 The engineer will make semi-monthly payment estimates in writing for the material in place and the work performed during the semi –monthly interval and the value thereof at the contract bid prices. For partially complete items, the proper percentage with relation to completion will be allowed.

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109.7.2 The contractor may request in any payment estimate that the engineer include the value of any non-perishable material that will be finally incorporated in the completed work. The engineer shall make the final decision whether to allow a partial payment. Provisions shall be in accordance with Sec. 109.7.2 of the *Missouri Standard Specifications for Highway Construction.*

109.7.3 From the total amount of work items of each estimate, there will be deducted five (5) percent. The retained percentage will be released as provided in Sec. 109.9. The net amount due on the estimate will be certified to the Owner for payment.

109.7.4 Payment may be withheld or nullified in whole or part to such extent as may be necessary to protect the Owner from loss on account of:

a. Failure to properly submit material certifications and substantiating test reports required under Sec. 106.1.4.1 and Sec. 106.3.

b. Failure to properly submit certified copies of labor payrolls required under Sec. 110.

c. Defective work not remedied.

d. Failure of the Contractor to properly make payment to suppliers or subcontractors for material and/or labor (RSMo 34.057)

e. A reasonable doubt that the contract can be completed for the balance then unpaid.

f. Damage to another Contractor.

Delete Sec. 109.9.1 and substitute the following:

109.9.1 Withholding of Retained Percentage Prior to any release of retained percentage, the Contractor shall file with the Owner the following:

a. An affidavit, to the effect that all payments have been made and all claims have been released for all materials, labor, and other items covered by the contract bond;

b. Written consent of the surety to such payment;

c. Certification regarding work performed by and payments made to Disadvantaged Business Enterprises (DBE's);

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d. Lien Waivers signed by each supplier furnishing materials to the project and/or each subcontractor providing services/materials for the project releasing all claims to said materials and services;

e. The Contractor and all subcontractors shall file an affidavit stating that each has fully complied with the provisions and requirements of the Prevailing Wage Law;

f. Any other documents which may be required by the contract, or the Engineer.

Add Sec. 109.9.1.3:

109.9.1.3 When the work has been completed and certified by the Owner, a final estimate will be executed and submitted, which will provide payment to the Contractor for the entire sum due him as set forth in these specifications, including the amount previously retained by the Owner. All prior partial estimates and payments shall be subject to correction by the Owner in this final estimate and payment.

SECTION 110 - STATE AND FEDERAL WAGE RATES AND OTHER REQUIREMENTS

Add Sec. 110.5:

110.5 The Contractor and all subcontractors shall maintain books, accounts, ledgers, invoices, drafts, documents, pages and other business records pertaining to the performance of the contract with such materials available at the Contractor's field or permanent business offices at all reasonable times during the performance of the contract and for four (4) years from the date of final payment under the contract, for inspection by authorized representatives.

Add Sec. 110.6:

110.6 The Contractor and each subcontractor shall be required to submit to the Engineer one certified copy of labor payrolls and a weekly statement of compliance (Form WH-347) for each week that work is in progress, within seven (7) days of the payment date of the payroll. If work is temporarily suspended, the last payroll shall be marked appropriately to note that it will be the last payroll until work is resumed.

Add Sec. 110.7:

110.7 Payrolls to be submitted shall be checked for compliance with the contract requirements and will be retained by the Owner for a period of three (3) years following final audit, during which time they will be open to inspection.

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Add Sec. 110.8:

110.8 The Contractor shall be responsible for the submittal of payrolls and certifications for all subcontractors.

Add Sec. 110.9:

110.9 The Owner may check payrolls with the following checks, however, it will still be the Contractor's responsibility to ensure proper labor compliance:

a. The employee's full name as shown on his social security card, his address and social security number shall be entered on each payroll.

b. Check the payroll for correct employee classification.

c. Check the payroll for correct hourly wage and, if applicable, the correct overtime hourly rate.

d. Check the daily and weekly hours worked in each classification including actual overtime hours worked. (Not adjusted hours)

e. All deductions are listed in the net wage shown. The Form WH-347 is to be used if fringe benefits are paid into established programs. However, if fringe benefits are paid in cash to the employee, the amount shall be indicated on the payroll.

f. To assure that the payrolls are arithmetically correct, approximately ten percent (10%) of the extensions on the first three (3) payrolls shall be checked. The Contractor will be advised of any violations noted on the labor payroll. All the errors will be corrected by means of a supplementary payroll.

g. All checking by the Owner will be made in red pencil and initialed by the checker.

h. Final payroll will be marked "Final" or "Last Payroll".

i. A record of all payrolls will be maintained by the Owner.

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Add Sec. 110.10:

110.10 The contracts for construction projects require that certain applicable information be displayed in a conspicuous place within the project limits for the duration of the contract. The following is a list of required information to be posted both on the project and in the Owner's office:

a. In the Owner's office:

1. Missouri Equal Employment Opportunity Notice
2. PR-1022, Title 18, Section 1020, Notice on False Statements

b. On the Projects:

1. State and Federal Wage Rates Notice
2. Federal Equal Employment Opportunity Notice (English and Spanish version)
3. PR-1022, Title 18, Section 1020, Notice on False Statements
4. Form FHWA-1495, and FHWA-1495A, Wage Rate Information (Post with Federal Wage Rates, if applicable)
5. Contractor's and Subcontractor's EEO Policy Statements and name, address, and telephone number of designated EEO Officers
6. Notice to Labor Unions of Contractor's commitment to EEO (if applicable)
7. Notice requesting referral of minorities by present employees

Add Sec. 110.11:

110.11 The Owner's personnel will generally conduct one wage rate interview on each project every month. Labor interviews are not required on railroad and other utility adjustments. The interviewer will determine the employee's name, the employer's name, the classification of the employee, the actual wage paid, and the posted wage.

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SECTION 8

TECHNICAL SPECIFICATIONS & STANDARD DRAWINGS

The Technical Specifications for this project shall consist of the currently effective version of:

- Missouri Standard Specifications for Highway Construction (MSSHC), Sections 201-1092
- Missouri Standard Plans for Highway Construction (MSPHC)
- City of Jefferson Technical Specifications
- City of Jefferson Standard Drawings

except as modified or contradicted by the County's Contract, Job Special Provisions, General Provisions and Plans.

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SECTION 9

MISSOURI DEPARTMENT OF NATURAL RESOURCES
LAND DISTURBANCE PERMIT #MOR100034

STORM WATER POLLUTION PREVENTION PLAN

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MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Michael L. Parson
Governor

Dru Buntin
Director

July 8, 2022

Andy Myers
Cole County Public Works
5055 Monticello Road
Jefferson City, MO 65101

Dear Permittee:

Pursuant to the Federal Water Pollution Control Act, under the authority granted to the State of Missouri and in compliance with the Missouri Clean Water Law, we have issued and are enclosing your Missouri State Operating Permit for Cole County, MOR-100034.

Please read and review your permit and attached Standard Conditions. They contain important information on site management and reporting requirements. Quarterly reports required by this report must be submitted through our Electronic Discharge Monitoring Report (eDMR) Submission System.

This permit may include requirements with which you may not be familiar. If you would like the Missouri Department of Natural Resources to meet with you to discuss how to satisfy the permit requirements, an appointment can be set up by contacting the permit writer at 573-526-1139. These visits are called Compliance Assistance Visits and focus on explaining the requirements to the permit holder.

This permit is both your Federal NPDES Permit and your new Missouri State Operating Permit and replaces all previous State Operating Permits issued for this facility under this permit number. In all future correspondence regarding this facility, please refer to your State Operating Permit number and facility name as shown on page one of the permit.

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to 10 CSR 20-1.020 and 10 CSR 20-6.020; RSMo Section 621.250, 640.013, and 644.051.6. To appeal, you must file a petition with the AHC within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Contact information for the AHC is: Administrative Hearing Commission, Truman State Office Building, Room 640, 301 W. High Street, P.O. Box 1557, Jefferson City, MO 65102, phone: 573-751-2422, fax: 573-751-5018; website: http://ahc.mo.gov/.

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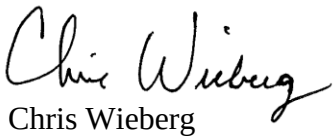
Please be aware that this facility may also be subject to any applicable county or other local ordinances or restrictions. If you have any questions concerning this permit, please do not hesitate to contact the Water Protection Program at P.O. Box 176, Jefferson City, MO 65102, 573-522-4502.

Sincerely,

WATER PROTECTION PROGRAM



Chris Wieberg
Director

CW:vs

Enclosure

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STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION

MISSOURI STATE OPERATING PERMIT

General Operating Permit

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No	MOR100034
Owner:	Cole County
Address:	301 E High Street Room 200 Jefferson City, MO 65109
Continuing Authority:	Cole County Road and Bridge Department 5055 Monticello Rd. Jefferson City, MO 65109
Facility Name:	Cole County Public Works
Facility Address:	5055 Monticello Rd JEFFERSON CITY, MO 65109
Legal Description:	Sec. 04, T43N, R12W, Cole County
UTM Coordinates:	565135.257/4262453.883
Receiving Stream:	Tributary to Moreau R (U)
First Classified Stream - ID#:	100K Extent-Remaining Streams (C) 3960.00
USGS# and Sub Watershed#:	10300102 - 1206

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein.

FACILITY DESCRIPTION

All Outfalls SIC #1629

All Outfalls - Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading, filling and other activity that results in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution of waters of the state)
Issued to a city, county, state or federal agency, other governmental jurisdiction, or other private area-wide projects as determined by the Department on a case-by-case basis

This permit authorizes only wastewater, including storm water, discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System, it does not apply to other regulated areas. This permit may be appealed in accordance with RSMo Section 644.051.6 and 621.250, 10 CSR 20-6.020, and 10 CSR 20-1.020.

July 05, 2022
Issue Date

Chris Wieberg, Director
Water Protection Program

July 04, 2027
Expiration Date

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I. APPLICABILITY

A. Permit Coverage and Authorized Discharges

1. This Missouri State Operating Permit (permit) authorizes the discharge of stormwater and certain non-stormwater discharges from land disturbance sites that disturb one or more acres, or disturb less than one acre when part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project.

   A Missouri State Operating Permit must be issued before any site vegetation is removed or the site disturbed. Any site owner/operator subject to these requirements for stormwater discharges and who disturbs land prior to permit issuance from the Missouri Department of Natural Resources (Department) is in violation of both State regulations per 10 CSR 20-6.200(1)(A) and Federal regulations per 40 CFR 122.26. The owner/operator of this permit is responsible for compliance with this permit [10 CSR 20-6.200 (3)(B)].

2. This general permit is issued to a city, county, state or federal agency, other governmental jurisdiction, or other private area-wide projects as determined by the Department on a case-by-case basis, for land disturbance projects performed by or under contract to the permittee.

3. This permit authorizes stormwater discharges from land disturbance support activities (e.g., equipment staging yards, material storage areas, excavated material disposal areas, borrow areas, concrete, or asphalt batch plants) provided appropriate stormwater controls are designed, installed, and maintained and the following conditions are met and addressed in the Stormwater Pollution Prevention Plan (SWPPP). The permittee is responsible for compliance with this permit for any stormwater discharges from construction support activity.
   (a) The support activity is directly related to the construction site required to have permit coverage for stormwater discharges;
   (b) The support activity is not a commercial operation or serve multiple unrelated construction sites;
   (c) The support activity does not continue to operate beyond the completion of the construction activity at the project it supports;
   (d) Sediment and erosion controls are implemented in accordance with the conditions of this permit; and
   (e) The support activity is strictly stormwater discharges or non-stormwater discharges listed in PART I, APPLICABILTY, Condition A.4. Support activities which discharge process water shall apply for separate coverage (e.g.,a concrete batch plant discharging process water shall be covered under a MOG49).

4. This permit authorizes non-stormwater discharges associated with your construction activity from the following activities provided that these discharges are treated by appropriate Best Management Practices (BMPs) where applicable and addressed in the permittee's site specific SWPPP required by this general permit:
   (a) Discharges from emergency fire-fighting activities;
   (b) Hydrant flushing and water line flushing, provided the discharged water is managed to avoid instream water quality impacts;
   (c) Landscape watering, including to establish vegetation;
   (d) Water used to control dust;
   (e) Waters used to rinse vehicles and equipment, provided there is no discharge of soaps, solvents, or detergents used for such purposes;
   (f) External building washdown, provided soaps, solvents, and detergents are not used, and external surfaces do not contain hazardous substances (e.g., paint or caulk containing polychlorinated biphenyls (PCBs))
   (g) Pavement wash waters, provided spills or leaks of toxic or hazardous substances have not occurred (unless all spill material has been removed) and where soaps, solvents, and detergents are not used. Directing pavement wash waters directly into any water of the state, storm drain inlet, or stormwater conveyance (constructed or natural site drainage features), unless the conveyance is connected to an effective control, is prohibited;
   (h) Uncontaminated air conditioning or compressor condensate;
   (i) Uncontaminated, non-turbid discharges of ground water or spring water;
   (j) Foundation or footing drains where flows are not contaminated with process materials; and
   (k) Uncontaminated construction dewatering water discharged in accordance with requirements found in this permit for specific dewatering activities.

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B. Permit Restrictions and Limitations

1. This permit does not authorize the discharge of process wastewaters, treated or otherwise.

2. For sites operating within the watershed of any Outstanding National Resource Water (which includes the Ozark National Riverways and the National Wild and Scenic Rivers System), sites that discharge to an Outstanding State Resource Water, or facilities located within the watershed of an impaired water as designated in the Clean Water Act (CWA) Section 303(d) list with an impairment for sedimentation/siltation:
   (a) This permit authorizes stormwater discharge provided no degradation of water quality occurs due to discharges from the permitted facility per 10 CSR 20-7.031(3)(C).
   (b) A site with a discharge found to be causing degradation or contributing to an impairment by discharging a pollutant of concern, during an inspection or through complaint investigations, may be required to become a no discharge facility or obtain a site-specific permit with more stringent monitoring and SWPPP requirements.

3. This permit does not allow placement of fill material into any stream or wetland, alteration of a stream channel, or obstruction of stream flow unless the appropriate CWA Section 404 permitting authority provides approval for such actions or determines such actions are exempt from Section 404 jurisdiction. Additionally, this permit does not authorize placement of fill in floodplains unless approved or determined exempt by appropriate federal and/or state floodplain development authorities.

4. This operating permit does not affect, remove, or replace any requirement of the National Environmental Policy Act; the Endangered Species Act; the National Historic Preservation Act; the Comprehensive Environmental Response, Compensation and Liability Act; the Resource Conservation and Recovery Act; or any other relevant acts. Determination of applicability to the above mentioned acts is the responsibility of the permittee. Additionally, this permit does not establish terms and conditions for runoff resulting from silvicultural activities listed in Section 402(l)(3)(a) of the Clean Water Act.

5. Compliance with all requirements in this permit does not supersede any requirement for obtaining project approval from an established local authority nor remove liability for compliance with county and other local ordinances.

6. The Department may require any facility or site authorized by a general permit to apply for a site-specific permit [10 CSR 20-6.010(13)(C)].

7. If a facility or site covered under a current general permit desires to apply for a site-specific permit, the facility or site may do so by contacting the Department for application requirements and procedures.

8. Any discharges not expressly authorized in this permit and not clearly disclosed in the permit application cannot become authorized or shielded from liability under CWA section 402(k) or Section 644.051.16, RSMo, by disclosure to EPA, state, or local authorities after issuance of this permit via any means, including any other permit applications, funding applications, the SWPPP, discharge monitoring reporting, or during an inspection. Discharges at the facility not expressly authorized by this permit must be covered by another permit, be exempt from permitting, or be authorized through some other method.

II. EXEMPTIONS FROM PERMIT REQUIREMENTS

1. Sites that discharge all stormwater runoff directly to a combined sewer system (as defined in 40 CFR 122.26 and 40 CFR 35.2005) connecting to a publicly owned treatment works which has consented to receive such a discharge are exempt from Department stormwater permit requirements.

2. Land disturbance activities that disturb less than one (1) acre of total land area which are not part of a common plan or sale where water quality standards are not exceeded are exempt from Department stormwater permit requirements.

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3. Oil and gas related activities as listed in 40 CFR 122.26(a)(2)(ii) where water quality standards are not exceeded are exempt from Department stormwater permit requirements.

4. Linear, strip, or ribbon construction or maintenance operations meeting one (1) of the following criteria are exempt from Department stormwater permit requirements:
   (a) Grading of existing dirt or gravel roads which does not increase the runoff coefficient and the addition of an impermeable surface over an existing dirt or gravel road;
   (b) Cleaning or routine maintenance of roadside ditches, sewers, waterlines, pipelines, utility lines, or similar facilities;
   (c) Trenches two (2) feet in width or less; or
   (d) Emergency repair or replacement of existing facilities as long as BMPs are employed during the emergency repair.

III. REQUIREMENTS

1. The permittee shall post a public notification sign at the main entrance to the site, or a publically visible location, with the specific MOR100 permit number. The public notification sign must be visible from the public road that provides access to the site's main entrance. An alternate location is acceptable provided the public can see it and it is noted in the SWPPP. The public notification sign must remain posted at the site until the site is finalized.

2. The permittee shall be responsible for notifying the land owner and each contractor or entity (including utility crews and city employees or their agents) who will perform work at the site of the existence of the SWPPP and what actions or precautions shall be taken while on site to minimize the potential for erosion and the potential for damaging any BMP. The permittee is responsible for any damage a subcontractor may do to established BMPs and any subsequent water quality violation resulting from the damage.

3. Ensure the design, installation, and maintenance of effective erosion and sediment controls to minimize the discharge of pollutants. At a minimum, such controls must be designed, installed, and maintained to:
   (a) Control stormwater volume, velocity, and peak flow rates to minimize soil erosion;
   (b) Control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion and scour;
   (c) Minimize the amount of exposed soil during construction activity;
   (d) Minimize the disturbance of steep slopes;
   (e) Minimize sediment discharges from the site. Address factors such as:
      1) The amount, frequency, intensity, and duration of precipitation;
      2) The nature of resulting stormwater runoff;
      3) Expected flow from impervious surfaces, slopes, and drainage features; and
      4) Soil characteristics, including the range of soil particle size expected to be present on the site.
   (f) Provide and maintain natural buffers around surface waters as detailed in Part V. BMP REQUIREMENTS Condition 7, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration and filtering, unless infeasible; and
   (g) Minimize soil compaction and preserve topsoil where practicable.

   A 2-year, 24-hour storm event can be determined for the project location using the National Oceanic and Atmospheric Administration's National Weather Service Atlas 14 which can be located at https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html, or the permittee can determine local rainfall distribution for a 2-year, 24 hours storm event using multi-decade local high density rain gauge data, as approved by the Department.

4. BMPs for land disturbance [10 CSR 20-6.200(1)(D)2] are a schedule of activities, practices, or procedures that reduces the amount of soil available for transport or a device that reduces the amount of suspended solids in runoff before discharge to waters of the state. The term BMPs are also used to describe the sediment and erosion controls and other activities used to prevent stormwater pollution. BMPs are divided into two main categories: structural or non-structural; and they are also classified as temporary or permanent.
   Temporary BMPs may be added and removed as necessary with updates to the SWPPP as specified in the requirements below.

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5. Installation of BMPs necessary to prevent soil erosion and sedimentation at the downgradient project boundary (e.g. buffers, perimeter controls, exit point controls, storm drain inlet protection) must be complete prior to the start of all phases of construction. By the time construction activity in any given portion of the site begins, downgradient BMPs must be installed and operational to control discharges from the initial site clearing, grading, excavating, and other earth-disturbing activities. Additional BMPs shall be installed as necessary throughout the life of the project.

6. All BMPs shall be maintained and remain in effective operating condition during the entire duration of the project, with repairs made within the timeframes specified elsewhere in this permit, until final stabilization has been achieved.
   (a) Ensure BMPs are protected from activities that would reduce their effectiveness.
   (b) Remove any sediment per the BMP manufacturer's instructions or before it has accumulated to one-half of the above-ground height of any BMP that collects sediment (i.e., silt fences, sediment traps, etc.)
   (c) The project is considered to achieve final stabilization when Part V. BMP REQUIREMENTS, Condition 13 is met.

7. Minimize sediment trackout from the site and sediment transport onto roadways.
   (a) Restrict vehicle traffic to designated exit points.
   (b) Use appropriate stabilization techniques or BMPs at all points that exit onto paved roads or areas outside of the site.
   (c) Use additional controls or BMPs to remove sediment from vehicle and equipment tires prior to exit from facility where necessary.
   (d) Any sediment or debris that is tracked out past the exit pad or is deposited on a roadway after a precipitation event shall be removed by the shorter of either the same business day (for business days only), or by the end of the next business day if track-out occurs on a non-business day, and before predicted rain events. Remove the track-out sediment by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. Sediment or debris tracked out on pavement or other impervious surfaces shall not be disposed of into any stormwater conveyance, storm drain inlet, or water of the state.
   (e) Stormwater inlets susceptible to receiving sediment or other pollutants from the permitted land disturbance site shall have curb inlet protection. This may include inlets off the active area where track out from vehicles and equipment could impact the stormwater runoff to those inlets.

8. Concrete washout facilities shall be used to contain concrete waste from the activities onsite, unless the washout of trucks and equipment is managed properly at an off-site location.
   The washout facility shall be managed to prevent solid and/or liquid waste from entering waters of the state by the following:
   (a) Direct the wash water into leak-proof containers or pits designed so that no overflows can occur due to inadequate sizing or precipitation;
   (b) Locate washout activities away from waters of the state, stormwater inlets, and/or stormwater conveyances where practicable. If not practicable, use BMPs to reduce risk of waste leaving the washout facility;
   (c) Washout facilities shall be cleaned, or new facilities must be constructed and ready for use, once the washout is 75% full;
   (d) Designate the washout area(s) and conduct such activities only in these areas.
   (e) Ensure contractors are aware of the location, such as by marking the area(s) on the map or signage visible to the truck and/or equipment operators.

9. Good housekeeping practices shall be maintained at all times to keep waste from entering waters of the state.
   (a) Provide solid and hazardous waste management practices, including providing trash containers, regular site cleanup for proper disposal of solid waste such as scrap building material, product/material shipping waste, food/beverage containers, spent structural BMPs;
   (b) Provide containers and methods for proper disposal of waste paints, solvents, and cleaning compounds.
   (c) Manage sanitary waste. Portable toilets shall be positioned so that they are secure and will not be tipped or knocked over and so that they are located away from waters of the state and stormwater inlets and stormwater conveyances.
   (d) Ensure the storage of construction materials be kept away from drainage courses, stormwater conveyances, storm drain inlets, and low areas.

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10. All fueling facilities present shall at all times adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers.

11. Any hazardous wastes that are generated onsite shall be managed, stored, and transported according to the provisions of the Missouri Hazardous Waste Laws and Regulations.

12. Store all paints, solvents, petroleum products, petroleum waste products, and storage containers (such as drums, cans, or cartons) so they are not exposed to stormwater or provide other prescribed BMPs (such as plastic lids and/or portable spill pans) to prevent the commingling of stormwater with container contents. Commingled water may not be discharged under this permit. Provide spill prevention, control, and countermeasures to contain the spill. Any containment system used to implement this requirement shall be constructed of materials compatible with the substances contained and shall prevent the contamination of groundwater.

13. Implement measures intended to prevent the spillage or loss of fluids, oil, grease, fuel, etc. from vehicles and equipment to thereby prevent the contamination of stormwater from these substances. This may include prevention measures such as, but not limited to, utilizing drip pans under vehicles and equipment stored outdoors, covering fueling areas, using dry clean-up methods, use of absorbents, and cleaning pavement surfaces to remove oil and grease.

14. Spills, Overflows, and Other Unauthorized Discharges.
    (a) Any spill, overflow, or other discharge not specifically authorized in the permit above are unauthorized.
    (b) Should an unauthorized discharge cause or permit any contaminants, other than sediment, or hazardous substance to discharge or enter waters of the state, the unauthorized discharge must be reported to the regional office as soon as practicable but no more than 24 hours after the discovery of the discharge. If the spill or overflow needs to be reported after normal business hours or on the weekend, the facility must call the Department's Environmental Emergency Response hotline at (573) 634-2436. Leaving a message on a Department staff member voice-mail does not satisfy this reporting requirement.
    (c) A record of all spills shall be retained with the SWPPP and made available to the Department upon request.
    (d) Other spills not reaching waters of the state must be cleaned up as soon as possible to prevent entrainment in stormwater but are not required to be reported to the Department.

15. The full implementation of this operating permit shall constitute compliance with all applicable federal and state statutes and regulations in accordance with RSMo 644.051.16 and the CWA §402(k); however, this permit may be reopened and modified or alternatively revoked and reissued to comply with any applicable effluent standard or limitation issued or approved under Clean Water Act §§ 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) if the effluent standard or limitation so issued or approved contains different conditions or is otherwise more stringent than any effluent limitation in the permit or controls any pollutant not limited in the permit. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, termination, notice of planned changes, or anticipated non-compliance does not stay any permit condition.

IV. STORMWATER POLLUTION PREVENTION PLAN (SWPPP) MANAGEMENT REQUIREMENTS

1. The primary requirement of this permit is the development and implementation of a SWPPP which incorporates site specific practices to best minimize the soil exposure, soil erosion, and the discharge of pollutants, including solids for each site covered under this permit.

   The purpose of the SWPPP is to ensure the design, implementation, management, and maintenance of BMPs in order to prevent sediment and other pollutants in stormwater discharges associated with the land disturbance activities [40 CFR 122.44 (k)(4)] from entering waters of the state above established general and narrative criteria; compliance with Missouri Water Quality Standards; and compliance with the terms and conditions of this general permit.

   (a) **The SWPPP must be developed and implemented prior to conducting any land disturbance activities and must be specific to the land disturbance activities at the site.**
   (b) The permittee shall fully implement the provisions of the SWPPP required under this permit as a condition of this general permit throughout the term of the land disturbance project. Failure to develop, implement, and maintain a SWPPP may lead to immediate enforcement action.

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(c) The SWPPP shall be updated any time site conditions warrant adjustments to the project or BMPs.
(d) Either an electronic copy or a paper copy of the SWPPP, and any required reports, must be accessible to anyone on site at all times when land disturbance operations are in process or other operational activities that may affect the maintenance or integrity of the BMP structures and made available as specified under Part VIII. STANDARD PERMIT CONDITIONS, Condition 1 of this permit. The SWPPP shall be readily available upon request and should not be sent to the Department unless specifically requested

2. Failure to implement and maintain the BMPs chosen, which can be revised and updated, is a permit violation. The chosen BMPs will be the most reasonable and cost effective while also ensuring the highest quality water discharged attainable for the facility. Facilities with established SWPPPs and BMPs shall evaluate BMPs on a regular basis and change the BMPs as needed if there are BMP deficiencies.

3. The SWPPP must:
(a) List and describe the location of all outfalls;
(b) List any allowable non-stormwater discharges occurring on site and where these discharges occur;
(c) Incorporate required practices identified below;
(d) Incorporate sediment and erosion control practices specific to site conditions;
(e) Discuss whether or not a 404 Permit is required for the project; and
(f) Name the person(s) responsible for inspection, operation, and maintenance of BMPs. The SWPPP shall list the names and describe the role of all owners/primary operators (such as general contractor, project manager) responsible for environmental or sediment and erosion control at the land disturbance site.

4. The SWPPP briefly must describe the nature of the land disturbance activity, including:
(a) The function of the project (e.g., low density residential, shopping mall, highway, etc.);
(b) The intended sequence and timing of activities that disturb the soils at the site; and
(c) Estimates of the total area expected to be disturbed by excavation, grading, or other land disturbance support activities including off-site borrow and fill areas;

5. In order to identify the site, the SWPPP shall include site information including size in acres. The SWPPP shall have sufficient information to be of practical use to contractors and site construction workers to guide the installation and maintenance of BMPs.

6. The function of the SWPPP and the BMPs listed therein is to prevent or minimize pollution to waters of the state. A deficiency of a BMP means it was not effective in preventing or minimizing pollution of waters of the state.

The permittee shall select, install, use, operate and maintain appropriate BMPs for the permitted site. The following manuals are acceptable resources for the selection of appropriate BMPs.

Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites, (Document number EPA 833-R-06-004) published by the United States Environmental Protection Agency (USEPA) in May 2007. This manual as well as other information, including examples of construction SWPPPs, is available at the USEPA internet site at https://www.epa.gov/sites/production/files/2015-10/documents/sw_swppp_guide.pdf; and https://www.epa.gov/npdes/developing-stormwater-pollution-prevention-plan-swppp.

The latest version of *Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri,* published by the Department. This manual is available at: https://dnr.mo.gov/document-search/protecting-water-quality-field-guide.

The permittee is not limited to the use of these guidance manuals. Other guidance publications may be used to select appropriate BMPs. However, all BMPs must be described and justified in the SWPPP. Although the use of these manuals or other resources is recommended and may be used for BMP selection, they do not supersede the conditions of this permit. They may be used to inform in the decision making process for BMP selection but they are not themselves part of the permit conditions.

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The permittee may retain the SWPPP, inspection reports, and all other associated documents (including a copy of this permit) electronically pursuant to RSMo 432.255. The documents must be made available to all interested persons in either paper or electronic format as required by this permit and the permittee must remit a copy (electronic or otherwise) of the SWPPP and inspection reports to the Department upon request.

7. The SWPPP must contain a legible site map, multiple maps if necessary, identifying:
   (a) Site boundaries of the property;
   (b) Locations of all waters of the state (including wetlands) within the site and half a mile downstream of the site's outfalls;
   (c) Location of all outfalls;
   (d) Direction(s) of stormwater flow (use arrows) and approximate slopes before and after grading activities;
   (e) Areas of soil disturbance and areas that will not be disturbed (or a statement that all areas of the site will be disturbed unless otherwise noted);
   (f) Location of structural and non-structural BMPs, including natural buffer areas, identified in the SWPPP;
   (g) Locations where stabilization practices are expected to occur;
   (h) Locations of on-site and off-site material, waste, borrow, or equipment storage areas and stockpiles;
   (i) Designated points where vehicles will exit the site;
   (j) Location of stormwater inlets and conveyances including ditches, pipes, man-made conduits, and swales; and
   (k) Areas where final stabilization has been achieved.

8. An individual shall be designated by the permittee as the environmental lead. This environmental lead shall have knowledge in erosion, sediment, and stormwater control principles, knowledge of the permit, and the site's SWPPP. The environmental lead shall ensure all personnel and contractors understand any requirements of this permit may be affected by the work they are doing. The environmental lead or designated inspector(s) knowledgeable in erosion, sediment, and stormwater control principles shall inspect all structures that function to prevent or minimize pollution of waters of the state.

9. Throughout coverage under this permit, the permittee shall amend and update the SWPPP as appropriate during the term of the land disturbance activity. All SWPPP modifications shall be signed and dated. The permittee shall amend the SWPPP to incorporate any significant site condition changes which impact the nature and condition of stormwater discharges. At a minimum, these changes include whenever the:
   (a) Location, design, operation, or maintenance of BMPs is changed;
   (b) Design of the construction project is changed that could significantly affect the quality of the stormwater discharges;
   (c) The permittee's inspections indicate deficiencies in the SWPPP or any BMP;
   (d) Department notifies the permittee in writing of deficiencies in the SWPPP;
   (e) SWPPP is determined to be ineffective in minimizing or controlling erosion and sedimentation (e.g., there is visual evidence of excessive site erosion or sediment deposits in streams, lakes, or downstream waterways, sediment or other wastes off site); and/or
   (f) Department determines violations of water quality standards may occur or have occurred.

10. Site Inspections: The environmental lead, or a designated inspector, shall conduct regularly scheduled inspections. These inspections shall be conducted by a qualified person, one who is responsible for environmental matters at the site, or a person trained by and directly supervised by the person responsible for environmental matters at the site. Site inspections shall include, at a minimum, the following:
   (a) For disturbed areas that have not achieved final stabilization, all installed BMPs and other pollution control measures shall be inspected to ensure they are properly installed, appear to be operational, and are working as intended to minimize the discharge of pollutants.
   (b) For areas on site that have achieved either temporary or final stabilization, while at the same time active construction continues on other areas, ensure that all stabilization measures are properly installed, appear to be operational, and are working as intended to minimize the discharge of pollutants.
   (c) Inspect all material, waste, borrow, and equipment storage and maintenance areas that are covered by this permit. Inspect for conditions that could lead to spills, leaks, or other accumulations of pollutants on the site.
   (d) Inspect all areas where stormwater typically flows within the site, including drainage ways designed to divert, convey, and/or treat stormwater.

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(e) All stormwater outfalls shall be inspected for evidence of erosion, sediment deposition, or impacts to the receiving stream. If a discharge is occurring during an inspection, the inspector must observe and document the visual quality of the discharge and take note of the characteristics of the stormwater discharge, including turbidity, color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of stormwater pollutants.
(f) When practicable the receiving stream shall also be inspected for a minimum of 50 feet downstream of the outfall.
(g) The perimeter of the site shall be inspected for evidence of BMP failure to ensure concentrated flow does not develop a new outfall.
(h) The SWPPP must explain how the environmental lead will be notified when stormwater runoff occurs.

11. Inspection Frequency: All BMPs must be inspected in accordance to one of the schedules listed below. The inspection frequency shall be documented in the SWPPP, and any changes to the frequency of inspections, including switching between the options listed below, must be documented on the inspection form:
(a) At least once every seven (7) calendar days and within 48 hours after any storm event equal to or greater than a 2-year, 24-hour storm has ceased during a normal work day or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday; or
(b) Once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches of precipitation or greater, or the occurrence of runoff from snowmelt. To determine if a storm event of 0.25 inches or greater has occurred on the site, the permittee shall either keep a properly maintained rain gauge on site, or obtain the storm event information from a weather station near the site location.
1) Inspections are only required during the project's normal working hours.
2) An inspection must be conducted within 24 hours of a storm event which has produced 0.25 inches. The inspection shall be conducted within 24 hours of the event end, or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.
3) If it is elected to inspect every 14 calendar days and there is a storm event at the site that continues for multiple days, and each day of the storm produces 0.25 inches or more of rain, the permittee shall conduct an inspection within 24 hours of the end of the storm or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.
(c) Areas on site that have achieved stabilization, while at the same time active construction continues on other areas, may reduce inspection frequency to monthly, for those stabilized areas, if the following conditions exist:
1) For areas where disturbed portions have undergone temporary stabilization, inspections shall occur at least once a month while stabilized and when re-disturbed shall follow either frequency outlined in (a),(b), or (c) above.
2) Areas on site that have achieved final stabilization must be inspected at least once per month until the permit is terminated.
(d) If construction activities are suspended due to frozen conditions, the permittee may temporarily reduce site inspections to monthly until thawing conditions begin to occur if all of the following are met:
1) Land disturbances have been suspended; and
2) All disturbed areas of the site have been stabilized in accordance with Part V. BMP REQUIREMENTS, Condition 13.
3) The change shall be noted in the SWPPP.
(e) Any basin dewatering shall be inspected daily when discharge is occurring. The discharge shall be observed and dewatering activities shall be ceased immediately if the receiving stream is being impacted. These inspections shall be noted on a log or on the inspection report.

If weather conditions or other issues prevent correction of BMPs within seven calendar days, the reasons for the delay must be documented (including pictures), and there must be a narrative explaining why the work cannot be accomplished within the seven day time period. The documentation must be filed with the regular inspection reports. The corrections shall be made as soon as weather conditions or other issues allow.

12. Site Inspection Reports: A log of each inspection and/or copy of the inspection report shall be kept readily accessible and must be made available upon request by the Department. Electronic logs are acceptable as long as reports can be provided within 24 hours. If inspection reports are kept off site, the SWPPP must indicate where they are stored. The inspection report shall be signed by the environmental lead or designated inspector (electronically or otherwise).
(a) The inspection report is to include the following minimum information:
1) Inspector's name and title.
2) Date and time of inspection.
3) Observations relative to the effectiveness of the BMPs and stabilization measures. The following must be

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documented:
a. Whether BMPs are installed, operational, and working as intended;
b. Whether any new or modified stormwater controls are needed;
c. Facilities examined for conditions that could lead to spill or leak;
d. Outfalls examined for visual signs of erosion or sedimentation at outfalls. Excessive erosion or sedimentation may be due to BMP failure or insufficiency. Response to observations should be addressed in the inspection report.

4) Corrective actions taken or necessary to correct the observed problem.
5) Listing of areas where land disturbance operations have permanently or temporarily stopped.

13. Any structural or maintenance deficiencies for BMPs or stabilization measures shall be documented and corrected as soon as possible but no more than seven (7) calendar days after the inspection.
(a) Corrective action documentation shall be stored with the associated site inspection report.
(b) Immediately take all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events.
(c) If weather conditions or other issues prevent correction of BMPs within seven calendar days, the reasons for the delay must be documented (this may include pictures) and there must be a narrative explaining why the work cannot be accomplished within the seven day time period. The permittee shall correct the problem as soon as weather conditions or issues allow.
(d) Corrective actions may be required by the Department. The permittee must comply with any corrective actions required by the Department as a result of permit violations found during an inspection.

V. BMP REQUIREMENTS

1. The information, practices, and BMP requirements in this section shall be implemented on site and, where noted, provided for in the SWPPP.

2. Existing vegetation and trees shall be preserved where practicable. The permittee is encouraged to preserve topsoil where practicable.

3. The permittee shall select appropriate BMPs for use at the site and list them in the SWPPP. When selecting effective BMPs, the permittee shall consider stormwater volume and velocity. A BMP that has demonstrated ineffectiveness in preventing or minimizing sediment or other pollutants from leaving a given site shall be replaced with a more effective BMP, or additional and sequential BMPs and treatment devices may be incorporated as site conditions allow. The permittee should consider a schedule for performing erosion control measures when selecting BMPs.

4. The SWPPP shall include a description of both structural and non-structural BMPs that will be used at the site.
(a) The SWPPP shall provide the following general information for each BMP which will be used one or more times at the site:
1) Physical description of the BMP;
2) Site conditions that must be met for effective use of the BMP;
3) BMP installation/construction procedures, including typical drawings; and
4) Operation and maintenance procedures and schedules for the BMP.
(b) The SWPPP shall provide the following information for each specific instance where a BMP is to be installed:
1) Whether the BMP is temporary or permanent;
2) When the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project; and
3) Site conditions that must be met before removal of the BMP if the BMP is not a permanent BMP.

5. Structural BMP Installation: The permittee shall ensure all BMPs are properly installed and operational at the locations and relative times specified in the SWPPP.
(a) Perimeter control BMPs for runoff from disturbed areas shall be installed before general site clearing is started. Note this requirement does not apply to earth disturbances related to initial site clearing and establishing entry, exit, or access of the site, which may require that stormwater controls be installed immediately after the earth

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disturbance.

(b) For phased projects, BMPs shall be properly installed as necessary prior to construction activities.

(c) Stormwater discharges which leave the site from disturbed areas shall pass through an appropriate impediment to sediment movement such as a sedimentation basin, sediment traps (including vegetative buffers), or silt fences prior to leaving the land disturbance site.

(d) A drainage course change shall be clearly marked on a site map and described in the SWPPP.

(e) If vegetative stabilization measures are being implemented, stabilization efforts are considered "installed" when all activities necessary to seed or plant the area are completed. Vegetative stabilization is not considered "operational" until the vegetation is established.

6. Install sediment controls along any perimeter areas of the site that are downgradient from any exposed soil or other disturbed areas. Prevent stormwater from circumventing the edge of the perimeter control. For sites where perimeter controls are infeasible, other practices shall be implemented to minimize discharges to perimeter areas of the site.

7. For surface waters of the state, defined in Section 644.016.1(27) RSMo, located on or adjacent to the site, the permittee must maintain a riparian buffer or structural equivalent in accordance with at least one of the following options. The selection and location must be described in the SWPPP.

(a) Provide and maintain a 50-foot undisturbed natural buffer; or

(b) Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer; or

(c) If infeasible to provide and maintain an undisturbed natural buffer of any size, implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

(d) The permittee is not required to comply with (a), (b), or (c) above if one or more of the following exceptions apply and documentation is provided in the SWPPP:

1) As authorized per CWA Section 404 Department of the Army permit and its associated Section 401 Water Quality Certification from the Department.

2) If there is no discharge of stormwater to waters of the state through the area between the disturbed portions of the site and waters of the state located within 50 feet of the site. This includes situations where the permittee has implemented permanent control measures that will prevent such discharges, such as a berm or other barrier.

3) Where no natural buffer exists due to preexisting development disturbances that occurred prior to the initiation of planning for the current development of the site.

a. Where some natural buffer exists but portions of the area within 50 feet of the waters of the state are occupied by preexisting development disturbances the permittee is required to comply with (a), (b), or (c) above.

4) For linear projects where site constraints make it infeasible to implement a buffer or equivalent provided the permittee limit disturbances within 50 feet of any waters of the state and/or the permittee provides supplemental erosion and sediment controls to treat stormwater discharges from earth disturbances within 50 feet of the water of the state. The permittee must also document in the SWPPP the rationale for why it is infeasible for the permittee to implement (a), (b), or (c) and describe any buffer width retained and supplemental BMPs installed.

(e) Where the permittee is retaining a buffer of any size, the buffer should be measured perpendicularly from any of the following points, whichever is further landward from the water:

1) The ordinary high water mark of the water body, defined as the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris; or

2) The edge of the stream or river bank, bluff, or cliff, whichever is applicable.

8. Slopes for disturbed areas must be identified in the SWPPP. A site map or maps defining the sloped areas for all phases of the project must be included in the SWPPP. The disturbance of steep slopes shall be minimized.

9. Manage stockpiles or land clearing debris piles composed, in whole or in part, of sediment and/or soil.

(a) Locate the piles outside of any natural buffers zones, established under the condition above, and away from any stormwater conveyances, drain inlets, and areas where stormwater flow is concentrated;

(b) Install a sediment barrier along all downgradient perimeter areas;

(c) Divert surface flows around stockpiles to reduce and minimize erosion of the stockpile.

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(d) For piles that will be unused for 14 or more days, provide cover with appropriate temporary stabilization in accordance with Part V. BMP REQUIREMENTS, Condition 13.
(e) Rinsing, sweeping, or otherwise placing any soil, sediment, debris, or stockpiled product which has accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or water of the state is prohibited.

10. The site shall include BMPs for pollution prevention measures and shall be noted in the SWPPP. At minimum such measures must be designed, installed, implemented, and maintained to:
(a) Minimize the discharge of pollutants from equipment and vehicle rinsing; no detergents, additives, or soaps of any kind shall be discharged. Rinse waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
(b) Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to precipitation and to stormwater;
(c) Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures, including, but not limited to, the installation of containment berms and use of drip pans at petroleum product and liquid storage tanks and containers; and
(d) Prevent discharges from causing or contributing to an exceedance of water quality standards including general criteria.

11. Sedimentation Basins: The SWPPP shall include a sedimentation basin for each drainage area with ten or more acres disturbed at one time.
(a) The sedimentation basin shall be sized, at a minimum, to treat a local 2-year, 24-hour storm.
(b) Sediment basins shall not be constructed in any waters of the state or natural buffer zones.
(c) Discharges from dewatering activities shall be managed by appropriate controls. The SWPPP shall include a description of any anticipated dewatering methods and specific BMPs designed to treat dewatering water.
    1) Appropriate controls include, but are not limited to, sediment socks, dewatering tanks, tube settlers, weir tanks, filtration systems (e.g. bag or sand filters), and passive treatment systems that are designed to remove or retain sediment.
    2) Erosion controls and velocity dissipation devices (e.g., check dams, riprap, and vegetated buffers) to minimize erosion at inlets, outlets, and discharge points from shall be utilized.
    3) Water with an oil sheen shall not be discharged and shall be marked in SWPPP.
    4) Visible floating solids and foam shall not be discharged.
(d) Until final stabilization has been achieved, sediment basins and impoundments shall utilize outlet structures or floating skimmers that withdraw water from the surface when discharging.
    1) Under frozen conditions it may be considered infeasible to withdraw water from the surface and an exception can be made for that specific period as long as discharges that may contain sediment and other pollutants are managed by appropriate controls. If determined infeasible due to frozen conditions, documentation must be provided in the SWPPP to support the determination, including the specific conditions or time period when this exception applies.
(e) Accumulated sediment shall not exceed 50% of total volume or as prescribed in the design, whichever is less. Note in the SWPPP the locations for disposal of the material removed from sediment basins.
(f) Prevent discharges to the receiving stream causing excessive visual turbidity. For the purposes of this permit, visual turbidity refers to a sediment plume or other cloudiness in the water caused by sediment that can be identified by an observer.
(g) The SWPPP shall require the basin be maintained until final stabilization of the disturbed area served by the basin.

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Where use of a sediment basin is infeasible, the SWPPP shall evaluate and specify other similarly effective BMPs to be employed to control erosion and sediment. These similarly effective BMPs shall be selected from appropriate BMP guidance documents authorized by this permit. The BMPs must provide equivalent water quality protection to achieve compliance with this permit. The SWPPP shall require both temporary and permanent sedimentation basins to have a stabilized spillway to minimize the potential for erosion of the spillway or basin embankment.

12. Soil disturbing activities on site that have ceased either temporarily or permanently shall initiate stabilization immediately in accordance with the options below. For soil disturbing activities that have been temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days:
    (a) The permittee shall construct BMPs to establish interim stabilization; and
    (b) Stabilization must be initiated immediately and completed within 14 calendar days.
    (c) For soil disturbing activities that have been permanently ceased on any portion of the site, final stabilization of disturbed areas must be initiated immediately and completed within 14 calendar days.
        1) Allowances to the 14-day completion period for temporary and final stabilization may be made due to weather and equipment malfunctions. The use of allowances shall be documented in the SWPPP. Allowances may be determined unnecessary after review by the Department.
    (d) Until stabilization is complete, interim sediment control shall consist of well-established and maintained BMPs that are reasonably certain to protect waters of the state from sediment pollution over an extended period of time. This may require adding more BMPs to an area than is normally used during daily operations. The types of BMPs used must be suited to the area disturbed, taking into account the number of acres exposed and the steepness of the slopes. If the slope of the area is greater than 3:1 (three feet horizontal to one foot vertical), then the permittee shall establish interim stabilization within seven days of ceasing operations on that part of the site. The following activities would constitute the immediate initiation of stabilization:
        1) Prepping the soil for vegetative or non-vegetative stabilization as long as seeding, planting, and/or installation of non-vegetative stabilization products takes place as soon as practicable;
        2) Applying mulch or other non-vegetative product to the exposed areas;
        3) Seeding or planting the exposed areas;
        4) Finalizing arrangements to have stabilization product fully installed in compliance with the deadlines for completing stabilization.
    (e) If vegetative stabilization measures are being implemented, stabilization is considered “installed” when all activities necessary to seed or plant the area are completed. Installed does not mean established.
    (f) If non-vegetative stabilization measures are being implemented, stabilization is considered “installed” when all such measures are implemented or applied.
        1) Non-vegetative stabilization shall prevent erosion and shall be chosen for site conditions, such as slope and flow of stormwater.
    (g) Final stabilization is not considered achieved until vegetation has grown and established to meet the requirements below.

13. Prior to removal of BMPs, ceasing site inspections, and removing from the quarterly report, final stabilization must be achieved. Final stabilization shall be achieved as soon as possible once land disturbance activities have ceased. Document in the SWPPP the type of stabilization and the date final stabilization is achieved.
    (a) The project is considered to have achieved final stabilization when perennial vegetation (excluding volunteer vegetation), pavement, buildings, or structures using permanent materials (e.g., riprap, gravel, etc.) cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetation must be at least 70% coverage of 100% of the vegetated areas on site. Vegetation must be evenly distributed.
    (b) Disturbed areas on agricultural land are considered to have achieved final stabilization when they are restored to their preconstruction agricultural use. If former agricultural land is changing to non-agricultural use, this is no longer considered agricultural land and shall follow condition (a).
    (c) If the intended function of a specific area of the site necessitates that it remain disturbed, final stabilization is considered achieved if all of the following are met:
        1) Only the minimum area needed remains disturbed (i.e., dirt access roads, motocross tracks, utility pole pads, areas being used for storage of vehicles, equipment, materials). Other areas must meet the criteria above.

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2) Permanent structural BMPs (e.g., rock checks, berms, grading, etc.) or non-vegetative stabilization measures are implemented and designed to prevent sediment and other pollutants from entering waters of the state.
3) Inspection requirements in Part IV. SWPPP MANAGEMENT REQUIREMENT, Condition 11 are met and documented in the SWPPP.

(d) Winter weather and frozen conditions do not excuse any of the above final stabilization requirements. If vegetation is required for stabilization the permittee must maintain BMPs throughout winter weather and frozen conditions until thawing and vegetation meets final stabilization criteria above. Document stabilization attempts during frozen conditions in the SWPPP. Consider future freezing when removing vegetation and plan with temporary stabilization techniques before the ground becomes frozen.

VI. SITE FINALIZATION & PERMIT TERMINATION

1. Until a site is finalized, the permittee must comply with all conditions in the permit, including continuation of site inspections and reporting quarterly to the Department. To finalize the site and remove from this permit coverage, the site shall meet the following requirements:
   (a) For any areas that (1) were disturbed during construction, (2) are not covered over by permanent structures, and (3) over which the permittee had control during the construction activities, the requirements for final vegetative or non-vegetative stabilization in Part V. BMP REQUIREMENTS, Condition 13;
   (b) The permittee has removed and properly disposed of all construction materials, waste, and waste handling devices and has removed all equipment and vehicles that were used during construction, unless intended for long-term beyond construction phase;
   (c) The permittee has removed all temporary BMPs that were installed and maintained during construction, except those that are intended for long-term use or those that are biodegradable; and
   (d) The permittee has removed all potential pollutants and pollutant-generating activities associated with construction, unless needed for long-term use following the construction activities.

2. The permit may be terminated if;
   (a) There has been a transfer of control of all areas of the site for which the current permittee is responsible under this permit to another operator, and that operator has obtained coverage under this permit;
   (b) Active sites obtain coverage under an individual or alternative general NPDES permit, with land disturbance conditions; or
   (c) This permit may be terminated when all projects covered under this permit are finalized. In order to terminate the permit, the permittee shall notify the Department by submitting a Request for Termination along with the final quarterly report for the current calendar quarter.

VII. REPORTING AND SAMPLING REQUIREMENTS

1. The permittee is not required to sample stormwater under this permit. The Department may require sampling and reporting as a result of illegal discharges, compliance issues related to water quality concerns, or evidence of off-site impacts from activities at a site. If such an action is needed, the Department will specify in writing the sampling requirements including such information as location and extent. If the permittee refuses to perform sampling when required, the Department may terminate the general permit and require the facility to obtain a site-specific permit with sampling requirements.

2. Electronic Discharge Monitoring Report (eDMR) Submission System. The NPDES Electronic Reporting Rule, 40 CFR Part 127, reporting of any report required by the permit shall be submitted via an electronic system to ensure timely, complete, accurate, and nationally consistent set of data for the NPDES program. The eDMR system is currently the only Department-approved reporting method for this permit unless specified elsewhere in this permit, or a waiver is granted by the Department. The facility must register in the Department's eDMR system through the Missouri Gateway for Environmental Management (MoGEM) before the first report is due.

3. Permittees shall prepare a quarterly report with a list of active land disturbance sites including any off-site borrow or depositional areas associated with the construction project and submit the following information electronically as an

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attachment to the eDMR system until such a time when the current or a new system is available to allow direct input of the data:

(a) The name of the project;
(b) The location of the project (including the county);
(c) The name of the primary receiving water(s) for each project;
(d) A description of the project;
(e) The number of acres disturbed;
(f) The percent of completion of the project; and
(g) The projected date of completion.

The quarterly report(s) shall be maintained by the permittee and readily available for review by the Department at the address provided on the application as well as submitted quarterly via the Department's eDMR system. The permittee shall submit quarterly reports according to Table A.

Table A	**Schedule for Quarterly Reporting**
Activity for the months of:	Report is due:
January, February, March (1st Quarter)	April 28
April, May, June (2nd Quarter)	July 28
July, August, September (3rd Quarter)	October 28
October, November, December (4th Quarter)	January 28

VIII. STANDARD PERMIT CONDITIONS

1. Records: The permittee shall retain copies of this general permit, the SWPPP and all amendments for the site named in the State Operating Permit, results of any monitoring and analysis, and all site inspection records required by this general permit.
   (a) The records shall be accessible during normal business hours and retained for a period of at least three (3) years from the date of termination.
   (b) The permittee shall provide a copy (electronic or otherwise) of the SWPPP to the Department, USEPA, or any local agency or government representative if they request a copy in the performance of their official duties within 24 hours of the request (or next working day), unless given more time by the representative.
   (c) The permittee shall provide a copy of the SWPPP to those who are responsible for installation, operation, or maintenance of any BMP. The permittee, their representative, and/or the contractor(s) responsible for installation, operation and maintenance of the BMPs shall have a current copy of the SWPPP with them when on the project site.

2. Land Ownership and Change of Ownership: Federal and Missouri stormwater regulations [10 CSR 20-6.200(1) (B)] require a stormwater permit and erosion control measures for all land disturbances of one or more acres. These regulations also require a permit for less than one acre lots if the lot is part of a larger common plan of development or sale where that plan is at least one acre in size.
   (a) If the permittee sells any portion of a permitted site to a developer for commercial, industrial, or residential use, this land remains a part of the common sale and the new owner must obtain a permit prior to conducting any land disturbance activity. Therefore, the original permittee must amend the SWPPP to show that the property has been sold and, therefore, no longer under the original permit coverage.
   (b) Property of any size which is part of a larger common plan of development where the property has achieved final stabilization and the original permit terminated will require application of a new land disturbance permit for any future land disturbance activity unless the activity is by an individual residential building lot owner on a site less than one acre.
   (c) If a portion of a larger common plan of development is sold to an individual for the purpose of building his or her own private residence, a permit is required if the portion of land sold is equal to or greater than one acre. No permit is required, however, for less than one acre of land sold.

3. Permit Transfer: This permit may not be transferred to a new owner.

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4. Termination: This permit may be terminated when the project has achieved final stabilization, defined in Part VI. SITE FINALIZATION & PERMIT TERMINATION.
   (a) In order to terminate the permit, the permittee shall notify the Department by submitting the form Request for Termination of Operating Permit Form MO 780-2814. The form should be submitted to the appropriate regional office or through an approved electronic system if it should become available.
   (b) The Cover Page (Certificate Page) of the Master General Permit for Land Disturbance specifies the "effective date" and the "expiration date" of the Master General Permit. The "issued date" along with the "expiration date" will appear on the State Operating Permit issued to the applicant. **This permit does not continue administratively beyond the expiration date.**

5. Duty to Reapply: If the project or development completion date will be after the expiration date of this general permit, then the permittee must reapply to the Department for a new permit. This permit may be applied for and issued electronically in accordance with Section 644.051.10, RSMo.
   (a) Due to the nature of the electronic permitting system, a period of time may be granted at the discretion of the Department in order to apply for a new permit after the new version is effective. Applicants must maintain appropriate best management practices and inspections during the discretionary period.

6. Duty to Comply: The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and Federal Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

7. Modification, Revocation, and Reopening:
   (a) If at any time the Department determines that the quality of waters of the state may be better protected by reopening this permit, or revoking this permit and requiring the owner/operator of the permitted site to apply for a site-specific permit, the Department may revoke a general permit and require any person to obtain such an operating permit as authorized by 10 CSR20-6.010(13) and 10 CSR 20-6.200(1)(B).
   (b) If this permit is reopened, modified, or revoked pursuant to this Section, the permittee retains all rights under Chapter 536 and 644 Revised Statutes of Missouri upon the Department's reissuance of the permit as well as all other forms of administrative, judicial, and equitable relief available under law.

8. Other Information: Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.

9. Duty to Provide Information: The permittee shall furnish to the Department, within 24 hours unless explicitly granted more time in writing, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.

10. Inspection and Entry: The permittee shall allow the Department, or an authorized representative (including an authorized contractor acting as a representative of the Department), upon presentation of credentials and other documents as may be required by law, to:
   (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of the permit;
   (b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
   (c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
   (d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Federal Clean Water Act or Missouri Clean Water Law, any substances or parameters at any location.

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11. Signatory Requirement:
    (a) All permit applications, reports required by the permit, or information requested by the Department shall be signed and certified. (See 40 CFR 122.22 and 10 CSR 20-6.010)
    (b) The Federal Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit (including monitoring reports or reports of compliance or non-compliance) shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
    (c) The Missouri Clean Water Law provides that any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than ten thousand dollars, or by imprisonment for not more than six months, or by both.

12. Property Rights: This permit does not convey any property rights of any sort or any exclusive privilege.

13. Notice of Right to Appeal: If you were adversely affected by this decision, you may be entitled to pursue an appeal before the administrative hearing commission (AHC) pursuant to Sections 621.250 and 644.051.6 RSMo. To appeal, you must file a petition with the AHC within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Any appeal should be directed to:

Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: https://ahc.mo.gov

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MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

STORMWATER DISCHARGES FROM THIS LAND DISTURBANCE SITE ARE AUTHORIZED BY THE MISSOURI STATE OPERATING PERMIT NUMBER:

_____

ANYONE WITH QUESTIONS OR CONCERNS ABOUT STORMWATER DISCHARGES FROM THIS SITE, PLEASE CONTACT THE MISSOURI DEPARTMENT OF NATURAL RESOURCES AT

1-800-361-4827

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
FACT SHEET FOR MASTER GENERAL PERMIT
MO-R100XXX

The Federal Water Pollution Control Act [Clean Water Act (CWA)] Section 402 of Public Law 92-500 (as amended) established the National Pollution Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States and the release of stormwater from certain point sources. All such discharges are unlawful without a permit (Section 301 of the CWA). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Missouri State Operating Permits (MSOPs) are issued by the Missouri Department of Natural Resources (Department) under an approved program operated in accordance with federal and state laws (Federal CWA and Missouri Clean Water Law Section 644 as amended). Permits are issued for a period of five (5) years unless otherwise specified.

Per 40 CFR 124.56, 40 CFR 124.8, and 10 CSR 20-6.020(1)(A)2, a Fact Sheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the permit. A Fact Sheet is not an enforceable part of an MSOP.

DEFINITIONS FOR THE PURPOSES OF THIS PERMIT:

Common Promotional Plan: A plan undertaken by one (1) or more persons to offer lots for sale or lease; where land is offered for sale by a person or group of persons acting in concert, and the land is contiguous or is known, designated, or advertised as a common unit or by a common name or similar names, the land is presumed, without regard to the number of lots covered by each individual offering, as being offered for sale or lease as part of a common promotional plan.

Dewatering: The act of draining rainwater and/or groundwater from basins, building foundations, vaults, and trenches.

Effective Operating Condition: For the purposes of this permit, a stormwater control is kept in effective operating condition if it has been implemented and maintained in such a manner that it is working as designed to minimize pollutant discharges.

Emergency-Related Project: A project initiated in response to a public emergency (e.g. earthquakes, extreme flooding conditions, tornado, disruptions in essential public services, pandemic) for which the related work requires immediate authorization to avoid imminent endangerment to human health/safety or the environment or to reestablish essential public services.

Exposed Soils: For the purposes of this permit, soils that as a result of earth-disturbing activities are left open to the elements.

Immediately: For the purposes of this permit, immediately should be defined as within 24 hours.

Impervious Surface: For the purpose of this permit, any land surface with a low or no capacity for soil infiltration including, but not limited to, pavement, sidewalks, parking areas and driveways, packed gravel or soil, or rooftops.

Infeasible: Infeasible means not technologically possible or not economically practicable and achievable in light of best industry practices.

Install or Installation: When used in connection with stormwater controls, to connect or set in position stormwater controls to make them operational.

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Land Disturbance Site or Site: The land or water area where land disturbance activities will occur and where stormwater controls will be installed and maintained. The land disturbance site includes construction support activities, which may be located at a different part of the property from where the primary land disturbance activity will take place or on a different piece of property altogether. Off-site borrow areas directly and exclusively related to the land disturbance activity are part of the site and must be permitted.

Larger Common Plan of Development or Sale: A continuous area where multiple separate and distinct construction activities are occurring under one plan, including any off-site borrow areas that are directly and exclusively related to the land disturbance activity. Off-site borrow areas utilized for multiple different land disturbance projects are considered their own entity and are not part of the larger common plan of development or sale. See definition of Common Promotional Plan to understand what a 'common plan' is.

Minimize: To reduce and/or eliminate to the extent achievable using stormwater controls that are technologically available and economically practicable and achievable in light of best industry practices.

Non-structural Best Management Practices (BMPs): Institutional, educational, or pollution prevention practices designed to limit the amount of stormwater runoff or pollutants that are generated in the landscape. Examples of non-structural BMPs include picking up trash and debris, sweeping up nearby sidewalks and streets, maintaining equipment, and training site staff on stormwater control practices.

Operational: for the purposes of this permit, stormwater controls are made "operational" when they have been installed and implemented, are functioning as designed, and are properly maintained.

Ordinary High Water Mark: The line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation and/or the presence of litter and debris.

Peripheral: For the purposes of this permit, peripheral should be defined as the outermost boundary of the area that will be disturbed.

Permanently: For the purposes of this permit, permanently is defined as any activity that has been ceased without any intentions of future disturbance.

Pollution Prevention Controls (or Measures): Stormwater controls designed to reduce or eliminate the addition of pollutants to construction site discharges through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions.

Qualified Person (Inspections): A person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

Stormwater Control (also referred to as sediment/erosion controls): refers to any temporary or permanent BMP or other method used to prevent or reduce the discharge of pollutants to waters of the state.

Structural BMP: Physical sediment/erosion controls working individually or as a group (treatment train) appropriate to the source, location, and area climate for the pollutant to be controlled. Examples of structural BMPs include silt fences, sedimentation ponds, erosion control blankets, and seeding.

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Temporary Stabilization: A condition where exposed soils or disturbed areas are provided temporary vegetation and/or non-vegetative protective cover to prevent erosion and sediment loss. Temporary stabilization may include temporary seeding, geotextiles, mulches, and other techniques to reduce or eliminate erosion until either final stabilization can be achieved or until further construction activities take place to re-disturb this area.

Treatment Train: A multi-BMP approach to managing the stormwater volume and velocity and often includes erosion prevention and sediment control practices often applied when the use of a single BMP is inadequate in preventing the erosion and transport of sediment. A good option to utilize as a corrective action.

Volunteer Vegetation: A volunteer plant is a plant that grows on its own, rather than being deliberately planted for stabilization purposes. Volunteers often grow from seeds that float in on the wind, are dropped by birds, or are inadvertently mixed into soils. Commonly, volunteer vegetation is referred to as 'weeds'. This does not meet the requirements for final stabilization.

Waters of the State: Section 644.016.1(27) RSMo. defines waters of the state as, "All waters within the jurisdiction of this state, including all rivers, streams, lakes and other bodies of surface and subsurface water lying within or forming a part of the boundaries of the state which are not entirely confined and located completely upon lands owned, leased or otherwise controlled by a single person or by two or more persons jointly or as tenants in common."

PART I – BASIC PERMIT INFORMATION

Facility Type:	Industrial Stormwater; Land Disturbance
Facility SIC Code(s):	1629
Facility Description:	Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading, filling, and other activities that result in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution to waters of the state)

This permit establishes a Stormwater Pollution Prevention Plan (SWPPP) requirement for pollutants of concern from this type of facility and for all facilities and sites covered under this permit. 10 CSR 20-6.200(7) specifies "general permits shall contain BMP requirements and/or monitoring and reporting requirements to keep the stormwater from becoming contaminated".

Land disturbance activities include clearing, grubbing, excavating, grading, filling and other activities that result in the destruction of the root zone and/or other activities that are reasonably certain to cause pollution to waters of the state. A Missouri State Operating Permit for land disturbance permit is required for construction disturbance activities of one or more acres or for construction activities that disturb less than one acre when they are part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project.

The primary requirement of a land disturbance permit is the development of a SWPPP which incorporates site-specific BMPs to minimize soil exposure, soil erosion, and the discharge of pollutants. The SWPPP ensures the design, implementation, management, and maintenance of BMPs in order to prevent sediment and other pollutants from leaving the site.

When it precipitates, stormwater washes over the loose soil on a construction site and various other materials and products being stored outside. As stormwater flows over the site, it can pick up pollutants like sediment, debris, and chemicals from the loose soil and transport them to nearby storm sewer systems or directly into rivers, lakes, or coastal waters.

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The Missouri Department of Natural Resources is responsible for ensuring that construction site operators have the proper stormwater controls in place so that construction can proceed in a way that protects your community's clean water and the surrounding environment. One way the department helps protect water quality is by issuing land disturbance permits.

Local conditions are not considered when developing conditions for a general permit. A facility may apply for a site-specific permit if they desire a review of site-specific conditions.

PART II – RECEIVING STREAM INFORMATION

APPLICABLE DESIGNATIONS OF WATERS OF THE STATE:
Per Missouri Effluent Regulations (10 CSR 20-7.015), the waters of the state are divided into seven (7) categories. This permit applies to facilities discharging to the following water body categories:

- ✓ Missouri or Mississippi River [10 CSR 20-7.015(2)]
- ✓ Lakes or Reservoirs [10 CSR 20-7.015(3)]
- ✓ Losing Streams [10 CSR 20-7.015(4)]
- ✓ Metropolitan No-Discharge Streams [10 CSR 20-7.015(5)]
- ✓ Special Streams [10 CSR 20-7.015(6)]
- ✓ Subsurface Waters [10 CSR 20-7.015(7)]
- ✓ All Other Waters [10 CSR 20-7.015(8)]

Missouri Water Quality Standards (10 CSR 20-7.031) defines the Clean Water Commission water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses." The receiving stream and/or 1st classified receiving stream's designated water uses shall be maintained in accordance with 10 CSR 20-7.031(24). A general permit does not take into consideration site-specific conditions.

MIXING CONSIDERATIONS:
This permit applies to receiving streams of varying low flow conditions. Therefore, the effluent limitations must be based on the smallest low flow streams considered, which includes waters without designated uses. As such, no mixing is allowed [10 CSR 20-7.031(5)(A)4.B.(I)(a)]. No Zone of Initial Dilution is allowed. [10 CSR 20-7.031(5)(A)4.B.(I)(b)].

RECEIVING STREAM MONITORING REQUIREMENTS:
There are no receiving water monitoring requirements recommended at this time.

PART III – RATIONALE AND DERIVATION OF EFFLUENT LIMITATIONS & PERMIT CONDITIONS

305(B) REPORT, 303(d) LIST, & TOTAL MAXIMUM DAILY LOAD (TMDL):
Section 305(b) of the Federal CWA requires each state identify waters not meeting Water Quality Standards and for which adequate water pollution controls have not been required. Water Quality Standards protect such beneficial uses of water as whole body contact, maintaining fish and other aquatic life, and providing drinking water for people, livestock, and wildlife. The 303(d) list helps state and federal agencies keep track of waters which are impaired but not addressed by normal water pollution control programs.

A TMDL is a calculation of the maximum amount of a given pollutant a body of water can absorb before its water quality is affected. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan will be developed which shall include the TMDL calculation. For facilities with an existing general permit before a TMDL is written on their receiving stream, the Department will evaluate the permit and may require any facility authorized by this general permit to apply for and obtain a site-specific operating permit.

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ANTI-BACKSLIDING:
A provision in the Federal Regulations [CWA Section 303(d)(4); CWA Section 402(c); 40 CFR Part 122.44(I)] requires a reissued permit to be as stringent as the previous permit with some exceptions.
✓ Not Applicable: All effluent limitations in this permit are at least as protective as those previously established.

ANTIDEGRADATION:
Antidegradation policies ensure protection of water quality for a particular water body on a pollutant by pollutant basis to ensure Water Quality Standards are maintained to support beneficial uses such as fish and wildlife propagation and recreation on and in the water. This also includes special protection of waters designated as an Outstanding National Resource Water or Outstanding State Resource Water [10 CSR 20-7.031(3)(C)]. Antidegradation policies are adopted to minimize adverse effects on water.

The Department has determined the best avenue forward for implementing the Antidegradation requirements into general stormwater permits is by requiring the appropriate development and maintenance of a SWPPP. The SWPPP must identify all reasonable and effective BMPs, taking into account environmental impacts and costs. This analysis must document why no discharge or no exposure options are not feasible at the facility. This selection and documentation of appropriate control measures will then serve as the analysis of alternatives and fulfill the requirements of the Antidegradation Rule and Implementation Procedure 10 CSR 20-7.031(3) and 10 CSR 20-7.015(9)(A)5.

Any facility seeking coverage under this permit which undergoes expansion or discharges a new pollutant of concern must update their SWPPP and select reasonable and cost effective new BMPs. New facilities seeking coverage under this permit are required to develop a SWPPP including this analysis and documentation of appropriate BMPs. Renewal of coverage for a facility requires a review of the SWPPP to ensure the selected BMPs continue to be appropriate.
✓ Applicable; the facility must review and maintain stormwater BMPs as appropriate.

BENCHMARKS:
When a permitted feature or outfall consists of only stormwater, a benchmark may be implemented at the discretion of the permit writer. Benchmarks require the facility to monitor and, if necessary, replace and update stormwater control measures. Benchmark concentrations are not effluent limitations. A benchmark exceedance, therefore, is not a permit violation; however, failure to take corrective action is a violation of the permit. Benchmark monitoring data is used to determine the overall effectiveness of control measures and to assist the permittee in knowing when additional corrective actions may be necessary to comply with the limitations of the permit.
✓ Not applicable; this permit does not contain numeric benchmarks.

BEST MANAGEMENT PRACTICES (BMPS):
Minimum site-wide BMPs are established in this permit to ensure all permittees are managing their sites equally to protect waters of the state from certain activities which could cause negative effects in receiving water bodies. While not all sites require a SWPPP because the SIC codes are specifically exempted in 40 CFR 122.26(b)(14), these BMPs are not specifically included for stormwater purposes. These practices are minimum requirements for all industrial sites to protect waters of the state. If the minimum BMPs are not followed, the facility may violate general criteria [10 CSR 20-7.031(4)]. Statutes are applicable to all permitted facilities in the state; therefore, pollutants cannot be released unless in accordance with RSMo 644.011 and 644.016 (17).

CHANGES IN DISCHARGES OF TOXIC POLLUTANT:
This special condition reiterates the federal rules found in 40 CFR 122.44(f) and 122.42(a)(1). In these rules, the facility is required to report changes in amounts of toxic substances discharged. Toxic substances are defined in 40 CFR 122.2 as "…any pollutant listed as toxic under section 307(a)(1) or, in the case of "sludge use or disposal practices," any pollutant identified in regulations implementing section 405(d) of the CWA." Section 307 of the CWA then refers to those parameters found in 40 CFR 401.15.

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The permittee should also consider any other toxic pollutant in the discharge as reportable under this condition.

EFFLUENT LIMITATION GUIDELINE:
Effluent Limitation Guidelines, or ELGs, are found at 40 CFR 400-499. These are limitations established by the EPA based on the SIC code and the type of work a facility is conducting. Most ELGs are for process wastewater and some address stormwater. All are technology based limitations which must be met by the applicable facility at all times.

✓ The industries covered under this permit have an associated Effluent Limit Guideline (ELG) which is applicable to the stormwater discharges in this permit and is applied under 40 CFR 125.3(a).

ELECTRONIC DISCHARGE MONITORING REPORT (EDMR) SUBMISSION SYSTEM:
The U.S. Environmental Protection Agency (EPA) promulgated a final rule on October 22, 2015, to modernize CWA reporting for municipalities, industries, and other facilities by converting to an electronic data reporting system. The final rule requires regulated entities and state and federal regulators to use information technology to electronically report data required by the National Pollutant Discharge Elimination System (NPDES) permit program instead of filing paper reports. To comply with the federal rule, the Department is requiring all permittees to begin submitting discharge monitoring data and reports online.

✓ Applicable; this permit requires quarterly reports.

GENERAL CRITERIA CONSIDERATIONS:
In accordance with 40 CFR 122.44(d)(1), effluent limitations shall be placed into permits for pollutants determined to cause, have reasonable potential to cause, or to contribute to, an excursion above any water quality standard, including narrative water quality criteria. In order to comply with this regulation, the permit writer has completed a reasonable potential determination on whether discharges have reasonable potential to cause or contribute to an excursion of the general criteria listed in 10 CSR 20-7.031(4). In instances where reasonable potential exists, the permit includes limitations within the permit to address the reasonable potential. In discharges where reasonable potential does not exist, the permit may include monitoring to later determine the discharge's potential to impact the narrative criteria. Additionally, RSMo 644.076.1, as well as Standard Permit Conditions Part VIII of this permit state it shall be unlawful for any person to cause or allow any discharge of water contaminants from any water contaminant or point source located in Missouri in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law or any standard, rule, or regulation promulgated by the commission.

LAND APPLICATION:
Land application, or surficial dispersion of wastewater and/or sludge, is performed by facilities to maintain a basin as no-discharge. Requirements for these types of operations are found in 10 CSR 20-6.015; authority to regulate these activities is from RSMo 644.026.

✓ Not applicable; this permit does not authorize operation of a surficial land application system to disperse wastewater or sludge.

LAND DISTURBANCE:
Land disturbance, sometimes called construction activities, are actions which cause disturbance of the root layer or soil; these include clearing, grading, and excavating of the land. 40 CFR 122.26(b)(14) and 10 CSR 20-6.200(3) requires permit coverage for these activities. Coverage is not required for facilities when only providing maintenance of original line and grade, hydraulic capacity, or to continue the original purpose of the facility.

✓ Applicable; this permit provides coverage for land disturbance activities. These activities have SWPPP requirements and may be combined with the standard site SWPPP. Land disturbance BMPs should be designed to control the expected peak discharges. The University of Missouri has design storm events for the 25 year 24 hour storm; these can be found at: http://ag3.agebb.missouri.edu/design_storm/comparison_reports/20191117_25yr_24hr_comparison_table.htm; to calculate peak discharges, the website https://www.lmnoeng.com/Hydrology/rational.php has the rational equation to calculate expected discharge volume from the peak storm events.

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NUTRIENT MONITORING:
Nutrient monitoring is required for facilities characteristically or expected to discharge nutrients (nitrogenous compounds and/or phosphorus) when the design flow is equal to or greater than 0.1 MGD per 10 CSR 20-7.015(9)(D)8.

✓ This is a stormwater only permit; therefore, it is not subject to provisions found in 10 CSR 20-7.015 per 10 CSR 20-7.015(1)(C).

OIL/WATER SEPARATORS:
Oil water separator (OWS) tank systems are frequently found at industrial sites where process water and stormwater may contain oils and greases, oily wastewaters, or other immiscible liquids requiring separation. Food industry discharges typically require pretreatment prior to discharge to municipally owned treatment works. Per 10 CSR 26-2.010(2)(B), all oil water separator tanks must be operated according to manufacturer's specifications and authorized in NPDES permits per 10 CSR 26-2.010(2) or may be regulated as a petroleum tank.

✓ Not applicable; this permit does not authorize the operation of OWS. The facility must obtain a separate permit to cover operation of and discharge from these devices.

PERMIT SHIELD:
The permit shield provision of the CWA (Section 402(k)) and Missouri Clean Water Law (644.051.16 RSMo) provides that when a permit holder is in compliance with its NPDES permit or MSOP, they are effectively in compliance with certain sections of the CWA and equivalent sections of the Missouri Clean Water Law. In general, the permit shield is a legal defense against certain enforcement actions but is only available when the facility is in compliance with its permit and satisfies other specific conditions, including having completely disclosed all discharges and all facility processes and activities to the Department at time of application. It is the facility's responsibility to ensure that all potential pollutants, waste streams, discharges, and activities, as well as wastewater land application, storage, and treatment areas, are all fully disclosed to the Department at the time of application or during the draft permit review process. Subsequent requests for authorization to discharge additional pollutants or expanded or newly disclosed flows, or for authorization for previously unpermitted and undisclosed activities or discharges, will likely require permit modification or may require the facility be covered under a site specific permit.

PRETREATMENT PROGRAM:
This permit does not regulate pretreatment requirements for facilities discharging to an accepting permitted wastewater treatment facility. If applicable, the receiving entity (the publicly owned treatment works - POTW) must ensure compliance with any effluent limitation guidelines for pretreatment listed in 40 CFR Subchapter N per 10 CSR 20-6.100. Pretreatment regulations per RSMo 644.016 are limitations on the introduction of pollutants or water contaminants into publicly owned treatment works or facilities.

✓ Not Applicable; the facilities covered under this permit are not required to meet pretreatment requirements under an ELG.

PUBLIC NOTICE OF COVERAGE FOR AN INDIVIDUAL FACILITY:
Public Notice of reissuance of coverage is not required unless the facility is a specific type of facility as defined in 10 CSR 20-6.200(1). The need for an individual public notification process shall be determined and identified in the permit [10 CSR 20-6.020(1)(C)5.].

✓ Not applicable; public notice is not required for coverage under this permit to individual facilities. The MGP is public noticed in lieu of individual permit PN requirements.

REASONABLE POTENTIAL ANALYSIS (RPA):
Federal regulation 40 CFR Part 122.44(d)(1)(i) requires effluent limitations for all pollutants which are or may be discharged at a level which will cause or have the reasonable potential to cause or contribute to an in-stream excursion above narrative or numeric water quality standard. In accordance with 40 CFR Part 122.44(d)(iii) if the permit writer determines any given pollutant has the reasonable potential to cause or contribute to an in-stream excursion above the water quality standard, the permit must contain effluent limits for the pollutant.

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- ✓ The permit writer reviewed industry materials, available past inspections, and other documents and research to evaluate general and narrative water quality reasonable potential for this permit. Permit writers also use the Department's permit writer's manual, the EPA's permit writer's manual (https://www.epa.gov/npdes/npdes-permit-writers-manual), program policies, and best professional judgment. For each parameter in each permit, the permit writer carefully considers all applicable information regarding technology based effluent limitations, effluent limitation guidelines, and water quality standards. Best professional judgment is based on the experience of the permit writer, cohorts in the Department and resources at the EPA, research, and maintaining continuity of permits if necessary. For stormwater permits, the permit writer is required per 10 CSR 6.200(6)(B)2 to consider: A. application and other information supplied by the permittee; B. effluent guidelines; C. best professional judgment of the permit writer; D. water quality; and E. BMPs.

SCHEDULE OF COMPLIANCE (SOC):
Per § 644.051, RSMo, a permit may be issued with a Schedule of Compliance (SOC) to provide time for a facility to come into compliance with new state or federal effluent regulations, water quality standards, or other requirements. Such a schedule is not allowed if the facility is already in compliance with the new requirement or if prohibited by other statute or regulation. An SOC includes an enforceable sequence of interim requirements (e.g. actions, operations, or milestone events) leading to compliance with the Missouri Clean Water Law, its implementing regulations, and/or the terms and conditions of an operating permit. *See also* Section 502(17) of the CWA, and 40 CFR 122.2. For new effluent limitations, the permit may include interim monitoring for the specific parameter to demonstrate the facility is not already in compliance with the new requirement. Per 40 CFR 122.47(a)(1) and 10 CSR 20-7.031(11), compliance must occur as soon as possible. If the permit provides a schedule for meeting new water quality based effluent limits, an SOC must include an enforceable, final effluent limitation in the permit even if the SOC extends beyond the life of the permit.

- ✓ Not Applicable: This permit does not contain a SOC.

SETBACKS:
Setbacks, sometimes called separation distances, are common elements of permits and are established to provide a margin of safety in order to protect the receiving water and other features from accidents, spills, unusual events, etc. Specific separation distances are included in 10 CSR 20-8 for minimum design standards of wastewater structures. While wastewater is considered separately from stormwater under this permit, the guides and Chapter 8 distances may remain relevant to requirements under this permit if deemed appropriate by the permittee.

- ✓ Discharge to the watersheds of a Metropolitan No-Discharge Stream (10 CSR 20-7.031 Table F) is authorized by this permit if the discharges are in compliance with 10 CSR 20-7.015(5) and 10 CSR 20-7.031(7). Discharges to these watersheds are authorized for uncontaminated stormwater discharges only.
- ✓ This permit authorizes stormwater discharges which are located in a way to allow water to be released into sinkholes, caves, fissures, or other openings in the ground which could drain into aquifers (except losing streams) per 10 CSR 20-7.015(7). It is the best professional judgment of the permit writer to allow discharges to losing streams as the effluent is stormwater only.
- ✓ This permit authorizes stormwater discharge in the watersheds of Outstanding state Resource Waters (OSRW); Outstanding National Resources Waters (ONRW), which includes the Ozark National Riverways and the National Wild and Scenic Rivers System; and impaired waters as designated in the 305(b) Report provided no degradation of water quality occurs in the OSRW and ONRW due to discharges from the permitted facility per 10 CSR 20-7.015(6)(B) and 10 CSR 20-7.031(3)(C). Additionally, if the facility is found to be causing degradation or contributing to an impairment by discharging a pollutant of concern during an inspection or through complaint investigations, they will be required to become a no discharge facility or obtain a site specific permit with more stringent monitoring and SWPPP requirements. Missouri's impaired waters can be found at https://dnr.mo.gov/water/what-were-doing/water-planning/quality-standards-impaired-waters-total-maximum-daily-loads/impaired-waters. Sites within 1000 feet of a OSRW, ONRW, or water impaired for sediment must operate as a no-discharge facility. These additional protections are borrowed from the USEPA 2021 draft Construction General Permit.

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SLUDGE – DOMESTIC BIOSOLIDS:
Biosolids are solid materials resulting from domestic wastewater treatment meeting federal and state criteria for beneficial use (i.e. fertilizer). Sewage sludge is solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works; including, but not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works.

✓ This permit does not authorize discharge or land application of biosolids. Sludge/biosolids is not generated by this industry.

SLUDGE – INDUSTRIAL:
Industrial sludge is solid, semi-solid, or liquid residue generated during the treatment of industrial process wastewater in a treatment works; including, but not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment process; scum and solids filtered from water supplies and backwashed; and a material derived from industrial sludge.

✓ Not applicable; sludge is not generated by this industry.

SPILL REPORTING:
Any emergency involving a hazardous substance must be reported to the Department's 24 hour Environmental Emergency Response hotline at (573) 634-2436 at the earliest practicable moment after discovery. The Department may require the submittal of a written report detailing measures taken to clean up a spill. These reporting requirements apply when the spill results in chemicals or materials leaving the permitted property or reaching waters of the state. This requirement is in addition to the noncompliance reporting requirement found in Standard Conditions Part I. https://dnr.mo.gov/waste-recycling/investigations-cleanups/environmental-emergency-response.

Underground and above ground storage devices for petroleum products, vegetable oils, and animal fats may be subject to control under federal Spill Prevention, Control, and Countermeasure Regulation and are expected to be managed under those provisions, if applicable. Substances regulated by federal law under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) which are transported, stored, or used for maintenance, cleaning or repair shall be managed according to the provisions of RCRA and CERCLA.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP):
In accordance with 40 CFR 122.44(k), BMPs must be used to control or abate the discharge of pollutants when: 1) Authorized under section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities; 2) Authorized under section 402(p) of the CWA for the control of stormwater discharges; 3) Numeric effluent limitations are infeasible; or 4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA. In accordance with the EPA's *Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites*, (Document number EPA 833-R-06-004) published by the EPA in 2007 https://www.epa.gov/sites/production/files/2015-10/documents/sw_swppp_guide.pdf, BMPs are measures or practices used to reduce the amount of pollution entering waters of the state from a permitted facility. BMPs may take the form of a process, activity, or physical structure. Additionally, in accordance with the Stormwater Management, a SWPPP is a series of steps and activities to 1) identify sources of pollution or contamination, and 2) select and carry out actions which prevent or control the pollution of storm water discharges. Additional information can be found in *Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-006; September 1992).

A SWPPP must be prepared if the SIC code for the facility is found in 40 CFR 122.26(b)(14) and/or 10 CSR 20-6.200(2). A SWPPP may be required of other facilities where stormwater has been identified as necessitating better management.

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The purpose of a SWPPP is to comply with all applicable stormwater regulations by creating an adaptive management plan to control and mitigate stream pollution from stormwater runoff. Developing a SWPPP provides opportunities to employ appropriate BMPs to minimize the risk of pollutants being discharged during storm events. The following paragraph outlines the general steps the permittee should take to determine which BMPs will work to achieve the benchmark values or limits in the permit. This section is not intended to be all encompassing or restrict the use of any physical BMP or operational and maintenance procedure assisting in pollution control. Additional steps or revisions to the SWPPP may be required to meet the requirements of the permit.

Areas which should be included in the SWPPP are identified in 40 CFR 122.26(b)(14). Once the potential sources of stormwater pollution have been identified, a plan should be formulated to best control the amount of pollutant being released and discharged by each activity or source. This should include, but is not limited to, minimizing exposure to stormwater, good housekeeping measures, proper facility and equipment maintenance, spill prevention and response, vehicle traffic control, and proper materials handling. Once a plan has been developed, the facility will employ the control measures determined to be adequate to prevent pollution from entering waters of the state. The facility will conduct inspections of the BMPs to ensure they are working properly and re-evaluate any BMP not achieving compliance with permitting requirements. For example if the BMP being employed is deficient in controlling stormwater pollution, corrective action should be taken to repair, improve, or replace the failing BMP. If failures do occur, continue this trial and error process until appropriate BMPs have been established.

The EPA has developed factsheets on the pollutants of concern for specific industries along with the BMPs to control and minimize stormwater (https://www.epa.gov/npdes/stormwater-discharges-industrial-activities). Along with EPA's factsheets, the International Stormwater BMP database (https://bmpdatabase.org/) may provide guidance on BMPs appropriate for specific industries.

For new, altered, or expanded stormwater discharges, the SWPPP shall identify reasonable and effective BMPs while accounting for environmental impacts of varying control methods. The antidegradation analysis must document why no discharge or no exposure options are not feasible. The selection and documentation of appropriate control measures shall serve as an alternative analysis of technology and fulfill the requirements of antidegradation [10 CSR 20-7.031(3)].

Alternative analysis evaluation of the BMPs is a structured evaluation of BMPs which are reasonable and cost effective. The alternative analysis evaluation should include practices designed to be: 1) non-degrading; 2) less degrading; or 3) degrading water quality. The glossary of the *Antidegradation Implementation Procedure* defines these three terms. The chosen BMP will be the most reasonable and effective management strategy while ensuring the highest statutory and regulatory requirements are achieved and the highest quality water attainable for the facility is discharged. The alternative analysis evaluation must demonstrate why "no discharge" or "no exposure" is not a feasible alternative at the facility. This structured analysis of BMPs serves as the antidegradation review, fulfilling the requirements of 10 CSR 20-7.031(3) Water Quality Standards and *Antidegradation Implementation Procedure*, Section II.B.

- ✓ Applicable: A SWPPP shall be developed and implemented for each site and shall incorporate required practices identified by the Department with jurisdiction, incorporate control practices specific to site conditions, and provide for maintenance and adherence to the plan.

UNDERGROUND INJECTION CONTROL (UIC):

The UIC program for all classes of wells in the State of Missouri is administered by the Missouri Department of Natural Resources and approved by EPA pursuant to section 1422 and 1425 of the Safe Drinking Water Act (SDWA) and 40 CFR 147 Subpart AA. Injection wells are classified based on the liquids which are being injected. Class I wells are hazardous waste wells which are banned by RSMo 577.155; Class II wells are established for oil and natural gas production; Class III wells are used to inject fluids to extract minerals; Class IV wells are also banned by Missouri in RSMo 577.155; Class V wells are shallow injection wells; some examples are heat pump wells and groundwater remediation wells. Domestic wastewater being disposed of sub-surface is also considered a Class V well.

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In accordance with 40 CFR 144.82, construction, operation, maintenance, conversion, plugging, or closure of injection wells shall not cause movement of fluids containing any contaminant into Underground Sources of Drinking Water (USDW) if the presence of any contaminant may cause a violation of drinking water standards or groundwater standards under 10 CSR 20-7.031 or other health-based standards or may otherwise adversely affect human health. If the Department finds the injection activity may endanger USDWs, the Department may require closure of the injection wells or other actions listed in 40 CFR 144.12(c), (d), or (e). In accordance with 40 CFR 144.26, the permittee shall submit a Class V Well Inventory Form for each active or new underground injection well drilled, or when the status of a well changes, to the Missouri Department of Natural Resources, Geological Survey Program, P.O. Box 250, Rolla, Missouri 65402. Single family residential septic systems and non-residential septic systems used solely for sanitary waste and having the capacity to serve fewer than 20 persons a day are excluded from the UIC requirements (40 CFR 144.81(9)).

- ✓ Not applicable; this permit does not authorize subsurface wastewater systems or other underground injection. These activities must be assessed under an application for a site specific permit. Certain discharges of stormwater into sinkholes may qualify as UIC. It is important the permittee evaluate all stormwater basins, even those holding water; as sinkholes have varying seepage rates. This permit does not allow stormwater discharges into sinkholes. The facility must ensure sinkholes are avoided in the construction process. The State's online mapping resource https://modnr.maps.arcgis.com/apps/webappviewer/index.html?id=87ebef4af15d438ca658ce0b2bbc862e has a sinkhole layer.

VARIANCE:
Per the Missouri Clean Water Law Section 644.061.4, variances shall be granted for such period of time and under such terms and conditions as shall be specified by the commission in its order. The variance may be extended by affirmative action of the commission. In no event shall the variance be granted for a period of time greater than is reasonably necessary for complying with the Missouri Clean Water Law Section 644.006 to 644.141 or any standard, rule or regulation promulgated pursuant to Missouri Clean Water Law Section 644.006 to 644.141.
- ✓ Not Applicable: This permit is not drafted under premises of a petition for variance.

WASTELOAD ALLOCATIONS (WLA) FOR LIMITATIONS:
Per 10 CSR 20-2.010(78), the amount of pollutant each discharger is allowed by the Department to release into a given stream after the Department has determined total amount of pollutant which may be discharged into the stream without endangering its water quality. Water quality based maximum daily and average monthly effluent limitations were calculated using methods and procedures outlined in USEPA's Technical Support Document For Water Quality-based Toxics Control (TSD) (EPA/505/2-90-001).
- ✓ Not applicable; water quality limitations were not applied in this permit.

WATER QUALITY STANDARDS:
Per 10 CSR 20-7.031(4), General Criteria shall be applicable to all waters of the state at all times, including mixing zones. Additionally, 40 CFR 122.44(d)(1) directs the Department to include in each NPDES permit conditions to achieve water quality established under Section 303 of the CWA, including state narrative criteria for water quality.

WHOLE EFFLUENT TOXICITY (WET) TEST:
Per 10 CSR 20-7.031(1)(FF), a toxicity test conducted under specified laboratory conditions on specific indicator organism; and per 40 CFR 122.2, the aggregate toxic effect of an effluent measured directly by a toxicity test. A WET test is a quantifiable method of determining if a discharge from a facility may be causing toxicity to aquatic life by itself, in combination with, or through synergistic responses when mixed with receiving water.
- ✓ Not applicable: At this time, permittees are not required to conduct a WET test. This permit is for stormwater only.

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PART IV – EFFLUENT LIMITATIONS DETERMINATION

EPA Construction General Permit (CGP)
The CGP was used to research and support best professional judgment decisions made in establishing technology-based conditions for this general permit which are consistent with national standards. The permit writer determined the standards established by the CGP are achievable and consistent with federal regulations. Additionally, the conditions reflecting the best practicable technology currently available are utilized to implement the ELG.

In this general permit, technology-based effluent conditions are established through the SWPPP and BMP requirements. Effective BMPs should be designed on a site-specific basis. The implementation of inspections provides a tool for each facility to evaluate the effectiveness of BMPs to ensure protection of water quality. Any flow through an outfall is considered a discharge. Future permit action due to permit modification may contain new operating permit terms and conditions which supersede the terms and conditions, including effluent limitations, of this operating permit.

PART V–REPORTING REQUIREMENTS

SAMPLING:
The permittee is not required to sample stormwater under this permit. The Department may require sampling and reporting as a result of illegal discharges, compliance issues related to water quality concerns or BMP effectiveness, or evidence of off-site impacts from activities at the facility. If such an action is needed, the Department will specify in writing the sampling requirements, including such information as location and extent. If the permittee refuses to perform sampling when required, the Department may terminate the general permit and require the facility to obtain a site-specific permit with sampling requirements.

REPORTING:
There are quarterly reporting requirements for MO-R100xxx land disturbance permits. Project specific information is required to be report to the Department through the eDMR system.

PART VI – RAINFALL VALUES FOR MISSOURI & SURFACE WATER BUFFER ZONES

Knowledge of the 2-year, 24-hour storm event is used in this permit for two main reasons:
1) The design, installation and maintenance of effective erosion and sediment controls to minimize the discharge of pollutants.
2) If the seven-day inspection frequency is utilized, an inspection must occur within 48 hours after any storm event equal to or greater than a 2-year, 24 hour storm has ceased.
For site-specific 2-year, 24-hour storm event information utilize the National Oceanic and Atmospheric Administration's National Weather Service Atlas 14 (NOAA Atlas 14) which is located at https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html. For more information visit; https://www.weather.gov/media/owp/oh/hdsc/docs/Atlas14_Volume8.pdf.

Surface Water Buffer Zones: In order to design controls that match the sediment removal efficiency of a 50-foot buffer, you first need to know what this efficiency is for your site. The sediment removal efficiencies of natural buffers vary according to a number of site-specific factors, including precipitation, soil type, land cover, slope length, width, steepness, and the types of erosion and sediment controls used to reduce the discharge of sediment prior to the buffer. For additional information; https://www.epa.gov/sites/default/files/2017-02/documents/2017_cgp_final_appendix_g_-_buffer_reqs_508.pdf

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PART VII – ADMINISTRATIVE REQUIREMENTS

On the basis of preliminary staff review and applicable standards and regulations, the Department, as administrative agent for the Missouri Clean Water Commission, proposes to issue a permit(s) subject to certain effluent limitations, schedules, and special conditions contained herein and within the permit. The proposed determinations are tentative pending public comment.

PUBLIC MEETING:
The department hosted three public meetings for this permit. The meetings were held on January 27, February 17, and March 9, 2021.

PUBLIC NOTICE:
The Department shall give public notice when a draft permit has been prepared and its issuance is pending. Additionally, public notice will be issued if a public hearing is to be held because of a significant degree of interest or because of water quality concerns related to a draft permit. No public notice is required when a request for a permit modification or termination is denied; however, the requester and facility must be notified of the denial in writing.

The Department must give public notice of a pending permit or of a new or reissued Missouri State Operating Permit. The public comment period is a length of time not less than thirty (30) days following the date of the public notice, during which interested persons may submit written comments about the proposed permit.

For persons wanting to submit comments regarding this proposed permit, please refer to the Public Notice page located at the front of this draft permit. The Public Notice page gives direction on how and where to submit appropriate comments.

- ✓ The Public Notice period for this permit is started March 25, 2022 and ended April 25, 2022. Two comment letters were received.

DATE OF FACT SHEET: 03/2/2022

COMPLETED BY:
SARAH WRIGHT
MS4 & LAND DISTURBANCE PERMITTING COORDINATOR
MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
OPERATING PERMITS SECTION - STORMWATER AND CERTIFICATION UNIT
(573) 526-1139
Sarah.wright@dnr.mo.gov, dnr.generalpermits@dnr.mo.gov

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Stormwater Pollution Prevention Plan (SWPPP)

for:

WILDWOOD DRIVE EXTENSION

Wildwood Dr. Between W. Edgewood Dr. & Rock Ridge Rd.
Jefferson City, Cole County, MO 65109

Owner/Operator:

Cole County Public Works Department
c/o Eric Landwehr, Director
5055 Monticello Rd.
Jefferson City, MO 65109
573-636-3614

SWPPP Preparation Date:

October 4, 2024

Estimated Project Dates:
Estimated Beginning of Construction –December 16, 2024
Estimated End of Construction – December, 2025

Prepared By:

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STATE OF MISSOURI · CODY ALAN DARR · NUMBER PE-2012018055 · PROFESSIONAL ENGINEER Date: 2024-12-06 Cody Alan Darr Professional Engineer PE-2012018055	Project Name Wildwood Drive Extension Location Wildwood Dr., Jefferson City, Cole County Client: Cole County Public Works — Job #: 07-022 CENTRAL MISSOURI PROFESSIONAL SERVICES, INC. ENGINEERING - SURVEYING - MATERIAL TESTING
	2500 E. McCarty St. Jefferson City, Missouri Phone: (573) 634-3455 Email: cdarr@cmps-inc.com Missouri Professional Engineering Certificate of Authority: #001558

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Appendix T – USFWS IPaC Resource List and MDC – Natural Heritage Review Report
Appendix U – DNR SHPO Letter – No Historic Properties Affected.
Appendix V – BMP Exhibits from Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri

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SECTION 1: CONTACT INFORMATION / RESPONSIBLE PARTIES

1.1 Contact Information/Responsible Parties

Operator:
Cole County Public Works
c/o Eric Landwehr, Director
5055 Monticello Rd.
Jefferson City, MO 65109
573-636-3614

General Contractor, Project Manager or Site Supervisor:

Subcontractor: (repeat as necessary, add sheets if necessary)

Land Owner:
Cole County Public Works
c/o Eric Landwehr, Director
5055 Monticello Rd.
Jefferson City, MO 65109
573-636-3614

Jefferson City
c/o David Bange, City Engineer
320 E. McCarty St.
Jefferson City, MO 65101
573-634-6410

Emergency Contact:
Company or Organization Name: Cole County Public Works Department
Contact Name: Matt Prenger, County Engineer
Contact Telephone Number: 573-636-3614

SWPPP Prepared by:
Central Missouri Professional Services, Inc.
Cody Darr, PE, PLS, Project Engineer
2500 East McCarty, Jefferson City, MO 65101
Phone: 573-634-3455

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SECTION 2: SITE EVALUATION, ASSESSMENT, AND PLANNING

2.1 Project / Site Information

Project/Site Name: Wildwood Drive Extension

Project Street/Location: Wildwood Dr. South of W. Edgewood Dr. & North of Rock Ridge Rd.

City: Jefferson City **State:** MO **Zip Code:** 65109

County : Cole County

Section/Township/Range: E ½ Section 16/44/12

Latitude/Longitude: 38.56868°N, -92.24724°W (North End) **Source:** Google Maps
38.55679°N, -92.24973°W (South End)

Is the project located in Indian Country? NO

Is this project considered a federal facility? NO

MDNR Permit Tracking Number: **MOR100034**

2.2 Local Regulations

Does your site discharge stormwater into a Municipal Separate Storm Sewer System (MS4)? YES – MOR04C058 (Cole County Phase II MS4)
MOR_____ (Jefferson City MS4)
Permit Required? Contact Cole County Public Works and City of Jefferson for further information, approved Permit forms should be filed in **Appendix E**.

Is any Disturbance in a Regulated Floodplain: Yes.
Permit Required? Yes. Floodplain Development Permit obtained through Jefferson City Public Works Dept. (See **Appendix D**)

Is any Disturbance within a locally regulated Stream Buffer? Yes
Permit Required? No. Disturbance approved with Issuance of Plans.

Do any local Stormwater Management Regulations affect this project? Yes, City of Jefferson Code of Ordinances and Cole County Stormwater Ordinance. See approved plans for project compliance with regulations.

Is there any local Tree Preservation Regulations that affect this project? No

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2.3 Discharge Information

PRIMARY DISCHARGE – WEARS CREEK

Permitted Feature Detail

Facility: Wildwood Drive Extension
Owner Name: Cole County Public Works

Permit Name: Land Disturbance
Master General Permit ID : MORA00000
Master General Permit Effective Date : 02/08/2022
Expiration Date: 02/07/2027

To view details for other permitted features, click the Permitted Feature List option at the top of the page. If you are ready to complete your application, click the Certification option at the top of the page.

Permitted Feature	
Permitted Feature Number:	002
Permitted Feature Type:	Storm Water Outfall
Primary:	No
Location Information	
UTM Easting:	565590.094
UTM Northing:	4269147.784
Legal Description:	S16T44NR12W
County:	Cole
Waterbody and Basin Information	
USGS HUC8:	10300102
Sub-Watershed Number:	1304
Receiving Waterbody Name:	
Is the first receiving waterbody a classified water:	No
Does this permitted feature discharge to any classified water in the state of MO:	Yes
Distance to Classfied Segment:	miles
Classified Waterbody ID:	
Classified Waterbody Name:	
Is the first receiving or first classified waterbody a 303 (d) listed waterbody:	No

(from DNR ePermitting site)

The primary discharge for the site is located within the Wear' Creek Watershed and discharges into an unnamed tributary to Wear's Creek which flows into Wear's Creek at the north end of the site.

Is Receiving Water Impaired (on 303(d) List)? NO (per 2020 Section 303(d) listed Waters Approved by EPA on 09/13/2021)

If any receiving water is on the 303(d) List, list any TMDL's which have been completed and the pollutants that are causing impairment: N/A

Action taken to address impacts from project on impaired stream: N/A

Is a 404 Permit required for this project? YES
Nationwide 14 Permit has been obtained and is attached in **Appendix C.**

Is any discharge in the watershed of Outstanding National or State Resource Water? NO
If Yes, note additional instructions; refer to Part I.B of the DNR General Operating Permit. N/A

See Section 3.1 for Jurisdictional Water Considerations

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SECONDARY DISCHARGE – TRIBUTARY TO NEIGHORN BRANCH

Permitted Feature Detail

Facility: Wildwood Drive Extension
Owner Name: Cole County Public Works

Permit Name: Land Disturbance
Master General Permit ID : MORA00000
Master General Permit Effective Date : 02/08/2022
Expiration Date: 02/07/2027

To view details for other permitted features, click the Permitted Feature List option at the top of the page. If you are ready to complete your application, click the Certification option at the top of the page.

Permitted Feature	
Permitted Feature Number:	001
Permitted Feature Type:	Storm Water Outfall
Primary:	Yes
Location Information	
UTM Easting:	565382.455
UTM Northing:	4267845.318
Legal Description:	S16T44NR12W
County:	Cole
Waterbody and Basin Information	
USGS HUC8:	10300102
Sub-Watershed Number:	1206
Receiving Waterbody Name:	Tributary to Neighorn Branch
Is the first receiving waterbody a classified water:	No
Does this permitted feature discharge to any classified water in the state of MO:	Yes
Distance to Classfied Segment:	2.77 miles
Classified Waterbody ID:	5015.00
Classified Waterbody Name:	Presumed Use Streams
Is the first receiving or first classified waterbody a 303 (d) listed waterbody:	No

(from DNR ePermitting site)

The secondary discharge for the site is located within the Neighorn Branch Watershed and discharges into an unnamed tributary to Neighorn Branch which flows into Neighorn Branch approximately 2.7 miles downstream of the site.

Is Receiving Water Impaired (on 303(d) List)? NO (per 2020 Section 303(d) listed Waters Approved by EPA on 09/13/2021)

If any receiving water is on the 303(d) List, list any TMDL's which have been completed and the pollutants that are causing impairment: N/A

Action taken to address impacts from project on impaired stream: N/A

Is a 404 Permit required for this project? NO (USACE Permit included for Primary Discharge Watershed, see page 3)

Is any discharge in the watershed of Outstanding National or State Resource Water? NO
If Yes, note additional instructions; refer to Part I.B of the DNR General Operating Permit. N/A

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2.4 Existing Site Conditions

The north 2/3rds of the site is undeveloped timber and forest. Wear's Creek Runs Generally West to East through the site, parallel and just south of W. Edgewood Dr. There is an unnamed tributary to Wear's Creek that runs generally South to North, and to the east of the proposed road. The tributary runs into Wear's Creek just east of our site. This entire area falls generally towards the Tributary and then to the north to Wear's Creek. The south 1/3rd of the site is generally a corridor along the existing Frog Hollow Rd. and Rock Ridge Rd. Generally, along Frog Hollow Rd the adjacent property is pasture and falls away from either side of Frog Hollow Rd to unnamed tributaries to Wear's Creek. Along the south side of Rock Ridge Rd. there are single family residences. South of Rock Ridge Rd falls to the south. Slopes across the property are approximately between 5-30%. Native soils on the project site are predominantly silt loam. Existing soils are primarily classified as Hydrologic Soil Group C and D (characterized as soils having slow to very slow infiltration rate, leading to high runoff potential)

The site is located partially inside the city limits of Jefferson City. (North 2/3rds of the Site, Farrer and Werner Properties).

2.5 Nature of Construction Activities

General Description of Project:
The project consists of construction of approximately 4,660 L.F. (0.88 miles) of new Arterial Street, Improvement of the Frog Hollow & Rock Ridge Road Intersection to a new Roundabout, and improvement/widening of 800 L.F. of Rock Ridge Road, and improvement/widening of 450 L.F. of Frog Hollow Road. The road project construction will include mass grading, sanitary sewer main & crossings construction, water line relocation, Arch-Span Structure construction for the Wear's Creek crossing, culvert and storm sewer construction, retaining wall construction, road grading and paving operations, and relocation/ installation of other utility lines along roads as necessary. Also, an alternate design for a 10' Greenway Trail has been accommodated with the project plans.

Unpaved areas on site will be established with temporary or final vegetation and grasses upon completion of infrastructure construction. Site Slopes and Drainage patterns will be modified to facilitate road construction; however, the general drainage patterns will remain the same as predevelopment. Existing vegetation should be left undisturbed as much as possible to provide filtration for runoff.

Size of Construction Site:
Entire Site is 22 acres.
Total Project area: 22 acres +/-
Total Area Expected to be Disturbed: 22 acres +/-
Maximum Area Expected to be Disturbed at one time: 15 acres +/-

Type of Construction Site:
Public Arterial Street and Roundabout

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Construction Support Activities:
No off-site construction support activities anticipated for this project. There will be disturbance off of the existing right-of-way, but within existing temporary construction easements, and drainage easements along the entire length of the project. There are also agreements with various adjacent land owners for the excavation of material, grading/flattening of slopes, and/or stockpiling of excess soil, as shown on the plans.

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2.6 Pre-Construction Meeting

A Preconstruction meeting is recommended prior to the beginning of disturbance activities. Attendees may include: Owner, General Contractor, appropriate Subcontractors, Engineer, Utility Providers, City and County Representatives. A sample pre-construction meeting checklist is provided below:

PROJECT NAME: _____

- Attendance list filled out and proper contact information recorded
  - Establish a chain of command for the contractors and subcontractors
  - Sign the certification pages of SWPPP (provide/schedule training as necessary)
  - Complete the contact page, and determine location for SWPPP
  - Establish the Erosion Control inspector for the site
- County/City permits are in order
  - (Driveway, Building, Right-of-way, Floodplain, Land Disturbance)
  - County and City Point of Contact
- Review the Construction Plans
  - Review construction activities and phasing
  - Procedure to change plans or erosion control measures
- Check perimeter marking, entrances, and buffer zone markings as appropriate
- Make sure all signs are posted (DNR Land Disturbance, City LDP)
- Review Ordinance requirements for Site Access, Track-out and Runoff Control
- Review procedures for notice of violations and stop work orders

NOTES:

_____

_____

_____

_____

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2.7 Sequence and Estimated Dates of Construction Activities

SECTION 1

(North 2/3 of site, Includes: Wildwood Dr. thru Farrer and Werner Properties, Wear's Creek crossing, and Edgewood Tie-in)

Phase 1 Estimated Start Date: 2/3/2025 End Date: _____

1. Receive County/City and DNR Land Disturbance Permit (completed by engineer).
2. Pre-Construction meeting. Notify County and City Representatives and Engineer 48 hours in advance. Provide/schedule SWPPP training as necessary.
3. Field verify benchmarks and survey control prior to construction as applicable. Notify engineer/surveyor with any discrepancies.
4. Secure Utility Locates within areas to be disturbed.
5. Installation of Temporary Construction Entrances with erosion control measures.
6. Clearing and grubbing only as necessary for installation of perimeter silt fence, perimeter diversion berms, and temporary silt traps.
7. Installation of perimeter silt fence, rock ditch checks, silt traps and associated diversion berms. Outlets must be completely installed as shown on the details before proceeding to the next step. Areas draining to these structures cannot be disturbed until the structures and diversions to the structures are completely installed. Grading may be required to achieve positive drainage in some cases.
8. Temporary seeding shall be installed at this time in all areas of land disturbance that are complete, and on silt trap/diversion berms to be in place longer than 14 days.

Phase 2 Estimated Start Date: _____ End Date: _____

9. Additional clearing and grubbing within limits of disturbance as necessary for current phase of construction. Include off-site material grading area on Farrer Property
10. Installation of Temporary Culvert Crossings.
11. Stripping and stockpiling of topsoil in cut/fill areas as necessary. Install sediment control around stockpiles as appropriate.
12. Install any required temporary drainage swales and berms within the disturbed area.
13. Rough Grading, cut and fill as necessary to achieve design subgrade elevation for installation of roads.
14. Install wattles and other slope interruption as necessary on disturbed slopes with high sheet runoff and long slopes.
15. Install erosion control blankets as necessary on finished slopes greater than 6:1 slopes and greater than 10' vertical height.
16. Install concrete washout areas.
17. Install Wear's Creek Arch-Span Structure.
18. Install 5.5' x 9' box culvert.
19. Remove temporary culvert crossings.

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20. Installation of sanitary sewer Line A.
21. Installation of sanitary sewer crossings.
22. Installation of remaining storm sewers, install early-stage inlet protection immediately after construction.
23. Trim Street Subgrade, prepare subgrade as required per plan, project specifications, geotechnical report and county/city requirements.
24. Install base material per plan for paved areas.
25. Street paving operations (remove inlet protection no more than 48 hours prior to placing base course)
26. Install right-of-way erosion control devices and late stage curb inlet, area inlet and pipe inlet protection.
27. Install utilities adjacent to roads.
28. Fine grading and backfill adjacent to roads.
29. Final site grading, top soil placement.

Phase 3 Estimated Start Date: _____ End Date: _____

30. Removal of concrete washout areas, temporary construction entrances and temporary silt traps. Remove all sediment, trash, debris from sewers, structures and basin upon substantial completion.
31. Remove all accumulated sediment from temporary silt traps, dry on-site or haul off-site. Regrade areas as necessary to match plan grades.
32. Temporary seeding and final stabilization of site for infrastructure purposes. (Permanent seeding where appropriate, or where no activities planned for longer than 12 months)
33. After entire area is stabilized to 70% density perform Final Stabilization/Termination checklist (See Appendix Q); then contractor may transfer responsibility of land disturbance management to Owner/Operator.
34. Remove all temporary erosion and sediment control devices when all areas are permanently stabilized.
35. Submit Request for Termination of Operating Permit Form to DNR for termination. (See Appendix R)

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SECTION 2

(South 1/3 of site, Includes: Rock Ridge Rd, Roundabout, Wildwood Dr. South of Werner Property and Frog Hollow Rd.)

Phase 1 Estimated Start Date: 4/1/2025 End Date: _____

1. Receive County/City and DNR Land Disturbance Permit (completed by engineer).
2. Pre-Construction meeting. Notify County and City Representatives and Engineer 48 hours in advance. Provide/schedule SWPPP training as necessary.
3. Field verify benchmarks and survey control prior to construction as applicable. Notify engineer/surveyor with any discrepancies.
4. Secure Utility Locates within areas to be disturbed.
5. Installation of Temporary Construction Entrances with erosion control measures.
6. Clearing and grubbing only as necessary for installation of perimeter silt fence, perimeter diversion berms, and temporary silt traps.
7. Installation of perimeter silt fence, rock ditch checks, silt traps and associated diversion berms. Outlets must be completely installed as shown on the details before proceeding to the next step. Areas draining to these structures cannot be disturbed until the structures and diversion to the structures are completely installed. Grading may be required to achieve positive drainage in some cases.
8. Temporary seeding shall be installed at that time in all areas of land disturbance that are complete, and on silt trap diversion berms to be in place longer than 14 days.

Phase 2 Estimated Start Date: _____ End Date: _____

9. Additional clearing and grubbing within limits of disturbance as necessary for current phase of construction.
10. Stripping and stockpiling of topsoil in cut/fill areas as necessary. Coordinate location of adjacent grading areas and potential stockpile locations with Ed Rackers for Rackers property. Coordinate location of adjacent grading areas and stockpile location with Gregg Popp for Popp property. Install sediment control around stockpiles as appropriate.
11. Install any required temporary drainage swales and berms within the disturbed area.
12. Grading on north shoulder of Rock Ridge Road along Popp Property to improve ease of maintenance.
13. Rough Grading, cut and fill as necessary to achieve design subgrade elevation for installation of roads.
14. Install wattles and other slope interruption as necessary on disturbed slopes with high sheet runoff and long slopes.
15. Install erosion control blankets as necessary on finished slopes greater than 6:1 slopes and greater than 10’ vertical height.
16. Install concrete washout areas.
17. Installation of storm sewers, install early-stage inlet protection immediately after construction.

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18. Trim Street Subgrade, prepare subgrade as required per plan, project specifications, geotechnical report and county/city requirements.
19. Install base material per plan for paved areas.
20. Street paving operations (remove inlet protection no more than 48 hours prior to placing base course)
21. Install right-of-way erosion control devices.
22. Install utilities adjacent to roads.
23. Fine grading and backfill adjacent to roads.
24. Final site grading, top soil placement.

Phase 3 Estimated Start Date: _____ End Date: _____

25. Removal of concrete washout areas, temporary construction entrances and temporary silt traps. Remove all sediment, trash, debris from sewers, structures and basin upon substantial completion.
26. Remove all accumulated sediment from temporary silt traps, dry on-site or haul off-site. Regrade areas as necessary to match plan grades.
27. Temporary seeding and final stabilization of site for infrastructure purposes. (Permanent seeding where appropriate, or where no activities planned for longer than 12 months)
28. After entire area is stabilized to 70% density perform Final Stabilization/Termination checklist (See Appendix Q); then contractor may transfer responsibility of land disturbance management to Owner/Operator.
29. Remove all temporary erosion and sediment control devices when all areas are permanently stabilized.
30. Submit Request for Termination of Operating Permit Form to DNR for termination. (See Appendix R)

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2.8 Authorized Non-Stormwater Discharges

The DNR general permit authorizes the discharge of certain non-stormwater discharges from land disturbance sites. The recording of any non-storm water discharge event shall be recorded on a site inspection form. Prior to the occurrence of any non-storm water discharge event, precautions should be taken and BMPs installed and recorded to prevent any offsite contamination. Any superchlorinated water from water distribution pipes shall be neutralized before releasing it into the environment. Coordinate neutralization methods with water service provider.

List of Authorized Non-Stormwater Discharges and if present at the site:

- Discharges from emergency fire-fighting activities: No
- Fire Hydrant flushing: Yes
- Landscape irrigation: Unknown at this time
- Water used to wash vehicles and equipment: No
- Water used to control dust: Yes
- Potable water including uncontaminated water line flushing's: Yes
- External building washdown (provided soaps/solvents are not used and external surfaces do not contain hazardous substances, e.g. Paint/Caulk/PCB's): No
- Pavement wash waters (provided spills or leaks of toxic or hazardous materials have not occurred and detergents are not used) also no directing pavement wash water directly into any receiving water, storm drain inlet or constructed or natural site drainage features unless the conveyance is connected to a sediment basin, silt trap or similar control): Yes
- Uncontaminated air conditioning or compressor condensate: No
- Uncontaminated, non-turbid discharges of ground water or spring water: No
- Foundation or footing drains: Yes
- Uncontaminated construction dewatering water: Yes

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2.9 Site Maps

Erosion Control maps are included in the following plan sheets prepared for this project (see **Appendix A**):

Sheet #	Plan Title	Plan Date
40	Erosion Control Plan – Phase 1 – Sheet 1	See date on latest sealed plan set by Civil Engineer and approved by Cole County Public Works
41	Erosion Control Plan – Phase 1 – Sheet 2	
42	Erosion Control Plan – Phase 1 – Sheet 3	
43	Erosion Control Plan – Phase 2 – Sheet 1	
44	Erosion Control Plan – Phase 2 – Sheet 2	
45	Erosion Control Plan – Phase 2 – Sheet 3	
46	Erosion Control Plan – Phase 3 – Sheet 1	
47	Erosion Control Plan – Phase 3 – Sheet 2	
48	Erosion Control Plan – Phase 3 – Sheet 3	
49	Erosion Control Details	
50	Erosion Control Details	
51	Erosion Control Details	

The site maps should be updated to reflect an accurate erosion control plan, which reflects current conditions. The responsible persons (as designated by Permittee) shall show modifications of erosion control measures on the plan as necessary, as the work progresses. This can include marking on the site maps with locations and dates of any changes made.

Also, the responsible persons shall ensure the maps show current locations of the following:

- Port-a-potty's
- Material storage, vehicle and equipment fueling and maintenance areas
- Concrete, paint and stucco washouts
- Dumpster containers
- Spill kits
- Stockpiles
- All other BMPs and whatever changes have been done to them
- Environmentally sensitive areas
- Steam buffers
- SWPPP amendments

See all Construction Plans, such as the Street and Storm Sewer Plans, Sanitary Sewer Plans and Water Line Plans for additional project information.

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SECTION 3: COMPLIANCE WITH FEDERAL REQUIREMENTS

3.1 USACE Jurisdictional Waters and Wetlands

Are there any waters of the U.S. within 50 feet of your projects earth disturbances? Yes.

Permit Required? Yes. See Appendix C for Nationwide Permit.

Refer to Part V.7 of the DNR General Operating Permit for riparian buffer requirements. Minimizing disturbed areas, implementing silt fence or other erosion controls and best management practices to treat stormwater discharges from disturbances within 50 feet of the regulated waters shall be implemented when working adjacent to the creek.

3.2 Endangered Species Protection

This project requires significant clearing that may affect endangered species. Included with the permitting process through USACE the owner retained Environmental Solutions & Innovations, Inc. (ESI) to coordinate Endangered Species Act compliance with the USFWS and the MDC, respectively as it relates to bats for the Wildwood Project. Project development is expected to remove approximately 16 acres of habitat potentially suitable for use by the federally listed Indiana and northern long-eared bats and proposed for listing tricolored bats. Mist net surveys were completed 15 through 18 May 2024, comprising 10 complete mist net nights of effort. Surveys yielded capture of a single adult male big brown bat. No Indiana, northern long-eared, nor tricolored bats were captured. Potential roosting habitat for Indiana and northern long -eared bats was ranked low through the project area. A complete report is available from the engineer. USFWS has accepted the results of the Final ESI "*Listed Bat Studies for the Wildwood Development Project in Cole County, Missouri*" report. USACE has determined to "not adversely" affect the listed bat species, the permittee must not cut or clear trees during the bats' active season, April 1 – October 14th.

If additional guidance is required please contact USACE, contact Kenny Pointer, 816-389-3833, or U.S. Fish and Wildlife Service (573-234-2132 ext. 100) for further coordination.

Additional reference documents are obtained from the Missouri Department of Conservation (MDC) Natural Heritage Review and US Fish and Wildlife Service (USFWS), including a IPaC Resource List. MDC review returned a **Level Two Report**: State Listed Endangered Species and/or Missouri Species/Natural Communities of Conservation Concern. Specific Considerations may be required for Endangered Species, Invasive exotic species, and/or Streams and Wetlands. Contact MDC for further guidance if necessary. Threatened or Endangered species identified as possibly located within the project area are Gray Bats, Indiana Bats, Northern Long-eared Bats, Tricolored Bat, Topeka Shiner Fish, and Monarch Butterfly. See IPaC Resource List for special attention required. See IPaC Resource List for USFWS Birds of Conservation

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Concern and further direction for special attention. No Critical Habitat was identified in the project area per the IPaC Resource List. **See Appendix T**.

3.3 Historic Property Protection

The majority of the site is currently undeveloped, or used for farm purposes. There are no known buildings or other potential historic sites that are evident on this site. Attached in **Appendix U** is a letter from Missouri DNR State Historic Preservation Office stating they have reviewed the April 2008 report entitled *Cultural Resource Investigations, Phase 1 Survey*…, by the Environmental Research Center of Missouri, Inc. and have determined that **no historic properties are affected** by this project.

3.4 Safe Drinking Water Act Underground Injection Control Requirements

Under the Safe Drinking Water Act of 1974, the U.S. Environmental Protection Agency (EPA) sets minimum federal requirements for injection practices that protect public health by preventing injection wells from contaminating underground sources of drinking water (USDWs). The state of Missouri obtained primacy for its UIC program from EPA and receives funding from EPA to administer the program.

See DNR's Website for more information on Well permitting and registration requirements.

https://dnr.mo.gov/land-geology/businesses-landowners-permittees/permits/underground-injection-control-wells

Are any Underground Wells anticipated to be used on this project? NO
Additional information: NA

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

SECTION 4: EROSION AND SEDIMENT CONTROLS

4.1 Natural Buffers

Existing vegetation should be left undisturbed as much as possible to provide filtration for runoff. The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
Vegetative Buffer Strip

See Plans and/or Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

4.2 Tree and Vegetation Preservation

Existing vegetation should be left undisturbed as much as possible to provide filtration for runoff. The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
-

See Plans and/or Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

4.3 Perimeter Controls

The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
Sediment Fence, Straw Wattles, Mulch Berms

See Plans and/or Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

4.4 Sediment Track-Out

Contractor Shall:

a. Restrict vehicle traffic to properly designed exit points.
b. Use appropriate stabilization techniques at all points that exit onto paved roads.
c. Remove any sediment that has been tracked out within the same business day or by the end of the next business day if track out occurs on a non-business day.

The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
Temporary Rock Construction Exits
Rumble Plate

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Wheel Wash

See Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

4.5 Topsoil & Stockpiled Soils

The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
Topsoiling Removal, Stockpiling and Replacement

See Plans and/or Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

4.6 Minimize Dust

The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
Dust Control

See Plans and/or Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

4.7 Minimize the Disturbance of Steep Slopes

The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
Erosion Control Blankets
Surface Roughening
Wattles
Slope Breaks
Temporary Seeding

See Plans and/or Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

4.8 Storm Drain Inlets

The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
Inlet Protection

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

See Plans and/or Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

4.9 Constructed Stormwater Conveyance and Diversions

The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
Temporary Diversions
Rock Check Dam
Ditch Checks
Wattles
Outlet Protection (Rip rap)

See Plans and/or Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

4.10 Sediment Basins and Silt Traps

The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
Temporary Sediment Trap

See Plans and/or Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

4.11 Chemical Treatment

The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
None anticipated for this site

See Plans and/or Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

4.12 Dewatering Practices

The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
Dewatering

See Plans and/or Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

4.13 Other Stormwater Controls

The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
None anticipated for this site

See Plans and/or Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

4.14 Site Stabilization

The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
Erosion Control Blankets
Hydroseeding
Mulch and Hydromulch
Temporary Seeding
Permanent Seeding
Sodding

See Plans and/or Appendix for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

A log of all Grading and Stabilization Activities to be kept with this SWPPP, see **Appendix J**.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

SECTION 5: POLLUTION PREVENTION CONTROLS

5.1 Pollutant Generating Activities & Potential Construction Site Pollutants

Potential Construction Site Pollutants										
Possible Source	Pollutants									Location
	Sediment	Nutrients	Heavy Metals	pH (acids & bases)	Pesticides & herbicides	Oil & grease	Bacteria & Viruses	Trash, debris, solids	Other toxic chemicals	
Clearing & Grubbing	x							x		***Within clearing limits***
Grading & site excavation	x									***Within grading limits***
Vehicle Tracking	x					x				***Public roadway at construction entrances***
Topsoil stripping & stockpiling	x									***Within grading limits***
Paving Operations	x							x		***Paving Areas***
Concrete washout & waste		x	x					x		***Designated concrete washout areas***
Demolition and debris disposal	x							x		***Demo Areas***
Dewatering operations	x	x								***Where necessary***
Material delivery and storage	x	x	x	x	x	x		x	x	***Designated staging areas***
Solid Waste (trash and debris)								x	x	***Designated trash receptacles***
Hazardous waste			x	x	x	x			x	***Designated staging areas***
Contaminated spills			x	x	x	x			x	***Designated staging areas***
Sanitary/septic waste		x		x			x		x	***Designated port-a-potty areas***
Vehicle/equipment use and storage						x			x	***Designated vehicle storage and refuel areas***
Landscaping operations	x	x						x		***Landscaping/Seed & Mulch Areas***

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

5.2 Hazardous Substances, Spill Prevention and Response:

Substances regulated by federal law under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) that are transported, stored or used for maintenance, cleaning or repairs shall be managed according to the provisions of RCRA and CERCLA.

Implement chemical spill and leak prevention and response procedures. These procedures include but are not limited to maintenance of spill kits, installation of containment berms, and use of drip pans at petroleum product and liquid storage tanks and containers.

Keep a spill kit on-site with equipment necessary for spill clean-up. Equipment and materials include, but are not limited to: brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sawdust, and trash containers.

Location of your site's spill kit: _____

In Missouri, state law requires the responsible party to report petroleum product releases greater than 50 gallons to the Missouri Department of Natural Resources at the earliest practical moment after discovery. If the release is from an underground storage tank, or UST, or piping, the reportable quantity is 25 gallons or more. Reports are also required for above ground storage tanks, or AST, that have released 50 gallons or greater. Further, federal law requires the responsible party to report any release of oil if the oil reaches or threatens any waterway.

From DNR General Operating Permit Part III.16

a) Any spill, overflow, or other discharge not specifically authorized in the permit are unauthorized.
b) Should an unauthorized discharge cause or permit any contaminants to discharge or enter waters of the state, the unauthorized discharge must be reported to the appropriate Regional Office as soon as practicable but no more than 24 hours after the discovery of the discharge. If the spill or overflow needs to be reported after normal business hours or on the weekend, the facility must call the DNR Environmental Emergency Response hotline at **573-634-2436**. Leaving a message on a Department staff member voice-mail does not satisfy this reporting requirement.
c) A record of all spills shall be retained with the SWPPP and made available to DNR upon request.
d) Other spills not reaching waters of the state must be cleaned up as soon as possible to prevent entrainment in stormwater but are not required to be reported to DNR.

See Appendix O for reporting Hazardous Substance Release.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

5.3 Good Housekeeping BMP's

Good housekeeping and pollution prevention practices consist of site management considerations that do not fit into other categories. Good Housekeeping entails keeping the site clean and reducing water and air-borne pollutants.

The following BMPs have been chosen as shown on the construction plans, or may be implemented by the contractor as needed, for this specific project.

BMP List:
Materials Management
Solid Waste Management
Parking and Material Laydown Areas
Concrete Washout
Petroleum and Hazardous Waste Management
Spill Prevention and Control
Dust Control and Air Emissions (Burning)

Refer to Part III.11 of the DNR General Operating Permit for additional information.

See Plans and/or **Appendix V** for description, Installation procedures, Maintenance requirements and design specifications for each listed BMP.

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General Housekeeping Reminders:

- An effort should be made to store only enough product to do the job. All materials stored on-site should be stored in a neat, orderly manner in their appropriate containers and, if applicable, under a roof or other enclosure.
- Products should be kept in their original containers with original manufacturer label. If a replacement container is used, it must be clearly labeled and the original label retained.
- Whenever possible, all of a product should be used up before disposing of the container.
- Manufacturer's recommendations for proper use and disposal of contents and containers must be followed. Refer to the Material Safety Data Sheets.
- The site superintendent should provide trash containers and regular site clean-up, as well as inspect daily to ensure proper usage, storage, and disposal of materials.
- Use portable toilet facilities on-site for proper disposal o sanitary sewage. Do not directly discharge any sanitary sewage into the drainage course.
- Install containment berms and use drip pans at petroleum produce and liquid storage tanks and containers.
- Fertilizers need to be applied only in the minimum amounts recommended by the manufacturer.
- All paint containers need to be tightly sealed and stored when not required for use. Excess paint may not be dumped into the storm sewer system but should be properly disposed of according the to the manufacturer's instructions, material safety data sheets, and state and local regulations. Non-hazardous non-bulk household products are allowed by regulation to be disposed of in sanitary landfills. However, landfill operators may impose more stringent restrictions. Contact the local government for more information.
- Disposal of waste oil. If used oil has come into contact with hazardous materials, it is considered to be waste oil. It must be disposed of according to hazardous waste regulations.
- Used oil (non-hazardous) should be disposed of at the nearest used-oil recycling center. For more information, check with local government and refer to the Missouri Solid Waste Management webpage, or call 800-361-4827

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SECTION 6: INSPECTION, MAINTENANCE, & CORRECTIVE ACTION

6.1 Inspection Personnel

(to be filled in by Contractor, add inspectors as necessary)
Note: All personnel conducting inspections must be considered a "qualified person." A "qualified person" is person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit. These are persons who are responsible for environmental matters of the site, or persons trained by, and directly supervised by the person responsible for environmental matters at the site.

PRIMARY (Environmental Lead)
Name: _____ Position: _____

Company Name: _____

Inspector Cell Phone: _____ Email: _____

Qualifications/Training: _____

_____

Name: _____ Position: _____

Company Name: _____

Inspector Cell Phone: _____ Email: _____

Qualifications/Training: _____

_____

Name: _____ Position: _____

Company Name: _____

Inspector Cell Phone: _____ Email: _____

Qualifications/Training: _____

_____

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6.2 Inspection Schedule / Procedures

The permittee (or a representative of the permittee) shall have a designated inspector conduct regularly scheduled inspections.
From Part IV.10 of the DNR General Operating Permit; Site Inspections shall include, at a minimum, the following:

- For disturbed areas that have not achieved final stabilization, all installed BMPs and other pollution control measures shall be inspected to ensure they are properly installed, appear to be operational, and are working as intended to minimize the discharge of pollutants.
- For areas on site that have achieved either temporary or final stabilization, while at the same time active construction continues on other areas, ensure that all stabilization measures are properly installed, appear to be operational, and are working as intended to minimize the discharge of pollutants.
- Inspect all material, waste, borrow, and equipment storage, and maintenance areas that are covered by this permit. Inspect to conditions that could lead to spills, leaks, or other accumulations of pollutants on the site.
- Inspect all areas where stormwater typically flows within the site, including drainage ways designed to divert, convey, and/or treat stormwater.
- All stormwater outfalls shall be inspected for evidence of erosion, sediment deposition, or impacts to the receiving stream. If a discharge is occurring during an inspection, the inspector must observe and document the visual quality of the discharge, and take note of the characteristics of the stormwater discharge, including turbidity, color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of stormwater pollutants.
- When practicable the receiving stream shall also be inspected for 50 feet downstream of the outfall.
- The perimeter of the site shall be inspected for evidence of BMP failure to ensure concentrated flow does not develop a new outfall.
- The SWPPP must explain how the permittee will be notified when stormwater runoff occurs.

Permittee, or General Contractor if designated by the Permittee, are to notify the designated inspector of occurrence of storm event requiring an Inspection by phone.

Any structural or maintenance problems shall be noted in an inspection report and corrected as soon as possible but no more than seven calendar days after the inspection. (*Refer to Part 1V.13 of the DNR General Operating Permit*)

Inspection Frequency:

From Part IV.11 of the DNR General Operating Permit:
All BMPs must be inspected in accordance to one of the schedules listed below. The inspection frequency shall be documented in the SWPPP, and any changes to the frequency of inspections, including switching between the options listed below, must be documented on the inspection form:

a. At least once every seven (7) calendar days and within 48 hours after any storm event equal to or greater than a 2-year, 24-hour storm (3.5” for Boone County / 4” for Cole County) has ceased during a normal work day or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday; or

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b. Once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches of precipitation or greater, or the occurrence of runoff from snowmelt. To determine if a storm event of 0.25 inches or greater has occurred on your site, you must either keep a properly maintained rain gauge on site **(Rainfall Gauge Recording form provided in Appendix P),** or obtain the storm even information from a weather station for your location.
    1. Inspections are only required during the projects normal working hours.
    2. You must conduct an inspection within 24 hours once a storm event has produced 0.25 inches. The inspections shall be conducted within 24 hours of the event end, or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.
    3. If it is elected to inspect every 14 calendar days and there is a storm event at the site that continues for multiple days, and each day of the storm produces 0.25 inches or more of rain, the permittee shall conduct an inspection within 24 hours of the end of the storm or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.
c. For any portion of the site that discharges within the watershed of an Outstanding National or State Resource Water or a water impaired for sediment, inspections shall be inspected once every seven (7) calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches or greater, or when the occurrence of runoff flow from frozen or snowmelt is sufficient to cause a discharge.
d. Areas on-site that have achieved stabilization, while at the same time active construction continues on other areas, may reduce inspection frequency to monthly, for those stabilized areas, if the following conditions exist:
    1. For areas where disturbed portions have undergone temporary stabilization, inspections shall occur at least once a month while stabilized and when re-disturbed shall follow either frequency outlined in a., b., or c. above.
    2. Areas on-site that have achieved final stabilization must be inspected at least once per month until the permit is terminated.
e. If construction activities are suspended due to frozen conditions, the permittee may temporarily reduce site inspections to monthly until thawing conditions begin to occur if all of the following are met:
    1. Land disturbances have been suspended; and
    2. All disturbed areas of the site have been stabilized in accordance with Part V. BMP requirements, Condition 13 of the General Operating Permit
    3. The change shall be noted in the SWPPP
f. Any basin dewatering shall be inspected daily when discharge is occurring. The discharge shall be observed and dewatering activities shall be ceased immediately if the receiving stream is being impacted. These inspections shall be noted on a log or on the inspection report.

For Information Only Bidders shall purchase a set of plans and bid documents from ADS.

6.3 Inspection Report Forms

From Part IV.12 of the DNR General Operating Permit:

A log of each inspection and/or copy of the inspection report shall be kept readily accessible and must be made available upon request by the Department. Electronic logs are acceptable as long as reports can be provided within 24 hours. If inspection reports are kept off-site, the SWPPP must indicate where they are stored. The inspection report shall be signed by the environmental lead or designated inspector (electronically or otherwise).

a. The inspection report is to include the following minimum information:
    1) Inspectors name and title;
    2) Date and time of inspection;
    3) Observations relative to the effectiveness of the BMPs and stabilization measures. The following must be documented:
        i) Whether BMPs are installed, operational, and working as intended;
        ii) Whether any new or modified stormwater controls are needed;
        iii) Facilities examined for conditions that could lead to spill or leak;
        iv) Outfalls examined for visual signs of erosion or sedimentation at outfalls. Excessive erosion or sedimentation may be due to BMP failure or insufficiency. Response to observations should be addressed in the inspection report.
    4) Corrective actions taken or necessary to correct the observed problem; and
    5) Listing of areas where land disturbance operations have permanently or temporarily stopped.

Site Inspection is recommended to be done using the provided inspection form in **Appendix H**.

Log of Inspections and Maintenance are recommended to be kept using form in **Appendix I**.

Each inspection report shall be signed by the permittee or by the person performing the inspection if duly authorized to do so.

6.4 Maintenance and Corrective Action

The permittee shall at all times maintain all pollution control measures and systems in good order to achieve compliance with the terms of this general permit.

The need to halt or reduce the permitted activity in order to maintain compliance with general permit conditions shall not be a defense to the permittee in an enforcement action.

Corrective action, as required or identified during inspections, or local, state or EPA investigation/inspections, to Erosion and Sediment Control BMP's shall be documented in the Corrective Action Log **(see Appendix K)**

The Corrective Action Log should describe repair, replacement, and maintenance of BMP's undertaken based on the inspections and maintenance procedures described above. Actions related to the findings of inspections should reference the specific inspection report.

This log should describe actions taken, date completed and the person that completed the work.

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If weather conditions prevent correction of the BMPs within seven calendar days, the reason for the delay must be documented (including pictures) and there must be a narrative explaining why the work cannot be accomplished within the seven-day time period. The documentation must be filed with the regular inspection reports. The permittee shall correct the problem as soon as weather conditions allow. Areas on-site that have been finally stabilized must be inspected at least once per month.

6.5 Delegation of Authority

The permittee may delegate an authorized representative to perform certain duties designated within this SWPPP. The authorized permittee and delegate must fill out an Authorized Representative Designation form and Certification. **(See Appendix M)**

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

6.6 Amending/Updating the SWPPP

From Part IV.9 of the DNR General Operating Permit:
Throughout coverage under the DNR Permit the permittee shall amend and update the SWPPP as appropriate during the term of the land disturbance activity. All SWPPP modifications shall be signed and dated. The permittee shall amend the SWPPP to incorporate any significant site condition changes which impact the nature and condition of stormwater discharges. At a minimum these changes include whenever the:

A. Location, design, operation, or maintenance of BMPs is changed (also addition/replacement of new BMPs);
B. Design (also scope, schedule) of the construction project is changed that could significantly affect the quality of the stormwater discharges;
C. Permittee's inspections indicate deficiencies in the SWPPP or any BMP;
D. Department notifies the permittee in writing of deficiencies in the SWPPP;
E. SWPPP is determined to be ineffective in minimizing or controlling erosion and sedimentation (e.g. there is visual evidence of excessive site erosion or sediment deposits in streams, lakes, or downstream waterways, sediment or other wastes offsite):
F. Department determines violation of water quality standards may occur or have occurred.

If inspections or investigations by site staff, local, state, or federal officials determine that discharges are causing water quality impacts exceeding the permit limits, or the SWPPP is ineffective in eliminating or minimizing pollutants in storm water discharges for the construction site, or there is a release containing a hazardous Substance, or Oil in an amount equal to or in excess of a reportable quantity as allowed by State Regulations, the SWPPP shall be modified to include additional or modified BMPs designed to correct identified problems. Revision shall be completed within seven calendar days following the inspection. Modifications that are the result of inspections shall be initiated within 24 hours and completed within 48 hours.

Additionally, the contractor shall be responsible for logging SWPPP modifications/amendments whenever the following occurs:

1. Changes in the Operator, contractor(s), Subcontractor(s) or other personnel.
2. Land Ownership and Change of Ownership. *Refer to Part VIII.2 of the DNR General Operating Permit for instruction/guidance.*

All such changes to the SWPPP must be documented in writing on the Amendment Log as provided in Appendix L.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

SECTION 6: RECORDKEEPING

The Contractor is responsible to keep a log of all Grading and Stabilization Activities, including:

1) When Major Grading activities begin and end
2) Construction temporarily or permanently ceased (dates)
3) Stabilization measures initiated (dates)

See **Appendix J** for Grading and Stabilization Log.

The permittee shall retain copies of this general permit, the SWPPP and all amendments for the site named in the State Operating Permit, results of any monitoring and analysis and all site inspection records required by the general permit. The records shall be accessible during normal business hours. The records shall be retained for aa period of at least three years from the date of the Letter of Termination.

The permittee shall provide a copy of the SWPPP to DNR, USEPA, or any local agency or government representative if they request a copy in the performance of their official duties.

The permittee shall provide a copy of the SWPPP to those who are responsible for installation, operation, or maintenance of any BMP. The permittee, their representative, and/or the contractor responsible for installation, operation and maintenance of the BMPs shall have a current copy of the SWPPP with them when on the project site.

Refer to Part VIII.1 of the DNR General Operating Permit

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

SECTION 7: TRAINING

The contractor shall be responsible for basic training of all onsite subcontractors and staff. All training for those with specific stormwater responsibilities, including subcontractors, shall be documented. **Training documentation form is included in Appendix N**, and shall be maintained and kept with the SWPPP. Make copies as necessary for each training session. Training shall follow the following requirements:

Basic training shall educate the attendees on the topics of:

1. An awareness of the SWPPP, its purpose, and the basics of how the purpose is being achieved.
2. Spill prevention and cleanup measures, including prohibition of dumping any material int storm drains or waterways.
3. An understanding of the basic purpose of BMPs, including what BMPs are on site, what they should look like, and how to avoid damaging them.
4. Potential penalties associated with stormwater non-compliance.

Entities and subcontractor directly responsible for implementing the SWPPP shall receive comprehensive stormwater training including:

1. The location and type of BMPs being implemented
2. The installation requirements and water quality purpose for each BMP
3. Maintenance procedures for each of the BMPs being implemented
4. Spill prevention and cleanup measures
5. Inspection and maintenance record keeping requirements.

Each person working on the site shall be informed of the following:

1. Only designated construction site entrances shall be used for entering and exiting the site
2. Equipment shall be kept away from silt fences, fiber rolls, and other sediment barriers
3. Know the locations of disposal areas, and know the proper practices for trash, concrete and paint washout, hazardous chemicals, etc.
4. Soil, materials and liquids shall be kept away from paved areas and storm drain inlets. Material shall not be swept or washed into a storm drain
5. Know the location and understand the proper use of spill kits
6. Know the locations and sites designated protection areas. Equipment shall be kept away from stream banks, valuable trees and shrubs, and steep slopes. Clearly mark these areas
7. Equipment shall be kept off mulched, seeded or stabilized areas. Clearly mark these areas
8. Know who to contact when problems are identified

All Subcontractors shall certify to understanding the requirements stated in this SWPPP. (See Appendix G)

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

SECTION 8: TERMINATION OF PERMIT COVERAGE

Final stabilization is defined by the state General Operating Permit when perennial vegetation, pavement, buildings, or structures using permanent materials cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetative cover shall be at least 70% of fully established plan density over 100% of the disturbed area. When final stabilization has been achieved over all disturbed areas, and the facility no longer discharges stormwater associated with construction activities, a Final Stabilization/Termination Checklist shall be completed and signed by the Contractor and submitted to the Owner/Operator **(See Appendix Q)**. Once the owner/operator has approved the checklist; the Owner/Operator may proceed with terminating the land disturbance permits.

Once verification of permit termination is received, they shall be placed in **Appendix R**.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

SECTION 6: CERTIFICATION AND NOTIFICATION

I CERTIFY UNDER PENALTY OF LAW THAT I UNDERSTAND THE TERMS AND CONDITIONS OF THE Missouri State Operating Permit – General Operating Permit by the Missouri Clean Water Commission that authorized the discharge of storm water associated with construction or land disturbance activity from this permitted construction site. I certify that I am familiar with the information contained in this Stormwater Pollution Prevention Plan (SWPPP), and General Operating Permit, and that to the best of my knowledge and belief such information is true, complete, and accurate. I agree to abide by the Missouri Clean Water law and all rules, regulations, orders and decisions, and terms of the General Operating Permit, subject to any legitimate appeal available to an applicant under the Missouri Clean Water law of the Missouri Clean Water commission. Further, by my signature, I understand that I am fully responsible, along with all other contractors and subcontractors signing such certifications who are performing work activities under this contract to comply with all provisions and requirements of the General Operating permit and this SWPPP. I understand that I, and my company, are legally required under the federal Clean Water Act and the code of Missouri, to ensure compliance with the terms and conditions of the General Operating Permit and this SWPPP. I further certify that I and my company shall provide all necessary training and continuing education to all applicable personnel and subcontractors to ensure a complete understanding of all provision and requirements of the General Operating Permit and this SWPPP prior to these entities beginning any work activities on this site.

OWNER/OPERATOR CERTIFICATION

Signature: Matthew Prenger Jr Date: 12-9-24

Print Name and Title: MATTHEUW PRENGER, COUNTY ENGINEER

Company Name: COLE COUNTY PUBLIC WORKS

GENERAL CONTRACTOR CERTIFICATION

Signature: _____ Date: _____

Print Name and Title: _____

Company Name: _____

PREPARER DECLARATION

I hereby declare that the Site Maps, Construction Plans, Land Disturbance Plans, and information contained within this SWPPP has been prepared under my direction or supervision in accordance with applicable Local, State and Federal Regulations and that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Signature: Cody Darr Date: 2024-12-06

Print Name and Title: CODY DARR, PROJECT ENGINEER

Company Name: CENTRAL MISSOURI PROFESSIONAL SERVICES, INC.

For Information Only Bidders shall purchase a set of plans and bid documents from ADS.

Appendix A

(Site Maps, Full Size Plans Not included in PDF Version of SWPPP)

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Appendix B

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Michael L. Parson
Governor

Dru Buntin
Director

July 8, 2022

Andy Myers
Cole County Public Works
5055 Monticello Road
Jefferson City, MO 65101

Dear Permittee:

Pursuant to the Federal Water Pollution Control Act, under the authority granted to the State of Missouri and in compliance with the Missouri Clean Water Law, we have issued and are enclosing your Missouri State Operating Permit for Cole County, MOR-100034.

Please read and review your permit and attached Standard Conditions. They contain important information on site management and reporting requirements. Quarterly reports required by this report must be submitted through our Electronic Discharge Monitoring Report (eDMR) Submission System.

This permit may include requirements with which you may not be familiar. If you would like the Missouri Department of Natural Resources to meet with you to discuss how to satisfy the permit requirements, an appointment can be set up by contacting the permit writer at 573-526-1139. These visits are called Compliance Assistance Visits and focus on explaining the requirements to the permit holder.

This permit is both your Federal NPDES Permit and your new Missouri State Operating Permit and replaces all previous State Operating Permits issued for this facility under this permit number. In all future correspondence regarding this facility, please refer to your State Operating Permit number and facility name as shown on page one of the permit.

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to 10 CSR 20-1.020 and 10 CSR 20-6.020; RSMo Section 621.250, 640.013, and 644.051.6. To appeal, you must file a petition with the AHC within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Contact information for the AHC is: Administrative Hearing Commission, Truman State Office Building, Room 640, 301 W. High Street, P.O. Box 1557, Jefferson City, MO 65102, phone: 573-751-2422, fax: 573-751-5018; website: http://ahc.mo.gov/.

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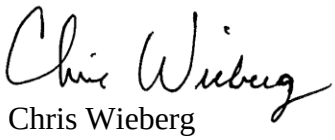
Please be aware that this facility may also be subject to any applicable county or other local ordinances or restrictions. If you have any questions concerning this permit, please do not hesitate to contact the Water Protection Program at P.O. Box 176, Jefferson City, MO 65102, 573-522-4502.

Sincerely,

WATER PROTECTION PROGRAM



Chris Wieberg
Director

CW:vs

Enclosure

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STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION

MISSOURI STATE OPERATING PERMIT

General Operating Permit

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No	MOR100034
Owner:	Cole County
Address:	301 E High Street Room 200 Jefferson City, MO 65109
Continuing Authority:	Cole County Road and Bridge Department 5055 Monticello Rd. Jefferson City, MO 65109
Facility Name:	Cole County Public Works
Facility Address:	5055 Monticello Rd JEFFERSON CITY, MO 65109
Legal Description:	Sec. 04, T43N, R12W, Cole County
UTM Coordinates:	565135.257/4262453.883
Receiving Stream:	Tributary to Moreau R (U)
First Classified Stream - ID#:	100K Extent-Remaining Streams (C) 3960.00
USGS# and Sub Watershed#:	10300102 - 1206

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein.

FACILITY DESCRIPTION

All Outfalls SIC #1629

All Outfalls - Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading, filling and other activity that results in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution of waters of the state)
Issued to a city, county, state or federal agency, other governmental jurisdiction, or other private area-wide projects as determined by the Department on a case-by-case basis

This permit authorizes only wastewater, including storm water, discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System, it does not apply to other regulated areas. This permit may be appealed in accordance with RSMo Section 644.051.6 and 621.250, 10 CSR 20-6.020, and 10 CSR 20-1.020.

July 05, 2022
Issue Date

Chris Wieberg, Director
Water Protection Program

July 04, 2027
Expiration Date

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I. APPLICABILITY

A. Permit Coverage and Authorized Discharges

1. This Missouri State Operating Permit (permit) authorizes the discharge of stormwater and certain non-stormwater discharges from land disturbance sites that disturb one or more acres, or disturb less than one acre when part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project.

   A Missouri State Operating Permit must be issued before any site vegetation is removed or the site disturbed. Any site owner/operator subject to these requirements for stormwater discharges and who disturbs land prior to permit issuance from the Missouri Department of Natural Resources (Department) is in violation of both State regulations per 10 CSR 20-6.200(1)(A) and Federal regulations per 40 CFR 122.26. The owner/operator of this permit is responsible for compliance with this permit [10 CSR 20-6.200 (3)(B)].

2. This general permit is issued to a city, county, state or federal agency, other governmental jurisdiction, or other private area-wide projects as determined by the Department on a case-by-case basis, for land disturbance projects performed by or under contract to the permittee.

3. This permit authorizes stormwater discharges from land disturbance support activities (e.g., equipment staging yards, material storage areas, excavated material disposal areas, borrow areas, concrete, or asphalt batch plants) provided appropriate stormwater controls are designed, installed, and maintained and the following conditions are met and addressed in the Stormwater Pollution Prevention Plan (SWPPP). The permittee is responsible for compliance with this permit for any stormwater discharges from construction support activity.
   (a) The support activity is directly related to the construction site required to have permit coverage for stormwater discharges;
   (b) The support activity is not a commercial operation or serve multiple unrelated construction sites;
   (c) The support activity does not continue to operate beyond the completion of the construction activity at the project it supports;
   (d) Sediment and erosion controls are implemented in accordance with the conditions of this permit; and
   (e) The support activity is strictly stormwater discharges or non-stormwater discharges listed in PART I, APPLICABILTY, Condition A.4. Support activities which discharge process water shall apply for separate coverage (e.g.,a concrete batch plant discharging process water shall be covered under a MOG49).

4. This permit authorizes non-stormwater discharges associated with your construction activity from the following activities provided that these discharges are treated by appropriate Best Management Practices (BMPs) where applicable and addressed in the permittee's site specific SWPPP required by this general permit:
   (a) Discharges from emergency fire-fighting activities;
   (b) Hydrant flushing and water line flushing, provided the discharged water is managed to avoid instream water quality impacts;
   (c) Landscape watering, including to establish vegetation;
   (d) Water used to control dust;
   (e) Waters used to rinse vehicles and equipment, provided there is no discharge of soaps, solvents, or detergents used for such purposes;
   (f) External building washdown, provided soaps, solvents, and detergents are not used, and external surfaces do not contain hazardous substances (e.g., paint or caulk containing polychlorinated biphenyls (PCBs))
   (g) Pavement wash waters, provided spills or leaks of toxic or hazardous substances have not occurred (unless all spill material has been removed) and where soaps, solvents, and detergents are not used. Directing pavement wash waters directly into any water of the state, storm drain inlet, or stormwater conveyance (constructed or natural site drainage features), unless the conveyance is connected to an effective control, is prohibited;
   (h) Uncontaminated air conditioning or compressor condensate;
   (i) Uncontaminated, non-turbid discharges of ground water or spring water;
   (j) Foundation or footing drains where flows are not contaminated with process materials; and
   (k) Uncontaminated construction dewatering water discharged in accordance with requirements found in this permit for specific dewatering activities.

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B. Permit Restrictions and Limitations

1. This permit does not authorize the discharge of process wastewaters, treated or otherwise.

2. For sites operating within the watershed of any Outstanding National Resource Water (which includes the Ozark National Riverways and the National Wild and Scenic Rivers System), sites that discharge to an Outstanding State Resource Water, or facilities located within the watershed of an impaired water as designated in the Clean Water Act (CWA) Section 303(d) list with an impairment for sedimentation/siltation:
   (a) This permit authorizes stormwater discharge provided no degradation of water quality occurs due to discharges from the permitted facility per 10 CSR 20-7.031(3)(C).
   (b) A site with a discharge found to be causing degradation or contributing to an impairment by discharging a pollutant of concern, during an inspection or through complaint investigations, may be required to become a no discharge facility or obtain a site-specific permit with more stringent monitoring and SWPPP requirements.

3. This permit does not allow placement of fill material into any stream or wetland, alteration of a stream channel, or obstruction of stream flow unless the appropriate CWA Section 404 permitting authority provides approval for such actions or determines such actions are exempt from Section 404 jurisdiction. Additionally, this permit does not authorize placement of fill in floodplains unless approved or determined exempt by appropriate federal and/or state floodplain development authorities.

4. This operating permit does not affect, remove, or replace any requirement of the National Environmental Policy Act; the Endangered Species Act; the National Historic Preservation Act; the Comprehensive Environmental Response, Compensation and Liability Act; the Resource Conservation and Recovery Act; or any other relevant acts. Determination of applicability to the above mentioned acts is the responsibility of the permittee. Additionally, this permit does not establish terms and conditions for runoff resulting from silvicultural activities listed in Section 402(l)(3)(a) of the Clean Water Act.

5. Compliance with all requirements in this permit does not supersede any requirement for obtaining project approval from an established local authority nor remove liability for compliance with county and other local ordinances.

6. The Department may require any facility or site authorized by a general permit to apply for a site-specific permit [10 CSR 20-6.010(13)(C)].

7. If a facility or site covered under a current general permit desires to apply for a site-specific permit, the facility or site may do so by contacting the Department for application requirements and procedures.

8. Any discharges not expressly authorized in this permit and not clearly disclosed in the permit application cannot become authorized or shielded from liability under CWA section 402(k) or Section 644.051.16, RSMo, by disclosure to EPA, state, or local authorities after issuance of this permit via any means, including any other permit applications, funding applications, the SWPPP, discharge monitoring reporting, or during an inspection. Discharges at the facility not expressly authorized by this permit must be covered by another permit, be exempt from permitting, or be authorized through some other method.

II. EXEMPTIONS FROM PERMIT REQUIREMENTS

1. Sites that discharge all stormwater runoff directly to a combined sewer system (as defined in 40 CFR 122.26 and 40 CFR 35.2005) connecting to a publicly owned treatment works which has consented to receive such a discharge are exempt from Department stormwater permit requirements.

2. Land disturbance activities that disturb less than one (1) acre of total land area which are not part of a common plan or sale where water quality standards are not exceeded are exempt from Department stormwater permit requirements.

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3. Oil and gas related activities as listed in 40 CFR 122.26(a)(2)(ii) where water quality standards are not exceeded are exempt from Department stormwater permit requirements.

4. Linear, strip, or ribbon construction or maintenance operations meeting one (1) of the following criteria are exempt from Department stormwater permit requirements:
   (a) Grading of existing dirt or gravel roads which does not increase the runoff coefficient and the addition of an impermeable surface over an existing dirt or gravel road;
   (b) Cleaning or routine maintenance of roadside ditches, sewers, waterlines, pipelines, utility lines, or similar facilities;
   (c) Trenches two (2) feet in width or less; or
   (d) Emergency repair or replacement of existing facilities as long as BMPs are employed during the emergency repair.

III. REQUIREMENTS

1. The permittee shall post a public notification sign at the main entrance to the site, or a publically visible location, with the specific MOR100 permit number. The public notification sign must be visible from the public road that provides access to the site's main entrance. An alternate location is acceptable provided the public can see it and it is noted in the SWPPP. The public notification sign must remain posted at the site until the site is finalized.

2. The permittee shall be responsible for notifying the land owner and each contractor or entity (including utility crews and city employees or their agents) who will perform work at the site of the existence of the SWPPP and what actions or precautions shall be taken while on site to minimize the potential for erosion and the potential for damaging any BMP. The permittee is responsible for any damage a subcontractor may do to established BMPs and any subsequent water quality violation resulting from the damage.

3. Ensure the design, installation, and maintenance of effective erosion and sediment controls to minimize the discharge of pollutants. At a minimum, such controls must be designed, installed, and maintained to:
   (a) Control stormwater volume, velocity, and peak flow rates to minimize soil erosion;
   (b) Control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion and scour;
   (c) Minimize the amount of exposed soil during construction activity;
   (d) Minimize the disturbance of steep slopes;
   (e) Minimize sediment discharges from the site. Address factors such as:
      1) The amount, frequency, intensity, and duration of precipitation;
      2) The nature of resulting stormwater runoff;
      3) Expected flow from impervious surfaces, slopes, and drainage features; and
      4) Soil characteristics, including the range of soil particle size expected to be present on the site.
   (f) Provide and maintain natural buffers around surface waters as detailed in Part V. BMP REQUIREMENTS Condition 7, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration and filtering, unless infeasible; and
   (g) Minimize soil compaction and preserve topsoil where practicable.

   A 2-year, 24-hour storm event can be determined for the project location using the National Oceanic and Atmospheric Administration's National Weather Service Atlas 14 which can be located at https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html, or the permittee can determine local rainfall distribution for a 2-year, 24 hours storm event using multi-decade local high density rain gauge data, as approved by the Department.

4. BMPs for land disturbance [10 CSR 20-6.200(1)(D)2] are a schedule of activities, practices, or procedures that reduces the amount of soil available for transport or a device that reduces the amount of suspended solids in runoff before discharge to waters of the state. The term BMPs are also used to describe the sediment and erosion controls and other activities used to prevent stormwater pollution. BMPs are divided into two main categories: structural or non-structural; and they are also classified as temporary or permanent.
   Temporary BMPs may be added and removed as necessary with updates to the SWPPP as specified in the requirements below.

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5. Installation of BMPs necessary to prevent soil erosion and sedimentation at the downgradient project boundary (e.g. buffers, perimeter controls, exit point controls, storm drain inlet protection) must be complete prior to the start of all phases of construction. By the time construction activity in any given portion of the site begins, downgradient BMPs must be installed and operational to control discharges from the initial site clearing, grading, excavating, and other earth-disturbing activities. Additional BMPs shall be installed as necessary throughout the life of the project.

6. All BMPs shall be maintained and remain in effective operating condition during the entire duration of the project, with repairs made within the timeframes specified elsewhere in this permit, until final stabilization has been achieved.
   (a) Ensure BMPs are protected from activities that would reduce their effectiveness.
   (b) Remove any sediment per the BMP manufacturer's instructions or before it has accumulated to one-half of the above-ground height of any BMP that collects sediment (i.e., silt fences, sediment traps, etc.)
   (c) The project is considered to achieve final stabilization when Part V. BMP REQUIREMENTS, Condition 13 is met.

7. Minimize sediment trackout from the site and sediment transport onto roadways.
   (a) Restrict vehicle traffic to designated exit points.
   (b) Use appropriate stabilization techniques or BMPs at all points that exit onto paved roads or areas outside of the site.
   (c) Use additional controls or BMPs to remove sediment from vehicle and equipment tires prior to exit from facility where necessary.
   (d) Any sediment or debris that is tracked out past the exit pad or is deposited on a roadway after a precipitation event shall be removed by the shorter of either the same business day (for business days only), or by the end of the next business day if track-out occurs on a non-business day, and before predicted rain events. Remove the track-out sediment by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. Sediment or debris tracked out on pavement or other impervious surfaces shall not be disposed of into any stormwater conveyance, storm drain inlet, or water of the state.
   (e) Stormwater inlets susceptible to receiving sediment or other pollutants from the permitted land disturbance site shall have curb inlet protection. This may include inlets off the active area where track out from vehicles and equipment could impact the stormwater runoff to those inlets.

8. Concrete washout facilities shall be used to contain concrete waste from the activities onsite, unless the washout of trucks and equipment is managed properly at an off-site location.
   The washout facility shall be managed to prevent solid and/or liquid waste from entering waters of the state by the following:
   (a) Direct the wash water into leak-proof containers or pits designed so that no overflows can occur due to inadequate sizing or precipitation;
   (b) Locate washout activities away from waters of the state, stormwater inlets, and/or stormwater conveyances where practicable. If not practicable, use BMPs to reduce risk of waste leaving the washout facility;
   (c) Washout facilities shall be cleaned, or new facilities must be constructed and ready for use, once the washout is 75% full;
   (d) Designate the washout area(s) and conduct such activities only in these areas.
   (e) Ensure contractors are aware of the location, such as by marking the area(s) on the map or signage visible to the truck and/or equipment operators.

9. Good housekeeping practices shall be maintained at all times to keep waste from entering waters of the state.
   (a) Provide solid and hazardous waste management practices, including providing trash containers, regular site cleanup for proper disposal of solid waste such as scrap building material, product/material shipping waste, food/beverage containers, spent structural BMPs;
   (b) Provide containers and methods for proper disposal of waste paints, solvents, and cleaning compounds.
   (c) Manage sanitary waste. Portable toilets shall be positioned so that they are secure and will not be tipped or knocked over and so that they are located away from waters of the state and stormwater inlets and stormwater conveyances.
   (d) Ensure the storage of construction materials be kept away from drainage courses, stormwater conveyances, storm drain inlets, and low areas.

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10. All fueling facilities present shall at all times adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers.

11. Any hazardous wastes that are generated onsite shall be managed, stored, and transported according to the provisions of the Missouri Hazardous Waste Laws and Regulations.

12. Store all paints, solvents, petroleum products, petroleum waste products, and storage containers (such as drums, cans, or cartons) so they are not exposed to stormwater or provide other prescribed BMPs (such as plastic lids and/or portable spill pans) to prevent the commingling of stormwater with container contents. Commingled water may not be discharged under this permit. Provide spill prevention, control, and countermeasures to contain the spill. Any containment system used to implement this requirement shall be constructed of materials compatible with the substances contained and shall prevent the contamination of groundwater.

13. Implement measures intended to prevent the spillage or loss of fluids, oil, grease, fuel, etc. from vehicles and equipment to thereby prevent the contamination of stormwater from these substances. This may include prevention measures such as, but not limited to, utilizing drip pans under vehicles and equipment stored outdoors, covering fueling areas, using dry clean-up methods, use of absorbents, and cleaning pavement surfaces to remove oil and grease.

14. Spills, Overflows, and Other Unauthorized Discharges.
    (a) Any spill, overflow, or other discharge not specifically authorized in the permit above are unauthorized.
    (b) Should an unauthorized discharge cause or permit any contaminants, other than sediment, or hazardous substance to discharge or enter waters of the state, the unauthorized discharge must be reported to the regional office as soon as practicable but no more than 24 hours after the discovery of the discharge. If the spill or overflow needs to be reported after normal business hours or on the weekend, the facility must call the Department's Environmental Emergency Response hotline at (573) 634-2436. Leaving a message on a Department staff member voice-mail does not satisfy this reporting requirement.
    (c) A record of all spills shall be retained with the SWPPP and made available to the Department upon request.
    (d) Other spills not reaching waters of the state must be cleaned up as soon as possible to prevent entrainment in stormwater but are not required to be reported to the Department.

15. The full implementation of this operating permit shall constitute compliance with all applicable federal and state statutes and regulations in accordance with RSMo 644.051.16 and the CWA §402(k); however, this permit may be reopened and modified or alternatively revoked and reissued to comply with any applicable effluent standard or limitation issued or approved under Clean Water Act §§ 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) if the effluent standard or limitation so issued or approved contains different conditions or is otherwise more stringent than any effluent limitation in the permit or controls any pollutant not limited in the permit. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, termination, notice of planned changes, or anticipated non-compliance does not stay any permit condition.

IV. STORMWATER POLLUTION PREVENTION PLAN (SWPPP) MANAGEMENT REQUIREMENTS

1. The primary requirement of this permit is the development and implementation of a SWPPP which incorporates site specific practices to best minimize the soil exposure, soil erosion, and the discharge of pollutants, including solids for each site covered under this permit.

   The purpose of the SWPPP is to ensure the design, implementation, management, and maintenance of BMPs in order to prevent sediment and other pollutants in stormwater discharges associated with the land disturbance activities [40 CFR 122.44 (k)(4)] from entering waters of the state above established general and narrative criteria; compliance with Missouri Water Quality Standards; and compliance with the terms and conditions of this general permit.

   (a) **The SWPPP must be developed and implemented prior to conducting any land disturbance activities and must be specific to the land disturbance activities at the site.**
   (b) The permittee shall fully implement the provisions of the SWPPP required under this permit as a condition of this general permit throughout the term of the land disturbance project. Failure to develop, implement, and maintain a SWPPP may lead to immediate enforcement action.

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(c) The SWPPP shall be updated any time site conditions warrant adjustments to the project or BMPs.
(d) Either an electronic copy or a paper copy of the SWPPP, and any required reports, must be accessible to anyone on site at all times when land disturbance operations are in process or other operational activities that may affect the maintenance or integrity of the BMP structures and made available as specified under Part VIII. STANDARD PERMIT CONDITIONS, Condition 1 of this permit. The SWPPP shall be readily available upon request and should not be sent to the Department unless specifically requested

2. Failure to implement and maintain the BMPs chosen, which can be revised and updated, is a permit violation. The chosen BMPs will be the most reasonable and cost effective while also ensuring the highest quality water discharged attainable for the facility. Facilities with established SWPPPs and BMPs shall evaluate BMPs on a regular basis and change the BMPs as needed if there are BMP deficiencies.

3. The SWPPP must:
(a) List and describe the location of all outfalls;
(b) List any allowable non-stormwater discharges occurring on site and where these discharges occur;
(c) Incorporate required practices identified below;
(d) Incorporate sediment and erosion control practices specific to site conditions;
(e) Discuss whether or not a 404 Permit is required for the project; and
(f) Name the person(s) responsible for inspection, operation, and maintenance of BMPs. The SWPPP shall list the names and describe the role of all owners/primary operators (such as general contractor, project manager) responsible for environmental or sediment and erosion control at the land disturbance site.

4. The SWPPP briefly must describe the nature of the land disturbance activity, including:
(a) The function of the project (e.g., low density residential, shopping mall, highway, etc.);
(b) The intended sequence and timing of activities that disturb the soils at the site; and
(c) Estimates of the total area expected to be disturbed by excavation, grading, or other land disturbance support activities including off-site borrow and fill areas;

5. In order to identify the site, the SWPPP shall include site information including size in acres. The SWPPP shall have sufficient information to be of practical use to contractors and site construction workers to guide the installation and maintenance of BMPs.

6. The function of the SWPPP and the BMPs listed therein is to prevent or minimize pollution to waters of the state. A deficiency of a BMP means it was not effective in preventing or minimizing pollution of waters of the state.

The permittee shall select, install, use, operate and maintain appropriate BMPs for the permitted site. The following manuals are acceptable resources for the selection of appropriate BMPs.

Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites, (Document number EPA 833-R-06-004) published by the United States Environmental Protection Agency (USEPA) in May 2007. This manual as well as other information, including examples of construction SWPPPs, is available at the USEPA internet site at https://www.epa.gov/sites/production/files/2015-10/documents/sw_swppp_guide.pdf; and https://www.epa.gov/npdes/developing-stormwater-pollution-prevention-plan-swppp.

The latest version of *Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri,* published by the Department. This manual is available at: https://dnr.mo.gov/document-search/protecting-water-quality-field-guide.

The permittee is not limited to the use of these guidance manuals. Other guidance publications may be used to select appropriate BMPs. However, all BMPs must be described and justified in the SWPPP. Although the use of these manuals or other resources is recommended and may be used for BMP selection, they do not supersede the conditions of this permit. They may be used to inform in the decision making process for BMP selection but they are not themselves part of the permit conditions.

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The permittee may retain the SWPPP, inspection reports, and all other associated documents (including a copy of this permit) electronically pursuant to RSMo 432.255. The documents must be made available to all interested persons in either paper or electronic format as required by this permit and the permittee must remit a copy (electronic or otherwise) of the SWPPP and inspection reports to the Department upon request.

7. The SWPPP must contain a legible site map, multiple maps if necessary, identifying:
   (a) Site boundaries of the property;
   (b) Locations of all waters of the state (including wetlands) within the site and half a mile downstream of the site's outfalls;
   (c) Location of all outfalls;
   (d) Direction(s) of stormwater flow (use arrows) and approximate slopes before and after grading activities;
   (e) Areas of soil disturbance and areas that will not be disturbed (or a statement that all areas of the site will be disturbed unless otherwise noted);
   (f) Location of structural and non-structural BMPs, including natural buffer areas, identified in the SWPPP;
   (g) Locations where stabilization practices are expected to occur;
   (h) Locations of on-site and off-site material, waste, borrow, or equipment storage areas and stockpiles;
   (i) Designated points where vehicles will exit the site;
   (j) Location of stormwater inlets and conveyances including ditches, pipes, man-made conduits, and swales; and
   (k) Areas where final stabilization has been achieved.

8. An individual shall be designated by the permittee as the environmental lead. This environmental lead shall have knowledge in erosion, sediment, and stormwater control principles, knowledge of the permit, and the site's SWPPP. The environmental lead shall ensure all personnel and contractors understand any requirements of this permit may be affected by the work they are doing. The environmental lead or designated inspector(s) knowledgeable in erosion, sediment, and stormwater control principles shall inspect all structures that function to prevent or minimize pollution of waters of the state.

9. Throughout coverage under this permit, the permittee shall amend and update the SWPPP as appropriate during the term of the land disturbance activity. All SWPPP modifications shall be signed and dated. The permittee shall amend the SWPPP to incorporate any significant site condition changes which impact the nature and condition of stormwater discharges. At a minimum, these changes include whenever the:
   (a) Location, design, operation, or maintenance of BMPs is changed;
   (b) Design of the construction project is changed that could significantly affect the quality of the stormwater discharges;
   (c) The permittee's inspections indicate deficiencies in the SWPPP or any BMP;
   (d) Department notifies the permittee in writing of deficiencies in the SWPPP;
   (e) SWPPP is determined to be ineffective in minimizing or controlling erosion and sedimentation (e.g., there is visual evidence of excessive site erosion or sediment deposits in streams, lakes, or downstream waterways, sediment or other wastes off site); and/or
   (f) Department determines violations of water quality standards may occur or have occurred.

10. Site Inspections: The environmental lead, or a designated inspector, shall conduct regularly scheduled inspections. These inspections shall be conducted by a qualified person, one who is responsible for environmental matters at the site, or a person trained by and directly supervised by the person responsible for environmental matters at the site. Site inspections shall include, at a minimum, the following:
   (a) For disturbed areas that have not achieved final stabilization, all installed BMPs and other pollution control measures shall be inspected to ensure they are properly installed, appear to be operational, and are working as intended to minimize the discharge of pollutants.
   (b) For areas on site that have achieved either temporary or final stabilization, while at the same time active construction continues on other areas, ensure that all stabilization measures are properly installed, appear to be operational, and are working as intended to minimize the discharge of pollutants.
   (c) Inspect all material, waste, borrow, and equipment storage and maintenance areas that are covered by this permit. Inspect for conditions that could lead to spills, leaks, or other accumulations of pollutants on the site.
   (d) Inspect all areas where stormwater typically flows within the site, including drainage ways designed to divert, convey, and/or treat stormwater.

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(e) All stormwater outfalls shall be inspected for evidence of erosion, sediment deposition, or impacts to the receiving stream. If a discharge is occurring during an inspection, the inspector must observe and document the visual quality of the discharge and take note of the characteristics of the stormwater discharge, including turbidity, color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of stormwater pollutants.
(f) When practicable the receiving stream shall also be inspected for a minimum of 50 feet downstream of the outfall.
(g) The perimeter of the site shall be inspected for evidence of BMP failure to ensure concentrated flow does not develop a new outfall.
(h) The SWPPP must explain how the environmental lead will be notified when stormwater runoff occurs.

11. Inspection Frequency: All BMPs must be inspected in accordance to one of the schedules listed below. The inspection frequency shall be documented in the SWPPP, and any changes to the frequency of inspections, including switching between the options listed below, must be documented on the inspection form:
(a) At least once every seven (7) calendar days and within 48 hours after any storm event equal to or greater than a 2-year, 24-hour storm has ceased during a normal work day or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday; or
(b) Once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches of precipitation or greater, or the occurrence of runoff from snowmelt. To determine if a storm event of 0.25 inches or greater has occurred on the site, the permittee shall either keep a properly maintained rain gauge on site, or obtain the storm event information from a weather station near the site location.
1) Inspections are only required during the project's normal working hours.
2) An inspection must be conducted within 24 hours of a storm event which has produced 0.25 inches. The inspection shall be conducted within 24 hours of the event end, or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.
3) If it is elected to inspect every 14 calendar days and there is a storm event at the site that continues for multiple days, and each day of the storm produces 0.25 inches or more of rain, the permittee shall conduct an inspection within 24 hours of the end of the storm or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.
(c) Areas on site that have achieved stabilization, while at the same time active construction continues on other areas, may reduce inspection frequency to monthly, for those stabilized areas, if the following conditions exist:
1) For areas where disturbed portions have undergone temporary stabilization, inspections shall occur at least once a month while stabilized and when re-disturbed shall follow either frequency outlined in (a),(b), or (c) above.
2) Areas on site that have achieved final stabilization must be inspected at least once per month until the permit is terminated.
(d) If construction activities are suspended due to frozen conditions, the permittee may temporarily reduce site inspections to monthly until thawing conditions begin to occur if all of the following are met:
1) Land disturbances have been suspended; and
2) All disturbed areas of the site have been stabilized in accordance with Part V. BMP REQUIREMENTS, Condition 13.
3) The change shall be noted in the SWPPP.
(e) Any basin dewatering shall be inspected daily when discharge is occurring. The discharge shall be observed and dewatering activities shall be ceased immediately if the receiving stream is being impacted. These inspections shall be noted on a log or on the inspection report.

If weather conditions or other issues prevent correction of BMPs within seven calendar days, the reasons for the delay must be documented (including pictures), and there must be a narrative explaining why the work cannot be accomplished within the seven day time period. The documentation must be filed with the regular inspection reports. The corrections shall be made as soon as weather conditions or other issues allow.

12. Site Inspection Reports: A log of each inspection and/or copy of the inspection report shall be kept readily accessible and must be made available upon request by the Department. Electronic logs are acceptable as long as reports can be provided within 24 hours. If inspection reports are kept off site, the SWPPP must indicate where they are stored. The inspection report shall be signed by the environmental lead or designated inspector (electronically or otherwise).
(a) The inspection report is to include the following minimum information:
1) Inspector's name and title.
2) Date and time of inspection.
3) Observations relative to the effectiveness of the BMPs and stabilization measures. The following must be

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documented:
a. Whether BMPs are installed, operational, and working as intended;
b. Whether any new or modified stormwater controls are needed;
c. Facilities examined for conditions that could lead to spill or leak;
d. Outfalls examined for visual signs of erosion or sedimentation at outfalls. Excessive erosion or sedimentation may be due to BMP failure or insufficiency. Response to observations should be addressed in the inspection report.

4) Corrective actions taken or necessary to correct the observed problem.
5) Listing of areas where land disturbance operations have permanently or temporarily stopped.

13. Any structural or maintenance deficiencies for BMPs or stabilization measures shall be documented and corrected as soon as possible but no more than seven (7) calendar days after the inspection.
(a) Corrective action documentation shall be stored with the associated site inspection report.
(b) Immediately take all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events.
(c) If weather conditions or other issues prevent correction of BMPs within seven calendar days, the reasons for the delay must be documented (this may include pictures) and there must be a narrative explaining why the work cannot be accomplished within the seven day time period. The permittee shall correct the problem as soon as weather conditions or issues allow.
(d) Corrective actions may be required by the Department. The permittee must comply with any corrective actions required by the Department as a result of permit violations found during an inspection.

V. BMP REQUIREMENTS

1. The information, practices, and BMP requirements in this section shall be implemented on site and, where noted, provided for in the SWPPP.

2. Existing vegetation and trees shall be preserved where practicable. The permittee is encouraged to preserve topsoil where practicable.

3. The permittee shall select appropriate BMPs for use at the site and list them in the SWPPP. When selecting effective BMPs, the permittee shall consider stormwater volume and velocity. A BMP that has demonstrated ineffectiveness in preventing or minimizing sediment or other pollutants from leaving a given site shall be replaced with a more effective BMP, or additional and sequential BMPs and treatment devices may be incorporated as site conditions allow. The permittee should consider a schedule for performing erosion control measures when selecting BMPs.

4. The SWPPP shall include a description of both structural and non-structural BMPs that will be used at the site.
(a) The SWPPP shall provide the following general information for each BMP which will be used one or more times at the site:
1) Physical description of the BMP;
2) Site conditions that must be met for effective use of the BMP;
3) BMP installation/construction procedures, including typical drawings; and
4) Operation and maintenance procedures and schedules for the BMP.
(b) The SWPPP shall provide the following information for each specific instance where a BMP is to be installed:
1) Whether the BMP is temporary or permanent;
2) When the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project; and
3) Site conditions that must be met before removal of the BMP if the BMP is not a permanent BMP.

5. Structural BMP Installation: The permittee shall ensure all BMPs are properly installed and operational at the locations and relative times specified in the SWPPP.
(a) Perimeter control BMPs for runoff from disturbed areas shall be installed before general site clearing is started. Note this requirement does not apply to earth disturbances related to initial site clearing and establishing entry, exit, or access of the site, which may require that stormwater controls be installed immediately after the earth

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disturbance.

(b) For phased projects, BMPs shall be properly installed as necessary prior to construction activities.

(c) Stormwater discharges which leave the site from disturbed areas shall pass through an appropriate impediment to sediment movement such as a sedimentation basin, sediment traps (including vegetative buffers), or silt fences prior to leaving the land disturbance site.

(d) A drainage course change shall be clearly marked on a site map and described in the SWPPP.

(e) If vegetative stabilization measures are being implemented, stabilization efforts are considered "installed" when all activities necessary to seed or plant the area are completed. Vegetative stabilization is not considered "operational" until the vegetation is established.

6. Install sediment controls along any perimeter areas of the site that are downgradient from any exposed soil or other disturbed areas. Prevent stormwater from circumventing the edge of the perimeter control. For sites where perimeter controls are infeasible, other practices shall be implemented to minimize discharges to perimeter areas of the site.

7. For surface waters of the state, defined in Section 644.016.1(27) RSMo, located on or adjacent to the site, the permittee must maintain a riparian buffer or structural equivalent in accordance with at least one of the following options. The selection and location must be described in the SWPPP.

(a) Provide and maintain a 50-foot undisturbed natural buffer; or

(b) Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer; or

(c) If infeasible to provide and maintain an undisturbed natural buffer of any size, implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.

(d) The permittee is not required to comply with (a), (b), or (c) above if one or more of the following exceptions apply and documentation is provided in the SWPPP:

1) As authorized per CWA Section 404 Department of the Army permit and its associated Section 401 Water Quality Certification from the Department.

2) If there is no discharge of stormwater to waters of the state through the area between the disturbed portions of the site and waters of the state located within 50 feet of the site. This includes situations where the permittee has implemented permanent control measures that will prevent such discharges, such as a berm or other barrier.

3) Where no natural buffer exists due to preexisting development disturbances that occurred prior to the initiation of planning for the current development of the site.

a. Where some natural buffer exists but portions of the area within 50 feet of the waters of the state are occupied by preexisting development disturbances the permittee is required to comply with (a), (b), or (c) above.

4) For linear projects where site constraints make it infeasible to implement a buffer or equivalent provided the permittee limit disturbances within 50 feet of any waters of the state and/or the permittee provides supplemental erosion and sediment controls to treat stormwater discharges from earth disturbances within 50 feet of the water of the state. The permittee must also document in the SWPPP the rationale for why it is infeasible for the permittee to implement (a), (b), or (c) and describe any buffer width retained and supplemental BMPs installed.

(e) Where the permittee is retaining a buffer of any size, the buffer should be measured perpendicularly from any of the following points, whichever is further landward from the water:

1) The ordinary high water mark of the water body, defined as the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris; or

2) The edge of the stream or river bank, bluff, or cliff, whichever is applicable.

8. Slopes for disturbed areas must be identified in the SWPPP. A site map or maps defining the sloped areas for all phases of the project must be included in the SWPPP. The disturbance of steep slopes shall be minimized.

9. Manage stockpiles or land clearing debris piles composed, in whole or in part, of sediment and/or soil.

(a) Locate the piles outside of any natural buffers zones, established under the condition above, and away from any stormwater conveyances, drain inlets, and areas where stormwater flow is concentrated;

(b) Install a sediment barrier along all downgradient perimeter areas;

(c) Divert surface flows around stockpiles to reduce and minimize erosion of the stockpile.

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(d) For piles that will be unused for 14 or more days, provide cover with appropriate temporary stabilization in accordance with Part V. BMP REQUIREMENTS, Condition 13.
(e) Rinsing, sweeping, or otherwise placing any soil, sediment, debris, or stockpiled product which has accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or water of the state is prohibited.

10. The site shall include BMPs for pollution prevention measures and shall be noted in the SWPPP. At minimum such measures must be designed, installed, implemented, and maintained to:
(a) Minimize the discharge of pollutants from equipment and vehicle rinsing; no detergents, additives, or soaps of any kind shall be discharged. Rinse waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
(b) Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to precipitation and to stormwater;
(c) Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures, including, but not limited to, the installation of containment berms and use of drip pans at petroleum product and liquid storage tanks and containers; and
(d) Prevent discharges from causing or contributing to an exceedance of water quality standards including general criteria.

11. Sedimentation Basins: The SWPPP shall include a sedimentation basin for each drainage area with ten or more acres disturbed at one time.
(a) The sedimentation basin shall be sized, at a minimum, to treat a local 2-year, 24-hour storm.
(b) Sediment basins shall not be constructed in any waters of the state or natural buffer zones.
(c) Discharges from dewatering activities shall be managed by appropriate controls. The SWPPP shall include a description of any anticipated dewatering methods and specific BMPs designed to treat dewatering water.
    1) Appropriate controls include, but are not limited to, sediment socks, dewatering tanks, tube settlers, weir tanks, filtration systems (e.g. bag or sand filters), and passive treatment systems that are designed to remove or retain sediment.
    2) Erosion controls and velocity dissipation devices (e.g., check dams, riprap, and vegetated buffers) to minimize erosion at inlets, outlets, and discharge points from shall be utilized.
    3) Water with an oil sheen shall not be discharged and shall be marked in SWPPP.
    4) Visible floating solids and foam shall not be discharged.
(d) Until final stabilization has been achieved, sediment basins and impoundments shall utilize outlet structures or floating skimmers that withdraw water from the surface when discharging.
    1) Under frozen conditions it may be considered infeasible to withdraw water from the surface and an exception can be made for that specific period as long as discharges that may contain sediment and other pollutants are managed by appropriate controls. If determined infeasible due to frozen conditions, documentation must be provided in the SWPPP to support the determination, including the specific conditions or time period when this exception applies.
(e) Accumulated sediment shall not exceed 50% of total volume or as prescribed in the design, whichever is less. Note in the SWPPP the locations for disposal of the material removed from sediment basins.
(f) Prevent discharges to the receiving stream causing excessive visual turbidity. For the purposes of this permit, visual turbidity refers to a sediment plume or other cloudiness in the water caused by sediment that can be identified by an observer.
(g) The SWPPP shall require the basin be maintained until final stabilization of the disturbed area served by the basin.

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Where use of a sediment basin is infeasible, the SWPPP shall evaluate and specify other similarly effective BMPs to be employed to control erosion and sediment. These similarly effective BMPs shall be selected from appropriate BMP guidance documents authorized by this permit. The BMPs must provide equivalent water quality protection to achieve compliance with this permit. The SWPPP shall require both temporary and permanent sedimentation basins to have a stabilized spillway to minimize the potential for erosion of the spillway or basin embankment.

12. Soil disturbing activities on site that have ceased either temporarily or permanently shall initiate stabilization immediately in accordance with the options below. For soil disturbing activities that have been temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days:
    (a) The permittee shall construct BMPs to establish interim stabilization; and
    (b) Stabilization must be initiated immediately and completed within 14 calendar days.
    (c) For soil disturbing activities that have been permanently ceased on any portion of the site, final stabilization of disturbed areas must be initiated immediately and completed within 14 calendar days.
        1) Allowances to the 14-day completion period for temporary and final stabilization may be made due to weather and equipment malfunctions. The use of allowances shall be documented in the SWPPP. Allowances may be determined unnecessary after review by the Department.
    (d) Until stabilization is complete, interim sediment control shall consist of well-established and maintained BMPs that are reasonably certain to protect waters of the state from sediment pollution over an extended period of time. This may require adding more BMPs to an area than is normally used during daily operations. The types of BMPs used must be suited to the area disturbed, taking into account the number of acres exposed and the steepness of the slopes. If the slope of the area is greater than 3:1 (three feet horizontal to one foot vertical), then the permittee shall establish interim stabilization within seven days of ceasing operations on that part of the site. The following activities would constitute the immediate initiation of stabilization:
        1) Prepping the soil for vegetative or non-vegetative stabilization as long as seeding, planting, and/or installation of non-vegetative stabilization products takes place as soon as practicable;
        2) Applying mulch or other non-vegetative product to the exposed areas;
        3) Seeding or planting the exposed areas;
        4) Finalizing arrangements to have stabilization product fully installed in compliance with the deadlines for completing stabilization.
    (e) If vegetative stabilization measures are being implemented, stabilization is considered “installed” when all activities necessary to seed or plant the area are completed. Installed does not mean established.
    (f) If non-vegetative stabilization measures are being implemented, stabilization is considered “installed” when all such measures are implemented or applied.
        1) Non-vegetative stabilization shall prevent erosion and shall be chosen for site conditions, such as slope and flow of stormwater.
    (g) Final stabilization is not considered achieved until vegetation has grown and established to meet the requirements below.

13. Prior to removal of BMPs, ceasing site inspections, and removing from the quarterly report, final stabilization must be achieved. Final stabilization shall be achieved as soon as possible once land disturbance activities have ceased. Document in the SWPPP the type of stabilization and the date final stabilization is achieved.
    (a) The project is considered to have achieved final stabilization when perennial vegetation (excluding volunteer vegetation), pavement, buildings, or structures using permanent materials (e.g., riprap, gravel, etc.) cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetation must be at least 70% coverage of 100% of the vegetated areas on site. Vegetation must be evenly distributed.
    (b) Disturbed areas on agricultural land are considered to have achieved final stabilization when they are restored to their preconstruction agricultural use. If former agricultural land is changing to non-agricultural use, this is no longer considered agricultural land and shall follow condition (a).
    (c) If the intended function of a specific area of the site necessitates that it remain disturbed, final stabilization is considered achieved if all of the following are met:
        1) Only the minimum area needed remains disturbed (i.e., dirt access roads, motocross tracks, utility pole pads, areas being used for storage of vehicles, equipment, materials). Other areas must meet the criteria above.

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2) Permanent structural BMPs (e.g., rock checks, berms, grading, etc.) or non-vegetative stabilization measures are implemented and designed to prevent sediment and other pollutants from entering waters of the state.
3) Inspection requirements in Part IV. SWPPP MANAGEMENT REQUIREMENT, Condition 11 are met and documented in the SWPPP.

(d) Winter weather and frozen conditions do not excuse any of the above final stabilization requirements. If vegetation is required for stabilization the permittee must maintain BMPs throughout winter weather and frozen conditions until thawing and vegetation meets final stabilization criteria above. Document stabilization attempts during frozen conditions in the SWPPP. Consider future freezing when removing vegetation and plan with temporary stabilization techniques before the ground becomes frozen.

VI. SITE FINALIZATION & PERMIT TERMINATION

1. Until a site is finalized, the permittee must comply with all conditions in the permit, including continuation of site inspections and reporting quarterly to the Department. To finalize the site and remove from this permit coverage, the site shall meet the following requirements:
   (a) For any areas that (1) were disturbed during construction, (2) are not covered over by permanent structures, and (3) over which the permittee had control during the construction activities, the requirements for final vegetative or non-vegetative stabilization in Part V. BMP REQUIREMENTS, Condition 13;
   (b) The permittee has removed and properly disposed of all construction materials, waste, and waste handling devices and has removed all equipment and vehicles that were used during construction, unless intended for long-term beyond construction phase;
   (c) The permittee has removed all temporary BMPs that were installed and maintained during construction, except those that are intended for long-term use or those that are biodegradable; and
   (d) The permittee has removed all potential pollutants and pollutant-generating activities associated with construction, unless needed for long-term use following the construction activities.

2. The permit may be terminated if;
   (a) There has been a transfer of control of all areas of the site for which the current permittee is responsible under this permit to another operator, and that operator has obtained coverage under this permit;
   (b) Active sites obtain coverage under an individual or alternative general NPDES permit, with land disturbance conditions; or
   (c) This permit may be terminated when all projects covered under this permit are finalized. In order to terminate the permit, the permittee shall notify the Department by submitting a Request for Termination along with the final quarterly report for the current calendar quarter.

VII. REPORTING AND SAMPLING REQUIREMENTS

1. The permittee is not required to sample stormwater under this permit. The Department may require sampling and reporting as a result of illegal discharges, compliance issues related to water quality concerns, or evidence of off-site impacts from activities at a site. If such an action is needed, the Department will specify in writing the sampling requirements including such information as location and extent. If the permittee refuses to perform sampling when required, the Department may terminate the general permit and require the facility to obtain a site-specific permit with sampling requirements.

2. Electronic Discharge Monitoring Report (eDMR) Submission System. The NPDES Electronic Reporting Rule, 40 CFR Part 127, reporting of any report required by the permit shall be submitted via an electronic system to ensure timely, complete, accurate, and nationally consistent set of data for the NPDES program. The eDMR system is currently the only Department-approved reporting method for this permit unless specified elsewhere in this permit, or a waiver is granted by the Department. The facility must register in the Department's eDMR system through the Missouri Gateway for Environmental Management (MoGEM) before the first report is due.

3. Permittees shall prepare a quarterly report with a list of active land disturbance sites including any off-site borrow or depositional areas associated with the construction project and submit the following information electronically as an

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attachment to the eDMR system until such a time when the current or a new system is available to allow direct input of the data:

(a) The name of the project;
(b) The location of the project (including the county);
(c) The name of the primary receiving water(s) for each project;
(d) A description of the project;
(e) The number of acres disturbed;
(f) The percent of completion of the project; and
(g) The projected date of completion.

The quarterly report(s) shall be maintained by the permittee and readily available for review by the Department at the address provided on the application as well as submitted quarterly via the Department's eDMR system. The permittee shall submit quarterly reports according to Table A.

Table A	**Schedule for Quarterly Reporting**
Activity for the months of:	Report is due:
January, February, March (1st Quarter)	April 28
April, May, June (2nd Quarter)	July 28
July, August, September (3rd Quarter)	October 28
October, November, December (4th Quarter)	January 28

VIII. STANDARD PERMIT CONDITIONS

1. Records: The permittee shall retain copies of this general permit, the SWPPP and all amendments for the site named in the State Operating Permit, results of any monitoring and analysis, and all site inspection records required by this general permit.
   (a) The records shall be accessible during normal business hours and retained for a period of at least three (3) years from the date of termination.
   (b) The permittee shall provide a copy (electronic or otherwise) of the SWPPP to the Department, USEPA, or any local agency or government representative if they request a copy in the performance of their official duties within 24 hours of the request (or next working day), unless given more time by the representative.
   (c) The permittee shall provide a copy of the SWPPP to those who are responsible for installation, operation, or maintenance of any BMP. The permittee, their representative, and/or the contractor(s) responsible for installation, operation and maintenance of the BMPs shall have a current copy of the SWPPP with them when on the project site.

2. Land Ownership and Change of Ownership: Federal and Missouri stormwater regulations [10 CSR 20-6.200(1) (B)] require a stormwater permit and erosion control measures for all land disturbances of one or more acres. These regulations also require a permit for less than one acre lots if the lot is part of a larger common plan of development or sale where that plan is at least one acre in size.
   (a) If the permittee sells any portion of a permitted site to a developer for commercial, industrial, or residential use, this land remains a part of the common sale and the new owner must obtain a permit prior to conducting any land disturbance activity. Therefore, the original permittee must amend the SWPPP to show that the property has been sold and, therefore, no longer under the original permit coverage.
   (b) Property of any size which is part of a larger common plan of development where the property has achieved final stabilization and the original permit terminated will require application of a new land disturbance permit for any future land disturbance activity unless the activity is by an individual residential building lot owner on a site less than one acre.
   (c) If a portion of a larger common plan of development is sold to an individual for the purpose of building his or her own private residence, a permit is required if the portion of land sold is equal to or greater than one acre. No permit is required, however, for less than one acre of land sold.

3. Permit Transfer: This permit may not be transferred to a new owner.

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4. Termination: This permit may be terminated when the project has achieved final stabilization, defined in Part VI. SITE FINALIZATION & PERMIT TERMINATION.
   (a) In order to terminate the permit, the permittee shall notify the Department by submitting the form Request for Termination of Operating Permit Form MO 780-2814. The form should be submitted to the appropriate regional office or through an approved electronic system if it should become available.
   (b) The Cover Page (Certificate Page) of the Master General Permit for Land Disturbance specifies the "effective date" and the "expiration date" of the Master General Permit. The "issued date" along with the "expiration date" will appear on the State Operating Permit issued to the applicant. **This permit does not continue administratively beyond the expiration date.**

5. Duty to Reapply: If the project or development completion date will be after the expiration date of this general permit, then the permittee must reapply to the Department for a new permit. This permit may be applied for and issued electronically in accordance with Section 644.051.10, RSMo.
   (a) Due to the nature of the electronic permitting system, a period of time may be granted at the discretion of the Department in order to apply for a new permit after the new version is effective. Applicants must maintain appropriate best management practices and inspections during the discretionary period.

6. Duty to Comply: The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and Federal Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

7. Modification, Revocation, and Reopening:
   (a) If at any time the Department determines that the quality of waters of the state may be better protected by reopening this permit, or revoking this permit and requiring the owner/operator of the permitted site to apply for a site-specific permit, the Department may revoke a general permit and require any person to obtain such an operating permit as authorized by 10 CSR20-6.010(13) and 10 CSR 20-6.200(1)(B).
   (b) If this permit is reopened, modified, or revoked pursuant to this Section, the permittee retains all rights under Chapter 536 and 644 Revised Statutes of Missouri upon the Department's reissuance of the permit as well as all other forms of administrative, judicial, and equitable relief available under law.

8. Other Information: Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.

9. Duty to Provide Information: The permittee shall furnish to the Department, within 24 hours unless explicitly granted more time in writing, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.

10. Inspection and Entry: The permittee shall allow the Department, or an authorized representative (including an authorized contractor acting as a representative of the Department), upon presentation of credentials and other documents as may be required by law, to:
   (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of the permit;
   (b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
   (c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
   (d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Federal Clean Water Act or Missouri Clean Water Law, any substances or parameters at any location.

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11. Signatory Requirement:
    (a) All permit applications, reports required by the permit, or information requested by the Department shall be signed and certified. (See 40 CFR 122.22 and 10 CSR 20-6.010)
    (b) The Federal Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit (including monitoring reports or reports of compliance or non-compliance) shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
    (c) The Missouri Clean Water Law provides that any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than ten thousand dollars, or by imprisonment for not more than six months, or by both.

12. Property Rights: This permit does not convey any property rights of any sort or any exclusive privilege.

13. Notice of Right to Appeal: If you were adversely affected by this decision, you may be entitled to pursue an appeal before the administrative hearing commission (AHC) pursuant to Sections 621.250 and 644.051.6 RSMo. To appeal, you must file a petition with the AHC within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Any appeal should be directed to:

Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: https://ahc.mo.gov

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MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

STORMWATER DISCHARGES FROM THIS LAND DISTURBANCE SITE ARE AUTHORIZED BY THE MISSOURI STATE OPERATING PERMIT NUMBER:

_____

ANYONE WITH QUESTIONS OR CONCERNS ABOUT STORMWATER DISCHARGES FROM THIS SITE, PLEASE CONTACT THE MISSOURI DEPARTMENT OF NATURAL RESOURCES AT

1-800-361-4827

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
FACT SHEET FOR MASTER GENERAL PERMIT
MO-R100XXX

The Federal Water Pollution Control Act [Clean Water Act (CWA)] Section 402 of Public Law 92-500 (as amended) established the National Pollution Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States and the release of stormwater from certain point sources. All such discharges are unlawful without a permit (Section 301 of the CWA). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Missouri State Operating Permits (MSOPs) are issued by the Missouri Department of Natural Resources (Department) under an approved program operated in accordance with federal and state laws (Federal CWA and Missouri Clean Water Law Section 644 as amended). Permits are issued for a period of five (5) years unless otherwise specified.

Per 40 CFR 124.56, 40 CFR 124.8, and 10 CSR 20-6.020(1)(A)2, a Fact Sheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the permit. A Fact Sheet is not an enforceable part of an MSOP.

DEFINITIONS FOR THE PURPOSES OF THIS PERMIT:

Common Promotional Plan: A plan undertaken by one (1) or more persons to offer lots for sale or lease; where land is offered for sale by a person or group of persons acting in concert, and the land is contiguous or is known, designated, or advertised as a common unit or by a common name or similar names, the land is presumed, without regard to the number of lots covered by each individual offering, as being offered for sale or lease as part of a common promotional plan.

Dewatering: The act of draining rainwater and/or groundwater from basins, building foundations, vaults, and trenches.

Effective Operating Condition: For the purposes of this permit, a stormwater control is kept in effective operating condition if it has been implemented and maintained in such a manner that it is working as designed to minimize pollutant discharges.

Emergency-Related Project: A project initiated in response to a public emergency (e.g. earthquakes, extreme flooding conditions, tornado, disruptions in essential public services, pandemic) for which the related work requires immediate authorization to avoid imminent endangerment to human health/safety or the environment or to reestablish essential public services.

Exposed Soils: For the purposes of this permit, soils that as a result of earth-disturbing activities are left open to the elements.

Immediately: For the purposes of this permit, immediately should be defined as within 24 hours.

Impervious Surface: For the purpose of this permit, any land surface with a low or no capacity for soil infiltration including, but not limited to, pavement, sidewalks, parking areas and driveways, packed gravel or soil, or rooftops.

Infeasible: Infeasible means not technologically possible or not economically practicable and achievable in light of best industry practices.

Install or Installation: When used in connection with stormwater controls, to connect or set in position stormwater controls to make them operational.

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Land Disturbance Site or Site: The land or water area where land disturbance activities will occur and where stormwater controls will be installed and maintained. The land disturbance site includes construction support activities, which may be located at a different part of the property from where the primary land disturbance activity will take place or on a different piece of property altogether. Off-site borrow areas directly and exclusively related to the land disturbance activity are part of the site and must be permitted.

Larger Common Plan of Development or Sale: A continuous area where multiple separate and distinct construction activities are occurring under one plan, including any off-site borrow areas that are directly and exclusively related to the land disturbance activity. Off-site borrow areas utilized for multiple different land disturbance projects are considered their own entity and are not part of the larger common plan of development or sale. See definition of Common Promotional Plan to understand what a 'common plan' is.

Minimize: To reduce and/or eliminate to the extent achievable using stormwater controls that are technologically available and economically practicable and achievable in light of best industry practices.

Non-structural Best Management Practices (BMPs): Institutional, educational, or pollution prevention practices designed to limit the amount of stormwater runoff or pollutants that are generated in the landscape. Examples of non-structural BMPs include picking up trash and debris, sweeping up nearby sidewalks and streets, maintaining equipment, and training site staff on stormwater control practices.

Operational: for the purposes of this permit, stormwater controls are made "operational" when they have been installed and implemented, are functioning as designed, and are properly maintained.

Ordinary High Water Mark: The line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation and/or the presence of litter and debris.

Peripheral: For the purposes of this permit, peripheral should be defined as the outermost boundary of the area that will be disturbed.

Permanently: For the purposes of this permit, permanently is defined as any activity that has been ceased without any intentions of future disturbance.

Pollution Prevention Controls (or Measures): Stormwater controls designed to reduce or eliminate the addition of pollutants to construction site discharges through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions.

Qualified Person (Inspections): A person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

Stormwater Control (also referred to as sediment/erosion controls): refers to any temporary or permanent BMP or other method used to prevent or reduce the discharge of pollutants to waters of the state.

Structural BMP: Physical sediment/erosion controls working individually or as a group (treatment train) appropriate to the source, location, and area climate for the pollutant to be controlled. Examples of structural BMPs include silt fences, sedimentation ponds, erosion control blankets, and seeding.

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Temporary Stabilization: A condition where exposed soils or disturbed areas are provided temporary vegetation and/or non-vegetative protective cover to prevent erosion and sediment loss. Temporary stabilization may include temporary seeding, geotextiles, mulches, and other techniques to reduce or eliminate erosion until either final stabilization can be achieved or until further construction activities take place to re-disturb this area.

Treatment Train: A multi-BMP approach to managing the stormwater volume and velocity and often includes erosion prevention and sediment control practices often applied when the use of a single BMP is inadequate in preventing the erosion and transport of sediment. A good option to utilize as a corrective action.

Volunteer Vegetation: A volunteer plant is a plant that grows on its own, rather than being deliberately planted for stabilization purposes. Volunteers often grow from seeds that float in on the wind, are dropped by birds, or are inadvertently mixed into soils. Commonly, volunteer vegetation is referred to as 'weeds'. This does not meet the requirements for final stabilization.

Waters of the State: Section 644.016.1(27) RSMo. defines waters of the state as, "All waters within the jurisdiction of this state, including all rivers, streams, lakes and other bodies of surface and subsurface water lying within or forming a part of the boundaries of the state which are not entirely confined and located completely upon lands owned, leased or otherwise controlled by a single person or by two or more persons jointly or as tenants in common."

PART I – BASIC PERMIT INFORMATION

Facility Type:	Industrial Stormwater; Land Disturbance
Facility SIC Code(s):	1629
Facility Description:	Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading, filling, and other activities that result in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution to waters of the state)

This permit establishes a Stormwater Pollution Prevention Plan (SWPPP) requirement for pollutants of concern from this type of facility and for all facilities and sites covered under this permit. 10 CSR 20-6.200(7) specifies "general permits shall contain BMP requirements and/or monitoring and reporting requirements to keep the stormwater from becoming contaminated".

Land disturbance activities include clearing, grubbing, excavating, grading, filling and other activities that result in the destruction of the root zone and/or other activities that are reasonably certain to cause pollution to waters of the state. A Missouri State Operating Permit for land disturbance permit is required for construction disturbance activities of one or more acres or for construction activities that disturb less than one acre when they are part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project.

The primary requirement of a land disturbance permit is the development of a SWPPP which incorporates site-specific BMPs to minimize soil exposure, soil erosion, and the discharge of pollutants. The SWPPP ensures the design, implementation, management, and maintenance of BMPs in order to prevent sediment and other pollutants from leaving the site.

When it precipitates, stormwater washes over the loose soil on a construction site and various other materials and products being stored outside. As stormwater flows over the site, it can pick up pollutants like sediment, debris, and chemicals from the loose soil and transport them to nearby storm sewer systems or directly into rivers, lakes, or coastal waters.

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The Missouri Department of Natural Resources is responsible for ensuring that construction site operators have the proper stormwater controls in place so that construction can proceed in a way that protects your community's clean water and the surrounding environment. One way the department helps protect water quality is by issuing land disturbance permits.

Local conditions are not considered when developing conditions for a general permit. A facility may apply for a site-specific permit if they desire a review of site-specific conditions.

PART II – RECEIVING STREAM INFORMATION

APPLICABLE DESIGNATIONS OF WATERS OF THE STATE:
Per Missouri Effluent Regulations (10 CSR 20-7.015), the waters of the state are divided into seven (7) categories. This permit applies to facilities discharging to the following water body categories:

- ✓ Missouri or Mississippi River [10 CSR 20-7.015(2)]
- ✓ Lakes or Reservoirs [10 CSR 20-7.015(3)]
- ✓ Losing Streams [10 CSR 20-7.015(4)]
- ✓ Metropolitan No-Discharge Streams [10 CSR 20-7.015(5)]
- ✓ Special Streams [10 CSR 20-7.015(6)]
- ✓ Subsurface Waters [10 CSR 20-7.015(7)]
- ✓ All Other Waters [10 CSR 20-7.015(8)]

Missouri Water Quality Standards (10 CSR 20-7.031) defines the Clean Water Commission water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses." The receiving stream and/or 1st classified receiving stream's designated water uses shall be maintained in accordance with 10 CSR 20-7.031(24). A general permit does not take into consideration site-specific conditions.

MIXING CONSIDERATIONS:
This permit applies to receiving streams of varying low flow conditions. Therefore, the effluent limitations must be based on the smallest low flow streams considered, which includes waters without designated uses. As such, no mixing is allowed [10 CSR 20-7.031(5)(A)4.B.(I)(a)]. No Zone of Initial Dilution is allowed. [10 CSR 20-7.031(5)(A)4.B.(I)(b)].

RECEIVING STREAM MONITORING REQUIREMENTS:
There are no receiving water monitoring requirements recommended at this time.

PART III – RATIONALE AND DERIVATION OF EFFLUENT LIMITATIONS & PERMIT CONDITIONS

305(B) REPORT, 303(d) LIST, & TOTAL MAXIMUM DAILY LOAD (TMDL):
Section 305(b) of the Federal CWA requires each state identify waters not meeting Water Quality Standards and for which adequate water pollution controls have not been required. Water Quality Standards protect such beneficial uses of water as whole body contact, maintaining fish and other aquatic life, and providing drinking water for people, livestock, and wildlife. The 303(d) list helps state and federal agencies keep track of waters which are impaired but not addressed by normal water pollution control programs.

A TMDL is a calculation of the maximum amount of a given pollutant a body of water can absorb before its water quality is affected. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan will be developed which shall include the TMDL calculation. For facilities with an existing general permit before a TMDL is written on their receiving stream, the Department will evaluate the permit and may require any facility authorized by this general permit to apply for and obtain a site-specific operating permit.

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ANTI-BACKSLIDING:
A provision in the Federal Regulations [CWA Section 303(d)(4); CWA Section 402(c); 40 CFR Part 122.44(I)] requires a reissued permit to be as stringent as the previous permit with some exceptions.
✓ Not Applicable: All effluent limitations in this permit are at least as protective as those previously established.

ANTIDEGRADATION:
Antidegradation policies ensure protection of water quality for a particular water body on a pollutant by pollutant basis to ensure Water Quality Standards are maintained to support beneficial uses such as fish and wildlife propagation and recreation on and in the water. This also includes special protection of waters designated as an Outstanding National Resource Water or Outstanding State Resource Water [10 CSR 20-7.031(3)(C)]. Antidegradation policies are adopted to minimize adverse effects on water.

The Department has determined the best avenue forward for implementing the Antidegradation requirements into general stormwater permits is by requiring the appropriate development and maintenance of a SWPPP. The SWPPP must identify all reasonable and effective BMPs, taking into account environmental impacts and costs. This analysis must document why no discharge or no exposure options are not feasible at the facility. This selection and documentation of appropriate control measures will then serve as the analysis of alternatives and fulfill the requirements of the Antidegradation Rule and Implementation Procedure 10 CSR 20-7.031(3) and 10 CSR 20-7.015(9)(A)5.

Any facility seeking coverage under this permit which undergoes expansion or discharges a new pollutant of concern must update their SWPPP and select reasonable and cost effective new BMPs. New facilities seeking coverage under this permit are required to develop a SWPPP including this analysis and documentation of appropriate BMPs. Renewal of coverage for a facility requires a review of the SWPPP to ensure the selected BMPs continue to be appropriate.
✓ Applicable; the facility must review and maintain stormwater BMPs as appropriate.

BENCHMARKS:
When a permitted feature or outfall consists of only stormwater, a benchmark may be implemented at the discretion of the permit writer. Benchmarks require the facility to monitor and, if necessary, replace and update stormwater control measures. Benchmark concentrations are not effluent limitations. A benchmark exceedance, therefore, is not a permit violation; however, failure to take corrective action is a violation of the permit. Benchmark monitoring data is used to determine the overall effectiveness of control measures and to assist the permittee in knowing when additional corrective actions may be necessary to comply with the limitations of the permit.
✓ Not applicable; this permit does not contain numeric benchmarks.

BEST MANAGEMENT PRACTICES (BMPS):
Minimum site-wide BMPs are established in this permit to ensure all permittees are managing their sites equally to protect waters of the state from certain activities which could cause negative effects in receiving water bodies. While not all sites require a SWPPP because the SIC codes are specifically exempted in 40 CFR 122.26(b)(14), these BMPs are not specifically included for stormwater purposes. These practices are minimum requirements for all industrial sites to protect waters of the state. If the minimum BMPs are not followed, the facility may violate general criteria [10 CSR 20-7.031(4)]. Statutes are applicable to all permitted facilities in the state; therefore, pollutants cannot be released unless in accordance with RSMo 644.011 and 644.016 (17).

CHANGES IN DISCHARGES OF TOXIC POLLUTANT:
This special condition reiterates the federal rules found in 40 CFR 122.44(f) and 122.42(a)(1). In these rules, the facility is required to report changes in amounts of toxic substances discharged. Toxic substances are defined in 40 CFR 122.2 as "…any pollutant listed as toxic under section 307(a)(1) or, in the case of "sludge use or disposal practices," any pollutant identified in regulations implementing section 405(d) of the CWA." Section 307 of the CWA then refers to those parameters found in 40 CFR 401.15.

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The permittee should also consider any other toxic pollutant in the discharge as reportable under this condition.

EFFLUENT LIMITATION GUIDELINE:
Effluent Limitation Guidelines, or ELGs, are found at 40 CFR 400-499. These are limitations established by the EPA based on the SIC code and the type of work a facility is conducting. Most ELGs are for process wastewater and some address stormwater. All are technology based limitations which must be met by the applicable facility at all times.

✓ The industries covered under this permit have an associated Effluent Limit Guideline (ELG) which is applicable to the stormwater discharges in this permit and is applied under 40 CFR 125.3(a).

ELECTRONIC DISCHARGE MONITORING REPORT (EDMR) SUBMISSION SYSTEM:
The U.S. Environmental Protection Agency (EPA) promulgated a final rule on October 22, 2015, to modernize CWA reporting for municipalities, industries, and other facilities by converting to an electronic data reporting system. The final rule requires regulated entities and state and federal regulators to use information technology to electronically report data required by the National Pollutant Discharge Elimination System (NPDES) permit program instead of filing paper reports. To comply with the federal rule, the Department is requiring all permittees to begin submitting discharge monitoring data and reports online.

✓ Applicable; this permit requires quarterly reports.

GENERAL CRITERIA CONSIDERATIONS:
In accordance with 40 CFR 122.44(d)(1), effluent limitations shall be placed into permits for pollutants determined to cause, have reasonable potential to cause, or to contribute to, an excursion above any water quality standard, including narrative water quality criteria. In order to comply with this regulation, the permit writer has completed a reasonable potential determination on whether discharges have reasonable potential to cause or contribute to an excursion of the general criteria listed in 10 CSR 20-7.031(4). In instances where reasonable potential exists, the permit includes limitations within the permit to address the reasonable potential. In discharges where reasonable potential does not exist, the permit may include monitoring to later determine the discharge's potential to impact the narrative criteria. Additionally, RSMo 644.076.1, as well as Standard Permit Conditions Part VIII of this permit state it shall be unlawful for any person to cause or allow any discharge of water contaminants from any water contaminant or point source located in Missouri in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law or any standard, rule, or regulation promulgated by the commission.

LAND APPLICATION:
Land application, or surficial dispersion of wastewater and/or sludge, is performed by facilities to maintain a basin as no-discharge. Requirements for these types of operations are found in 10 CSR 20-6.015; authority to regulate these activities is from RSMo 644.026.

✓ Not applicable; this permit does not authorize operation of a surficial land application system to disperse wastewater or sludge.

LAND DISTURBANCE:
Land disturbance, sometimes called construction activities, are actions which cause disturbance of the root layer or soil; these include clearing, grading, and excavating of the land. 40 CFR 122.26(b)(14) and 10 CSR 20-6.200(3) requires permit coverage for these activities. Coverage is not required for facilities when only providing maintenance of original line and grade, hydraulic capacity, or to continue the original purpose of the facility.

✓ Applicable; this permit provides coverage for land disturbance activities. These activities have SWPPP requirements and may be combined with the standard site SWPPP. Land disturbance BMPs should be designed to control the expected peak discharges. The University of Missouri has design storm events for the 25 year 24 hour storm; these can be found at: http://ag3.agebb.missouri.edu/design_storm/comparison_reports/20191117_25yr_24hr_comparison_table.htm; to calculate peak discharges, the website https://www.lmnoeng.com/Hydrology/rational.php has the rational equation to calculate expected discharge volume from the peak storm events.

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NUTRIENT MONITORING:
Nutrient monitoring is required for facilities characteristically or expected to discharge nutrients (nitrogenous compounds and/or phosphorus) when the design flow is equal to or greater than 0.1 MGD per 10 CSR 20-7.015(9)(D)8.

✓ This is a stormwater only permit; therefore, it is not subject to provisions found in 10 CSR 20-7.015 per 10 CSR 20-7.015(1)(C).

OIL/WATER SEPARATORS:
Oil water separator (OWS) tank systems are frequently found at industrial sites where process water and stormwater may contain oils and greases, oily wastewaters, or other immiscible liquids requiring separation. Food industry discharges typically require pretreatment prior to discharge to municipally owned treatment works. Per 10 CSR 26-2.010(2)(B), all oil water separator tanks must be operated according to manufacturer's specifications and authorized in NPDES permits per 10 CSR 26-2.010(2) or may be regulated as a petroleum tank.

✓ Not applicable; this permit does not authorize the operation of OWS. The facility must obtain a separate permit to cover operation of and discharge from these devices.

PERMIT SHIELD:
The permit shield provision of the CWA (Section 402(k)) and Missouri Clean Water Law (644.051.16 RSMo) provides that when a permit holder is in compliance with its NPDES permit or MSOP, they are effectively in compliance with certain sections of the CWA and equivalent sections of the Missouri Clean Water Law. In general, the permit shield is a legal defense against certain enforcement actions but is only available when the facility is in compliance with its permit and satisfies other specific conditions, including having completely disclosed all discharges and all facility processes and activities to the Department at time of application. It is the facility's responsibility to ensure that all potential pollutants, waste streams, discharges, and activities, as well as wastewater land application, storage, and treatment areas, are all fully disclosed to the Department at the time of application or during the draft permit review process. Subsequent requests for authorization to discharge additional pollutants or expanded or newly disclosed flows, or for authorization for previously unpermitted and undisclosed activities or discharges, will likely require permit modification or may require the facility be covered under a site specific permit.

PRETREATMENT PROGRAM:
This permit does not regulate pretreatment requirements for facilities discharging to an accepting permitted wastewater treatment facility. If applicable, the receiving entity (the publicly owned treatment works - POTW) must ensure compliance with any effluent limitation guidelines for pretreatment listed in 40 CFR Subchapter N per 10 CSR 20-6.100. Pretreatment regulations per RSMo 644.016 are limitations on the introduction of pollutants or water contaminants into publicly owned treatment works or facilities.

✓ Not Applicable; the facilities covered under this permit are not required to meet pretreatment requirements under an ELG.

PUBLIC NOTICE OF COVERAGE FOR AN INDIVIDUAL FACILITY:
Public Notice of reissuance of coverage is not required unless the facility is a specific type of facility as defined in 10 CSR 20-6.200(1). The need for an individual public notification process shall be determined and identified in the permit [10 CSR 20-6.020(1)(C)5.].

✓ Not applicable; public notice is not required for coverage under this permit to individual facilities. The MGP is public noticed in lieu of individual permit PN requirements.

REASONABLE POTENTIAL ANALYSIS (RPA):
Federal regulation 40 CFR Part 122.44(d)(1)(i) requires effluent limitations for all pollutants which are or may be discharged at a level which will cause or have the reasonable potential to cause or contribute to an in-stream excursion above narrative or numeric water quality standard. In accordance with 40 CFR Part 122.44(d)(iii) if the permit writer determines any given pollutant has the reasonable potential to cause or contribute to an in-stream excursion above the water quality standard, the permit must contain effluent limits for the pollutant.

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- ✓ The permit writer reviewed industry materials, available past inspections, and other documents and research to evaluate general and narrative water quality reasonable potential for this permit. Permit writers also use the Department's permit writer's manual, the EPA's permit writer's manual (https://www.epa.gov/npdes/npdes-permit-writers-manual), program policies, and best professional judgment. For each parameter in each permit, the permit writer carefully considers all applicable information regarding technology based effluent limitations, effluent limitation guidelines, and water quality standards. Best professional judgment is based on the experience of the permit writer, cohorts in the Department and resources at the EPA, research, and maintaining continuity of permits if necessary. For stormwater permits, the permit writer is required per 10 CSR 6.200(6)(B)2 to consider: A. application and other information supplied by the permittee; B. effluent guidelines; C. best professional judgment of the permit writer; D. water quality; and E. BMPs.

SCHEDULE OF COMPLIANCE (SOC):
Per § 644.051, RSMo, a permit may be issued with a Schedule of Compliance (SOC) to provide time for a facility to come into compliance with new state or federal effluent regulations, water quality standards, or other requirements. Such a schedule is not allowed if the facility is already in compliance with the new requirement or if prohibited by other statute or regulation. An SOC includes an enforceable sequence of interim requirements (e.g. actions, operations, or milestone events) leading to compliance with the Missouri Clean Water Law, its implementing regulations, and/or the terms and conditions of an operating permit. *See also* Section 502(17) of the CWA, and 40 CFR 122.2. For new effluent limitations, the permit may include interim monitoring for the specific parameter to demonstrate the facility is not already in compliance with the new requirement. Per 40 CFR 122.47(a)(1) and 10 CSR 20-7.031(11), compliance must occur as soon as possible. If the permit provides a schedule for meeting new water quality based effluent limits, an SOC must include an enforceable, final effluent limitation in the permit even if the SOC extends beyond the life of the permit.

- ✓ Not Applicable: This permit does not contain a SOC.

SETBACKS:
Setbacks, sometimes called separation distances, are common elements of permits and are established to provide a margin of safety in order to protect the receiving water and other features from accidents, spills, unusual events, etc. Specific separation distances are included in 10 CSR 20-8 for minimum design standards of wastewater structures. While wastewater is considered separately from stormwater under this permit, the guides and Chapter 8 distances may remain relevant to requirements under this permit if deemed appropriate by the permittee.

- ✓ Discharge to the watersheds of a Metropolitan No-Discharge Stream (10 CSR 20-7.031 Table F) is authorized by this permit if the discharges are in compliance with 10 CSR 20-7.015(5) and 10 CSR 20-7.031(7). Discharges to these watersheds are authorized for uncontaminated stormwater discharges only.
- ✓ This permit authorizes stormwater discharges which are located in a way to allow water to be released into sinkholes, caves, fissures, or other openings in the ground which could drain into aquifers (except losing streams) per 10 CSR 20-7.015(7). It is the best professional judgment of the permit writer to allow discharges to losing streams as the effluent is stormwater only.
- ✓ This permit authorizes stormwater discharge in the watersheds of Outstanding state Resource Waters (OSRW); Outstanding National Resources Waters (ONRW), which includes the Ozark National Riverways and the National Wild and Scenic Rivers System; and impaired waters as designated in the 305(b) Report provided no degradation of water quality occurs in the OSRW and ONRW due to discharges from the permitted facility per 10 CSR 20-7.015(6)(B) and 10 CSR 20-7.031(3)(C). Additionally, if the facility is found to be causing degradation or contributing to an impairment by discharging a pollutant of concern during an inspection or through complaint investigations, they will be required to become a no discharge facility or obtain a site specific permit with more stringent monitoring and SWPPP requirements. Missouri's impaired waters can be found at https://dnr.mo.gov/water/what-were-doing/water-planning/quality-standards-impaired-waters-total-maximum-daily-loads/impaired-waters. Sites within 1000 feet of a OSRW, ONRW, or water impaired for sediment must operate as a no-discharge facility. These additional protections are borrowed from the USEPA 2021 draft Construction General Permit.

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SLUDGE – DOMESTIC BIOSOLIDS:
Biosolids are solid materials resulting from domestic wastewater treatment meeting federal and state criteria for beneficial use (i.e. fertilizer). Sewage sludge is solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works; including, but not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works.

✓ This permit does not authorize discharge or land application of biosolids. Sludge/biosolids is not generated by this industry.

SLUDGE – INDUSTRIAL:
Industrial sludge is solid, semi-solid, or liquid residue generated during the treatment of industrial process wastewater in a treatment works; including, but not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment process; scum and solids filtered from water supplies and backwashed; and a material derived from industrial sludge.

✓ Not applicable; sludge is not generated by this industry.

SPILL REPORTING:
Any emergency involving a hazardous substance must be reported to the Department's 24 hour Environmental Emergency Response hotline at (573) 634-2436 at the earliest practicable moment after discovery. The Department may require the submittal of a written report detailing measures taken to clean up a spill. These reporting requirements apply when the spill results in chemicals or materials leaving the permitted property or reaching waters of the state. This requirement is in addition to the noncompliance reporting requirement found in Standard Conditions Part I. https://dnr.mo.gov/waste-recycling/investigations-cleanups/environmental-emergency-response.

Underground and above ground storage devices for petroleum products, vegetable oils, and animal fats may be subject to control under federal Spill Prevention, Control, and Countermeasure Regulation and are expected to be managed under those provisions, if applicable. Substances regulated by federal law under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) which are transported, stored, or used for maintenance, cleaning or repair shall be managed according to the provisions of RCRA and CERCLA.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP):
In accordance with 40 CFR 122.44(k), BMPs must be used to control or abate the discharge of pollutants when: 1) Authorized under section 304(e) of the CWA for the control of toxic pollutants and hazardous substances from ancillary industrial activities; 2) Authorized under section 402(p) of the CWA for the control of stormwater discharges; 3) Numeric effluent limitations are infeasible; or 4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA. In accordance with the EPA's *Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites*, (Document number EPA 833-R-06-004) published by the EPA in 2007 https://www.epa.gov/sites/production/files/2015-10/documents/sw_swppp_guide.pdf, BMPs are measures or practices used to reduce the amount of pollution entering waters of the state from a permitted facility. BMPs may take the form of a process, activity, or physical structure. Additionally, in accordance with the Stormwater Management, a SWPPP is a series of steps and activities to 1) identify sources of pollution or contamination, and 2) select and carry out actions which prevent or control the pollution of storm water discharges. Additional information can be found in *Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-006; September 1992).

A SWPPP must be prepared if the SIC code for the facility is found in 40 CFR 122.26(b)(14) and/or 10 CSR 20-6.200(2). A SWPPP may be required of other facilities where stormwater has been identified as necessitating better management.

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The purpose of a SWPPP is to comply with all applicable stormwater regulations by creating an adaptive management plan to control and mitigate stream pollution from stormwater runoff. Developing a SWPPP provides opportunities to employ appropriate BMPs to minimize the risk of pollutants being discharged during storm events. The following paragraph outlines the general steps the permittee should take to determine which BMPs will work to achieve the benchmark values or limits in the permit. This section is not intended to be all encompassing or restrict the use of any physical BMP or operational and maintenance procedure assisting in pollution control. Additional steps or revisions to the SWPPP may be required to meet the requirements of the permit.

Areas which should be included in the SWPPP are identified in 40 CFR 122.26(b)(14). Once the potential sources of stormwater pollution have been identified, a plan should be formulated to best control the amount of pollutant being released and discharged by each activity or source. This should include, but is not limited to, minimizing exposure to stormwater, good housekeeping measures, proper facility and equipment maintenance, spill prevention and response, vehicle traffic control, and proper materials handling. Once a plan has been developed, the facility will employ the control measures determined to be adequate to prevent pollution from entering waters of the state. The facility will conduct inspections of the BMPs to ensure they are working properly and re-evaluate any BMP not achieving compliance with permitting requirements. For example if the BMP being employed is deficient in controlling stormwater pollution, corrective action should be taken to repair, improve, or replace the failing BMP. If failures do occur, continue this trial and error process until appropriate BMPs have been established.

The EPA has developed factsheets on the pollutants of concern for specific industries along with the BMPs to control and minimize stormwater (https://www.epa.gov/npdes/stormwater-discharges-industrial-activities). Along with EPA's factsheets, the International Stormwater BMP database (https://bmpdatabase.org/) may provide guidance on BMPs appropriate for specific industries.

For new, altered, or expanded stormwater discharges, the SWPPP shall identify reasonable and effective BMPs while accounting for environmental impacts of varying control methods. The antidegradation analysis must document why no discharge or no exposure options are not feasible. The selection and documentation of appropriate control measures shall serve as an alternative analysis of technology and fulfill the requirements of antidegradation [10 CSR 20-7.031(3)].

Alternative analysis evaluation of the BMPs is a structured evaluation of BMPs which are reasonable and cost effective. The alternative analysis evaluation should include practices designed to be: 1) non-degrading; 2) less degrading; or 3) degrading water quality. The glossary of the *Antidegradation Implementation Procedure* defines these three terms. The chosen BMP will be the most reasonable and effective management strategy while ensuring the highest statutory and regulatory requirements are achieved and the highest quality water attainable for the facility is discharged. The alternative analysis evaluation must demonstrate why "no discharge" or "no exposure" is not a feasible alternative at the facility. This structured analysis of BMPs serves as the antidegradation review, fulfilling the requirements of 10 CSR 20-7.031(3) Water Quality Standards and *Antidegradation Implementation Procedure*, Section II.B.

- ✓ Applicable: A SWPPP shall be developed and implemented for each site and shall incorporate required practices identified by the Department with jurisdiction, incorporate control practices specific to site conditions, and provide for maintenance and adherence to the plan.

UNDERGROUND INJECTION CONTROL (UIC):

The UIC program for all classes of wells in the State of Missouri is administered by the Missouri Department of Natural Resources and approved by EPA pursuant to section 1422 and 1425 of the Safe Drinking Water Act (SDWA) and 40 CFR 147 Subpart AA. Injection wells are classified based on the liquids which are being injected. Class I wells are hazardous waste wells which are banned by RSMo 577.155; Class II wells are established for oil and natural gas production; Class III wells are used to inject fluids to extract minerals; Class IV wells are also banned by Missouri in RSMo 577.155; Class V wells are shallow injection wells; some examples are heat pump wells and groundwater remediation wells. Domestic wastewater being disposed of sub-surface is also considered a Class V well.

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In accordance with 40 CFR 144.82, construction, operation, maintenance, conversion, plugging, or closure of injection wells shall not cause movement of fluids containing any contaminant into Underground Sources of Drinking Water (USDW) if the presence of any contaminant may cause a violation of drinking water standards or groundwater standards under 10 CSR 20-7.031 or other health-based standards or may otherwise adversely affect human health. If the Department finds the injection activity may endanger USDWs, the Department may require closure of the injection wells or other actions listed in 40 CFR 144.12(c), (d), or (e). In accordance with 40 CFR 144.26, the permittee shall submit a Class V Well Inventory Form for each active or new underground injection well drilled, or when the status of a well changes, to the Missouri Department of Natural Resources, Geological Survey Program, P.O. Box 250, Rolla, Missouri 65402. Single family residential septic systems and non-residential septic systems used solely for sanitary waste and having the capacity to serve fewer than 20 persons a day are excluded from the UIC requirements (40 CFR 144.81(9)).

- ✓ Not applicable; this permit does not authorize subsurface wastewater systems or other underground injection. These activities must be assessed under an application for a site specific permit. Certain discharges of stormwater into sinkholes may qualify as UIC. It is important the permittee evaluate all stormwater basins, even those holding water; as sinkholes have varying seepage rates. This permit does not allow stormwater discharges into sinkholes. The facility must ensure sinkholes are avoided in the construction process. The State's online mapping resource https://modnr.maps.arcgis.com/apps/webappviewer/index.html?id=87ebef4af15d438ca658ce0b2bbc862e has a sinkhole layer.

VARIANCE:
Per the Missouri Clean Water Law Section 644.061.4, variances shall be granted for such period of time and under such terms and conditions as shall be specified by the commission in its order. The variance may be extended by affirmative action of the commission. In no event shall the variance be granted for a period of time greater than is reasonably necessary for complying with the Missouri Clean Water Law Section 644.006 to 644.141 or any standard, rule or regulation promulgated pursuant to Missouri Clean Water Law Section 644.006 to 644.141.
- ✓ Not Applicable: This permit is not drafted under premises of a petition for variance.

WASTELOAD ALLOCATIONS (WLA) FOR LIMITATIONS:
Per 10 CSR 20-2.010(78), the amount of pollutant each discharger is allowed by the Department to release into a given stream after the Department has determined total amount of pollutant which may be discharged into the stream without endangering its water quality. Water quality based maximum daily and average monthly effluent limitations were calculated using methods and procedures outlined in USEPA's Technical Support Document For Water Quality-based Toxics Control (TSD) (EPA/505/2-90-001).
- ✓ Not applicable; water quality limitations were not applied in this permit.

WATER QUALITY STANDARDS:
Per 10 CSR 20-7.031(4), General Criteria shall be applicable to all waters of the state at all times, including mixing zones. Additionally, 40 CFR 122.44(d)(1) directs the Department to include in each NPDES permit conditions to achieve water quality established under Section 303 of the CWA, including state narrative criteria for water quality.

WHOLE EFFLUENT TOXICITY (WET) TEST:
Per 10 CSR 20-7.031(1)(FF), a toxicity test conducted under specified laboratory conditions on specific indicator organism; and per 40 CFR 122.2, the aggregate toxic effect of an effluent measured directly by a toxicity test. A WET test is a quantifiable method of determining if a discharge from a facility may be causing toxicity to aquatic life by itself, in combination with, or through synergistic responses when mixed with receiving water.
- ✓ Not applicable: At this time, permittees are not required to conduct a WET test. This permit is for stormwater only.

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PART IV – EFFLUENT LIMITATIONS DETERMINATION

EPA Construction General Permit (CGP)
The CGP was used to research and support best professional judgment decisions made in establishing technology-based conditions for this general permit which are consistent with national standards. The permit writer determined the standards established by the CGP are achievable and consistent with federal regulations. Additionally, the conditions reflecting the best practicable technology currently available are utilized to implement the ELG.

In this general permit, technology-based effluent conditions are established through the SWPPP and BMP requirements. Effective BMPs should be designed on a site-specific basis. The implementation of inspections provides a tool for each facility to evaluate the effectiveness of BMPs to ensure protection of water quality. Any flow through an outfall is considered a discharge. Future permit action due to permit modification may contain new operating permit terms and conditions which supersede the terms and conditions, including effluent limitations, of this operating permit.

PART V–REPORTING REQUIREMENTS

SAMPLING:
The permittee is not required to sample stormwater under this permit. The Department may require sampling and reporting as a result of illegal discharges, compliance issues related to water quality concerns or BMP effectiveness, or evidence of off-site impacts from activities at the facility. If such an action is needed, the Department will specify in writing the sampling requirements, including such information as location and extent. If the permittee refuses to perform sampling when required, the Department may terminate the general permit and require the facility to obtain a site-specific permit with sampling requirements.

REPORTING:
There are quarterly reporting requirements for MO-R100xxx land disturbance permits. Project specific information is required to be report to the Department through the eDMR system.

PART VI – RAINFALL VALUES FOR MISSOURI & SURFACE WATER BUFFER ZONES

Knowledge of the 2-year, 24-hour storm event is used in this permit for two main reasons:
1) The design, installation and maintenance of effective erosion and sediment controls to minimize the discharge of pollutants.
2) If the seven-day inspection frequency is utilized, an inspection must occur within 48 hours after any storm event equal to or greater than a 2-year, 24 hour storm has ceased.
For site-specific 2-year, 24-hour storm event information utilize the National Oceanic and Atmospheric Administration's National Weather Service Atlas 14 (NOAA Atlas 14) which is located at https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html. For more information visit; https://www.weather.gov/media/owp/oh/hdsc/docs/Atlas14_Volume8.pdf.

Surface Water Buffer Zones: In order to design controls that match the sediment removal efficiency of a 50-foot buffer, you first need to know what this efficiency is for your site. The sediment removal efficiencies of natural buffers vary according to a number of site-specific factors, including precipitation, soil type, land cover, slope length, width, steepness, and the types of erosion and sediment controls used to reduce the discharge of sediment prior to the buffer. For additional information; https://www.epa.gov/sites/default/files/2017-02/documents/2017_cgp_final_appendix_g_-_buffer_reqs_508.pdf

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PART VII – ADMINISTRATIVE REQUIREMENTS

On the basis of preliminary staff review and applicable standards and regulations, the Department, as administrative agent for the Missouri Clean Water Commission, proposes to issue a permit(s) subject to certain effluent limitations, schedules, and special conditions contained herein and within the permit. The proposed determinations are tentative pending public comment.

PUBLIC MEETING:
The department hosted three public meetings for this permit. The meetings were held on January 27, February 17, and March 9, 2021.

PUBLIC NOTICE:
The Department shall give public notice when a draft permit has been prepared and its issuance is pending. Additionally, public notice will be issued if a public hearing is to be held because of a significant degree of interest or because of water quality concerns related to a draft permit. No public notice is required when a request for a permit modification or termination is denied; however, the requester and facility must be notified of the denial in writing.

The Department must give public notice of a pending permit or of a new or reissued Missouri State Operating Permit. The public comment period is a length of time not less than thirty (30) days following the date of the public notice, during which interested persons may submit written comments about the proposed permit.

For persons wanting to submit comments regarding this proposed permit, please refer to the Public Notice page located at the front of this draft permit. The Public Notice page gives direction on how and where to submit appropriate comments.

- ✓ The Public Notice period for this permit is started March 25, 2022 and ended April 25, 2022. Two comment letters were received.

DATE OF FACT SHEET: 03/2/2022

COMPLETED BY:
SARAH WRIGHT
MS4 & LAND DISTURBANCE PERMITTING COORDINATOR
MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
OPERATING PERMITS SECTION - STORMWATER AND CERTIFICATION UNIT
(573) 526-1139
Sarah.wright@dnr.mo.gov, dnr.generalpermits@dnr.mo.gov

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Appendix C

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DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, KANSAS CITY DISTRICT
MISSOURI STATE REGULATORY OFFICE
515 EAST HIGH STREET, #202
JEFFERSON CITY, MISSOURI 65101

July 30, 2024

Missouri State Regulatory Office
(NWK 2008-00027)
(Cole, MO, NWP 14 and 58)

Mr. Matt Prenger
Cole County Public Works Department
5055 Monticello Road
Jefferson City, MO 65109

Dear Mr. Prenger:

This letter pertains to your application, on behalf of the Cole County Public Works Department, for a Department of the Army (DA) permit for proposed work activities in Wears Creek and an unnamed tributary of Wears Creek associated with the proposed extension of Wildwood Drive. Your application was received on March 11, 2024. The project is located in Section 16, Township 44 north, Range 12 west, in Cole County, Missouri (Lat.: 38.563932° N, Long.: -92.250136° W).

The proposed work activities include the construction of a 189-foot-long by 9-foot-wide by 5.5-foot-tall reinforced concrete box culvert crossing in an unnamed tributary of Wears Creek, deposition of a total of approximately 120 cubic yards of MoDOT Type II rock to armor 50 linear feet of the unnamed tributary Wears Creek immediately upstream of the inlet of the concrete box culvert and deposition of a total of approximately 146 cubic yards of MoDOT Type II rock to armor 80 linear feet of the unnamed tributary of Wears Creek immediately downstream of the outlet of the concrete box culvert. Approximately 11 cubic yards of MoDOT Type II rock is to be deposited as a rock blanket along 20 linear feet of the left descending bank of the unnamed tributary of Wears Creek to armor the bank at the outlet of a 42-inch-diameter reinforced concrete pipe. Approximately 20 linear feet of Wears Creek would be temporarily impacted for the installation of a new 8-inch-diameter sanitary sewer line via open trench method.

The Corps of Engineers has jurisdiction over all waters of the United States. Discharges of dredged or fill material in waters of the United States, including wetlands, require prior authorization from the Corps under Section 404 of the Clean Water Act (33 USC 1344). The implementing regulation for this Act is found at 33 CFR 320-332.

We have reviewed the information furnished and have determined that your project is authorized by nationwide permit **(NWP) 14** for the proposed stream crossing and rock riprap placement, and **NWP 58** for the new sanitary sewer line crossing, provided you ensure that the conditions listed in the enclosed copy of excerpts from the January 13, 2021, U.S. Army Corps of Engineers (Corps) (86 FR 2744 and the correction at 86 FR 27274), Reissuance and Modification of Nationwide Permits, are met. You must also comply with the Kansas City District Regional NWP Conditions posted at:
http://www.nwk.usace.army.mil/Missions/RegulatoryBranch/NationWidePermits.aspx

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In addition to the general and regional conditions of this NWP, a special condition has been added in order to replace the lost aquatic resources that result from the authorized project.

You project occurs within the Moreau/Loutre Ecological Drainage Unit (EDU). You must purchase 1,320 stream credits from an approved mitigation provider within this service area for the unavoidable impacts to 326 linear feet of the unnamed tributary of Wears Creek. At this time, credits may be obtained only from mitigation providers with available credits. Credit availability is subject to market change; therefore, you must contact this office to verify credit availability prior to completing the transaction. In order to satisfy this mitigation requirement in its entirety, the purchase of the compensatory stream mitigation must be completed, and a mitigation receipt signed by the mitigation sponsor, stating the date of purchase and the type and amount of credits purchased must be submitted to our office. Commencement of work within our regulatory jurisdiction may not begin until our office has received and acknowledged the signed mitigation receipt confirming that all required compensatory stream mitigation has been purchased.

You must submit a receipt of payment from the mitigation sponsor that includes the type and amount of credits purchased and the date of credit purchase. Receipts submitted by authorized agents will not be accepted. You can contact:

Mr. Shane Staten with Swallow Tail LLC at 314-984-0050 or by email at sstaten@swallowtailenvironmental.com.

Ms. Sherry Fischer at Missouri Conservation Heritage Foundation at 573-634-2080 or by email at mchf@mochf.org.

Please be aware that the endangered Indiana bat (*Myotis sodalis*), Gray bat (*Myotis grisescens*), and Northern long-eared bat (*Myotis septentrionalis*) may be present within your project area. To "not adversely" these listed species, you must not cut or clear trees during the bats' active season, April 1 – October 14th. If implementation of the seasonal tree cutting restriction is not possible, please contact the Corps of Engineers, Regulatory Branch, for further consultation with the United States Fish and Wildlife Service (USFWS).

The Missouri Department of Natural Resources has certified that these NWPs will not violate existing state water quality standards provided you comply with the conditions included in the attached Missouri Section 401 Water Quality Certification (WQC) document. All conditions included in the WQC are conditions of the NWP authorizations. Please review all conditions associated with these NWPs. Per 40 CFR Part 121.11(c) the Corps is responsible for enforcing WQC conditions that are incorporated into these permit verifications. If you have any questions concerning state WQC standards or compliance issues with the associated certification conditions, please contact the project manager at the phone number and/or email provided below.

General condition 30 requires you to sign and submit the enclosed "Compliance Certification"

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within 30 days of completing the authorized activity or the completion of the implementation of any required compensatory mitigation.

This NWP verification is valid until March 14, 2026. Should your project plans change or if your activity is not complete within the specified verification term, you must contact this office for another permit determination. Although the Corps has verified your project would meet the terms and conditions of a nationwide permit, other Federal, state and/or local permits may be required. You should verify this yourself.

We are interested in your thoughts and opinions concerning your experience with the Kansas City District, Corps of Engineers Regulatory Program. Please feel free to Complete our Customer Service Survey form on our website at: https://regulatory.ops.usace.army.mil/customer-service-survey/. You may also call and request a paper copy of the survey which you may complete and return to us by mail.

Mr. Kenny Pointer, Regulatory Project Manager, reviewed the information furnished and made this determination. If you have any questions concerning this matter, please feel free to contact Mr. Pointer at 816-389-3833 or by email at james.k.pointer@usace.army.mil. Please reference File No. NWK 2008-00027 in all comments and/or inquiries relating to this project. This letter is only being provided to you electronically at: mprenger@colecounty.org.

Enclosures

cc (electronically w/o enclosures):

Environmental Protection Agency,
Watershed and Grants Branch
U.S. Fish and Wildlife Service, Columbia, Missouri
Missouri Department of Natural Resources,
Water Protection Program
State Historic Preservation Office
Missouri Department of Conservation

Cody Darr, Central Missouri Professional Services, Inc.

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Missouri Department of Natural Resources

CLEAN WATER ACT SECTION 401 WATER QUALITY CERTIFICATION
2021 GENERAL AND SPECIFIC CONDITIONS

Water Protection Program 10/2021

Division of Environmental Quality PUB2947

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Consistent with Section 401 of the Clean Water Act (CWA), 33 U.S.C. § 1341, the Missouri Department of Natural Resources (Department) has designed these precertified conditions to ensure activities carried out in Missouri pursuant to Nationwide Permits (NWPs) authorized by the U.S. Army Corps of Engineers (USACE) will comply with Missouri water quality requirements. Unless otherwise stated, these conditions are in addition to, not a replacement for, any federal requirements or conditions.

The conditions outlined in this programmatic WQC apply to those authorized projects where the project proponent has chosen to accept these conditions instead of pursuing an individual CWA Section 401 Water Quality Certification (WQC) for the following NWPs:

- Only General Conditions apply to projects authorized by NWPs 5, 6, 7, 13, 15, 16, 18, 19, 22, 23, 25, 27, 29, 30, 31, 36, 39, 40, 42, 43, 45, 46, 54, and 59.
- Both General and Specific Conditions apply to projects authorized by NWPs 3, 4, 12, 14, 20, 33, 41, 53, 57, and 58.

Alternatively, a project proponent may apply to the Department for individual WQC if it does not wish to accept the conditions outlined in this document.

NWPs 1, 2, 8, 9, 10, 11, 28, and 35 authorize projects pursuant to Section 10 of the Rivers and Harbors Act of 1899 only. These NWPs do not require CWA Section 401 WQC because they authorize activities which, in the opinion of the USACE, could not reasonably be expected to result in a discharge into waters of the United States. An activity needing only a Section 10 permit may require a WQC if that activity can reasonably be expected to result in any discharge either during construction or operation of the facility. Thus, if the USACE determines the activity is likely to result in a discharge during construction or operation, the Department has discretion to require a WQC for the Section 10 activity. The USACE may advise a Section 10 permit project proponent that it might need a WQC if there is a reasonable expectation that a discharge will occur either during the construction or operation of the project.

Pursuant to Section 644.037, RSMo, the Department shall certify without conditions NWPs as they apply to impacts on wetlands in Missouri. Because NWPs are minimal impact, Missouri does not have water quality standards specific to wetlands, and only the general criteria apply, discharges to wetlands from projects authorized by NWPs will comply with water quality requirements.

Pursuant to Section 644.038, RSMo, the Department shall certify without conditions all NWPs for impacts in all waters of the state for the construction of highways and bridges approved by the Missouri Highway and Transportation Commission. A Memorandum of Understanding between the Missouri Departments of Natural Resources and Transportation contains the requirements by which the Missouri Department of Transportation will design and construct such projects in order to protect the water quality of waters of the state. Therefore, as a result of this side agreement, the Department grants programmatic WQC for all NWPs without conditions for the construction of highways and bridges approved by the Missouri Highway and Transportation Commission, because any discharges from these projects will comply with water quality requirements.

GENERAL CONDITIONS

1. A stream's pattern, profile, and dimension, including but not limited to sinuosity, slope, and channel width, shall be maintained as much as practicable. Streambed gradient shall not be adversely impacted during project construction. No project shall accelerate bed or bank erosion. This will ensure compliance with the Missouri Water Quality Standards general criterion requiring waters to be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

2. Channelization of streams is not allowed under this precertification. Channelization includes but is not limited to reducing the length of the channel, widening the channel for increased water storage or flow, and/or construction of hard structures which concentrate flow. Unless necessary for a stream crossing associated with infrastructure projects and contained within an associated right-of-way, construction easement, or permanent easement, bank stabilization activities only along one bank of a stream are permitted, including but not limited to bank sloping and riprapping. The redirection of flow by excavation of the opposite bank or a streambed is considered a channel modification and is not authorized by this WQC. This will ensure compliance with the Missouri Water Quality Standards general criterion requiring waters to be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

3. No new or expanded wet stormwater retention basins or similar impoundment structures may be constructed unless they are located off-channel. In-channel dry stormwater detention basins are allowable if the stream channel is either temporarily or not adversely affected by the basin. This will ensure compliance with the Missouri Water Quality Standards general criterion requiring waters to be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

4. Only clean, nonpolluting fill shall be used. The following materials are not suitable where contact with water is expected and shall not be used due to their potential to cause violations of the general criteria of Missouri's Water Quality Standards [10 CSR 20-7.031(4)]:
   a. Earthen fill, gravel and broken concrete where the material does not meet the Suitable Material specifications stated in the "Missouri Nationwide Permit Regional Conditions" (https://usace.contentdm.oclc.org/digital/collection/p16021coll11/id/2662/) in locations where erosive flows are expected to occur on a regular basis, such as streambanks and/or lake shorelines.
   b. Asphalt.
   c. Concrete with exposed rebar.
   d. Tires, vehicles or vehicle bodies, and construction or demolition debris are solid waste and are excluded from placement in the waters of the state. Properly sized, broken concrete without exposed rebar is allowed.
   e. Liquid concrete, including grouted riprap, if not placed in forms as part of an engineered structure.
   f. Any material containing chemicals that would result in violation of Missouri Water Quality Standards general criteria [10 CSR 20-7.031(4)] or specific criteria [10 CSR 20-7.031(5)].

5. Waste concrete or concrete rinsate shall be disposed of in a manner that does not result in discharge to any jurisdictional water ways. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from unsightly bottom deposits [10 CSR 20-7.031(4)(A)]; substances resulting in toxicity to human, animal, or aquatic life [10 CSR 20-7.031(4)(D)]; and physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

6. Missouri Water Quality Standards antidegradation requirements dictate all appropriate and reasonable Best Management Practices related to erosion and sediment control, project stabilization and prevention of water quality degradation are applied and maintained; for example, preserving vegetation, streambank stability and basic drainage [10 CSR 20-7.031(3)(D)]. Best Management Practices shall be properly installed prior to conducting authorized activities and maintained, repaired and/or replaced as needed during all phases of the project to limit the amount of discharge of water contaminants to waters of the state. The project shall not involve more than normal stormwater or incidental loading of sediment caused by project activities so as to comply with Missouri's general water quality criteria [10 CSR 20-7.031(4)]; https://www.sos.mo.gov/cmsimages/adrules/csr/current/10csr/10c20-7a.pdf

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7. Clearing of vegetation and trees shall be the minimum necessary to accomplish the activity except for the removal of invasive or noxious species and placement of ecologically beneficial practices. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B)].

8. Care shall be taken to keep machinery out of the water way as much as possible. If work in the water way is unavoidable, it shall be performed in a way that minimizes the duration and amount of any disturbance to banks, substrate and vegetation to prevent increases in turbidity. Fuel, oil and other petroleum products, equipment, construction materials and any solid waste shall not be stored below the ordinary high water mark at any time or in the adjacent flood-prone areas beyond normal working hours. All precautions shall be taken to avoid the release of wastes or fuel to streams and other adjacent waters as a result of this operation. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B]) and Missouri Water Quality Standards general criteria requiring waters be free from substances preventing beneficial uses [10 CSR 20-7.031(3)(A)]; substances causing unsightly color or turbidity [10 CSR 20-7.031(4)(C)]; and physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

9. Petroleum products spilled into any water or on the banks where the material may enter waters of the state shall be immediately cleaned up and disposed of properly. Any such spills of petroleum shall be reported as soon as possible, but no later than 24 hours after discovery to the Department of Natural Resources' Environmental Emergency Response number at 573-634-2436 or website at http://dnr.mo.gov/env/esp/esp-eer.htm. This will ensure compliance with Missouri Environmental Improvement Authority to provide for the conservation of state water resources by the prevention of pollution and proper methods of disposal [Section 260.015, RSMo] and Missouri Water Quality Standards general criteria requiring waters be free from substances that prevent maintenance of beneficial uses; cause unsightly bottom deposits, color, turbidity or toxicity; and/or impair the natural biological community [10 CSR 20-7.031(4)(A), -(B), and -(H)].

10. All efforts shall be made to minimize exposure of unprotected soils. To the best of the project proponent's ability, project activity shall be conducted at times of little or no rainfall to limit the amount of overland flow and sediment disturbance caused by heavy equipment. This will ensure compliance with Missouri antidegradation requirements for Best Management Practices [10 CSR 20-7.031(3)(B)].

11. Programmatic WQC is denied for any NWP issued on a water that is listed for a sediment-related impairment, aquatic habitat alteration, channelization, or unknown impairment as listed in the most current Water Quality Report (Section 305(b) Report) at https://dnr.mo.gov/water/what-were-doing/water-planning/quality-standards-impaired-waters-total-maximum-daily-loads/impaired-waters. Although intended to result in minimal impacts, NWP authorizations in these waters may contribute to impairments and result in noncompliance with Missouri's general water quality criteria requiring waters be free from physical, chemical, and hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)] or exceedance of Missouri Water Quality Standards specific criteria [10 CSR 20-7.031(5)]. Since WQC General or Specific Conditions cannot be established to address all concerns from the variety of impairments and activities authorized by NWPs, individual review for WQC will be required. Requirements for individual WQC will be determined on a case-by-case basis based on the specific impairments, and additional testing, design, disposal, or BMP considerations may be required.

    To determine the location of the waters noted above, the Department's geospatial data is available upon request, and all published data is available on the Missouri Spatial Data Information Services website at msdis.missouri.edu/. Additional information to identify the project location, including stream reaches with listed impairments or special water designations, may be obtained from the Department's Water Protection Program at 573-522-4502.

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12. Programmatic WQC is denied for projects authorized by NWPs 17, 21, 32, 34, 37, 38, 44, 48, 49, 50, 51, 52, 55, and 56. Although intended to result in minimal impacts, these NWPs authorize activities that may contribute to impairments and result in noncompliance with Missouri's general water quality criteria [10 CSR 20-7.031(4)], including the requirement that all waters of the state shall be free from physical, chemical, and hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)], or noncompliance with Missouri's specific water quality criteria [10 CSR 20-7.031(5)]. Because programmatic WQC General or Specific Conditions cannot be established to address all concerns from the variety of impairments and activities authorized by these NWPs, the Department requires individual review for WQC for these NWPs. Requirements for individual WQC will be determined on a case-by-case basis based on the specific projects, and additional testing, design, disposal, or BMP considerations may be required.

13. Mitigation for loss of stream resources should be in conformance with the compensatory mitigation guidance currently approved for use in Missouri, including guidance provided by the Missouri Stream Mitigation Method. Stream impacts shall require compensatory mitigation with only instream or riparian corridor credits. Compensatory mitigation shall be within the state of Missouri. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)] Mitigation guidance documents can be located online at www.nwk.usace.army.mil/Missions/RegulatoryBranch/StateofMissouri.

SPECIFIC CONDITIONS

14. Nationwide Permit 3 *Maintenance*
    a. Silt, sediment, and debris removal shall be limited to a maximum of 200 LF upstream and 200 LF downstream of structures. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)].

15. Nationwide Permit 4 *Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities*
    Any inorganic or extraneous debris, such as may be found on Christmas trees shall be removed to qualify as clean, nonpolluting fill. This will ensure compliance with the Missouri's Water Quality Standards general criteria that waters shall be free from unsightly bottom deposits [10 CSR 20-7.031(4)(A)] and solid waste [10 CSR 20-7.031(4)(I)].

16. Nationwide Permit 12 *Oil and Natural Gas Pipeline Activities*,
    Nationwide Permit 57 *Electric Utility Line and Telecommunications Activities,* and
    Nationwide Permit 58 *Utility Line Activities for Water and Other Substances*
    a. For project crossings that must disturb a water body, work shall be conducted in such a manner as to seal off the work area from flow and minimize sediment transport. Material resulting from the activity shall not be sidecast into waters of the state for more than one month. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B) and general criteria requiring waters be free from substances that prevent maintenance of beneficial uses; cause unsightly color, turbidity, or toxicity; and/or impair the natural biological community [10 CSR 20-7.031(4)(B), -(C), and -(H)].
    b. If Horizontal Directional Drilling is used, drilling mud and/or other materials shall not be discharged into waters of the state. Best Management Practices shall be implemented to prevent possible discharges from reaching waters of the state. In the event materials are inadvertently discharged to waters of the state, notification to the Department of Natural Resources is required within 24 hours by calling 573-634-2436. This will ensure compliance with Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B)] and Missouri Environmental Improvement Authority [Section 260.015, RSMo] to provide for the conservation of state air, land and water resources by the prevention of pollution and proper methods of disposal.
    c. Project crossings shall be placed as close to perpendicular as possible and shall be limited to a maximum crossing length of no more than one and one-half times the width of the stream. This will ensure compliance with the Missouri antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)] and Best Management Practices [10 CSR 20-7.031(3)(B)].

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17. Nationwide Permit 14 *Linear Transportation Projects*
    a. The permittee shall propose and employ measures to mitigate the removal of impounded sediment (e.g., sand, gravel) in the unstable area upstream of a proposed project to prevent it from being transported downstream and/or construct a notched weir to slow the release of impounded sediment from upstream of the proposed project. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from substances causing unsightly color or turbidity [10 CSR 20-7.031(4)(C)] and physical chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)]. Accumulated gravel may be allowed to naturally deposit into downstream plunge pool voids. Consultation with a hydrologist or other scientist is recommended if the amount of accumulated unconsolidated gravel exceeds the volume of plunge pool voids.
    b. Where this NWP is used to authorize bridge and culvert structures, stream channel work shall be limited to a maximum of 200 feet upstream and a maximum of 200 feet downstream of the bridge or culvert. For purposes of this condition, a channel modification is any activity that alters the width, depth, length and/or sinuosity of a water way. This will ensure compliance with the Missouri antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)] and the Missouri Water Quality Standards general criterion requiring waters be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

18. Nationwide Permit 20 *Response Operations for Oil and Hazardous Substances*
    Oil and hazardous substance releases shall be reported to the Department of Natural Resources' Environmental Emergency Response number at 573-634-2436. Continue to report updates with regard to the containment and cleanup of releases. This will ensure compliance with Missouri Environmental Improvement Authority [Section 260.015, RSMo] to provide for the conservation of state water resources by the prevention of pollution and proper methods of disposal.

19. Nationwide Permit 33 *Temporary Construction, Access and Dewatering*
    a. The use of this NWP shall be limited to impacts of six months or less in duration. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirements for maintenance and protection of designated uses [10 CSR 20-7.031(3)]
    b. Any removal of accumulated sediment (e.g., sand, gravel) upstream of a proposed project shall be limited to the quantity necessary to relieve any obstruction or to protect downstream habitat. The permittee must propose and employ measures to mitigate the removal of impounded sediment in the unstable area upstream of a proposed project to prevent it from being transported downstream and/or construct a notched weir to slow the release of impounded sediment from upstream of the proposed project. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from substances causing unsightly color or turbidity [10 CSR 20-7.031(4)(C)] and physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

20. Nationwide Permit 41 *Reshaping Existing Drainage Ditches*
    In-channel disposal of excavated material not used for reshaping activities is prohibited. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B) and general criteria requiring waters be free from substances that prevent maintenance of beneficial uses; cause unsightly color, turbidity or toxicity; and/or impair the natural biological community [10 CSR 20-7.031(4)(B), -(C), and -(H)].

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21. Nationwide Permit 53 *Removal of Low-Head Dams*
    a. The permittee must propose and employ measures to mitigate the removal of impounded sediment (e.g., sand, gravel) in the unstable area upstream of a proposed project to prevent it from being transported downstream and/or construct a notched weir to slow the release of impounded sediment from upstream of the proposed project. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from substances causing unsightly color or turbidity [10 CSR 20-7.031(4)(C)] and physical chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)]. Accumulated gravel may be allowed to naturally deposit into downstream plunge pool voids. Consultation with a hydrologist or other scientist is recommended if the amount of accumulated unconsolidated gravel exceeds the volume of plunge pool voids.
    b. Stream channel work shall be limited to a maximum of 100 feet upstream and a maximum of 100 feet downstream of the dam. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)] and the Missouri Water Quality Standards general criterion requiring waters to be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].
    c. Restoration of the stream channel to its former, natural state is authorized. Individual WQC is required for non-natural channel modifications. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from physical chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)]. For purposes of this condition, a channel modification is any activity that alters the width, depth, length and/or sinuosity of a water way.

Unless the Department agrees to an alternative, requests for WQC should be sent electronically to wpsc401cert@dnr.mo.gov [Section 644.026.1(26), RSMo and 10 CSR 20-6.060(5)]. A request for WQC shall include all required information for a complete request for certification in compliance with 40 CFR Part 121. The Department may request additional information prior to providing a WQC decision to ensure Missouri water quality requirements are met, such as a response to comments from the Department, other resource agencies, and/or the public; planned compensatory mitigation; and/or an analysis of practicable alternatives.

An issued WQC, whether programmatically or individually issued, becomes part of and expires with the Section 404 and/or Section 10 permit unless explicitly stated in the WQC.

Acquisition of NWPs and the attendant WQCs shall not be construed or interpreted to imply the requirements for other permits are replaced or superseded, including Clean Water Act Section 402 National Pollutant Discharge Elimination System Permits required under Missouri Clean Water Law [Sections 644.026.1 and 644.051, RSMo] for land disturbance or return water from material deposition. Permits or any other requirements shall remain in effect. Project proponents with questions are encouraged to contact the Department of Natural Resources' regional office in the project area. A regional office map with contact information is located at https://dnr.mo.gov/about-us/division-environmental-quality/regional-office.

Some localities are covered pursuant to Municipal Separate Storm Sewer System Permits with measures to control and possibly treat stormwater. If the project is located within one of these localities, project proponents must comply with all stormwater requirements of the locality's Stormwater Management Plan and any related ordinances. This ensures compliance with CWA Section 402 National Pollutant Discharge Elimination System Permit requirements and the Missouri Clean Water Law [Chapter 644, RSMo].

The Department encourages, but does not require, permittees to consider environmentally-friendly design techniques to include stormwater management strategies that maintain or restore the original site hydrology through infiltration, evaporation, or reuse of stormwater. Designs might include using porous pavement or creating vegetated swales and/or rain gardens. More information can be found at these websites: www.epa.gov/owow/NPS/lid/ and www.lid-stormwater.net/lid_techniques.htm.

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The Department encourages the use of native vegetation to protect impacted areas from future water quality concerns. Native vegetation has evolved with Missouri's geology, climate, and wildlife to occur within a region as a result of natural processes rather than human intervention. For areas where direct impacts to streams are to be avoided, the Department recommends a minimum riparian buffer strip width of 50 feet as measured from top of bank.

The Department encourages the use of Horizontal Directional Drilling for stream and wetland crossings when practicable. If properly utilized, Horizontal Directional Drilling is an alternative to more traditional, open-trench methods and can result in significant minimization and/or complete avoidance of aquatic resource impacts.

The following publication provides guidance on how to protect water quality through Best Management Practices on project sites. For more information, please read: "Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri and Kansas" dated January 2011 and located online at https://dnr.mo.gov/document-search/protecting-water-quality-field-guide.

To help determine if a proposed activity could encounter species or sites of conservation concern within or near a project, including those that have not been recorded, the project proponent is encouraged to visit:

- Missouri Department of Conservation's "Natural Heritage Review" website at https://naturalheritagereview.mdc.mo.gov/.
- U.S. Fish and Wildlife Service's "Information, Planning and Conservation" website at http://ecos.fws.gov/ipac/.

If the proposed project encounters and will potentially affect a species of concern, please promptly report it to the Missouri Department of Conservation and the U.S. Fish and Wildlife Service.

For more information
Missouri Department of Natural Resources
Water Protection Program
P.O. Box 176
Jefferson City, MO 65102-0176
wpsc401cert@dnr.mo.gov
800-361-4827 or 573-522-4502
https://dnr.mo.gov/water

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Appendix D

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CITY OF JEFFERSON, MISSOURI
FLOODPLAIN DEVELOPMENT PERMIT / APPLICATION

APPLICATION #: DATE:

TO THE ADMINISTRATOR: The undersigned hereby makes application for a permit to develop in a floodplain. The work to be performed, including flood protection works, is as described below and in attachments hereto. The undersigned agrees that all such work shall be done in accordance with the requirements of the Flood Hazard Regulations of Jefferson City, Missouri and with all other applicable City, State of Missouri, and Federal laws and regulations.

City of Jefferson	Bartlet & West
Property Owner	Consultant/Builder
320 East McCarthy St	601 Monroe St Ste 201
Address	Address
Jefferson City, MO 65101	Jefferson City, MO 65101
City / State/ Zip	City / State / Zip
573-634-6410	573-634-3181
Phone	Phone

SITE DATA

1.	Location (Section, Township, Range) **16, 44N, 12W**				
	Subdivision, Lot # **N/A**				
	Street Address **N/A**				
2.	Development Type: **Roadway Extension**	Filling	Grading	Excavating	New Const.
	Substantial Improvement **Fill and Pavement construction for Road and Arch/Span Structure for Creek Crossing**		Non-Substantial Improvement		Other **Roadway Extension**
3.	Description of Development **Wildwood Drive is to be extended from Edgewood to Rock Ridge Road. This extension takes Wildwood over Wears Creek and adds better connectivity to the community.**				
4.	Premises: R/W	Structure size: 51 ft. x 10.3 ft. Arch		Area of site:	sq. ft./acres
	Principal use: **Roadway**		Accessory uses (storage, parking etc.): **N/A**		
5.	Value of Improvement (fair market) $ **900,000**		Pre-Improvement/Assessed Value of Structure $ **N/A**		
6.	Is property located in a designated **FLOODWAY?**		YES **X**		NO
If answered yes, certification must be provided prior to the issuance of a permit to develop verifying that proposed development will result in NO INCREASE in the base flood (100-year) elevation.					
7.	Is property located in a designated **FLOODPLAIN FRINGE?**		YES **X**		NO
8.	Elevation of the 100-year flood	**648 ft** MSL/NGVD			**FEMA** ID SOURCE
9.	Elevation of the proposed development site		**Top Pavement at CL = 652.72 ft** MSL/NGVD		
10.	Elevation / floodproofing requirement		MSL/NGVD		
11.	Other floodplain elevation information (ID and describe source)				
12.	Are other permits required?	U.S. Army Corps of Engineers 404 Permit:	Yes **X** No		
		Missouri Department of Natural Resources:	Yes **X** No		
		Other:			

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ALL provisions of Chapter 31, Article III, Flood Hazard Regulations shall be in compliance.

Signature of Property Owner	Signature of Consultant / Builder
	Austin K. Johnson Project Manager
Print Name and Title	Print Name and Title

PERMIT APPROVAL / DENIAL BY THE CITY OF JEFFERSON, MISSOURI

Plans and Specifications Approved / Denied this: _____ Day of _____, 20____

Signature of Authorizing Official	Print Name and Title

Approval by the City does not relieve the owner from fully complying with all FEMA / SEMA NFIP Floodplain / Floodway Development Regulations.

This permit is issued with the following conditions (1) that the lowest floor (including basement) of any new or substantially-improved residential structure will be elevated a minimum of one (1) foot above the base flood elevation. If the proposed development is a non-residential structure, this permit is issued with the condition that the lowest floor (including basement) of any new or substantially-improved non-residential structure will be elevated or floodproofed a minimum of one (1) foot above the base flood elevation and (2) that the developer/owner will provide certification by a registered engineer, architect, or land surveyor of the as-built lowest floor elevation of any new or substantially-improved structure covered by the permit.

cc: Engineering Division
Building and Inspection Services Division

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CITY OF JEFFERSON
John G. Christy Municipal Building
320 East McCarty Street, Jefferson City, MO 65101
Phone: (573) 634-6410 / Fax: (573) 634-6562

Appendix E

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Appendix F

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CONSTRUCTION SITE SIGN

(to be filled out by contractor and posted on-site)

Emergency: Fire, Police, & Ambulance		Phone:	911
Operator:	Cole County Public Works		
Address:	Wildwood Dr. Jefferson City, MO 65109	Phone:	
Contact:	Matt Prenger	Phone:	573-636-3614
General Contractor:			
Address:			
24 Hour Contact:		Phone:	
Contact:		Phone:	
Subcontractors:			
Sub #1		Phone:	
Sub #2		Phone:	
Sub #3		Phone:	
City/County Contact:	City of Jefferson	Phone:	573-634-6410
MDNR:	Water Pollution Control Program	Phone:	573-751-1300

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Appendix G

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SUBCONTRACTORS CERTIFICATION LOG

I hereby certify that I understand the requirements stated in this SWPPP, that I am responsible for completing the requirements which have been listed in the plan as being a part of my scope of work.

Subcontractor:_____

Name & Title:_____ Date:_____

Responsible for:_____

Subcontractor's Signature:_____

Subcontractor:_____

Name & Title:_____ Date:_____

Responsible for:_____

Subcontractor's Signature:_____

Subcontractor:_____

Name & Title:_____ Date:_____

Responsible for:_____

Subcontractor's Signature:_____

Subcontractor:_____

Name & Title:_____ Date:_____

Responsible for:_____

Subcontractor's Signature:_____

Subcontractor:_____

Name & Title:_____ Date:_____

Responsible for:_____

Subcontractor's Signature:_____

Subcontractor:_____

Name & Title:_____ Date:_____

Responsible for:_____

Subcontractor's Signature:_____

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Appendix H

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Stormwater Construction Site Inspection Report

General Information			
Project Name			
MDNR Permit No.		**Location**	
Date of Inspection		**Start/End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present phase of construction			

Type of Inspection:
❑ Regular ❑ Pre-storm event ❑ During storm event ❑ Post-storm event

SWPPP Located on Site & Updated Weekly ❑ Yes ❑ No

DNR Land Disturbance Sign Posted at Entrance ❑ Yes ❑ No

Weather Information

Has there been a storm event since the last inspection? ❑Yes ❑No
If yes, provide:
Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):

Weather at time of this inspection?
❑ Clear ❑Cloudy ❑Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds
❑ Other: Temperature:

Have any discharges occurred since the last inspection? ❑Yes ❑No
If yes, describe:

Are there any discharges at the time of inspection? ❑Yes ❑No
If yes, describe:

Listing of areas where land disturbance operations have permanently or temporarily stopped been listed on the Grading and Stabilization Logs at the time of inspection? ❑Yes ❑No

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Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Document whether any new or modified stormwater controls are needed at each BMP.*
- *Examine each BMP for conditions that could lead to spill or leak.*
- *Outfalls examined for visual signs of erosion or sedimentation. Excessive erosion or sedimentation may be due to BMP failure or insufficiency. Include response to observation in notes section.*
- *Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.*

	BMP	**BMP Installed?**	**BMP Maintenance Required?**	**Corrective Action Needed and Notes** (add sheets if necessary)
1		❑Yes ❑No	❑Yes ❑No	
2		❑Yes ❑No	❑Yes ❑No	
3		❑Yes ❑No	❑Yes ❑No	
4		❑Yes ❑No	❑Yes ❑No	
5		❑Yes ❑No	❑Yes ❑No	
6		❑Yes ❑No	❑Yes ❑No	
7		❑Yes ❑No	❑Yes ❑No	
8		❑Yes ❑No	❑Yes ❑No	
9		❑Yes ❑No	❑Yes ❑No	
10		❑Yes ❑No	❑Yes ❑No	
11		❑Yes ❑No	❑Yes ❑No	
12		❑Yes ❑No	❑Yes ❑No	
13		❑Yes ❑No	❑Yes ❑No	

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	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes (add sheets if necessary)
14		❑Yes ❑No	❑Yes ❑No	
15		❑Yes ❑No	❑Yes ❑No	
16		❑Yes ❑No	❑Yes ❑No	
17		❑Yes ❑No	❑Yes ❑No	
18		❑Yes ❑No	❑Yes ❑No	
19		❑Yes ❑No	❑Yes ❑No	
20		❑Yes ❑No	❑Yes ❑No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

	BMP/activity	Imple - mented?	Maint- enance Required?	Corrective Action Needed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	❑Yes ❑No	❑Yes ❑No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	❑Yes ❑No	❑Yes ❑No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	❑Yes ❑No	❑Yes ❑No	
4	Are discharge points and receiving waters free of any sediment deposits?	❑Yes ❑No	❑Yes ❑No	

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	BMP/activity	Imple - mented?	Maint- enance Required?	Corrective Action Needed and Notes
5	Are storm drain inlets properly protected?	❑Yes ❑No	❑Yes ❑No	
6	Is the construction exit preventing sediment from being tracked into the street?	❑Yes ❑No	❑Yes ❑No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	❑Yes ❑No	❑Yes ❑No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	❑Yes ❑No	❑Yes ❑No	
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	❑Yes ❑No	❑Yes ❑No	
10	Are materials that are potential stormwater contaminants stored inside or under cover?	❑Yes ❑No	❑Yes ❑No	
11	Are non-stormwater discharges (e.g., wash water, dewatering) properly controlled?	❑Yes ❑No	❑Yes ❑No	
12	(Other)	❑Yes ❑No	❑Yes ❑No	

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Non-Compliance

Describe any incidents of non-compliance not described above:

CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and Title: _____

Signature: _____

Date: _____

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Appendix I

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Inspection and Maintenance Log

Project Name:
SWPPP Contact:

Inspection No.	Description of the Inspection/Maintenance	Date of Inspection	Inspection Prepared by [Name(s) and Title]

Add Additional Sheets as necessary

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Appendix J

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Grading and Stabilization Activities Log

Project Name:
SWPPP Contact:

Date Grading Activity Initiated	Description of Grading Activity	Date Grading Activity Ceased (Indicate Temporary or Permanent)	Date When Stabilization Measures are Initiated	Description of Stabilization Measure and Location

Add Additional Sheets as necessary

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Appendix K

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Corrective Action Log

Project Name:
SWPPP Contact:

Inspection Date	Inspector Name(s)	Description of BMP Deficiency	Corrective Action Needed (including planned date/responsible person)	Date Action Taken/Responsible person

Add Additional Sheets as necessary

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Appendix L

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SWPPP Amendment Log

Project Name:
SWPPP Contact:

Amendment No.	Description of the Amendment ***	Date of Amendment	Amendment Prepared by [Name(s) and Title]

***** Each Description should include: (1) Changes required to the SWPPP; (2) Reasons for change; (3) Who is responsible to perform the changes; and (4) Date the changes are to be completed by. Include additional pages as necessary.**

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Appendix M

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AUTHORIZED REPRESENTATIVE DESIGNATION

I, _____ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the Missouri State Operating Permit by the Missouri Clean Water Commission, any local land disturbance permits, and this Storm Water Pollution Prevention Plan, at the _____ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

Authorized Representative:

_____ (name of person or position)

_____ (company)

_____ (address)

_____ (city, state, zip)

_____ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in the Missouri Clean Water Commission, Missouri State Operating Permit

Name: _____

Company: _____

Title: _____

Signature: _____

Date: _____

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AUTHORIZED REPRESENTATIVE CERTIFICATION

PROJECT: _____

I CERTIFY UNDER PENALTY OF LAW THAT I UNDERSTAND THE TERMS AND CONDITIONS OF THE Missouri State Operating Permit – General Operating Permit by the Missouri Clean Water Commission that authorized the discharge of storm water associated with construction or land disturbance activity from this permitted construction site. I certify that I am familiar with the information contained in this Stormwater Pollution Prevention Plan (SWPPP), and General Operating Permit, and that to the best of my knowledge and belief such information is true, complete, and accurate. I agree to abide by the Missouri Clean Water law and all rules, regulations, orders and decisions, and terms of the General Operating Permit, subject to any legitimate appeal available to an applicant under the Missouri Clean Water law of the Missouri Clean Water commission. Further, by my signature, I understand that I am fully responsible, along with all other contractors and subcontractors signing such certifications who are performing work activities under this contract to comply with all provisions and requirements of the General Operating permit and this SWPPP. I understand that I, and my company, are legally required under the federal Clean Water Act and the code of Missouri, to ensure compliance with the terms and conditions of the General Operating Permit and this SWPPP. I further certify that I and my company shall provide all necessary training and continuing education to all applicable personnel and subcontractors to ensure a complete understanding of all provision and requirements of the General Operating Permit and this SWPPP prior to these entities beginning any work activities on this site.

AUTHORIZED REPRESENTATIVE CERTIFICATION

Signature: _____ Date: _____

Print Name and Title: _____

Company Name: _____

Phone Number: _____

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Appendix N

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RECORD OF PERSONNEL TRAINING ACTIVITIES FORM

Date:_____

Instructor & Title:_____

Instructor Phone #:_____

Course Location:_____

Course Length:_____

STORMWATER POLLUTION PREVENTION PLAN TOPIC (check all that apply)**:**

- ☐ Temporary Soil Stabilization
- ☐ Non-stormwater Management Control, Dust/Wind Control
- ☐ Inspections/Corrective Actions
- ☐ Waste Management & Materials Pollution
- ☐ Erosion and Sediment Control Plan
- ☐ Temporary Sediment Control
- ☐ Tracking Control
- ☐ Emergency Procedures
- ☐ Other (specify)_____

Specific Training Objective:_____

Attendance Roster			
Name	**Company**	**Telephone Number**	**Signature**

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Appendix O

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HAZARDOUS SUBSTANCE RELEASE FORM

The discharges of hazardous substances or oil in storm water discharges from construction sites shall be prevented or minimized in accordance with the SWPPP. When a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established by Missouri State Law (See Section 4), for more information on specific material quantities required to be reported), the following steps shall be taken:

1. All measures shall be taken to contain and abate the spill and to prevent the discharge of the pollutant(s) to storm water or off-site.
2. Report the release of hazardous substance to the Missouri Department of Natural Resources 24-hour Environmental Emergency Response Spill Line 1-573-634-2436, and Cole County Emergency Response Team 1-573-634-9146, as soon as site staff has knowledge of the discharge.
3. Contact the Operator, Engineer, and Cole County Public Works, 1-573-636-3614, as soon as site staff has knowledge of the discharge. See "SPILL OR INCIDENT REPORT FORM" next page, and fill out for each occurrence.
4. The SWPPP shall be updated within seven (7) calendar days of knowledge of the discharge to provide a description of the release, the circumstances leading to the release, and the date of the release. The plans shall identify measures to prevent the recurrence of such releases and to respond to such releases.

Date of Spill	Material Spilled	Approximate Quantity of Spill (in gallons)	Agency(s) Notified	Date of Notification	SWPPP Revision Date

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SPILL OR INCIDENT REPORT FORM

Instructions: *Complete for any type of petroleum product or hazardous materials/waste spill or incident. Provide a copy of this report to management.*

1. Personnel Involved in Spill Reporting:

Name, Title, and Phone Number: _____

_____

DNR Regional Environmental Office: Name, Title, and Phone Number: _____

_____

2. Contractor

Name and Title of Person Responsible for Spill Response: _____

*Phone Number:*_____

3. General Spill Information:

Common Name of Spilled Substance: _____

Quantity Spilled (Estimate): _____

Describe Concentration of Material (Estimate): _____

Date of Spill: _____/_____/_____

Time Spill Started: _____ *AM* _____ *PM* *Time Spill Ended:* _____ *AM* _____ *PM*

4. Spill Location and Conditions:

Project Title: _____

Street Address and/or Milepost, City: _____

Weather Conditions: _____

If Spill to Water,

Name of Water Body (if ditch or culvert, identify the water body that the structure discharges to):

_____

Identify the Discharge Point: _____

Estimate the Depth and Width of the Water Body: _____

Estimate Flow Rate (i.e. slow, moderate, or fast): _____

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Describe Environmental Damage (i.e., fish kill?): _____

5. Actions taken:

To Contain Spill or Impact of Incident: _____

To Cleanup Spill or Recover from Incident: _____

To Remove Cleanup Material: _____

To Document Disposal: _____

To Prevent Reoccurrence: _____

> ***Spills to soil or water that may be an immediate threat to health or the environment*** *(i.e., explosive, flammable, toxic vapors, shallow groundwater, nearby creek, etc.): Immediately call the Missouri Department of Natural Resources* ***573-634-2436***
> *Other reporting numbers: National Response Center (1-800-424-8802), USEPA(913-281-0991),*

6. Reporting the Spill:

List all agencies contacted; include names, dates, and phone numbers for people you spoke with:

_____

_____

_____

Record ERTS #, if issued by MoDNR: _____

7. Person Responsible for Managing Termination/Closure of Incident or Spill:

Name and Phone: _____

Address and Fax: _____

8. Additional Notes/Information and Photos:

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Appendix P

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RAINFALL GAUGE RECORDING

Use the table below to record the rainfall gauge readings, in inches, at the beginning and end of each work day.

Month/Year			Month/Year			Month/Year		
Day	Start time	End time	Day	Start time	End time	Day	Start time	End time
1			1			1		
2			2			2		
3			3			3		
4			4			4		
5			5			5		
6			6			6		
7			7			7		
8			8			8		
9			9			9		
10			10			10		
11			11			11		
12			12			12		
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23			23			23		
24			24			24		
25			25			25		
26			26			26		
27			27			27		
28			28			28		
29			29			29		
30			30			30		
31			31			31		

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Appendix Q

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FINAL STABILIZATION/TERMINATION CHECKLIST

- All soil disturbing activities are complete.
- All construction debris and trash has been removed.
- All paved surfaces onsite and in the surrounding area have been cleaned of all sediment, trash, debris, etc. generated from the project site.
- All subcontractors have completed and cleaned up their work involving land disturbance/erosion and sediment control. The general contractor has inspected and approved this work.
- All temporary BMPs (such as silt fence) have been removed, finish graded, and seed and mulched. Residual sediment has been removed as needed. BMPs that will completely decompose, including some fiber rolls and blankets, may be left in place as approved by the Operator.
- All areas where erosion control blankets were installed have been inspected. All loose, exposed blankets have been restapled/staked. If less than 70% blanket areas is covered by vegetation, coordinate with Operator to determine solution.
- The project is stabilized. (The project is considered stabilized when perennial vegetation, pavement, buildings, or structures using permanent materials cover all areas that have been disturbed. Perennial vegetative cover shall be at least 70% of fully established plant density over 100% of the disturbed area.)
- All signs of erosion and sediment deposition have been repaired and are permanently stabilized.
- All permanent BMPs are in place and operational. Written maintenance requirements for all permeant BMPs have been provided to the Operator.
- All drainage conveyances and inlets/outlets have been installed per plan; all trash/debris has been removed, and are functioning as intended. All inlet/outlet areas have been inspected to ensure complete stabilization in the surrounding area.
- All rip-rap areas are stable and rip-rap that has become dislodged has been replaced.

CONTRACTOR'S CERTIFICATION:

> "I certify under penalty of law that all storm water discharges associated with Construction Activity from the identified project that are authorized by the Missouri General Operating Permit, have been eliminated, and that all disturbed areas and soils at the construction site have achieved final stabilization and all temporary erosion and sediment control measures have been removed or will be removed at a scheduled time coordinated with and approved by the Operator."

Project Name:_____

Name (Print) and Title:_____

Company:_____

Signature:_____Date:_____

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Appendix R

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Appendix S

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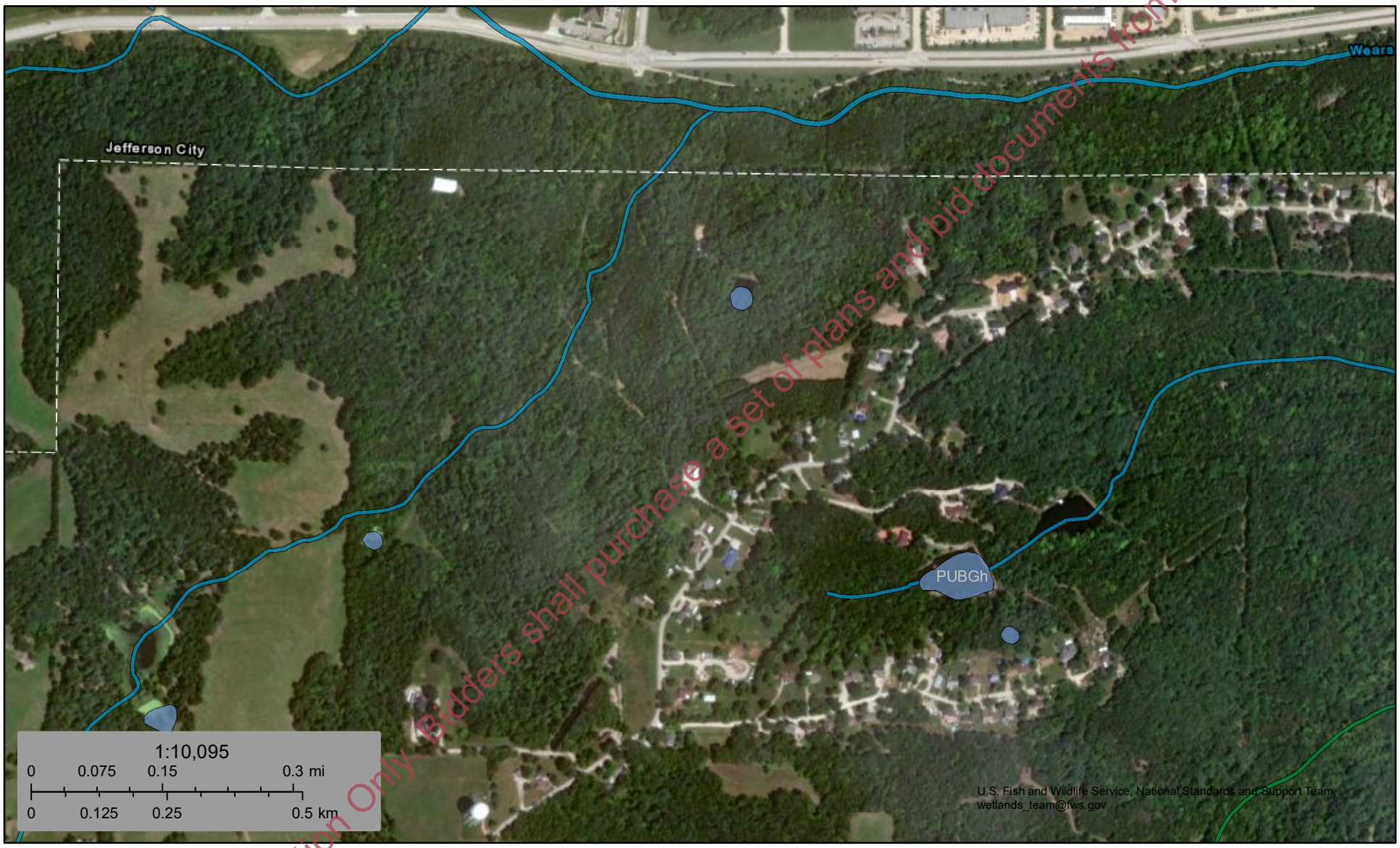
U.S. Fish and Wildlife Service

National Wetlands Inventory

Wildwood Drive Extension



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August 8, 2023

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Tributary to Moreau River

Classification code: R2UBG

System **Riverine (R)** : The Riverine System includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts of 0.5 ppt or greater. A channel is an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water.
Subsystem Lower Perennial (2) : This Subsystem is characterized by a low gradient. There is no tidal influence, and some water flows all year, except during years of extreme drought. The substrate consists mainly of sand and mud. Oxygen deficits may sometimes occur. The fauna is composed mostly of species that reach their maximum abundance in still water, and true planktonic organisms are common. The gradient is lower than that of the Upper Perennial Subsystem and the floodplain is well developed.
Class Unconsolidated Bottom (UB) : Includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30%.
Water Regime Intermittently Exposed (G) : Water covers the substrate throughout the year except in years of extreme drought.

Existing Pond

Classification code: PUBGh

System **Palustrine (P)** : The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 ppt. It also includes wetlands lacking such vegetation, but with all of the following four characteristics: (1) area less than 8 ha (20 acres); (2) active wave-formed or bedrock shoreline features lacking; (3) water depth in the deepest part of basin less than 2.5 m (8.2 ft) at low water; and (4) salinity due to ocean-derived salts less than 0.5 ppt.
Class **Unconsolidated Bottom (UB)** : Includes all wetlands and deepwater habitats with at least 25% cover of particles smaller than stones (less than 6-7 cm), and a vegetative cover less than 30%.
Water Regime **Intermittently Exposed (G)** : Water covers the substrate throughout the year except in years of extreme drought.
Special Modifier **Diked/Impounded (h)** : These wetlands have been created or modified by a man-made barrier or dam that obstructs the inflow or outflow of water.

Tributary to Tributary of Moreau River (East of Site)

Classification code: R4SBC

System **Riverine (R)** : The Riverine System includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts of 0.5 ppt or greater. A channel is an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water.
Subsystem **Intermittent (4)** : This Subsystem includes channels that contain flowing water only part of the year. When the water is not flowing, it may remain in isolated pools or surface water may be absent.
Class **Streambed (SB)** : Includes all wetlands contained within the Intermittent Subsystem of the Riverine System and all channels of the Estuarine System or of the Tidal Subsystem of the Riverine System that are completely dewatered at low tide.
Water Regime **Seasonally Flooded (C)** : Surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.

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Appendix T

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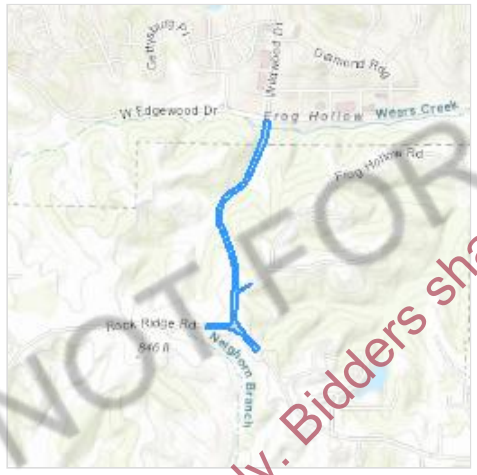
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Cole County, Missouri



Local office

Missouri Ecological Services Field Office

(573) 234-2132
(573) 234-2181

101 Park Deville Drive
Suite A
Columbia, MO 65203-0057

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Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

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Gray Bat Myotis grisescens Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat Myotis sodalis Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

There are no documented cases of eagles being present at this location. However, if you believe eagles may be using your site, please reach out to the local Fish and Wildlife Service office.

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Additional information can be found using the following links:

- Eagle Managment https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

Bald and Golden Eagle information is not available at this time

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.

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2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

Migratory bird information is not available at this time

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a

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breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

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Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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Missouri Department of Conservation

Missouri Department of Conservation's Mission is to protect and manage the forest, fish, and wildlife resources of the state and to facilitate and provide opportunities for all citizens to use, enjoy and learn about these resources.

Natural Heritage Review Level Two Report: State Listed Endangered Species and/or Missouri Species/Natural Communities of Conservation Concern

There are records of state-listed Endangered Species, or Missouri Species or Natural Communities of Conservation Concern within or near the defined Project Area. Please contact Missouri Department of Conservation for further coordination.

Foreword: Thank you for accessing the Missouri Natural Heritage Review Website developed by the Missouri Department of Conservation with assistance from the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, Missouri Department of Transportation and NatureServe. The purpose of this report is to provide information to federal, state and local agencies, organizations, municipalities, corporations, and consultants regarding sensitive fish, wildlife, plants, natural communities, and habitats to assist in planning, designing, and permitting stages of projects.

PROJECT INFORMATION

Project Name and ID Number: Wildwood Drive Extension #13163
User Project Number: 07-022
Project Description: 38.56365° N, 92.25070° W; Section 16, T44N, R12W, Wears Creek and Tributary; Jefferson City, Cole County Construction of a New Arterial Street
Project Type: Transportation, Roads
Contact Person: Cody Darr
Contact Information: cdarr@cmps-inc.com or 5736343455

PRELIMINARY REPORT
For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Disclaimer: This NATURAL HERITAGE REVIEW REPORT identifies if a species or natural community tracked by the Natural Heritage Program is known to occur within or near the project area submitted, and shares recommendations to avoid or minimize project impacts to sensitive species or natural habitats. Incorporating information from the Natural Heritage Program into project plans is an important step in reducing impacts to Missouri's sensitive natural resources. If an occurrence record is present, or the proposed project might affect federally listed species, the user must contact the Department of Conservation or U.S. Fish and Wildlife Service for more information.

This Natural Heritage Review Report is not a site clearance letter for the project. Rather, it identifies public lands and records of sensitive resources located close to and/or potentially affected by the proposed project. If project plans or location change, this report may no longer be valid. Because land use conditions change and animals move, the existence of an occurrence record does not mean the species/habitat is still present. Therefore, reports include information about records near but not necessarily on the project site. Lack of an occurrence record does not mean that a sensitive species or natural community is not present on or near the project area. On-site verification is the responsibility of the project. However, the Natural Heritage Program is only one reference that should be used to evaluate potential adverse project impacts and additional information (e.g. wetland or soils maps, on-site inspections or surveys) should be considered. Reviewing current landscape and habitat information, and species' biological characteristics would additionally ensure that Missouri Species of Conservation Concern are appropriately identified and addressed in planning efforts.

U.S. Fish and Wildlife Service – Endangered Species Act (ESA) Coordination: Lack of a Natural Heritage Program occurrence record for federally listed species in your project area does not mean the species is not present, as the area may never have been surveyed. Presence of a Natural Heritage Program occurrence record does not mean the project will result in negative impacts. This report does not fulfill Endangered Species Act consultation with the U.S. Fish and Wildlife Service (USFWS) for listed species. Direct contact with the USFWS may be necessary to complete consultation and it is required for actions with a federal connection, such as federal funding or a federal permit. Direct contact is also required if ESA concurrence is necessary. Visit IPaC: Home (fws.gov) to initiate USFWS Information for Planning and Conservation (IPaC) consultation. Contact the Columbia Missouri Ecological Field Services Office (573-234-2132, or by mail at 101 Park Deville Drive, Suite A, Columbia, MO 65203) for more information.

Transportation Projects: If the project involves the use of Federal Highway Administration transportation funds, these recommendations may not fulfill all contract requirements. Please contact the Missouri Department of Transportation at 573-526-4778 or visit Home Page | Missouri Department of Transportation (modot.org) for additional information on recommendations.

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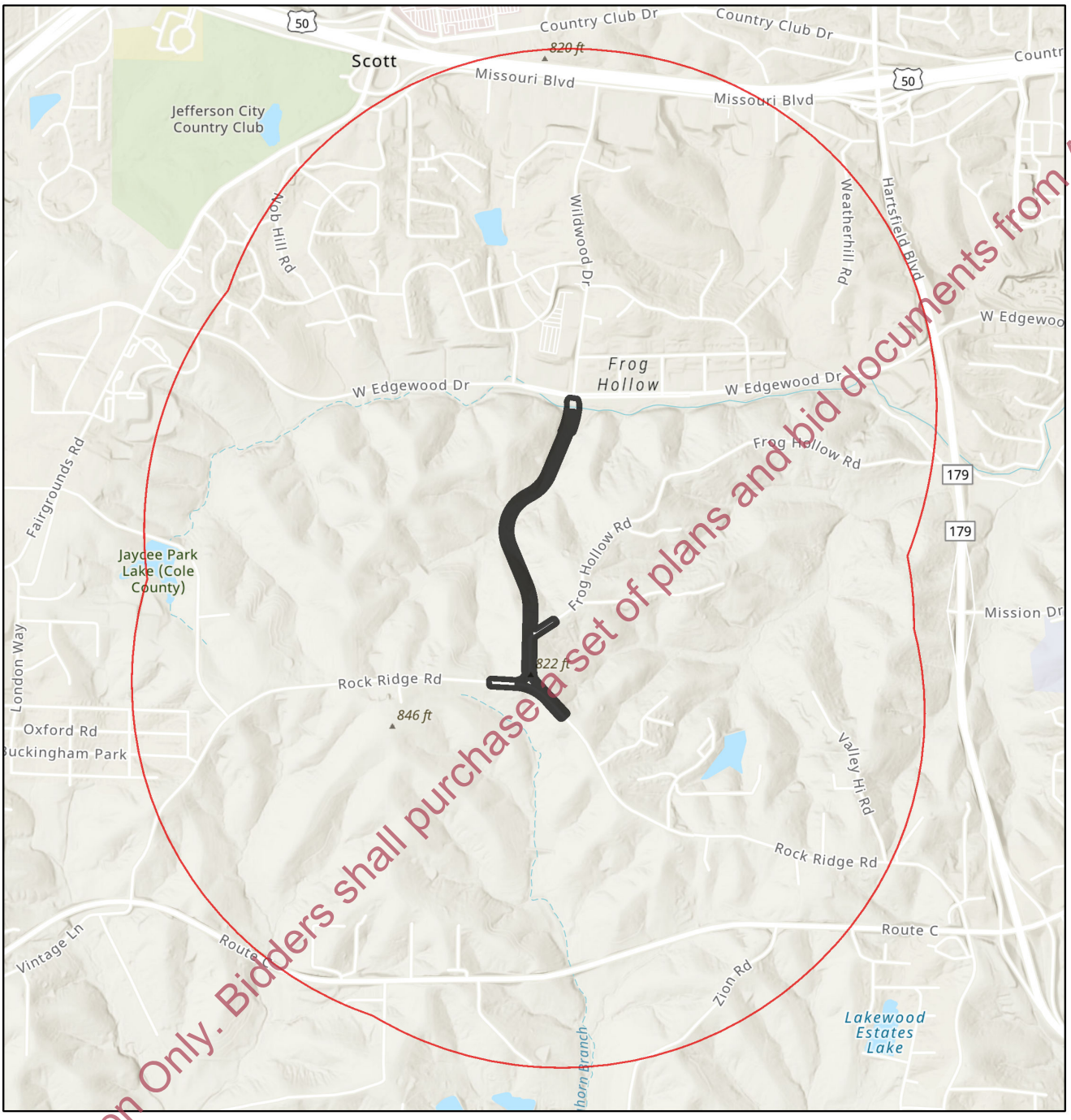
Wildwood Drive Extension



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August 8, 2023

1:25,112

Buffered Project Boundary

Project Boundary

0 0.2 0.4 0.8 mi

0 0.33 0.65 1.3 km

Esri, NASA, NGA, USGS, FEMA, Missouri Dept. of Conservation, Missouri DNR, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

Species or Communities of Conservation Concern within the Area:

There are records of state-listed Endangered Species, or Missouri Species or Natural Communities of Conservation Concern within or near the defined Project Area. Please contact the Missouri Department of Conservation for further coordination.

Email (preferred): NaturalHeritageReview@mdc.mo.gov
MDC Natural Heritage Review
Science Branch
P.O. Box 180
Jefferson City, MO
65102-0180
Phone: 573-522-4115 ext. 3182

Other Special Search Results:

The project occurs on or near public land, Cole County (Jaycee Park Lake), please contact MDC.

Project Type Recommendations:
Transportation - Roads: New and Maintenance projects typically change the plants and animals that live on the right-of-way or in the vicinity. Minimize erosion and sedimentation/runoff to nearby streams and lakes by carefully adhering to any Clean Water Act permit conditions; and include design elements to manage stormwater so that present water discharge rates from the site to streams during heavy rain events are not increased. Revegetation of disturbed areas is recommended to minimize erosion, as is restoration with native plant species compatible with the local landscape and wildlife needs. Annuals like ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive exotic perennials such as crown vetch and sericea lespedeza.
Maintenance of ground cover in utility corridors can have significant implications for sensitive resources. Native plant species typically require low maintenance over the long term, and provide more benefits to native wildlife. Use silt fences and/or vegetative filter strips to buffer streams and drainages, and monitor those after rain events and until a well-rooted ground cover is reestablished. Please see Best Management Practices for Construction and Development Projects Affecting Missouri Rivers and Streams (mo.gov).

Project Location and/or Species Recommendations:

Endangered Species Act Coordination – If this project has the potential to alter habitat (e.g. tree removal, projects in karst habitat) or cause direct mortality of bats, please coordinate directly with U.S. Fish and Wildlife Service (Ecological Services, 101 Park DeVille Drive, Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132 Ext. 100 for Ecological Services) for further coordination under the Endangered Species Act. Indiana bats *(Myotis sodalis*, federal- and state-listed endangered) and **Northern long-eared bats** (*Myotis septentrionalis,* federal-listed threatened) may occur near the project area. Both of these species of bats hibernate during winter months in caves and mines. During the summer months, they roost and raise young under the bark of trees in wooded areas, often riparian forests and upland forests near perennial streams. During project activities, avoid degrading stream quality and where possible leave snags standing and preserve mature forest canopy. Do not enter caves known to harbor Indiana bats or Northern long-eared bats, especially from September to April.

Karst: This county has known karst geologic features (e.g., caves, springs, and sinkholes, all characterized by subterranean water movement). Few karst features are recorded in Natural Heritage records, and ones not noted here may be encountered at the project site or affected by the project. Cave fauna (many of which are Species of Conservation Concern) are influenced by changes to water quality; please check your project site for any karst features and make every effort to protect groundwater in the project area. Additional information and specific recommendations are available at Management Recommendations for Construction and Development Projects Affecting Missouri Karst Habitat (mo.gov).

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Invasive exotic species are a significant issue for fish, wildlife and agriculture in Missouri. Seeds, eggs, and larvae may be moved to new sites on boats or construction equipment. Please inspect and clean equipment thoroughly before moving between project sites. See Managing Invasive Species in Your Community | Missouri Department of Conservation (mo.gov) for more information.

- Remove any mud, soil, trash, plants or animals from equipment before leaving any water body or work area.
- Drain water from boats and machinery that have operated in water, checking motor cavities, live-well, bilge and transom wells, tracks, buckets, and any other water reservoirs.
- When possible, wash and rinse equipment thoroughly with hard spray or HOT water (>140° F, typically available at do-it-yourself car wash sites), and dry in the hot sun before using again.

Streams and Wetlands – Clean Water Act Permits: Streams and wetlands in the project area should be protected from activities that degrade habitat conditions. For example, soil erosion, water pollution, placement of fill, dredging, in-stream activities, and riparian corridor removal, can modify or diminish aquatic habitats. Streams and wetlands may be protected under the Clean Water Act and require a permit for any activities that result in fill or other modifications to the site. Conditions provided within the U.S. Army Corps of Engineers (USACE) Clean Water Act Section 404 permit (Kansas City District Regulatory Branch (army.mil)) and the Missouri Department of Natural Resources (DNR) issued Clean Water Act Section 401 Water Quality Certification (Section 401 Water Quality Certification | Missouri Department of Natural Resources (mo.gov)), if required, should help minimize impacts to the aquatic organisms and aquatic habitat within the area. Depending on your project type, additional permits may be required by the Missouri Department of Natural Resources, such as permits for stormwater, wastewater treatment facilities, and confined animal feeding operations. Visit Wastewater Permits | Missouri Department of Natural Resources (mo.gov) for more information on DNR permits. Visit both the USACE and DNR for more information on Clean Water Act permitting.

For further coordination with the Missouri Department of Conservation and the U.S. Fish and Wildlife Services, please see the contact information below:

Email (preferred): NaturalHeritageReview@mdc.mo.gov
MDC Natural Heritage Review
Science Branch
P.O. Box 180
Jefferson City, MO
65102-0180
Phone: 573-522-4115 ext. 3182

U.S. Fish and Wildlife Service
Ecological Service
101 Park Deville Drive
Suite A
Columbia, MO
65203-0007
Phone: 573-234-2132

PRELIMINARY REPORT
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Miscellaneous Information

FEDERAL Concerns are species/habitats protected under the Federal Endangered Species Act and that have been known near enough to the project site to warrant consideration. For these, project managers must contact the U.S. Fish and Wildlife Service Ecological Services (101 Park Deville Drive Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132; Fax 573-234-2181) for consultation.

STATE Concerns are species/habitats known to exist near enough to the project site to warrant concern and that are protected under the Wildlife Code of Missouri (RSMo 3 CSR 1 0). "State Endangered Status" is determined by the Missouri Conservation Commission under constitutional authority, with requirements expressed in the Missouri Wildlife Code, rule 3CSR 1 0-4.111. Species tracked by the Natural Heritage Program have a "State Rank" which is a numeric rank of relative rarity. Species tracked by this program and all native Missouri wildlife are protected under rule 3CSR 10-4.110 General Provisions of the Wildlife Code.

See Missouri Species and Communities of Conservation Concern Checklist (mo.gov) for a complete list of species and communities of conservation concern. Detailed information about the animals and some plants mentioned may be accessed at Mofwis Search Results. Please contact the Missouri Department of Conservation to request printed copies of any materials linked in this document.

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Appendix U

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STATE OF MISSOURI
Matt Blunt, Governor • Doyle Childers, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.mo.gov

April 16, 2008

RECEIVED
APR 18 2008
CENTRAL MISSOURI
PROFESSIONAL SERVICES, INC

Robert M. Bates, P.E.
Central Missouri Porfessional services, Inc.
2500 E. McCarty Street
Jefferson City, Missouri 65101

Re: Wildwood Extension Project, Cole County, Missouri

Dear Mr. Bates:

Thank you for submitting information on the above referenced project for our review pursuant to Section 106 of the National Historic Preservation Act (P.L. 89-665, as amended) and the Advisory Council on Historic Preservation's regulation 36 CFR Part 800, which requires identification and evaluation of cultural resources.

We have reviewed the April 2008 report entitled *Cultural Resource Investigations, Phase I Survey, Wildwood Extension Project, Cole County, Missouri* by the Environmental Research Center of Missouri, Inc.. Based on this review it is evident that a thorough and adequate cultural resources survey has been conducted of the project area. We concur with the investigator's recommendation that there will be **no historic properties affected** and, therefore, we have no objection to the initiation of project activities.

Please be advised that, should project plans change, information documenting the revisions should be submitted to this office for further review. In the event that cultural materials are encountered during project activities, all construction should be halted, and this office notified as soon as possible in order to determine the appropriate course of action.

If you have any questions, please write Judith Deel at State Historic Preservation Office, P.O. Box 176, Jefferson City, Missouri 65102 or call 573/751-7862. Please be sure to include the SHPO Log Number **(032-CO-08)** on all future correspondence or inquiries relating to this project.

Sincerely,

STATE HISTORIC PRESERVATION OFFICE

Mark A. Miles
Director and Deputy
State Historic Preservation Officer

MAM:jd

c Craig Sturdevant, ERC

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Recycled Paper

Appendix V

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Vegetative Buffer Strip

Figure 6.86 Vegetative buffer strips slow surface runoff, reduce sedimentation and help capture pollutants. Depending on the choice of plant materials, they can be low maintenance areas (mow once or twice a year) or provide habitat for wildlife.

Practice Description

A vegetative buffer strip is a wide belt of vegetation designed to provide infiltration, intercept sediment and other pollutants and reduce stormwater flow and velocity. Vegetative buffer strips are similar to grassed swales except they are designed to accept only overland sheet flow. They cannot treat high velocity flows. Surface runoff must be evenly distributed across the vegetative buffer strip. After a channel forms in the vegetative buffer strip, it is no longer effective.

Vegetative buffer strips can consist of grass, woody vegetation or other erosion resistant plants. They can be used adjacent to impervious surfaces and next to stream corridors or wetlands to slow the flow and help remove sediment from runoff. They can also be used in conjunction with infiltration basins, infiltration trenches or alongside streams to provide water quality treatment for post-construction.

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Recommended Minimum Requirements

Prior to start of construction, vegetative buffer strips should be designed by a qualified professional. The site superintendant and field personnel should refer to plans and specifications throughout the construction process. The vegetative buffer strip should be built according to planned alignment, grade and cross section. Should any field adjustment to the design and installation be needed, a qualified professional should be consulted in the modification to the original design or specification.

Drainage Area

Less than 5 acres.

Location

Adjacent to low or medium density residential areas on gently sloping ground (less than 5 percent), with length of strip running along the contour, along the perimeter of a site, or any available vegetated area or area capable of being vegetated.

Vegetation

A mix of erosion resistant plants that form a dense mat and effectively bind the soil (see Permanent Seeding).

Slope

Uniform, even and relatively flat (5 percent or less) with a level spreading device (level lip, weir, etc.) across the top edge of the vegetative buffer strip.

Minimum Width

Should conform to those in Table 6.16.

Minimum Length

At least as long as the contributing runoff area, but no less than 50 feet plus 4 feet for each one percent increase in slope.

Table 6.16 Minimum Width of Vegetative Buffer Strip

Slope of Land	Width of Vegetative Buffer Strip	Width of Vegetative Buffer Strip
(Percent)	For Grassed Areas (ft.)	For Forested Areas (ft.)
0	10	25
2	12	29
4	14	33
6	16	37
8	18	41
10	20	45
15	25	55

Construction

Site Preparation

- Natural wooded strips in addition to grass strips should be considered. At the start of development, designate, identify and fence off any areas to be preserved. Avoid storing debris from clearing and grubbing activities and other construction waste material in these areas during construction.
- If a vegetative buffer strip is constructed, clear and grub the vegetative buffer strip area before the impervious area is completed.

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Grading

- If the adjacent area does not meet the buffer on a uniform contour, grade a swale along the contour directly adjacent to the top edge of the vegetative buffer strip. The swale will serve as a “level spreader” to collect overland flow and distribute the runoff evenly to the vegetative buffer strip. By discharging to the vegetative buffer strip uniformly along the top of the strip, rill and gully formation due to concentration of flow is minimized.
- Line the swale with rock or other erosion resistance material.
- Sod or seed, fertilize and protect the vegetative buffer strip area with an appropriate rolled erosion control product per the specifications.

  Note: Some fertilizing activities may be prohibited near wetlands and other eco-sensitive areas. Consult a qualified professional if needed.
- Vegetated buffer strips should be protected from excessive sediment laden storm water runoff during construction operations because excess sediment will kill the vegetation. This protection can be in the form of silt fence or other sediment control best management practices placed at the top of the slope to pretreat runoff headed for the buffer strip. If excessive sediment is deposited in the buffer strip, appropriate measures should be taken to reestablish the vegetative strip, including complete regrading and reseeding or sodding of the area.

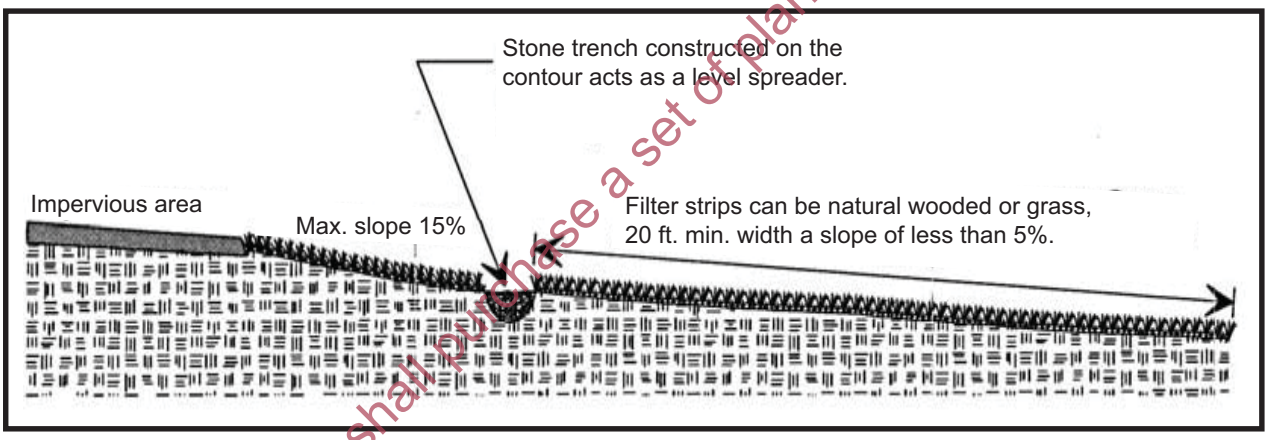

Figure 6.87 Vegetative Buffer Strip

Erosion Control

- Minimize the size of all disturbed areas and stabilize as soon as each phase of construction is complete.
- Direct all overland flow to the vegetative buffer strip or the level spreading swale at low velocities.

Safety

- Store all construction materials and waste material well away from the vegetative buffer strip.
- Follow all local, state and federal guidelines in constructing utility trenches. If utility lines are buried beneath the vegetative buffer strip, do not perform final grading until all trench settlement has taken place. Prior to excavation activities of any type, call 1-800-DIG-RITE (344-7483) to obtain utility locations.
- Provide temporary fencing and warning signs until vegetation is established.

Construction Verification

Check the finished grades and configuration of all earthwork, level spreaders and diversions.

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Maintenance, Inspection and Removal

- Check for eroded channels in the vegetative buffer strip after every storm event. Fix eroded areas and reseed, mulch and fertilize the affected area. Modify the Storm Water Pollution Prevention Plan to prevent further issues.
- Apply fertilizer in accordance with soil test recommendations and always consider application timing and rates that will protect water quality – i.e. do not apply more than is necessary and do not apply when rain will likely carry fertilizer off to the stream system. Excessive fertilizer can cause a change in pH that allows heavy metals and other toxic compounds to become mobile and available for uptake by aquatic plants and animals. The change in pH can also prohibit nutrient uptake by the targeted vegetation.
- Remove sediment deposits accumulating in the vegetative buffer. This should be done very carefully to avoid damage to the vegetation.
- Protect new plantings from livestock or wildlife.
- Mow grass strips to a height of 6- to 12-inches two to three times a year to suppress weeds and woody vegetation unless natural, woody vegetation is indicated on the plan.
- Repair foot paths and traffic ruts.
- Remove the temporary vegetative bufferstrip and stabilize the site prior to filing *Form H: Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One - Missouri Permit Requirements).

Troubleshooting

Consult with a design professional if any of the following occur:

- Variations in topography on-site indicate vegetative buffer strip will not function as intended.
- Design specifications for fill, rock, sod, seed, mulch or fertilizer cannot be met; substitution may be required. Unapproved substitutions could lead to the vegetative buffer strip not operating as designed after construction activities have been completed.
- Naturally vegetated areas intended for use as buffer strips have been damaged or inadvertently reduced in width.

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Common Problems and Solutions

Problem	Solution
Inadequate vegetation causing erosion of vegetative buffer strip due to too great a length of overland flow, too great a slope or high flow rates due to a drainage area greater than 5 acres.	Repair erosion damage and reevaluate erosion protection measures.
Inadequate vegetation causing erosion of vegetative buffer strip due to malfunctioning irrigation or lack of proper watering to establish the vegetation.	Repair erosion damage and possible irrigation issues, provide sufficient water for plant establishment and reevaluate erosion protection measures.
Settlement of soil in utility trenches or settlement of fill creates ponding within the vegetative buffer strip.	Fill low areas and regrade to provide proper drainage.
Uneven slope or debris clogging the trench at top of vegetative buffer strip creates a diversion of flow around vegetative buffer strip.	Remove debris and regrade as needed to provide proper drainage.
Sediment and debris clogging upper end of vegetative buffer strip creates a reduction in flow across vegetative buffer strip.	Replace clogged portion of vegetative buffer strip.

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Tree Protection

Practice Description

Tree protection preserves and protects trees during construction. Trees provide aesthetic and economic value, and aid in energy conservation, landscaping, air purification and erosion control. This practice applies to any construction site where desirable trees are present and need to be protected.

Trees can be damaged or killed by direct contact with construction equipment, compaction of the soil within the root zone of the tree, changes in the elevation of the water table due to site grading, and by construction chemicals and refuse. Although damage may be unseen, it can result in tree death within three or four years. Damage to the root zone is the leading factor in the unintentional destruction of trees.

Recommended Minimum Requirements

Prior to start of construction, desirable trees (including sensitive species) should be selected and marked for protection by a registered design professional. A grading plan that indicates the location of protected trees, utility trenches and other protected areas (e.g., floodplains, steep slopes, wetlands and streambanks) should be made available to field personnel. Areas for parking equipment should be designated away from the canopy (drip line) to protect the root zones of desired trees, shrubs, stream buffer vegetation and other protected areas. The root zone of plants is generally as broad as the drip line.

Temporary Fences

Placement

Around the dripline or tree canopy perimeter to restrict traffic, excavation, parking, storing materials and filling under the tree canopy. (For tree species sensitive to root damage, place the fence at the critical root radius to ensure tree's survival.)

Materials

Snow, board, plastic or cord fence.

Restricted Activities

Use temporary fence to restrict traffic, excavation, parking, storing materials and filling under the tree canopy (or at the critical root radius to ensure survival of sensitive species).

Permanent Drains

Install permanent drains in areas where site grading may be expected to cause water table saturation of the root zone (See Subsurface Drain).

Grading

Minimize cut and fill near trees by following the natural contours, and locating roadways, storage areas and parking pads away from desired tree stands.

Trenching

Minimize trenching near tree canopy perimeter and place several utilities in one trench when possible.

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Up to 90 percent of trees' roots may be in the top 12 inches of soil. Typically, roots spread out from two to three times the width of the canopy or tree's branches.

Build a barrier at the dripline (or at the critical root radius for sensitive species) to prevent damage from soil compaction, cut and fill operations physical wounds.

To calculate the critical root radius: measure the tree's diameter in inches at breast height (4.5 feet above the ground), multiply that number by 1.5 feet. This will provide you with the critical root radius in feet.

For example, a tree with a diameter (breast height) of 20 inches will have a critical root radius of 30 feet (60 foot diameter).

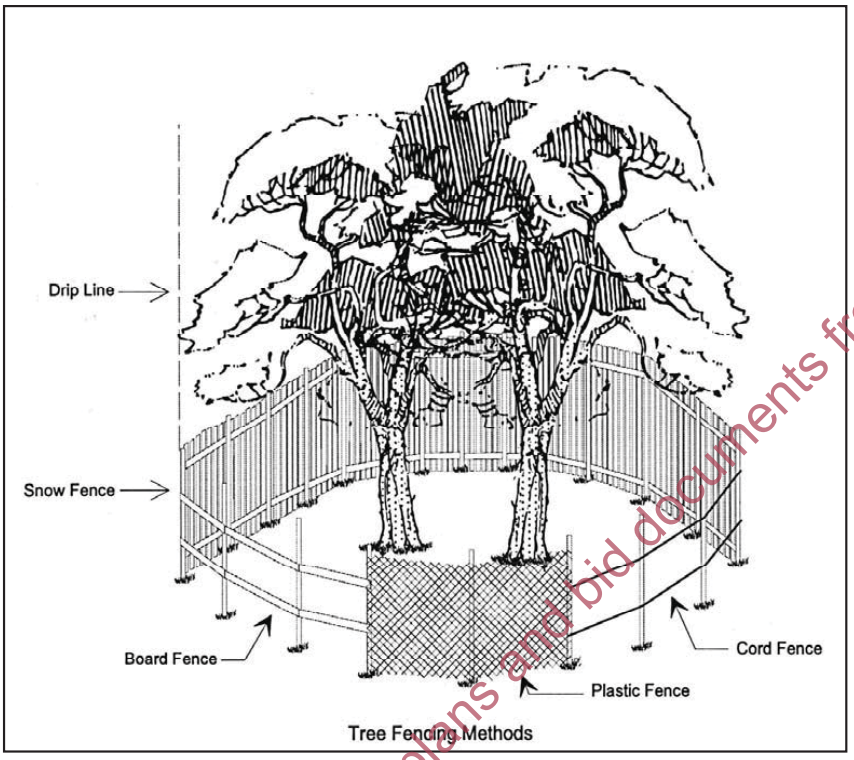

Figure 6.8 Erecting Barriers for Tree Protection Source: *Adapted from MU Guide 6885*

Construction

- Install temporary fences at tree driplines (at the critical root radius for sensitive tree species). To avoid compaction of the soil around desired trees, keep traffic, equipment and supplies off of the root systems. Figure 6.8 shows the correct method of erecting barriers for tree protection.
- Route the underground utilities according to plan. If possible, combine in one trench and route away from trees and potential planting sites.
- Use a brush cutter, rotary axe, or cut by hand instead of grading off brush to maintain the area within the tree canopy perimeter.

  Note: If grading beneath a tree's canopy is indicated on the plan:

  - Prior to construction activities, prune low hanging branches that may be damaged by equipment. To avoid tearing the bark from the tree while pruning, remove large branches with a stub-cut method. Figure 6.9 illustrates correct methods of pruning.
  - Minimize grading beneath the tree canopy. Avoid placing fill, or removing leaf litter or soil in the ungraded areas. Cut large roots instead of tearing them with equipment.

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Stub-cut Method
First, make an undercut about one foot from the trunk. Then, cut through the branch near the first cut. Leave the tree's branch collar intact during the final cut to promote healing. Source: *Adapted from MU Guide 6866*

Construction Verification
Check the construction site to verify protective measures are being observed.

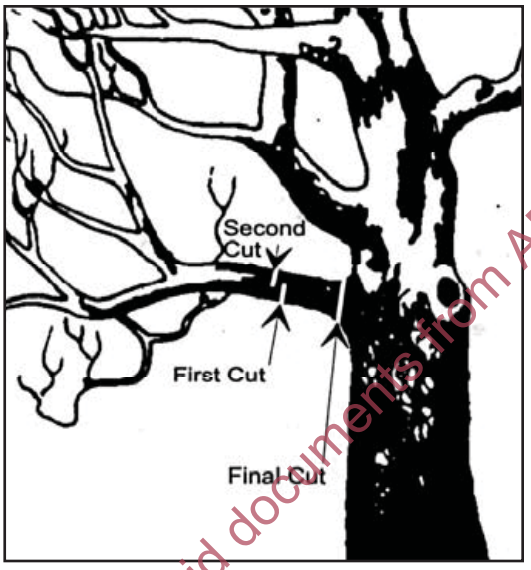

Figure 6.9 Proper Method of Pruning
Source: *Adapted from MU Guide 6866*

Troubleshooting

Consult with registered design professional such as an arborist or silviculturist if any of the following occur:

- A protected tree is accidentally injured by construction activities.
- If grade around a protected tree must be raised.

Maintenance, Inspection and Removal

- Remove fence around protected trees only after all construction is complete and all disturbed soil is stabilized.
- In spite of these precautionary steps some damage may occur to desired trees. If minor damage occurs, repair it immediately. Repair damage to limbs or roots by cutting off the damaged areas. Repair damage to bark by trimming the perimeter of the damaged area. If there is any question about the correct course of action, enlist the service of a professional arborist or silviculturist.
- Inspect trees for signs of stress, such as insect, disease and drought damage. Stressed trees should be watered during dry periods. Soak area under the canopy to a depth of 12- to 18-inches. Avoid fertilizing severely stressed trees until they become reestablished a year or two later. Treat insect and disease problems with a pesticide, if necessary, but be sure to follow instructions on the label. Or, employ a certified pesticide applicator to treat the problem.
- Remove temporary devices and stabilize the site prior to filing *Form H - Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One - Missouri Permit Requirements).

Common Problems and Solutions

Problem	Solution
Trees show signs of damage such as wilting, early leaf drop in the fall or slow growth often caused by compaction.	Aerate the soil by pulling 12- to 18- inch deep cores in the soil within the dripline to assist movement of moisture and oxygen into the soil, then backfill with compost.
Trees killed during construction.	Remove after site completion and replace with new trees.

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Sediment Fence

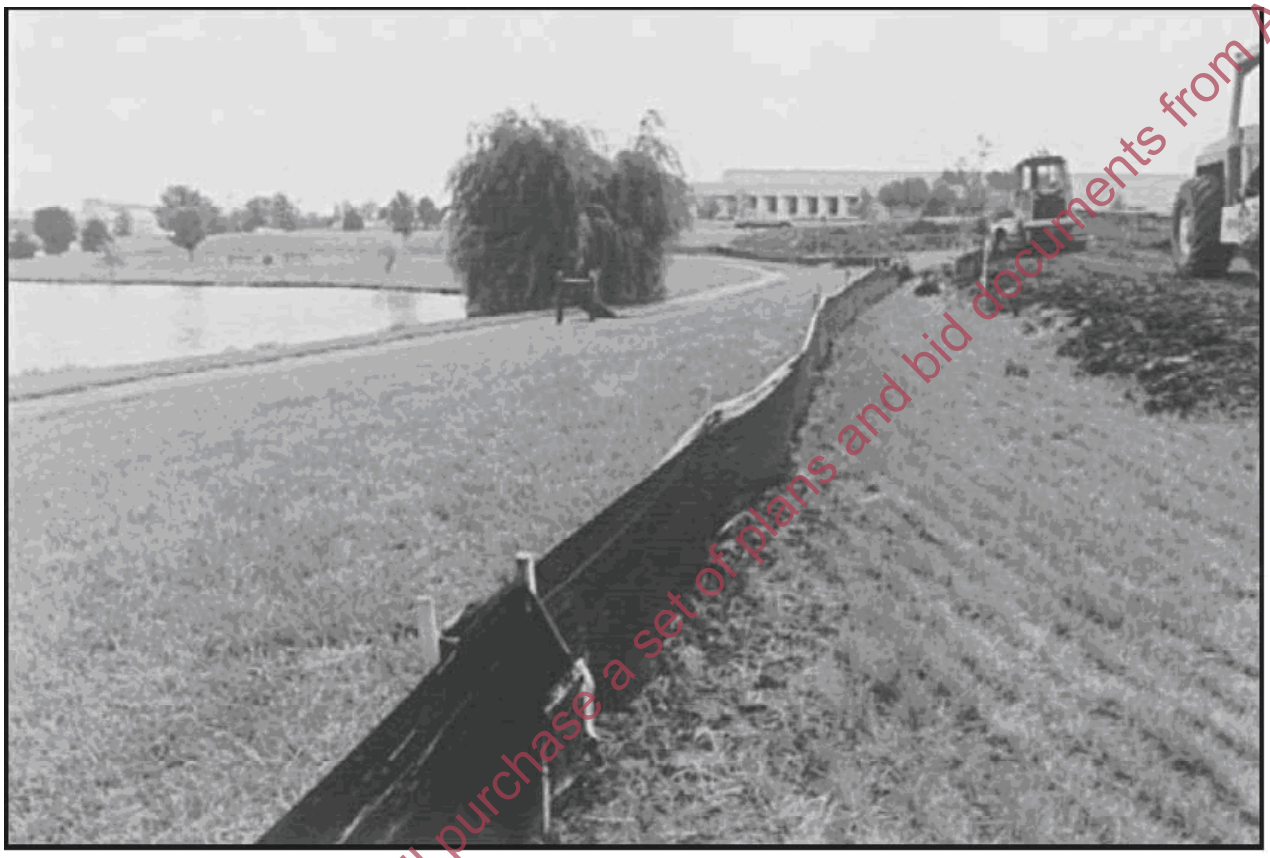

Figure 6.50 A properly installed sediment fence slows water flow long enough for the sediment to settle out. There should be no gaps under fence if heeled in properly. Source: C. Rahm, NRCS. Platte Co.

Practice Description

A sediment fence (often called a silt fence) is a temporary sediment barrier consisting of a geotextile fabric that is attached to supporting posts and trenched into the ground. Sediment-laden runoff ponds uphill from the sediment fence and runoff is temporarily stored to allow sediment to settle out of the water.

This practice applies where sheet erosion occurs on small disturbed areas. Sediment fences are intended to intercept and detain small amounts of sediment from disturbed areas in order to prevent sediment from leaving the site. Sediment fences can also prevent sheet erosion by decreasing the velocity of the runoff. Silt fence is not intended to be used in concentrated flow paths.

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Recommended Minimum Requirements

Prior to start of construction, sediment fence placement and installment methods should be designed by a qualified professional. The site superintendant and field personnel should refer to plans and specifications throughout the construction process.

Drainage Area

Limit to ¼ acre per 100 feet of fence. Further restrict the area by slope steepness as shown in Table 5.16.

Location

Fence should be built on a nearly level grade and at least 10 feet from the toe of the slope to provide a broad shallow sediment pool. Install on the contour, where fence can intercept runoff as a sheet flow; not located crossing channels, waterways or other concentrated flow paths; not attached to existing trees; and not located vertically up the slope (at a right angle to the slope.)

J-Hook

Silt fence should not be used around the entire perimeter of the site unless it is a small, flat site. It should only be located at areas where stormwater flow discharges with overland or sheet flow. You can use silt fence to create small catchments of stormwater flow by creating a small J-hook shape with the silt fence. The drainage area should be less than ¼ acre with little or no slope (see Figure 3.83).

Length

Maximum of 600 feet; flare ends of fence uphill to temporarily impound water as shown in Figure 5.32.

Geotextile

Commercially available silt fence fabric is almost exclusively woven geotextile fabric. Non-woven material has better flow through but poorer strength. A higher porosity geotextile would be a mono-filament fabric with larger voids between the woven threads.

Table 6.14 Typical Land Slope and Distance for Sediment Fence

Land Slope (percent)	Maximum Slope Distance* above Fence (feet)
Less than 2	100
2 to 5	75
5 to 10 greater than 10	50*

*** Follow manufacturers' recommendations for proper spacing.**

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Spacing of Support Posts

A good minimum stand is 6-feet maximum for geotextile fabric supported by wire and 5-feet maximum for geotextile fabric without supportive wire backing. Follow the local design standards in your area and the site SWPPP.

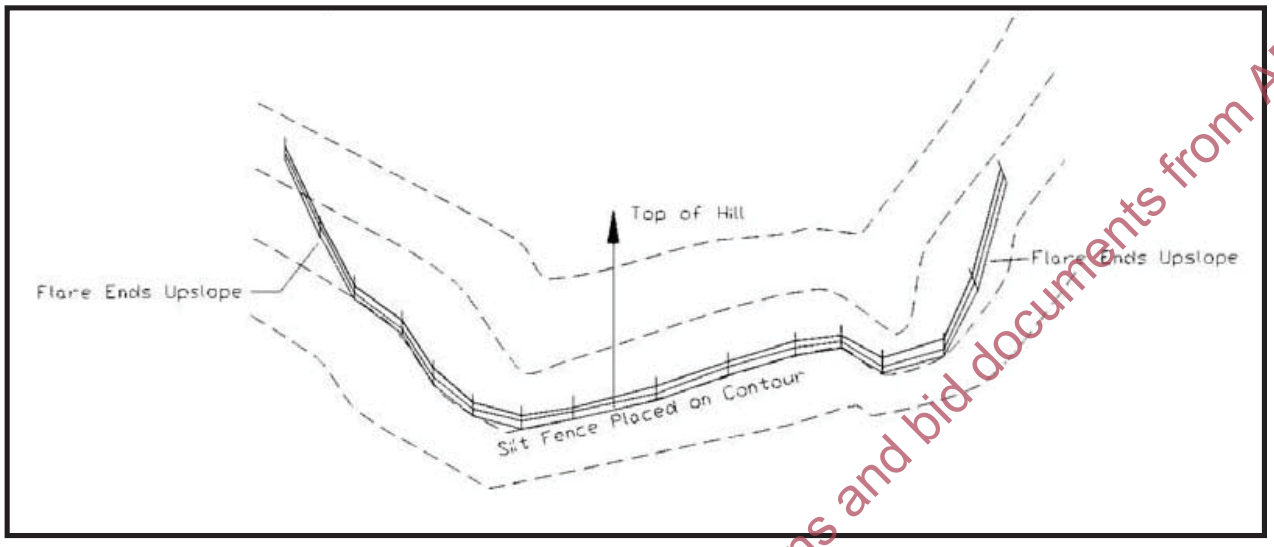

Figure 6.51 Placement of sediment fence

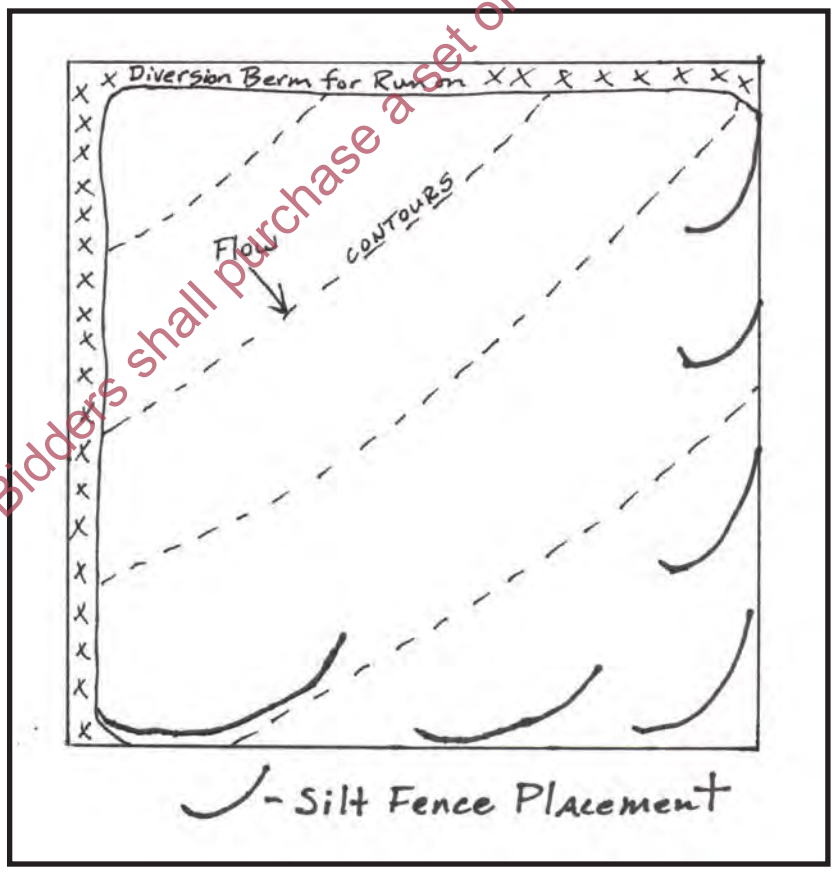

Figure 6.52 Placement of J-hook silt fence along the perimeter of a construction site to slow and pond small areas of stormwater runoff.

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Proper Installation of Silt Fence

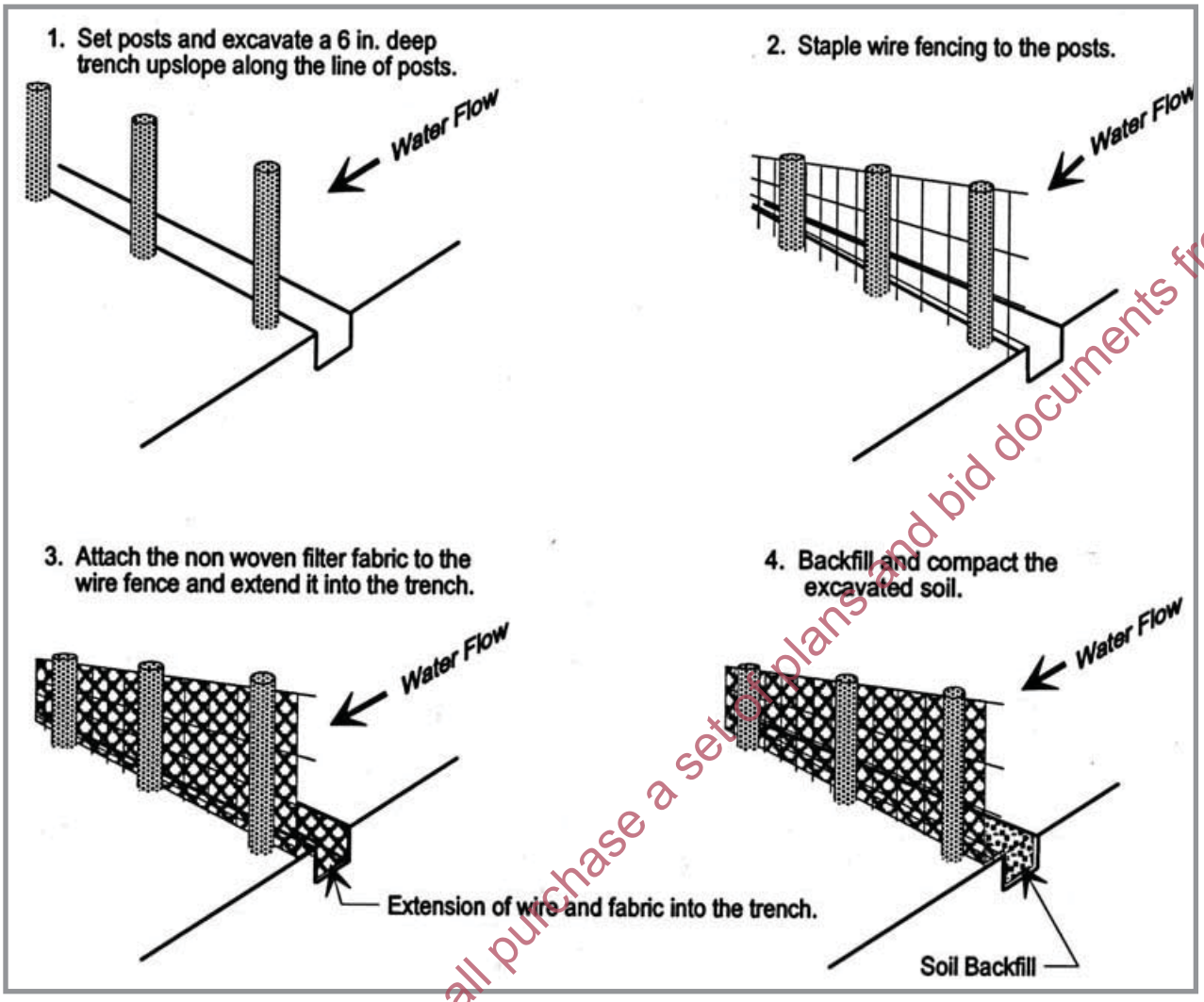

Figure 6.53 Proper Installation of silt fence

Construction

Site Preparation

- Prior to excavation activities of any type, call 1-800-DIG-RITE (344-7483) to obtain utility locations.
- Grade alignment of fence as needed to provide broad, nearly level area upstream of fence.

Fence Installation

- Dig a trench at least 6-inches deep along the fence alignment as shown in Figure 5.84.
- Drive hard wood or steel posts at least 24-nches into the ground on the downslope side of the trench. Space posts a maximum of 6-feet if fence is supported by wire, or 5-feet if no reinforcing wire fence is used.
- Fasten support wire fence to upslope side of posts, extending 6-inches into the trench as shown in Figure 5.84.
- Attach continuous length of fabric to upslope side of fence posts. Try to minimize the number of joints. Avoid joints at low points in the fence line. Where joints are necessary, fasten fabric securely to support posts and overlap to the next post.

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- Place the bottom 1-foot of fabric in the 6-inch deep trench (minimum), lapping toward the upslope side. Backfill with compacted earth or gravel as shown in Figure 5.85.
- To reduce maintenance, excavate a shallow sediment storage area in the upslope side of the fence.
- Provide good access in areas of heavy sedimentation for clean out and maintenance.

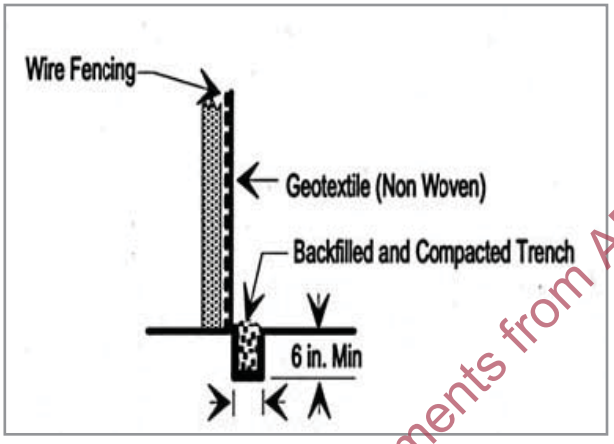

Figure 6.54 Detail of sediment fence installation

Reinforced Stabilized Outlet Installation

- Allow for safe bypass of storm flow to prevent overtopping failure of fence.
- Set outlet elevation so water depth cannot exceed 1.5 feet at the lowest point along the fence.
- Drive posts securely at least 24 inches into the ground, at a spacing of 5- to 6-feet depending on the use of wire fence reinforcement or not. Install a horizontal brace between the support posts to serve as an overflow weir and to support the top of the fabric.
- Immediately downslope of the fabric, excavate foundation for splashpad a minimum of 5-feet wide, 5-feet long and 1-foot deep. Place 1-foot of riprap in the excavated foundation. The surface of the riprap should be flush with the undisturbed ground (no outfall).

Erosion Control

Stabilize disturbed areas in accordance with landscape plan.

Construction Verification

Check finished grades and dimensions of the sediment fence. Check materials for compliance with specifications.

Maintenance, Inspection and Removal

Inspect sediment fences at least once a week and after each rainfall as dictated by your permit. Make any required repairs immediately.

- Immediately replace the fabric of the sediment fence should it collapse, tear, decompose or become ineffective.
- Remove sediment deposits as necessary to provide adequate storage volume for the next rain event and to reduce pressure on the fence. Take care to avoid damaging or undermining the fence during cleanout.
- Remove all fencing materials and unstable sediment deposits and bring the area to grade and stabilize it after the contributing drainage area has been properly stabilized.
- Remove the temporary sediment fence and stabilize the site prior to filing *Form H: Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One - Missouri Permit Requirements).

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Troubleshooting

Consult with registered design professional if any of the following occur:

- Variations in topography on-site indicate sediment fence will not function as intended; changes in the plan may be needed.
- Design specifications for geotextile fabric, support posts, support fence, gravel or riprap cannot be met; substitutions may be required. Unapproved substitutions could lead to failure.
- Fence is not installed on the contour or is installed across channels or other concentrated flow areas.
- Installation of sediment fence as designed appears to create a potential flooding hazard or directs runoff overflows into sensitive ecological areas.

Common Problems and Solutions

Problem	Solution
Overtopping, sagging or collapse of fence occurs; caused by the drainage area too large or too much sediment accumulation allowed before cleanout.	Increase sediment storage capacity upslope of fence or remove accumulation more frequently, then repair fence.
Collapse of fence due to high velocity or undercutting of fence; caused by approach too steep.	Reduce slope of approach area, or consult with a registered design professional.
Sagging or collapse of fence; caused by fence not adequately supported.	Add additional supports.
Undercutting of fence; caused by the bottom of fence not buried properly.	Reinstall fence using proper method of trenching.
Sagging, collapse or undercutting of fence; fence installed across drainage way.	Relocate fence away from drainage way. Silt fence should only be used adjacent to drainageway; other devices should be used across or within drainageway (see Rock Check Dam or Ditch Check).
Water runs on both sides of fence; fence installed vertically or at right angle to contour.	Relocate fence along contours.

Fence should never be used as a check dam or in concentrated flow paths.

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Temporary Rock Construction Exit Pad

Figure 6.1 A temporary rock construction exit can reduce sediment and resulting safety hazards on public streets. This pad needs maintenance due to sediment filling the void spaces between the rocks making the rock exit pad ineffective. Source: ABC's of BMP's, LLC

Practice Description

A temporary rock construction exit is a stone base installed to provide an exit area where construction vehicles can drop the mud and caked soil from their tires to avoid transporting it onto public roads. The mud and dirt that ends up on the street is called "track out" and is the number one complaint associated with construction projects. The rock will jar and flex the tire treads so dirt and mud on the tires will become dislodged and collect in the voids of the rock exit pad. This device should be incorporated anywhere traffic will be leaving a construction site and moving directly onto a public road or other paved area.

The rock exit pad is often not effective by itself and requires a lot of maintenance. High-clay content soils may not adequately separate from the tires, and the rocks must be reconditioned as void space is filled with sediment. You may need to install additional practices, some of which are described below. Superior practices may be available in the construction industry, although the temporary rock construction exit pad is most commonly used.

Prior to the start of construction, temporary rock construction exit pads should be designed by a qualified professional. The site superintendant and field personnel should refer to plans and specifications throught the construction process.

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The design professional should give consideration to the following:

- Limit the points of entrance and exit to the site.
- Designate combination or single purpose access points to the construction site, and require all employees, subcontractors and others to use them.
- Properly grade each construction entrance and exit to prevent runoff from leaving the construction site.
- Route runoff from a stabilized pad through a sediment-trapping device before discharge.
- Design the pad to support the heaviest vehicles and equipment that will use it.
- Avoid placing the exit pad in low areas where stormwater accumulates or discharges off-site.

Recommended Minimum Requirements

Aggregate Size

2- to 3-inch washed stone.

Pad Design

- Thickness: 6 inches minimum.
- Width: 12 feet minimum or full width of roadway, whichever is greater.
- Length: 50 feet minimum.

Signage

Clearly designate these areas to be used for exiting the construction site and make sure everyone involved with the project is aware that track out is not tolerated.

Wheel Wash (Optional)

Level the area with a minimum of 3 inches of washed stone. Remember if a wheel wash station is installed, all wash water must be collected and treated before it is discharged from the construction site. A simple sediment trap can be added next to the rock pad to collect the wash water and allow it to discharge over a check dam and into the road ditch. See additional information on wheel wash devices later in this section.

Geotextile Fabric

An underliner of woven geotextile (fabric) should be used under the rock to provide stability.

Construction

Avoid locating on steep slopes or at curves on public roads. If possible, locate where permanent roads will eventually be constructed. Limit the number of access roads to limit the inspection and maintenance of these devices and areas where sediment could be tracked onto public roads.

Site Preparation

Remove all vegetation and other unsuitable material from the foundation area; grade and crown for positive drainage. If wheel washing is indicated, provide a sediment trap adjacent to the rock pad to collect the discharged wash water for treatment before it is released off-site.

Grading

- If the slope towards the road exceeds 2 percent, construct a 6- to 8-inch high ridge with 3:1 side slopes across the foundation approximately 15 feet from the entrance to divert runoff away from the public road.
- Place geotextile filter fabric on the graded foundation to improve stability.

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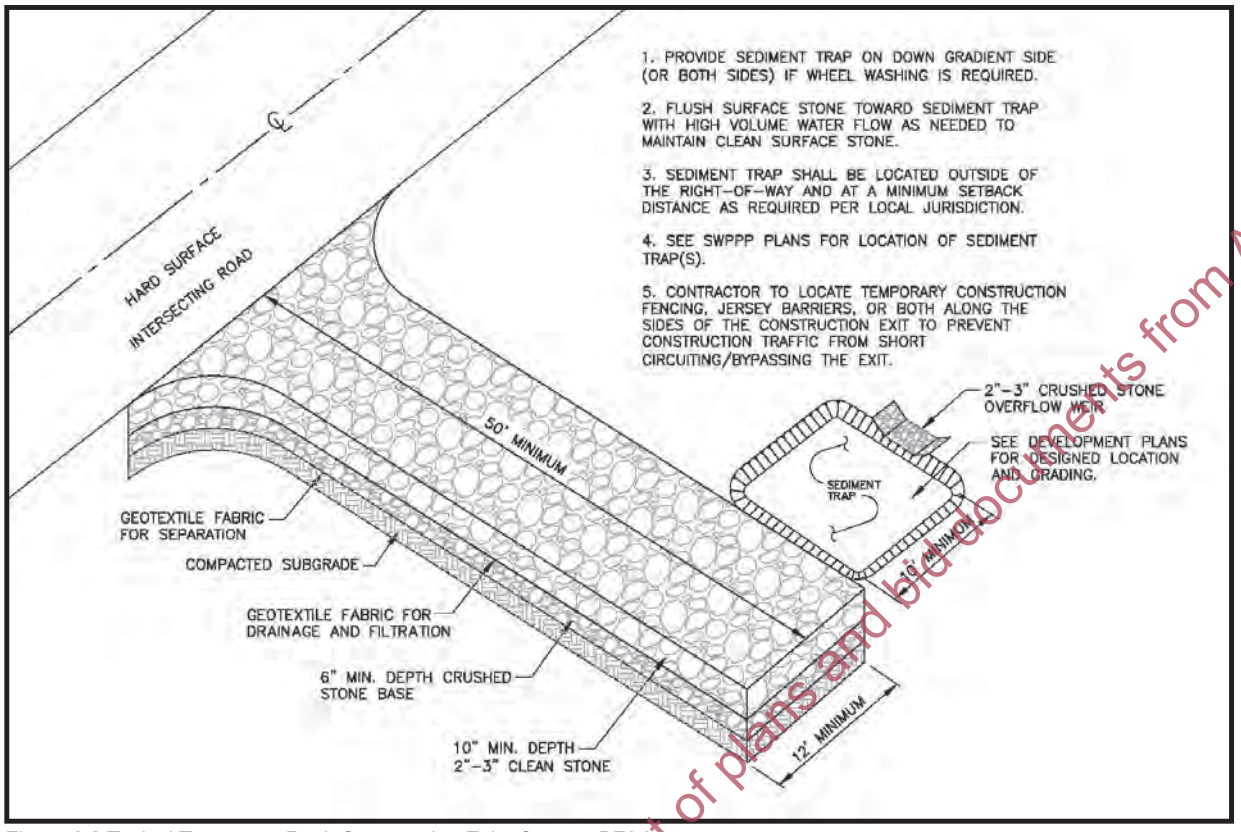

Figure 6.2 Typical Temporary Rock Construction Exit. Source; BFA Inc.

- Place stone to dimensions and grade shown on plans. Stone size should not be less than 2 inches or greater than 3 inches. Stones in the dimensions of 4- to 6-inches may become trapped between the dual tires on some construction vehicles and be transported off-site to later be thrown from the trucks tires and cause damage to vehicles or their drivers. Leave the surface smooth and sloped for drainage.
- Divert all surface runoff and drainage from the stone pad to a sediment trap or basin.

Maintenance, Inspection and Removal

- Inspect stone pad and sediment disposal areas weekly and after storm events or heavy use. When the voids between stones are filled with sediment or the pad becomes smooth and does not function to jar the truck and flex the rubber, it is not functioning properly and should be repaired. Add more rock or turn the existing stone over to move sediment below the stone so the stone pad will again have proper roughness and void spaces.
- Reshape pad as needed for drainage and runoff control.
- Topdress with clean 2- to 3-inch stone as needed.
- Immediately remove mud or sediment tracked or washed onto public road within 24 hours.
- Keep all temporary roadway ditches clear.
- Repair any broken road pavement immediately.
- Remove this temporary device and stabilize the site stabilized prior to filing *Form H: Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One - Missouri Permit Requirements).

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Common Problems and Solutions

Problem	Solution
Inadequate runoff control; sediment washes onto public road.	Install diversions or other runoff control measures.
Stone too small, pad too thin or geotextile fabric absent; results in ruts and muddy conditions as stone is pressed into soil.	Increase stone size or pad thickness, or add geotextile fabric. Stone should not be more than 4-inches in diameter, to avoid rocks being caught and thrown from dual tires.
Pad too short for heavy construction traffic.	Extend pad beyond the minimum 50-foot length as necessary.

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Rumble Plate

Figure 6.4 Prefabricated rumble plate, which produces a vibration of the tires and vehicle to dislodge dirt and mud form the construction equipment. Source: *Track out Control, LLC*

Practice Description

A rumble plate is a device that provides rough vibration to construction vehicles exiting the construction site. The vibration dislodges dirt and mud from the tires and undercarriage of the vehicles so sediment does not leave the construction site and drop onto a public road. The rumble plates can be constructed of many types of material including, but not limited to, pipe or wood poles.

Recommended Minimum Requirements

Size the plate for maximum efficiency and allow for void space and sediment collection under the plate. Create a width so construction vehicles can not drive around and avoid the device.

Construction

Many rumble plate devices are prefabricated and shipped by the manufacture to the construction site. To construct your own device, remember the objects you construct it with need to be different diameters and spacing to create the vibration effect. The size and spacing of material should not be such as to cause harm or destruction to the vehicles driving over it.

The device should sit up on a frame with a void space below so the sediment drops from the trucks is trapped under the device. Then you can lift the device and scrape out the dropped sediment for easy clean out. Dispose of the sediment in an appropriate manner.

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Maintenance, Inspection and Removal

- Clean sediment from under the device when it is close to filling the void area underneath. Dispose of the sediment on the construction site in an area that is stabilized and protected with a sediment control device.
- Remove the temporary device and stabilize the site stabilized prior to filing *Form H - Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One-Missouri Permit Requirements) for termination of permit coverage.

Common Problems and Solutions

Problem	Solution
Device is ineffective.	Build the device longer and wider so construction vehicles can not exit without traveling over the device.
Device does not create a rough vibration.	Redesign the device with varied sizes of pipe and spaces between pipes.
After vehicles drive over the device, sediment is dropped onto the public street – device is not long enough to be effective or does not create a rough enough vibration.	Increase the length of device, clean out sediment from under the device and if necessary, redesign to increase vibration to vehicles driving over it.

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Wheel Wash

Figure 6.3 Industrial wheel wash unit with all contained and recycled wash water. Source: *Innovative Equipment Solutions.*

Practice Description

A wheel wash device can consist of a range of tools from a simple compressor, hose and water source to a large scale industrial truck wash system. A wheel wash is designed to complement the rock construction exit pad to reduce the amount of sediment that might leave the construction site via construction vehicle traffic. Several portable wheel wash systems are available on the market today.

Recommended Minimum Requirements

While the installation of a wheel wash on the construction site will minimize mud tracking onto the roads, it is necessary to collect and treat the wash water to keep it from discharging off-site. Whatever type of wheel wash device is used at the construction site, a collection of the wash water is required in the form of a sediment trap or other such device. The water must be allowed to settle so the sediment is retained on-site and the treated water is allowed to discharge.

The size of the device and quantity of wash water will depend on the quantity and size of trucks treated. Some devices such as the one pictured above have self contained wash water collection systems that do not discharge the runoff.

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Construction

Whether you install a portable wheel wash, or construct one on-site, you will need a water source and a collection system for the wash water. How the wheel wash is constructed and installed will depend on the type of system used. Make sure the installation of the system allows for a drip area between the device and public road so as little as possible of the wash water is transported to the public road to decrease wetting of the road. This is extremely important in cold weather when freezing is a possibility and the wash water could create hazardous conditions.

Maintenance, Inspection and Removal

- Capture all sediment from the wash water on-site and dispose of it in an appropriate manner.
- Clean out wash water capture device when sediment fills it to greater than 50 percent.
- Removal of this temporary device must be performed and the site stabilized prior to filing *Form H - Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One-Missouri Permit Requirements).

Common Problems and Solutions

Problem	Solution
Sediment laden water drops onto the public road from the trucks exiting the construction site.	Increase the amount of washing to remove sediment from truck and increase the distance from wash area to road to provide a drip/dry pad for trucks. This will reduce water getting onto the public road.
Sediment-laden wash water from the trucks leaving the site drips onto the public road creating slick conditions.	Increase the washing of the vehicle on the site and allow the truck to drip-dry before driving onto the public street. Provide a sediment trap for wheel wash run-off as necessary.
Temperatures are near or below freezing creating ice from the wash water.	Discontinue the use of water to remove sediment from the construction vehicles before they enter the public street.

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Topsoiling: Removal, Stockpiling and Replacement

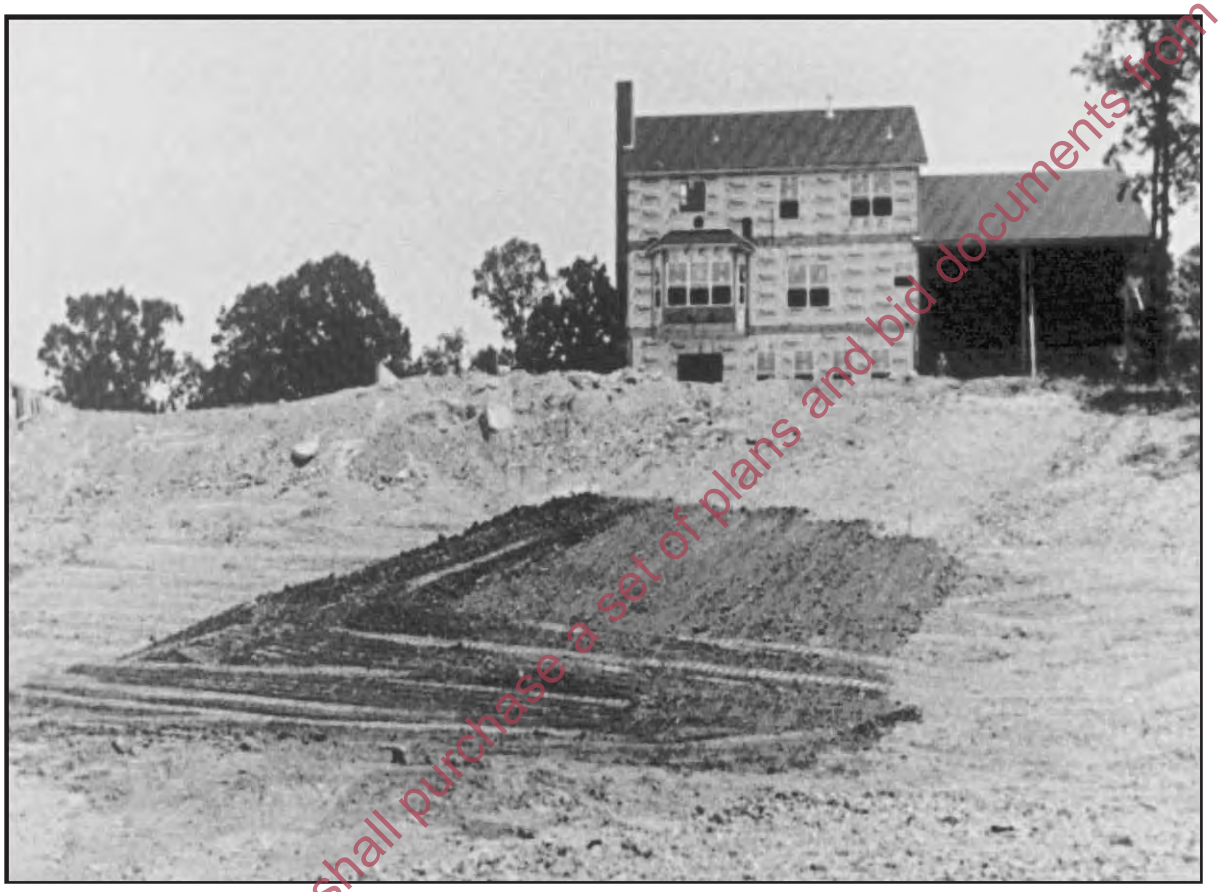

Figure 6.16 It's important to mix / incorporate topsoil with the underlying subsoil to prevent sloughing on sloping soils.
Source: *C. Rahm, NRCS. St. Louis Co.*

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Practice Description

Topsoiling is a method of preserving the topsoil prior to construction, stockpiling it and using it after construction to help establish vegetation on a construction site. Stockpiling is also used for storage of other soils and construction material such as fill material. These practices apply to areas on a site to be disturbed by excavation, compaction or filling, and where vegetation is to be reestablished.

Recommended Minimum Requirements

Prior to the start of construction, topsoiling should be designed by a qualified professional. The existing soil should be tested to ensure the material to be saved is topsoil and helps with vegetation establishment and long-term, permanent growth. The location of other material to be stockpiled on the site should be shown on the site map and stabilized according to the regulations. Refer to the plans and specifications throughout the construction process.

Topsoil

- Surface soil or top layer of undisturbed soil, usually richest in organic matter and nutrients.
- Should be free of debris, trash, stumps, large rocks, roots and noxious weeds. It should contain no substance potentially toxic to plant growth.

Minimum Soil Depth

- 24 inches of total soil depth over bedrock (combined topsoil and subsoil); from 8- to 12-inches of total soil depth over loose sand or rock.
- The top 4- to 6-inches of soil must be good topsoil, rich with organic matter, microorganisms, and not more than 50 percent clay content to ensure good vegetation establishment and growth on a permanent basis.

pH Range

- From 6.0 to 7.5.
- If the pH is less than 5.2, lime should be incorporated in accordance with soil test results.

Construction

Site Preparation

- Establish all perimeter erosion and sediment control practices, (e.g., sediment barriers, diversions, grade stabilization structures, berms, dikes, sediment basins) before stripping.

Stripping

- Strip topsoil from areas that will be disturbed by excavation, filling or compaction by equipment.
- Determine depth of stripping by taking soil cores at several locations within each area to be stripped.
- Make sure the soil being saved is topsoil. It should have a minimum of five percent organic material and a clay content of less than 50 percent.

Stockpiling

- Do not place topsoil or other stockpiles near areas of water (e.g., conveyances, ditches, swales).
- Do not place stockpiles on impervious surfaces or within 50 feet of storm drain inlets.
- Avoid placing topsoil or stockpiling other material on steep slopes. Side slopes of stockpile should not exceed 2:1.
- Use sediment fences or other barriers where necessary to retain sediment.
- Protect topsoil and other stockpiles with temporary seeding or other soil stabilization techniques as soon as possible, but not more than 14 working days after formation of the stockpile. If stockpiles will not be used within 12 months, they should be stabilized by permanent vegetation to control erosion and weed growth.

Grading

Established grades should be maintained according to the approved plan and should not be altered by adding topsoil.

Liming of Subsoil

Where the pH of the existing subsoil is below 5.2, incorporate agricultural limestone in amounts indicated by soil tests or specified for the seeding mixture to be used (See Temporary or Permanent Seeding). Incorporate lime into the subsoil to a depth of at least two inches by disking. Retest the soil to determine the pH and if pH is not 5.2 or higher, repeat the process.

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Roughening

Immediately prior to spreading topsoil, loosen the subgrade by disking or scarifying to a depth of at least two inches to ensure bonding of the topsoil and subsoil.

Spreading Topsoil

- Spreading frozen or muddy topsoil can prevent proper grading or seeding. Uniformly spread topsoil to a minimum compacted depth of four inches. For long-term growth of vegetation without irrigation, minimum soil depth (subsoil and topsoil) should be 8- to 12-inches over loose sand or rock fragments, and 24 inches over bedrock.
- Prior to the establishment of final vegetation, the topsoil should be final graded so it is smooth with no clods greater than one inch in diameter.

Construction Verification

Verify that topsoil was spread evenly and incorporated with underlying subsoil.

Maintenance and Inspection

- Maintain erosion control devices over topsoil until vegetation is fully established with a density of 70 percent over the entire area.
- Inspect topsoiled areas frequently until vegetation is established.
- Repair eroded or damaged areas and revegetate.

Common Problems and Solutions

Problem	Solution
Poor or no vegetation establishment caused by topsoil pH too low.	Add agricultural limestone to adjust pH.
Poor or no vegetation establishment caused by topsoil containing sterilants or toxic chemicals.	Remove contaminated topsoil and replace.
Poor or no vegetation establishment caused by topsoil being too high in clay content or too low in organic material and microorganisms.	Add organic material.
Poor vegetation establishment caused by topsoil being compacted too much during application.	Loosen by disking or scarifying and reseed.
Poor drainage and possible sloughing on steep slopes caused by topsoil not properly bonded to subsoil.	Remove topsoil, roughen subgrade and respread topsoil.
Inadequate vegetation establishment caused by topsoil removed during construction and not replaced.	Add topsoil with a minimum of 5 percent organic material, a clay content under 50 percent, fertilize according to soil test results, reseed or sod site, and apply water to establish vegetation.

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Dust Control

Figure 6.33 Spraying water is effective for dust control on haul roads, although it must be frequently repeated during hot days or heavy traffic periods. Source: C. Rahm, NRCS, St. Charles Co.

Dust Control

In Missouri, the contractor is required by State law to control fugitive dust blown from the site. Kansas does not have specific regulations for fugitive dust emissions; however, the Kansas Department of Health and Environment encourages contractors to implement measures to reduce such emissions. Dust can be minimized by stabilizing areas with mulch as soon as possible. Provide watering in unstabilized areas. Contact Missouri Department of Natural Resources or Kansas Department of Health and Environment for guidance.

Practice Description

Dust control includes a wide range of techniques that reduce movement of wind-borne soil particles (dust) from disturbed soil surfaces. This practice applies to construction routes and other disturbed areas where on-site and off-site damage or hazards may occur if dust is not controlled.

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Recommended Minimum Requirements

Dust control measures should be designed by a qualified professional. The site superintendant and field personnel should refer to plans and specifications throughout the construction process. Whenever possible, leave undisturbed vegetated buffer areas between graded areas.

Scheduling

Plan and schedule construction operations so the smallest area is disturbed at one time.

Erosion Control

Install surface stabilization measures immediately after completing land grading.

Construction

Any combination of the following may be used to help reduce dust and air pollution at a construction site.

Vegetative Cover

For areas not subjected to traffic, vegetation provides the most practical method of dust control (See Temporary or Permanent Seeding).

Sprinkling

The site can be sprinkled with water until the surface is moist. This practice is effective for dust control on haul roads or other traffic routes, but constant repetition is required for effective control.

Soil Stabilizers and Binders

Soil stabilizers are polymers that bind the soil particles together so they are less likely to be transported in the air from the energy of the wind.

Limitations

- Soil binders are temporary in nature and may need reapplication.
- Soil binders require a minimum curing time until fully effective, as prescribed by the manufacturer, which may be 24 hours or longer. Soil binders may need reapplication after a storm event.
- Soil binders will generally experience spot failures during heavy rainfall events. If runoff penetrates the soil at the top of a slope treated with a soil binder, it is likely the runoff will undercut the stabilized soil layer and discharge at a point further down slope.
- Some soil binders do not hold up to pedestrian or vehicular traffic across treated areas. Consult manufacturers' representatives for specific applications and limitations of materials.
- Soil binders may not penetrate soil surfaces made up primarily of silt and clay, particularly when compacted. Some soil binders may not perform well with low relative humidity. Under rainy conditions, some agents may become slippery or leach out of the soil.
- Soil binders may not cure if low temperatures occur within 24 hours of application.

General Considerations

- Site-specific soil types will dictate appropriate soil binders to be used.
- A soil binder must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical and shall not stain paved or painted surfaces.
- Some soil binders are compatible with existing vegetation.
- Performance of soil binders depends on temperature, humidity and traffic across treated areas.
- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.

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Dust Control

Water clarifying compounds may be used on mineral soils for dust control. Traffic must be kept off treated areas to prevent the product from becoming ineffective. The manufacturer or supplier shall provide written application methods for the water clarifying compounds and mixtures. The application method shall ensure uniform coverage to the target and avoid drift to non-target areas including waters of the state. The manufacturer or supplier shall also provide written instructions to ensure proper safety, storage and mixing of the product.

Mulching

This practice offers a fast and effective means of controlling dust when properly applied. Use binders or tackifiers to tack organic mulches (See Mulch and Hydromulch). Mulching is not recommended for areas with heavy traffic.

Barriers

Board fences placed perpendicular to the prevailing winds at intervals of 15 times the barrier height can control blowing soil. In areas of known dust problems, windbreak vegetation should be preserved.

If the following materials or any other chemicals are used for dust control, contact the Missouri Department of Natural Resources, Water Pollution Control Program or the Kansas Department of Health and Environment for permit requirements.

- Calcium Chloride - This material is best used on road surfaces. It can be applied by a mechanical spreader at a rate that keeps the surface moist.

Note: This method may cause restrictions for vegetation establishment.

Maintenance and Inspection

- Maintain dust control measures continuously throughout dry weather periods until all disturbed areas have been stabilized.
- If using a soil binder, it may need to be reapplied for proper maintenance.
- High traffic areas shall be inspected daily, and lower traffic areas shall be inspected weekly.
- After any rainfall event, the permittee is responsible for maintaining all slopes to prevent erosion.

Troubleshooting

Consult with a qualified professional if the following occurs:

- Spray-on adhesives are specified. A permit may be needed.

Common Problems and Solutions

Problem	Solution
Dry soils and increase in dust problems caused by drought conditions.	Use greater precautions during these periods.

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Erosion Control Blankets

Figure 6.30 Follow manufacturer's recommendations to successfully install erosion control blankets or matting. The manufacturer of this high velocity blanket called for stapling every two feet and a check slot wherever two sections were joined. This blanket was used to protect soil and establish grass in a waterway on the August Busch Memorial Conservation Area

Practice Description

Erosion control blankets are used to aid in controlling erosion on critical areas by providing a protective cover made of straw, jute, wood or other plant fibers; plastic, nylon, paper or cotton. This practice is best used on slopes and channels where the erosion hazard is high and plant growth is likely to be slow to provide adequate protective cover for the seed and soil until germination. Erosion control blankets are typically used as an alternative to mulching but are also used to provide structural erosion protection.

Some important factors in the choice of a blanket are: soil conditions, steepness of slope, length of slope, type and duration of protection required to establish desired vegetation, and probable shear stress. (See Compost for compost blanket considerations.)

Recommended Minimum Requirements

Prior to the start of construction, the application of erosion control blankets should be designed by a qualified professional and plans and specifications should be available to field personnel. The field inspector should verify that installation is in accordance with the plans and specifications.

Numerous products designed to control erosion are available. Product installation procedures for manufactured erosion control blanket products should always be available from the manufacturer. Tables 6.11 and 6.12 list some of the more common temporary and permanent products available.

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Table 6.11 Types of Temporary Erosion Control Blankets

ULTRA SHORT-TERM - Typical three month functional longevity						
Type	**Product Description**	**Material Composition**	**Slope Applications***		**Channel Applications***	**Minimum**
			Maximum Gradient	**C Factor[2, 5]**	**Max. Shear Stress[3, 4, 6]**	**Tensile Strength[1]**
1.A	Mulch Control Nets	A photodegradable synthetic mesh or woven biodegradable natural fiber netting.	5:1 (H:V)	< 0.1 @ 5:1	0.25 lb./ft.^{2} (12 Pa)	5 lb./ft. (0.073 kN/m)
1.B	Netless Rolled Erosion Control Blankets	Natural or polymer fibers mechanically interlocked or chemically adhered together to form a RECP.	4:1 (H:V)	< 0.1 @ 4:1	0.5 lb./ft.^{2} (24 Pa)	5 lb./ft (0.073 kN/m)
1.C	Single-net Erosion Control Blankets and Open Weave Textiles	Processed degradable natural or polymer fibers mechanically bound together by a single rapidly degrading, synthetic or natural fiber netting or an open weave textile of processed rapidly degrading natural or polymer yarns or twines woven into a continuous matrix.	3:1 (H:V)	< 0.15 @ 3:1	1.5 lb./ft.^{2} (72 Pa)	50 lb./ft. (0.73 kN/m)
1.D	Double-net Erosion Control Blankets	Processed degradable natural and/or polymer fibers mechanically bound together between two rapidly degrading, synthetic or natural fiber nettings.	2:1 (H:V)	< 0.2 @ 2:1	1.75 lb./ft.^{2} (84 Pa)	75 lb./ft. (1.09 kN/m)
SHORT-TERM - Typical 12 month functional longevity						
2.A	Mulch Control Nets	A photodegradable synthetic mesh or woven biodegradable natural fiber netting.	5:1 (H:V)	< 0.1 @ 5:1	0.25 lb./ft.^{2} (12 Pa)	5 lb./ft. (0.073 kN/m)
2.B	Netless Rolled Erosion Control Blankets	Natural and/or polymer fibers mechanically interlocked or chemically adhered together to form a RECP.	4:1 (H:V)	< 0.1 @ 4:1	0.5 lb./ft.^{2} (24 Pa)	5 lb./ft. (0.073 kN/m)
2.C	Single-net Erosion Control Blankets and Open Weave Textiles	An erosion control blanket composed of processed degradable natural or polymer fibers mechanically bound together by a single degradable synthetic or natural fiber netting to form a continuous matrix or an open weave textile composed of processed degradable natural or polymer yarns or twines woven into a continuous matrix.	3:1 (H:V)	< 0.15 @ 3:1	1.5 lb./ft.^{2} (72 Pa)	50 lb./ft. (0.73 kN/m)
2.D	Double-net Erosion Control Blankets	Processed degradable natural and/or polymer fibers mechanically bound together between two degradable, synthetic or natural fiber nettings.	2:1 (H:V)	< 0.2 @ 2:1	1.75 lb./ft.^{2} (84 Pa)	75 lb./ft. (1.09 kN/m)

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EXTENDED-TERM - Typical 24 month functional longevity.						
3.A	Mulch Control Nets	A slow degrading synthetic mesh or woven natural fiber netting.	5:1 (H:V)	< 0.10 @ 5:1	0.25 lb./ft.^{2} (12 Pa)	25 lb./ft. (0.36 kN/m)
3.B	Erosion Control Blankets & Open Weave Textiles	An erosion control blanket composed of processed slow degrading natural or polymer fibers mechanically bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix or an open weave textile composed of processed slow degrading natural or polymer yarns or twines woven into a continuous matrix.	1.5:1 (H:V)	< 0.25 @ 1.5:1	2.00 lb./ft.^{2} (96 Pa)	100 lb./ft. (1.45 kN/m)
LONG-TERM - Typical 36 month functional longevity.						
4	Erosion Control Blankets and Open Weave Textiles	An erosion control blanket composed of processed slow degrading natural or polymer fibers mechanically bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix or an open weave textile composed of processed slow degrading natural or polymer yarns or twines woven into a continuous matrix.	1:1 (H:V)	< 0.25 @ 1:1	2.25 lb./ft.^{2} (108 Pa)	125 lb./ft. (1.82 kN/m)

Source: *Erosion Control Technology Council.*

* "C" factor and shear stress for Types 1.A., 2.A. and 3.A mulch control nettings must be obtained with netting used in conjunction with pre-applied mulch material.

[1] Minimum Average Roll Values, Machine direction using ECTC Mod. ASTM D 5035.

[2] "C" Factor calculated as ratio of soil loss from RECP protected slope (tested at specified or greater gradient, h:v) to ratio of soil loss from unprotected (control) plot in large-scale testing.

[3] Required minimum shear stress RECP (unvegetated) can sustain without physical damage or excess erosion (> 12.7 mm (0.5 in) soil loss) during a 30-minute flow event in large-scale testing.

[4] The permissible shear stress levels established for each performance category are based on historical experience with products characterized by Manning's roughness coeffecients in the range of 0.01 - 0.05.

[5] Acceptable large-scale test methods may include ASTM D6459,or other independent testing deemed acceptable by the engineer.

[6] Per the engineers discretion. Recommended acceptable large-scale testing protocol may include ASTM D6460, or other independent testing deemed acceptable by the engineer.

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TABLE 6.12 Types of Temporary Erosion Control Blankets - For applications where vegetation alone will not sustain expected flow conditionsor provide sufficient long-term erosion protection.

PERMANENT[1] - All categories of TRMs must have a minimum thickness of 0.25 inches (6.35 mm) per ASTM D 6525 and U.V. stability of 80 percent per ASTM D 4355 (500 hours exposure).					
Type	**Product Description**	**Material Composition**	**Slope Applications**	**Channel Applications***	**Minimum**
			Maximum Gradient	**Max. Shear Stress**[4, 6]	**Tensile Strength**[2, 3]
5.A	Turf Reinforcement Mat	Turf Reinforcement Mat – A rolled erosion control product composed of non-degradable synthetic fibers, filaments, nets, wire mesh or other elements, processed into a permanent, three-dimensional matrix of sufficient thickness. Mats that may be supplemented with degradable components, are designed to impart immediate erosion protection, enhance vegetation establishment and provide long-term functionality by permanently reinforcing vegetation during and after maturation. Note: Mats are typically used in hydraulic applications, such as high flow ditches and channels, steep slopes, stream banks, and shorelines, where erosive forces may exceed the limits of natural, unreinforced vegetation or in areas where limited vegetation establishment is anticipated.	0.5:1 (H:V)	6.0 lbs/ft^2 (288 Pa)	125 lbs/ft (1.82 kN/m)
5.B	Turf Reinforcement Mat		0.5:1 (H:V)	8.0 lbs/ft^2 (384 Pa)	150 lbs/ft (2.19 kN/m)
5.C	Turf Reinforcement Mat		0.5:1 (H:V)	10.0 lbs/ft^2 (480 Pa)	175 lbs/ft (2.55 kN/m)

Source: *Erosion Control Technology Council.*

[1] For mats containing degradable components, all property values must be obtained on the non-degradable portion of the matting alone.

[2] Minimum Average Roll Values, machine direction only for tensile strength determination using ASTM D6818 (Supercedes Mod. ASTM D5035 for RECPs)

[3] Field conditions with high loading or high survivability requirements may warrant the use of a mat with a tensile strength of 44 kN/m (3,000 lb./ft.) or greater.

[4] Required minimum shear stress mat (fully vegetated) can sustain without physical damage or excess erosion (> 12.7 mm (0.5 in.) soil loss) during a 30-minute flow event in large scale testing.

[5] Acceptable large-scale testing protocol may include ASTM D6460, or other independent testing deemed acceptable by the engineer.

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Construction
Site Preparation

- Grade the site in accordance with the approved design to a smooth and uniform surface, free of debris.
- Add and incorporate topsoil where needed.
- Make sure seed bed is firm yet friable.
- Seed and fertilize as shown on the design plan.

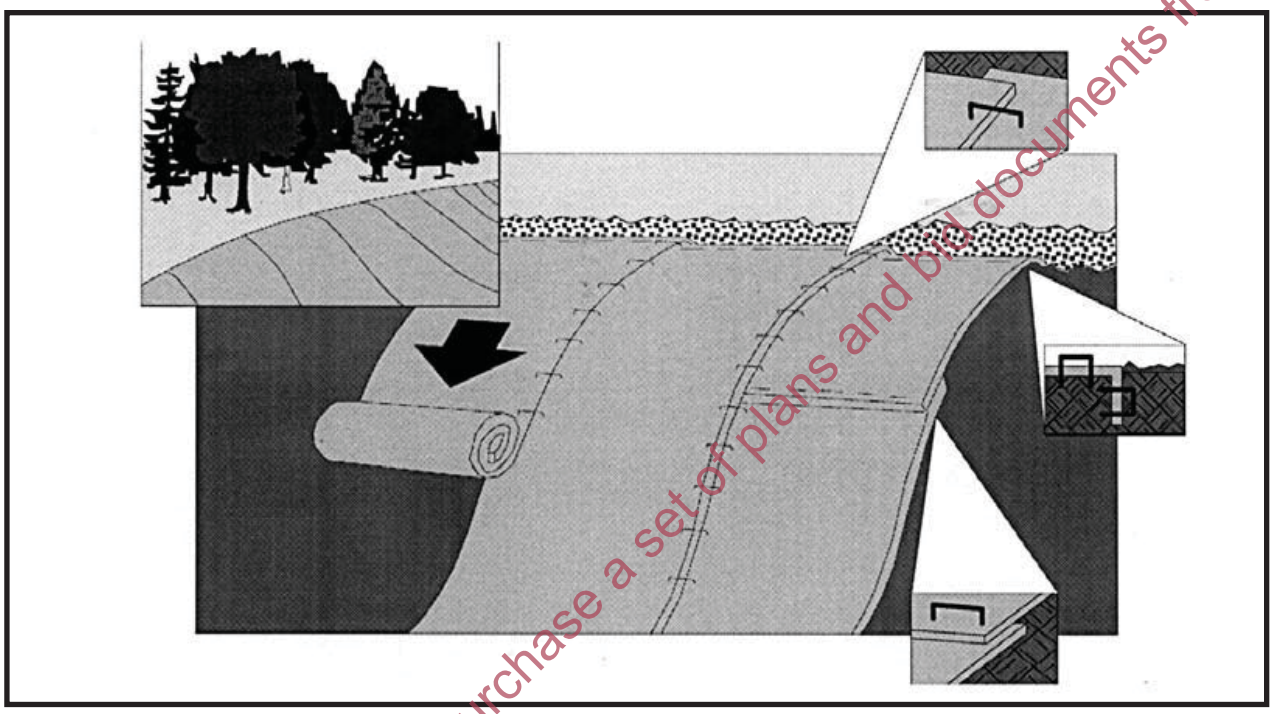

Figure 6.31 Typical installation of erosion control blankets on a slope - Consult manufacturer for recommendations on proper installation of staple patterns, overlap and keying edges.

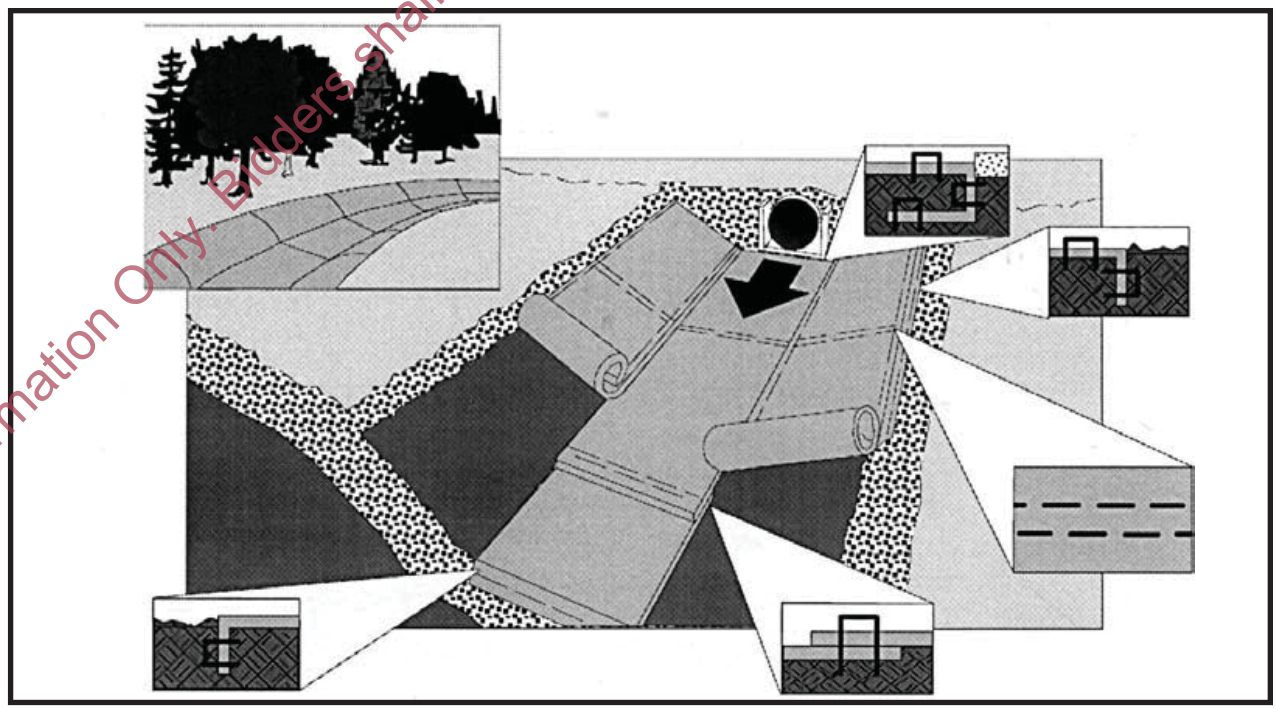

Figure 6.32 Typical installation of erosion control blankets in a channel - Consult manufacturer for recommendations on proper installation of staple patterns, overlap and keying edges.

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Erosion Control Blankets

Blanket Installation

Install erosion control products in accordance with the manufacturer's recommendations and specifications, including check slots and stapling materials.

Anchor product so a continuous, firm contact (no tenting) with the soil surface/seed bed is maintained. Soil must be fine graded with no clods.

Note: Failure to do the above could result in soil erosion, which would require regrading and reseeding.

Construction Verification

Check finished grade, dimensions and staple spacing of erosion control blankets. Check materials for compliance with specifications.

- Movement of the blanket or erosion under the blanket is observed.
- Variations in topography on-site indicate erosion control mat will not function as intended; changes in the plan may be needed, or a blanket with a shorter or longer life may be needed.
- Design specifications for seed variety, seeding dates or erosion control materials cannot be met; substitution may be required. Unapproved substitutions could result in failure to establish vegetation.

Maintenance, Inspection and Removal

Inspect weekly and after storm events, until vegetation is established, for erosion or undermining beneath the blankets. If any area shows erosion, pull back that portion of the blanket, add tamped soil and reseed; then resecure the blankets.

If blankets become dislocated or damaged, repair or replace and resecure immediately.

Although some erosion control blankets are temporary, they are left in place to decompose and are not to be removed prior to filing *Form H: Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One, Missouri Permit Requirements).

Common Problems and Solutions

Problem	Solution
Surface water flows under rather than over the blanket, causing erosion. This may be caused by poor contact between soil and the erosion control blanket.	Smooth grade or remove large clods and retrench or reanchor to direct water over blanket.
Tenting (air pockets under blanket), blanket movement or displacement is caused by blanket inadequately or improperly stapled.	Reinstall and ensure blanket is properly anchored.
Blanket or slope failure caused by unstable slope.	Determine cause of slope failure, stabilize slope and reinstall blanket.

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SECTION 4: SEDIMENT CONTROLS

Fabric Drop Inlet Protection

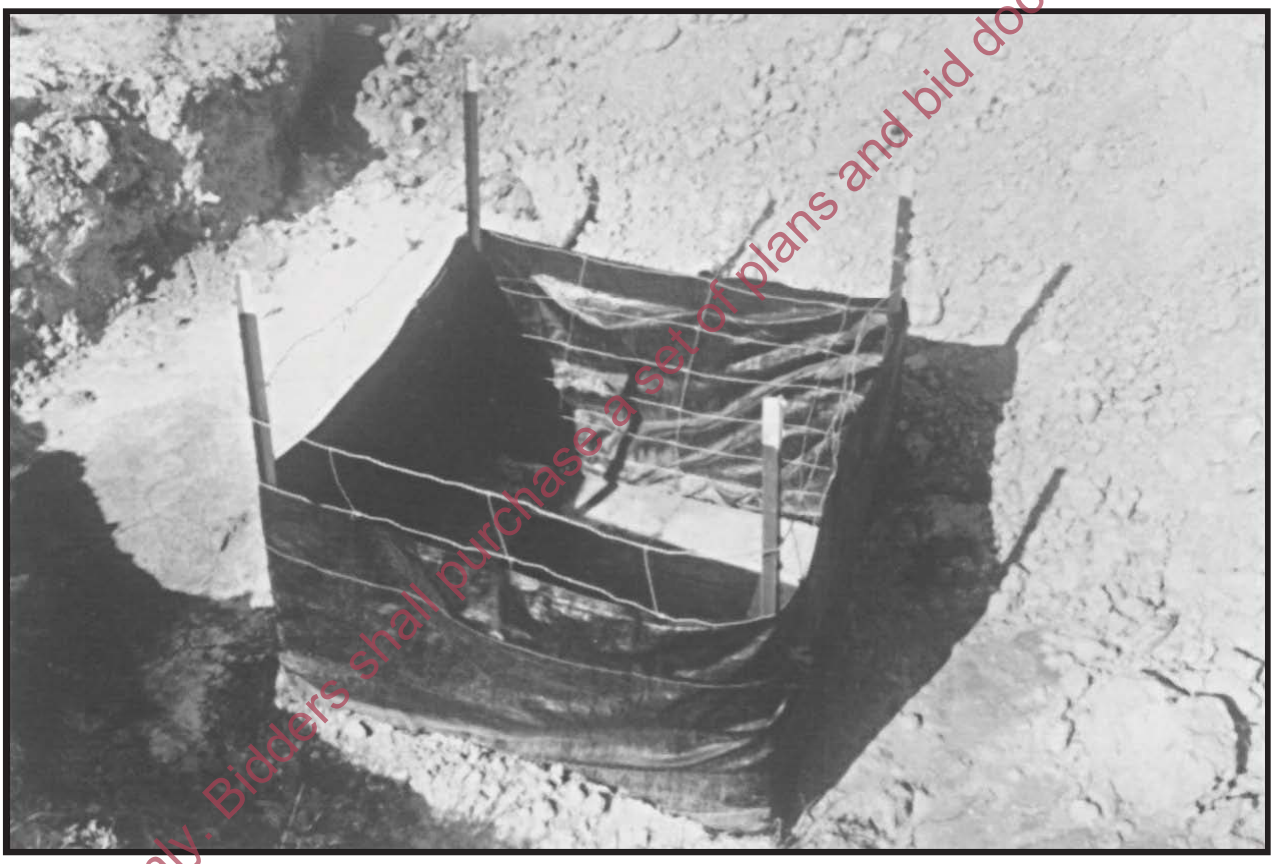

Figure 6.40 Filter fabric is only one way of protecting storm water inlets from siltation early in the grading process.

Practice Description

A fabric drop inlet protection is a temporary woven geotextile barrier placed around a drop inlet to reduce the amount of sediment entering the storm drains during construction operations. This practice applies where early use of the storm drain system is necessary.

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Recommended Minimum Requirements

Prior to start of construction, fabric drop inlet protection structures should be designed by a registered design professional. The site superintendant and field personnel should refer to plans and specifications throughout the construction process.

Drainage area

Less than 1 acre per inlet.

Capacity

Ten year or design storm should enter inlet without bypass flow.

Height of Fabric

One and one-half feet maximum, 1-foot minimum; base of fabric should be buried at least 6-inches below the ground surface.

Approach

Less than 1 percent slope.

Sediment Storage

Generally 35 yard^3/disturbed acre/year for watershed slopes of under 8 percent; 100 yard^3/disturbed acre/year for slopes more than 8 percent.

Support Posts

Steel fence posts or 2 x 4 inch wooden posts. Minimum length of the stakes should be 3-feet; maximum spacing of stakes should be 3-feet.

Fabric

Durable, high-strength synthetic woven fabric.

Framing

Use frame cross members to connect the tops of the posts to stabilize the structure.

Stakes

Close to the drop inlet so overflow will fall directly into the structure and not onto unprotected soil.

Approach

Less than 1 percent slope.

Sediment Storage

Generally 35 yard^3/disturbed acre/year for watershed slopes of under 8 percent; 100 yard^3/disturbed acre/year for slopes more than 8 percent.

Support Posts

Steel fence posts or 2 x 4 inch wooden posts. Minimum length of the stakes should be 3-feet; maximum spacing of stakes should be 3-feet.

Fabric

Durable, high-strength synthetic woven fabric.

Framing

Use frame to connect the tops of the posts to stabilize the structure.

Stakes

Close to the drop inlet so overflow will fall directly into the structure and not onto unprotected soil.

Safety

Provide protection to prevent children from entering the inlet and outlet.

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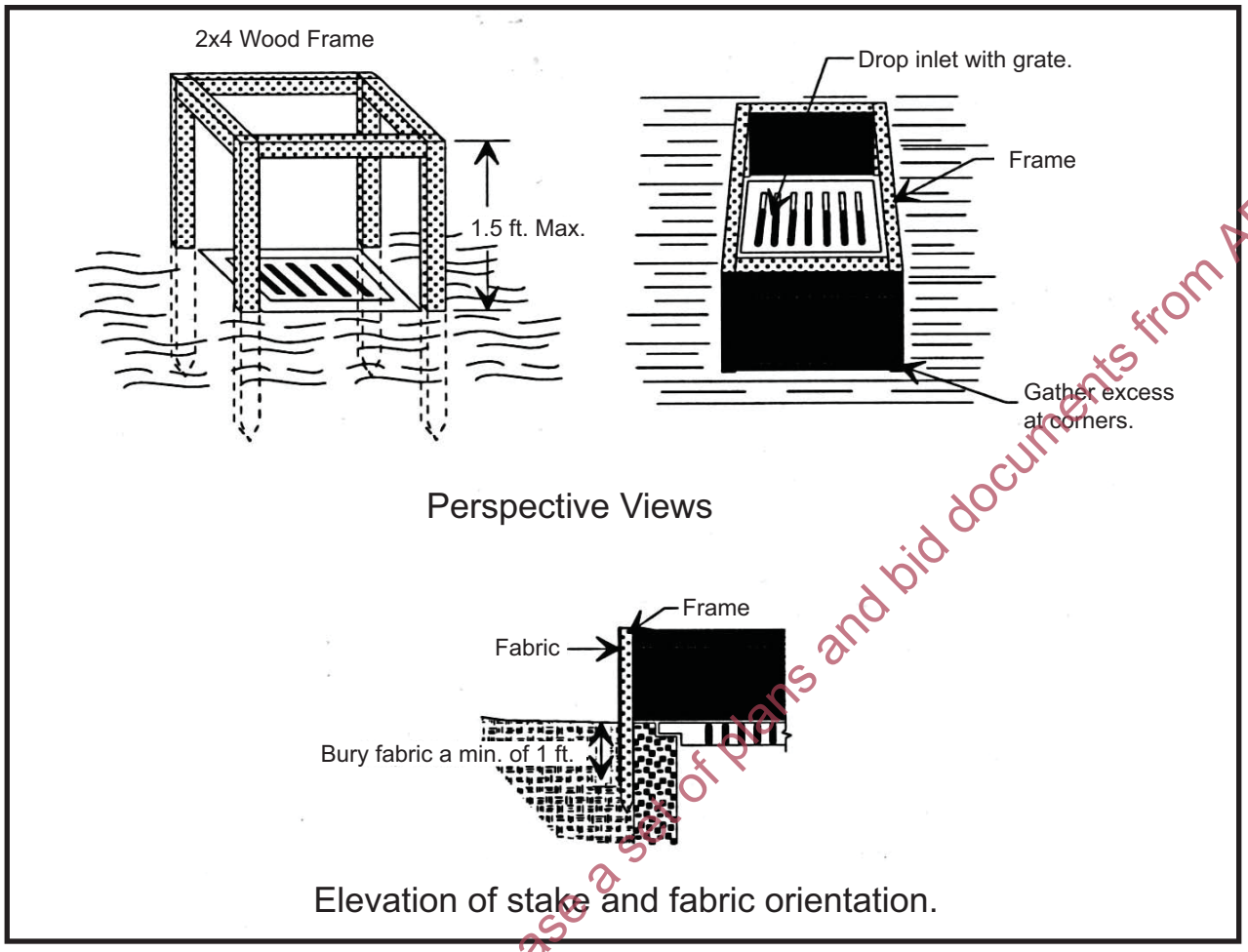

Figure 6.41 Fabric Drop Inlet Protection

Construction

- Space stakes evenly around the perimeter of the inlet a maximum of 3-feet apart and securely drive them into the ground, approximately 18-inches deep.
- To provide needed stability to the installation, frame with 2 x 4 inch wood strips or other suitable materials around the crest of the overflow area at a maximum of 18-inches above the drop inlet crest.
- If possible, cut fabric from one continuous roll to eliminate joints.
- Place the bottom 12-inches of the fabric in a trench and backfill the trench with crushed stone or compacted soil.
- Fasten the fabric securely to the stakes and frame. Joints should be overlapped to the next stake.
- Optional: Wire fence may be used to support the fabric. The wire should be 14-gage minimum with maximum mesh spacing of 6-inches. The top of the fence should be level, and the bottom should be buried at least 6-inches below ground surface.
- The top of the frame and fabric must be well below the ground elevation downslope from the drop inlet to keep runoff from bypassing the inlet. It may be necessary to build a temporary dike on the downslope side of the structure to prevent bypass flow. Material from within the sediment pool may be used for dike construction.

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Stabilization
Stabilize all bare areas around the inlet.

Construction Verification
Check finished grades and dimensions of fabric drop inlet protection structures.
Verify sturdiness of frame construction.

Troubleshooting
Consult with a registered design professional if any of the following occur:

- Variations in topography on-site indicate fabric drop inlet protection will not function as intended; changes in plan may be needed.
- Design specifications for posts, fabric or fencing cannot be met; substitution may be required. Unapproved substitutions could result in failure of the structure.
- Fabric clogs or creates flooding due to ponding of storm water flows.

Maintenance, Inspection and Removal
- Inspect fabric barrier and frame weekly and after each rainfall event and make needed repairs immediately.
- Remove sediment from the pool area as necessary to restore required storage volume for the next rain. Take care not to damage or undercut the fabric during the sediment removal.
- When the contributing drainage area has been adequately stabilized, remove all materials and unstable sediment and dispose of properly in an upland area to dry and be stabilized. Bring the disturbed area to the grade of the drop inlet, smooth and compact it.
- Remove the temporary fabric drop inlet protection, stabilize the site prior to filing *Form H: Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One - Missouri Permit Requirements).

Common Problems and Solutions

Problem	Solution
Overtopping of fence; caused by posts and fabric unsupported at top.	Repair frame as necessary and use frame to support tops of post and fence to support fabric.
Undercutting of fence; caused by fabric not properly buried at bottom.	Use proper installation to bury fabric (see Figure 5.44)
Inadequate storage volume for the next storm; caused by sediment not being removed from pool.	Remove sediment as needed to prevent build-up.
Flow bypassing the inlet; caused by top of fabric set too high.	Lower top of fabric or select other inlet protection device.
Erosion and undercutting of inlet; caused by fence not close enough to inlet.	Relocate fence adjacent to inlet.
High flow velocity and poor trapping efficiency; caused by steep slopes at drain inlet.	Flatten slope at inlet.
Flooding; high water ponding around inlet; caused by improper selection of best management practice.	Reevaluate appropriate best management practice inlet protection device.

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Excavated Drop Inlet Protection

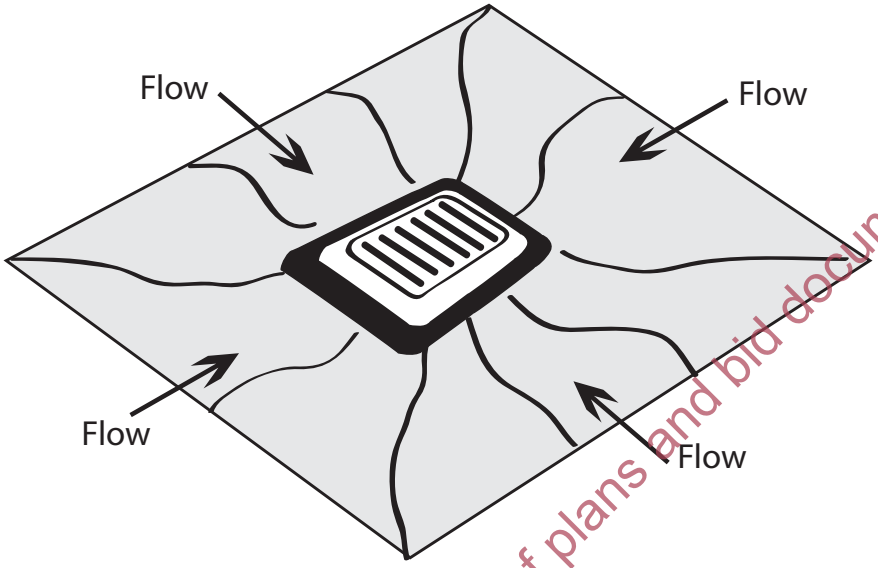

Figure 6.42 Perspective of Excavated Drop Inlet Protection

Practice Description

An excavated area in the approach to a storm drain drop inlet or curb inlet. The purpose is to trap sediment at the approach to the storm drainage system and not permit sediment to flow into the storm drain. This practice applies where early use of the storm drain system is necessary.

Recommended Minimum Requirements

Prior to start of construction, excavated drop inlet protection structures should be designed by a registered design professional. The site superintendant and field personnel should refer to plans and specifications throughout the construction process.

Drainage Area

Less than 1 acre per inlet.

Capacity

Ten year or design storm should enter inlet without bypass flow.

Minimum Depth

One foot, as measured from the top of the drop inlet.

Maximum Depth

Two feet, as measured from the top of the drop inlet.

Side Slopes

Side slopes at 2:1 or flatter around the excavation.

Dewatering

Place drain holes in drop inlet, covered with wire screen and gravel.

Gravel

Use clean gravel, 1/2- to 3/4-inches in diameter.

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Sediment Storage
Keep the minimum volume of excavated material around the drop inlet at approximately 35 yd^3/ disturbed acre.

Basin Shape
To fit site conditions, with the longest dimension placed toward the longest inflow area to provide maximum settling efficiency. Try to keep the slopes less than 2:1 and allow access for excavation equipment for sediment removal, if possible.

Drain
Install provision for draining the temporary pool to improve trapping efficiency for small storms and to avoid problems from standing water after heavy rains.

Safety
Provide protection to prevent children from entering the inlet or outlet.

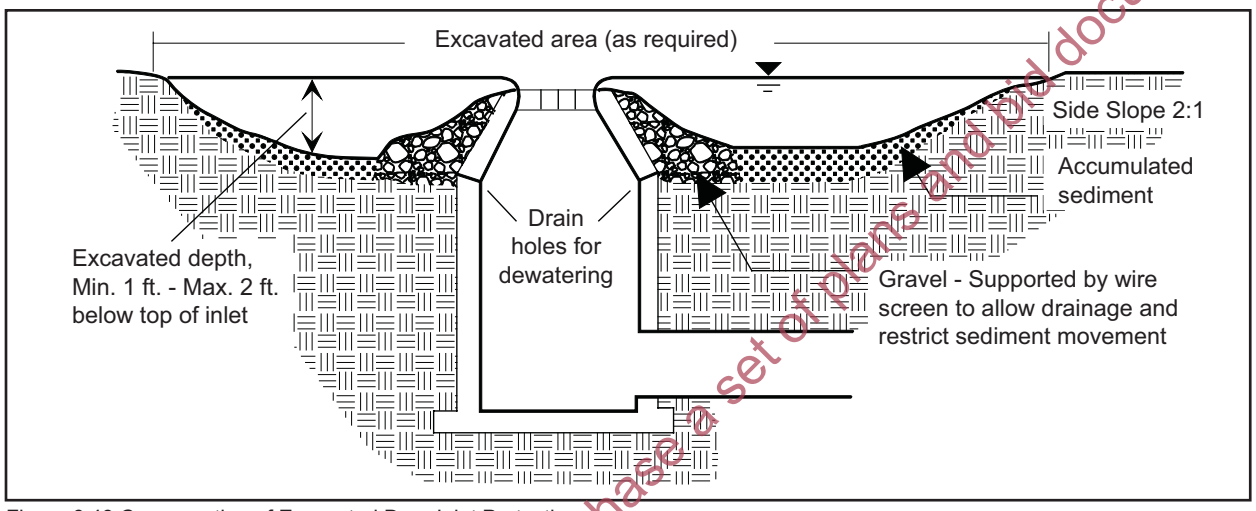

Figure 6.43 Cross section of Excavated Drop Inlet Protection

Construction
Site Preparation
- Prior to excavation activities of any type, call 1-800-DIG-RITE (344-7483) to obtain utility locations.
- Clear the area of all debris that might hinder excavation and disposal of spoil.
- Excavate the basin to the depth, side slopes and dimensions shown on the plans.
- Grade the approach to the inlet uniformly.
- Install drain holes in the drop inlet to drain pool slowly. Cover holes with wire screen and place gravel around sides of inlet.
- When necessary, spoil may be placed to form a dike on the downstream side of the excavation to prevent bypass flow.

Erosion Control
Stabilize disturbed areas, except the excavated pool bottom, in accordance with vegetation plan.

Construction Verification
Check finished grades and dimensions of excavated drop inlet protection structures.

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Troubleshooting

Consult with a registered design professional if the following occurs:

- Variations in topography on-site indicate excavated drop inlet protection will not function as intended; changes in plan may be needed.

Maintenance, Inspection and Removal

- Inspect, clean and properly maintain the excavated basin after every storm as needed until the contributing drainage area has been permanently stabilized. While removing sediment from around inlet, do not allow accumulated sediment to discharge into unprotected inlet.
- Remove sediment when the excavated volume is approximately one-half full.
- Spread all excavated material evenly over the surrounding land area or stockpile and stabilize it appropriately.
- When the contributing drainage area has been permanently stabilized, seal drain holes, fill the basin with stable soil to final grading elevations, compact it properly, and establish vegetation or provide other means of protection.
- Remove the temporary excavated drop inlet protection stabilize the site prior to filing *Form H: Request for Termination of a General Permit, Form-MO 780-1409* (see Chapter One - Missouri Permit Requirements).

Common Problems and Solutions

Problem	Solution
Sediment entering drain; caused by sediment producing area too large for basin design or inlet not properly maintained.	Enlarge basin and maintain inlet (remove sediment, refresh filter fabric and rock).
Excessive ponding; caused by gravel over drain holes plugged with sediment.	Remove debris, clear sediment and replace gravel.
Flooding and erosion; caused by blockage of the storm drain from debris entering inlet.	Install trash rack around inlet.

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Temporary Diversions

Figure 6.55 An unfinished temporary diversion routes sediment-laden storm water to a sediment basin. Temporary diversions should be shaped and protected with a turf reinforcement mat or rock. Establish permanent vegetation if the diversion will be used for one year or more. Source: K. Grimes, Soil and Water Conservation District. St. Charles Co.

Practice Description

A temporary diversion is a temporary ridge or excavated channel or combination ridge and channel. It is designed to either prevent runoff from flowing across the active construction site work areas and discharge it through stable, protected outlets or to divert sediment laden water to sediment traps. Temporary diversions are usually constructed by excavating a channel and using the excavated material to construct a ridge on the down slope side of the channel.

This practice applies wherever storm water runoff must be temporarily diverted to protect disturbed areas and slopes or to retain sediment on-site during construction. When a diversion is needed to direct runoff from undisturbed areas above the construction site around a disturbed area, it must be routed to a stabilized outlet. The diversion must be fully stabilized and non-erodible prior to receivingstorm water flows. Check dams may be installed within the diversion to reduce velocities and control flows better. A diversion of cleanstorm water flow should never be allowed to flow over disturbed areas and create erosion or pick up sediment in the flow. If the untreated flow mixes with sediment ladenstorm water on the construction site, it must be treated through a control device before it discharges off-site.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Recommended Minimum Requirements

Prior to start of construction, temporary diversions should be designed by a registered design professional. The site superintendant and field personnel should refer to plans and specifications throughout the construction process. Temporary diversions should be constructed to minimize erosion at the design flow.

Drainage Area

Less than 5 acres.

Ridge Design

- Side Slope: 2:1 or flatter; 3:1 or flatter where vehicles must cross.
- Top Width: 2.0 ft.
- Freeboard: 0.3 ft.
- Settlement: 10 percent of fill height.

Channel Design

- Side Slope: 2:1 or flatter; 3:1 or flatter where vehicles must cross.
- Grade: Stable, positive grade towards outlet, but not exceeding 2 percent.

Construction

Site Preparation

- Locate and mark the alignment of the diversion as shown on the plans. The alignment should maintain a stable, positive grade toward the outlet. Minor adjustments to the grade and alignment may be required by site conditions. Realign or elevate the diversion as needed to avoid reverse grade.

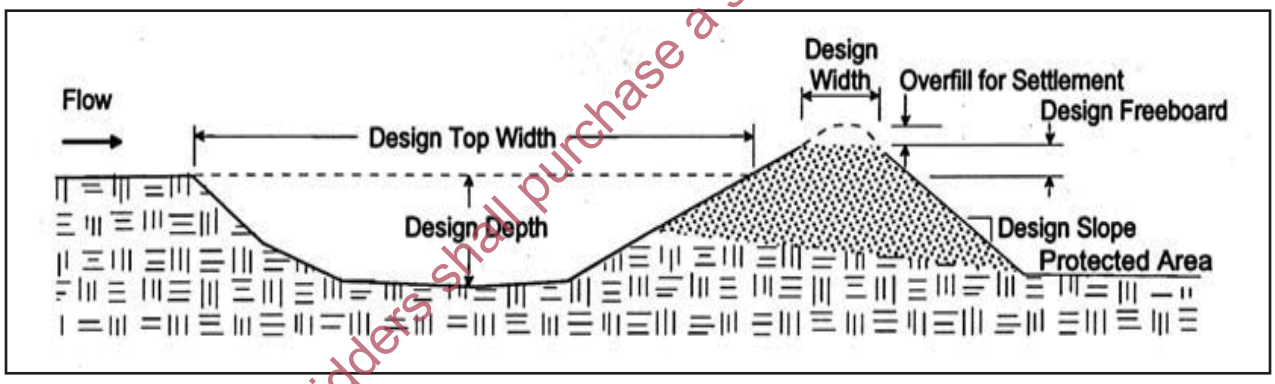

Figure 6.56 Typical temporary combination diversion.

- Prior to excavation activities of any type, call 1-800-DIG-RITE (344-7483) to obtain utility locations.
- Remove trees, brush, stumps and other unsuitable material from the site.
- Disk the base of the ridge before placing fill.

Grading

- Construct the diversion to the dimension and grades shown on the design.
- Build the ridge 10 percent higher than designed for settlement and compact with wheels of the construction equipment or sheep foot roller.
- Leave sufficient area along the diversion to permit clean out and regrading.

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Erosion Control

- Stabilize the outlets in accordance with design plans during construction of the diversion.
- Vehicles should not be allowed to drive across through diversions.
- Stabilize ridges, side slopes and channels with vegetation or synthetic erosion control measures as specified in the design. Do not allow storm water flows to enter the channel until it is fully stabilized especially if it is being used to direct clean storm water around a disturbed area.
- Outlet should be nonerosive for design flow. Divert flow containing sediment to sediment trap or basin.
- Stabilize ridge with vegetation if in place more than 30 working days.
- Diversions should not be installed on slopes greater than 15 percent or where diversion flows are calculated to be greater than 3-feet per second over vegetation. If the diversion is constructed above a steep slope, install temporary slope drains or other stable outlet to control runoff and prevent erosion of the slope (see Temporary Slope Drains, Grass-lined Channel, Riprap-lined Channel or Turf Reinforcement Mats).

Construction Verification

- The field inspector should verify the dimensions shown on the plans for the following: depth, bottom width, top width, side slopes of channel and ridge, grade of channel bottom, ridge height and channel stabilization techniques.
- Check all of the finished grades and configuration of all channels to eliminate constrictions to flow and to ensure final discharge flows to sediment basins or stabilized outlets. Also check all ridges for low spots and stability.

Grading

- Construct the diversion to the dimension and grades shown on the design.
- Build the ridge 10 percent higher than designed for settlement and compact with wheels of the construction equipment or sheep foot roller.
- Leave sufficient area along the diversion to permit clean out and regrading.

Erosion Control

- Stabilize the outlets in accordance with design plans during construction of the diversion.
- Vehicles should not be allowed to drive across through diversions.
- Stabilize ridges, side slopes and channels with vegetation or synthetic erosion control measures as specified in the design. Do not allow storm water flows to enter the channel until it is fully stabilized especially if it is being used to direct clean storm water around a disturbed area.
- Outlet should be nonerosive for design flow. Divert flow containing sediment to sediment trap or basin.
- Stabilize ridge with vegetation if in place more than 30 working days.
- Diversions should not be installed on slopes greater than 15 percent or where diversion flows are calculated to be greater than 3-feet per second over vegetation. If the diversion is constructed above a steep slope, install temporary slope drains or other stable outlet to control runoff and prevent erosion of the slope (see Temporary Slope Drains, Grass-lined Channel, Riprap-lined Channel or Turf Reinforcement Mats).

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Construction Verification

- The field inspector should verify the dimensions shown on the plans for the following: depth, bottom width, top width, side slopes of channel and ridge, grade of channel bottom, ridge height and channel stabilization techniques.
- Check all of the finished grades and configuration of all channels to eliminate constrictions to flow and to ensure final discharge flows to sediment basins or stabilized outlets. Also check all ridges for low spots and stability.

Maintenance, Inspections and Removal

- Inspect weekly and following each storm event.
- Remove debris and sediment from the channel and rebuild the ridge as needed.
- Check outlets and make necessary repairs immediately.
- Remove sediment from traps or check dams when they are 50 percent full.
- When the work area has been stabilized, remove the ridge and fill in the channel to blend with the natural ground. Remove temporary slope drains and stabilize all disturbed areas with permanent vegetation or other erosion control practices.
- Remove the temporary deversion and stabilize the site stabilized. *Form H: Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One - Missouri Permit Requirements).
- Maintain vegetation in channel as shown in the design plan.

Common Problems and Solutions

Problem	Solution
Seepage is encountered during construction.	It may be necessary to install drains.
Variations in topography on-site indicate diversion will not function as intended.	Consult with a registered design professional.
Design specifications for seed variety, seeding dates or erosion control materials cannot be met.	Substitutions may be required. Unapproved substitutions could result in erosion and lead to diversion failure.
Final discharges from diversion channels cause ongoing erosion at the outlets.	Modifications to the diversion system need to be made or energy dissipation devices installed.
Overtopping of channel; caused by sedimentation in channel resulting in grade decreasing or reversing.	Realign or deepen the channel to maintain grade.
Overtopping of ridge due to low point in ridge where diversion crosses a natural depression.	Build up ridge.
Erosion and scour of the channel; caused by high velocity in channel.	Consult a design professional and install velocity dissipators such as check dams.

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Breach of ridge caused by uneven channel grade and leading to erosion in channel before vegetation is established.	Repair channel and add more effective erosion control option-erosion control blanket, turf reinforcement mat, transition mat, etc.
Poor vegetation establishment caused by seepage or poor drainage in channel.	Install subsurface drains or stone channel bottom.
Erosion in channel caused by excessive grade in channel.	Consult design professional, repair channel, install an erosion resistant lining and velocity dissipators such as check dams or realign to reduce the grade.
Erosion; caused by excessive velocity at outlet.	Consult a design professional, install an outlet stabilization structure (see Rock Outlets or Energy Dissipators).
Runoff from a storm event causes blow out failure; caused by ridge not being compacted.	Repair and use construction equipment to compact.

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Rock Check Dam

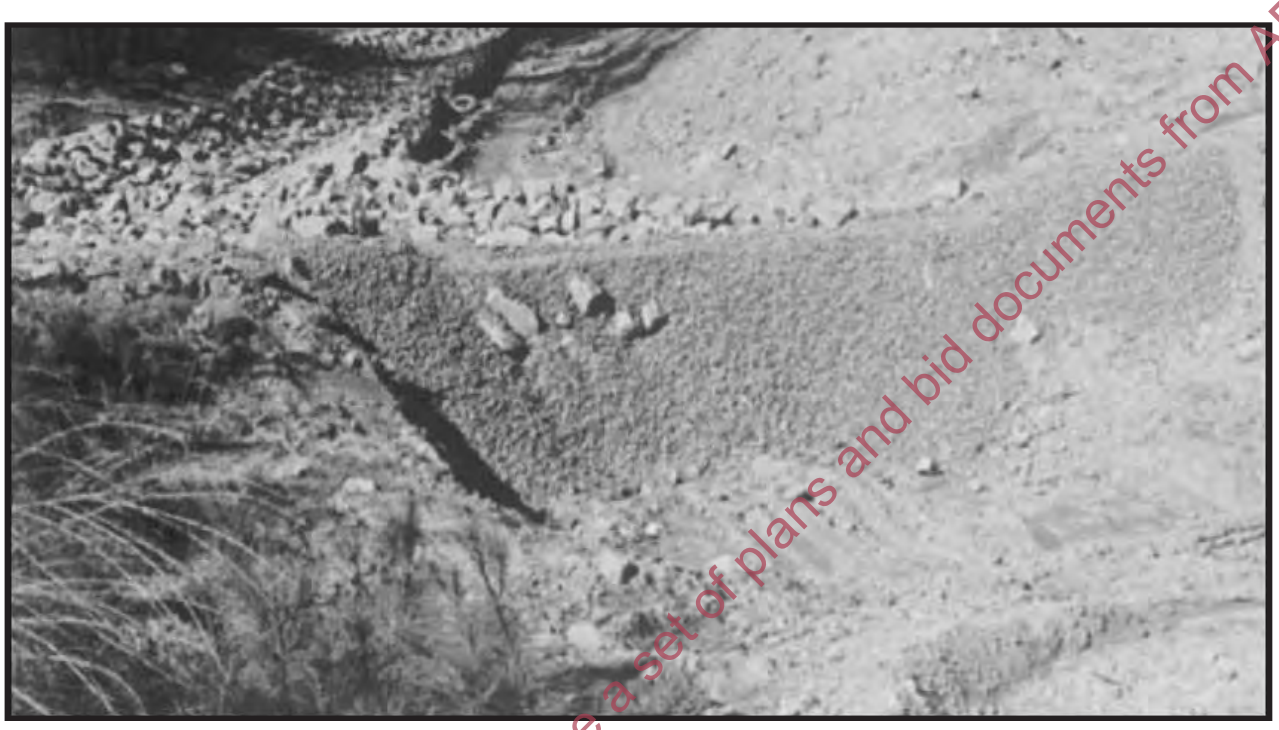

Figure 6.79 Rock check dams can provide sediment control in channels and swales. Source ABC of BMPs, LLC

Practice Description

A rock check dam is a stone dam designed to capture sediment within drainage swales and diversions on the construction site. This practice can be used as an alternative to a standard sediment basin for locations with a drainage area of 20 acres or less. It may be preferred over standard sediment basins for sites where an earthen embankment would be difficult to construct.

Recommended Minimum Requirements

Prior to start of construction, rock check dams should be designed by a registered design professional. The site superintendant and field personnel should refer to plans and specifications throughout the construction process. The rock check dam should be built according to planned grades and dimensions.

The major design elements include:

- Middle of the check dam is the lowest point where stormwater flow will go over the check dam. Make sure the ends are at a higher elevation than the middle.
- The downhill side slope of the check dam has a longer angle of repose to dissipate the energy of the stormwater flow over the dam to prevent scour on the downstream side of the check dam.
- The spacing between check dams is such that the bottom of the upper check dam is at the same elevation as the top of the check dam below it. This will not allow the stormwater flow to increase velocity as it goes down the slope but make the feature more like a stair step journey.

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Construction

Site Preparation

- Prior to excavation activities of any type, call 1-800-DIG-RITE (344-7483) to obtain utility locations.
- Divert runoff from undisturbed areas away from the rock check dam and basin area.
- Do not divert toward existing buildings or houses.
- Stabilize the diversion, swale or channel with vegetation or a turf reinforcement mat to prevent or minimize erosion of the channel.

Construct the check dams as shown in the Figure 5.89 and remember the following three design principals:

- The middle of the check dam is the lowest point so the storm water flow is directed to the middle of the channel.
- The down gradient side of each check dam is at a lower angle to allow for energy dissipation of the storm water flow over the check dam to reduce the potential for scour.
- Space the check dams so the elevation of the bottom of the upper check dam at the same elevation as the top of the lower check dam. This allows water to pond back to the check dam above it to reduce velocity and create a stair step cascade of the storm water flow.

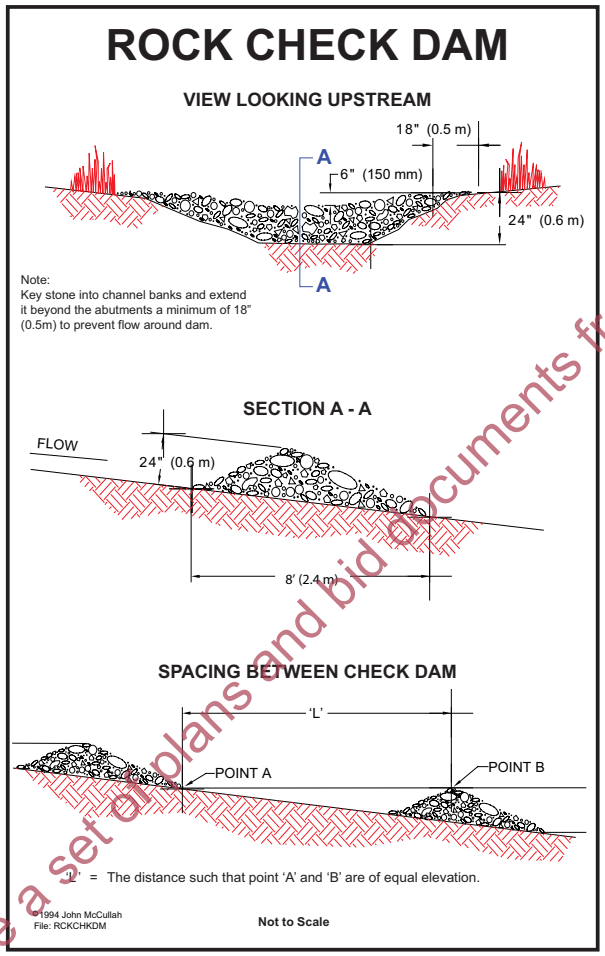

Figure 6.80 Detail of Rock Check Dam

Safety

Because rock check dam sediment basins impound water, they should be considered potentially hazardous. Take the following precautions:

- Avoid steep slopes; both cut and fill slopes should be 2.5:1 or flatter; 3:1 where maintained with tractor or other equipment.
- Fence area and post warning signs if trespassing is likely.
- Do not construct directly above structures that could be damaged in the event of failure.

Construction Verification

Check finished grades and dimensions of the rock check dam. Check materials for compliance with specifications.

Maintenance, Inspection and Removal

- Inspect the rock check dams weekly and after each storm event as required by your permit.
- Remove sediment when it accumulates to half the design volume.
- Check the dam and abutments for erosion, piping or rock displacement and repair immediately.
- If the channel does not drain between storms, replace the stone on the upstream face of the dam.

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- After the construction site has become permanently stabilized:
  - Remove all temporary check dams and any unstable sediment.
  - Smooth the site to blend with the surrounding area and stabilize.
  - Remove all water and sediment from the basin prior to dam removal.
  - Place the sediment in designated disposal areas and is not allowed to flow into streams or drainage ways during structure removal.
  - Leave check dams in place if they are designed as permanent structures.
- Remove of this temporary rock check dam and stabilize the site prior to filing *Form H: Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One - Missouri Permit Requirements).

Common Problems and Solutions

Problem	Solution
Variations in topography on-site indicate the rock check dam will not function as intended.	Changes in plan may be needed, consult with a registered design professional.
Erosion increased during storm events; caused by the channel not being properly stabilized.	Stabilize the channel immediately with vegetation or turf reinforcement mat.
Storm flow goes around the sides of check dam eroding the bank; caused by the elevation of dam being too high in the middle.	Lower the middle of the check dam so storm water flow goes over the middle, repair damage and stabilize eroded side slopes.
Rock is displaced; caused by the stone size being too small or embankment slope is too steep.	Replace larger size stone or reduce slope.
Rock is displaced; caused by the high velocities because spacing between dams is too long and therefore does not sufficiently reduce velocity.	Consult the design professional to recalculate the drainage slope and dam heights to determine correct check dam spacing.
Erosion occurs in downstream area; caused by the apron not extended to stable grade.	Repair erosion and extend apron.
Erosion of abutments occurs during spillway flow; caused by the rock not being high enough on the abutment.	Extend rock higher on the abutment.
Sediment is being carried through the spillway or accumulates in excess between clean outs; caused by the drainage area being too large.	Divert runoff from undisturbed areas way from the basin, enlarge basin and clean out basin more frequently or consult the professional designer for other alternatives.
Sediment is lost through the check dam; caused by the layer of gravel aggregate on the upstream face not being thick enough or is too coarse to restrict flow through the dam.	Replace gravel aggregate with material having proper gradation to provide filtration.

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Ditch Checks

Figure 6.81 This check dam device appears to be working correctly but there should also be erosion control protection covering the channel to reduce scour and erosion of the channel bottom. Source ABC of BMPs, LLC

Practice Description

As with rock check dams, premanufactured ditch checks are used in water ways and swales to reduce water velocities in concentrated flows, dissipate energy to drop out larger sediment loads in fast moving water and reduce erosion in ditches until permanent, vegetation can be established. With routine maintenance, life expectancy is usually six and nine months.

Sediment fence and straw bales are generally not recommended for ditch checks. Suitable products include silt dikes, permeable plastic triangular berms and permeable M panels. In lighter flows use straw and excelsior wattles and compost socks. A critical component of any ditch check is that it does not cause more erosion on the downstream side than what it is protecting upstream. All channels should have erosion control practices in place such as blankets or turf reinforcement mats to further reduce scour and erosion of the channel.

Recommended Minimum Requirements

Drainage Area

The drainage area requirements are in direct relation to how wide the ditch or swale is and the strength of the ditch check. Hydraulic design is recommended to ensure proper material selection and placement.

BMP Lifespan

Six and nine months. Some will last longer.

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Anchors
Vary by product type. Silt dikes require stapling with 6-inch staples(in fill conditions, 12- to 18-inches geotextile fabric pins are required) Permeable plastic berms require 10-inch landscape spikes. Permeable M panels require separate M-pins. Wattles and logs typically require 18- to 24-inch wood stakes on 2-foot centers.

Other Materials
A geotextile fabric is strongly recommended for any rock ditch check to separate the rock from the finished grade.

Location
A generally accepted standard for ditch check location is to locate ditch checks where elevation change from one check to the next is equivalent to the height of the particular ditch check used.

Construction
Site Preparation
Finish swale grading to plans. If swale is not in its final configuration, immediately install designed ditch check according to the manufacturer's requirements for effective sediment control. If swale is completed and ready for final stabilization, use the appropriate erosion control practice as designed by the engineer, then install ditch checks that will allow for vegetation establishment. A critical component of any ditch check is the elevation at the center of the check be lower than any other point. including the termination of the check into the side slope. At no time should water have the ability to flow around the ditch check.

Erosion Control
Erosion control measures should be used in conjunction with a ditch check. In many cases, effective erosion control can reduce the need for as many ditch checks on a project.

Figure 6.82 Wattle Ditch Check Source: American Excelsior

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Construction Verification

The field inspector should:

- Verify the dimensions shown on the plans for the ditch location.
- Verify the top elevation as it relates to the termination at the sides.
- Verify the ditch check is properly secured to the ground surface.
- Evaluate stabilization techniques required for effective erosion control.
- Check all finished grades and final ditch check locations.

Maintenance, Inspection and Removal

- Maintenance includes periodic sediment removal after rain events to allow for maximum capacity of sediment. Each rain event will drop a significant amount of sediment. For rock ditch checks, complete removal of sediment laden rock and replacement with clean rock is required after the ditch check is plugged and ponds water. Geotextile may need to be replaced as well. If ditch checks become damaged from bed load and floating debris, replace as necessary.
- Remove temporary ditch check and stabilize the site prior to filing *Form H: Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One - Missouri Permit Requirements).

Common Problems and Solutions

Problem	Solution
Erosion occurs into the side slope - water goes around ditch check.	Increase length of ditch check so lowest point is in center of channel or swale.
Significant erosion occurs between ditch checks - too much distance between ditch checks.	Install additional ditch check in between - follow recommended guideline for spacing.
There is poor erosion control on grade between ditch checks.	Re-grade, seed and apply appropriate erosion control practice.
There is scour on downstream side of ditch check-may be caused by too much water flowing in ditch or poor ditch check design for hydraulic condition.	Use alternative ditch check and install appropriate erosion control measure to reduce erosion on downstream side of ditch check.
Stormwater flow cuts around the ends of the ditch check.	Ditch check is lower at the ends than the middle and needs to be redesigned and installed properly.

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Wattles

Figure 6.83 Wattles are used here as slope breaks to reduce the velocity of overland flow. Source: Missouri Department on Natural Resources Southwest Regional Office

Definition and Purpose

Wattles are degradable or nondegradable materials rolled or bound into a tight tubular roll and placed on the toe and face slopes to intercept runoff, reduce flow velocity, release the runoff as sheet flow and provide removal of sediment from the runoff. Wattles may also be used for inlet protection and as check dams under certain situations. A degradable wattle consists of wood excelsior, rice or wheat straw, or coconut fibers. Nondegradable wattles consist of recycled tire products, foam peanut material or other material bound in a heavy mesh tube.

Recommended Minimum Requirements

This Best Management Practice may be implemented on a project-by-project basis with other best management practices when determined necessary and feasible. Wattles may be used:

- Along the toe, top, face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- Below the toe of exposed and erodible slopes.
- As check dams in drainage swales.
- For drain inlet protection.
- Down-slope of exposed soil areas.
- Along the perimeter of a small area (less than 1/3 acre) such as home lot.

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Construction

- Runoff and erosion may occur if the wattle is not adequately trenched in.
- Wattles must be overlapped along the edges of at least 12-inches.
- Wattles at the toe of slopes greater than 1:5 may require the use of 500 mm (20" diameter) or installations achieving the same protection (e.g., stacked smaller diameter fiber rolls, etc.).
- Wattles may be used for drainage inlet protection if they can be properly anchored.
- Degradable wattles are somewhat difficult to move once saturated.
- Wattles could be transported by high flows if not properly staked and trenched in place.
- Wattles have limited sediment capture zone.
- Do not use wattles on slopes subject to creep, slumping or landslide.

Maintenance, Inspection and Removal

- Inspect wattles each week and after rain events as required by your permit.
- Clean accumulated sediment from behind wattles prior to the next rain event.
- Maintain wattles to provide an adequate sediment holding capacity. Sediment shall be removed when the sediment accumulation reaches one-half of the barrier height. Removed sediment shall be incorporated in the project or disposed in accordance with Missouri State solid waste regulations.
- Remove wattles as soon as possible after the project site has been stabilized. Dispose of in accordance with solid waste regulations and permit requirements.
- Remove the temporary wattles and stabilize the site prior to filing *Form H: Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One - Missouri Permit Requirements).

Common Problems and Solutions

Problem	Solution
Erosion and rills form under the wattle; caused by the wattle not being properly trenched into the ground.	Repair erosion, fill rills and trench wattle properly.
Erosion around edges of the wattle; caused by the wattle not placed on the contour with a slight up gradient at the edges.	Reinstall wattles on the contour with a slight turn up gradient at the edges.
Erosion at the joints of two wattles; caused by the wattles not being properly overlapped.	Reinstall wattles with overlap of the edges at least 12-inches.

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Temporary Sediment Trap

Figure 6.73 Sediment traps are used to collect sediment laden runoff from disturbed areas on construction sites. Source: EPA

Recommended Minimum Requirements

Prior to start of construction, sediment traps should be designed by a registered design professional. The site superintendant and field personnel should refer to plans and specifications throughout the construction process. The sediment traps should be built according to planned grades and dimensions.

Location

- Where access can be maintained for sediment removal and proper disposal.
- Where runoff can be directed into basin at low velocity.

Drainage Area

- Below areas less than 5 acres in size. If the drainage area is larger, construct a sediment basin (see Sediment Basin).
- In the approach to a storm water inlet located below a disturbed area as part of an inlet protection system.
- Where failure of the structure will not result in loss of life, damage to homes, commercial or industrial buildings, main highways or railroads; or in the use or service of public utilities.

Structure Life

Limited to 18 months.

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Sediment Storage
A minimum of 3,600 cubic square per acre of drainage area or sufficient to safely pass run-off greater than the two year frequency, 24-hour duration or design storm event.

Embankment
Dam Height
Less than five feet.

Top Width
At least five feet.

Fill Slopes
2.5:1 or flatter.

Settlement
10 percent or less.

Fill Material
Locally available soil; machine compacted in 8-inch lifts; moist when compacted, free of organic material, tree roots and waste material.

Spillway
A rock-lined open channel spillway should be constructed in the embankment to safely pass stormwater runoff. As an option, a perforated outlet riser can be used as the principal spillway.

Capacity
Sufficient to safely pass runoff from the two year frequency, 24-hour duration or design storm event.

Bottom Width
At least five feet.

Crest
A minimum of 18-inches lower than the top of the embankment.

Outlet
Include an apron at least five feet long to dissipate energy.

Filter
Geotextile should be placed between the embankment soil and the rock in the spillway section.

Construction
Site Preparation
- Locate the temporary sediment trap in an upland area as close to the sediment source as possible, considering soil type, pool area, dam length and spillway conditions.
- Prior to excavation activities of any type, call 1-800-DIG-RITE (344-7483) to obtain utility locations.
- Follow all federal, state and local requirements on impoundment sites.
- Clear, strip and grub the foundation of the dam to minimum depth of 4-inches, removing all woody vegetation, rocks and other objectionable material. Dispose of trees, limbs, logs and other debris in designated disposal areas.
- Divert off-site run-on from all undisturbed areas away from the sediment trap.
- Excavate the sediment trap (if necessary), stockpiling and stabilizing any surface soil having high amounts of organic matter for later use.

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Embankment

- Scarify the base of the embankment before placing fill.
- Use fill from predetermined borrow areas. Fill should be clean, stable mineral soil free of organics, roots, woody vegetation, rocks and other debris, and must be wet enough to form a ball without crumbling, yet not so wet that water can be squeezed out.
- Compact the fill material in 8-inch continuous layers (maximum) over the length of the dam. (One way is by routing construction equipment over the dam so each layer is traversed by at least one wheel of the equipment.)

Open Channel Spillway

- Excavate a trapezoidal outlet section in the compacted embankment.
- Install geotextile fabric on the base of the channel, extending it up the sides to the top of the embankment.
- Place specified stone to the lines and grades, working smaller stones into voids to achieve a dense mass. The spillway crest should be level with a minimum width of five feet.
- Construct a stone outlet apron below the toe of the dam on level grade until a stable condition is reached (5-feet minimum).
- The base of the stone outlet should be at least two feet thick.
- Make the edges and end of the stone apron section flush with the surrounding ground.
- Cover the inside face of the stone outlet section with a 1-foot layer of well graded stone (2-inch minus).

Set a clean-out measurement stake in the basin at a height equal to one-half the distance from the bottom to the spillway crest.

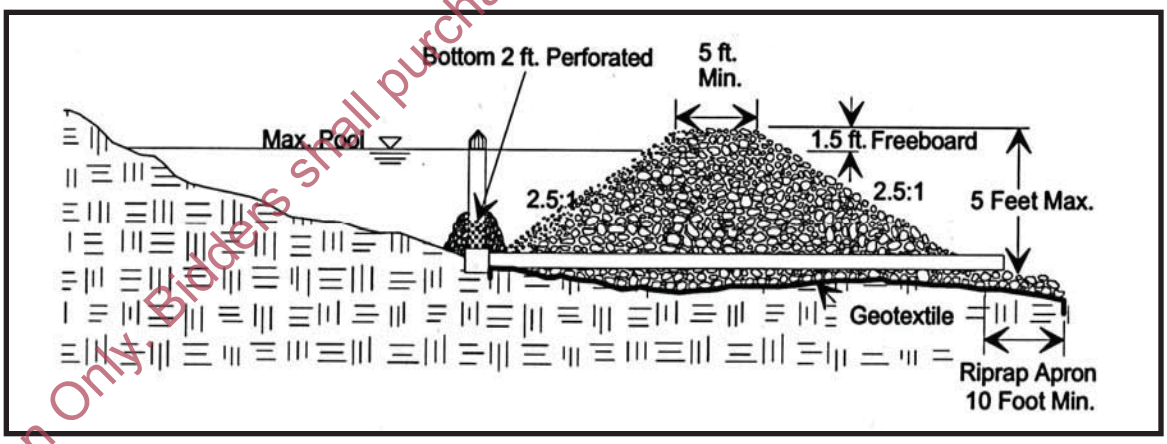

Figure 6.74 Temporary Sediment Trap with Spillway Riser

Optional Spillway Riser Construction

- Clear all vegetation and roots from the pipe foundation; prepare the bedding.
- Situate the spillway pipe and riser (minimum 18-inch diameter) on a firm, even foundation.
- Align the pipe and construct with the bell end of the pipe facing upstream. Around the barrel, place a 4-inch layer of moist, clayey, workable soil (not pervious material, such as sand, gravel, or silt), and compact with hand tampers to at least the density of the foundation soil. Don't raise the pipe from the foundation when compacting under the pipe haunches. Connect the pipe to the riser.

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- Perforate the bottom 2 feet of spillway riser with 1/2 inch diameter holes spaced 3-inches apart (or use a manufactured perforated riser) for draining the sediment trap. Wrap the riser with geotextile fabric.
- Embed the riser at least 12-inches into concrete. The weight of the concrete should balance the buoyant force acting on the riser. Buoyant Force = Volume of Riser x 62.4 lbs./ft.^{3}
- Surround the entire riser with two feet of clean uniformly graded stone.
- At the pipe outlet, install a riprap apron at least five feet wide and 10 feet long. The riprap should be a minimum of 6-inches in diameter (see Rock Outlets).
- Dewatering can also be accomplished with a skimmer (see Skimmers).

Erosion Control

- The size of disturbed areas should be minimized. Stabilize all disturbed areas immediately after construction. Establish vegetation and erosion controls within 14 days after construction is complete.
- Divert sediment-laden water to the upper end of the temporary sediment trap to improve trap effectiveness.
- Direct all runoff into the basin at low velocity.

Safety

Because temporary sediment traps will likely impound water, the following precautions should be taken:

- Avoid steep slopes; the slopes around the temporary sediment trap should be 2.5:1 or flatter; 3:1 if maintained by tractors or other machinery.
- Fence area and post warning signs if trespassing is likely.

Construction Verification

- Check finished grades and dimensions of the temporary sediment trap.
- Check materials for compliance with specifications.

Maintenance, Inspection and Removal

- Inspect the temporary sediment trap weekly and after each storm event.
- Remove and properly dispose of sediment on an upland area to dry and be stabilized when it accumulates to one-half the design volume, as indicated by the clean-out stake.
- Periodically check the embankment, spillway and outlet apron for erosion damage, settling, seepage or slumping along the toe, and repair immediately.
- Replace the spillway gravel facing if it becomes clogged.
- Inspect vegetation and reseed if necessary.
- Replace any displaced riprap, being careful no replacement rock is above the design grade.
- Remove the temporary sediment trap after the drainage area has been permanently stabilized, inspected and approved. Do so by draining any water, removing the sediment to a designated disposal area, grading the site to blend with the surrounding area; then stabilize.
- Remove the temporary sediment trap and stabilize the site prior to filing *Form H: Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One - Missouri Permit Requirements).

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Troubleshooting

Consult with a registered design professional if any of the following occur:

- Variations in topography on-site indicate sediment trap will not function as intended.
- Design specifications for fill, pipe, seed variety or seeding dates cannot be met; substitutions may be required. Unapproved substitutions could lead to failure.

Common Problems and Solutions

Problem	Solution
Embankment overtopping and possible failure of the structure; caused by inadequate spillway size.	Increase size of spillway.
Overtopping and possible failure; caused by extensive embankment settling.	Add additional fill to bring embankment back to design grade.
Erosion and displacement of rock; caused by rock outlet apron not extending to stable grade.	Extend apron.
Erosion of spillway or embankment slopes; caused by inadequate vegetation or rock size in spillway too small.	Improve vegetation, incorporate rolled erosion control product, or replace rock with larger size.
Settling of embankment; caused by inadequate compaction or use of unsuitable soil.	Add fill in settled areas to restore embankment to original grade.
Structural failure; caused by inadequate compaction due to construction with dry soil.	Replace failed material and compact to original grade.
Slumping failure; caused by overly steep slopes.	Repair damage and flatten slope without reducing the storage volume.
Piping failure; caused by too steep of a slope between stone spillway and earth embankment.	Flatten slope, then repair piping damage.
Inadequate storage capacity; caused by sediment not being properly removed.	Remove sediment on a regular schedule.
Inadequate storage capacity; caused by having a greater are a contributing sediment than originally designed.	Stabilize the disturbed area contributing to the trap or regrade the construction site and add additional traps to better distribute sediment laden storm water among the traps to handle the sediment discharging to the drainage area.
Safety or health hazard; caused by ponded water due to sediment clogging the gravel on the upstream slope of the riprap.	Remove sediment and install security fence if necessary.

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Dewatering

Figure 6.88 Use of a dewatering bag where storm water is pumped into a geotextile bag. The sediment stays in the bag while the storm water is allowed to flow out through the small voids in the material. Source: ACF Environmental Inc.

Practice Description

Dewatering is a commonly required practice occurrence after a storm event on a construction site. Dewatering is performed in excavated work areas such as utility trenches and footings to clear the area of storm water so work can be performed. It may also be required on sediment traps or basins that are designed to pond water to make storage room for additional storm water during the next rain event. It is also performed in excavated work areas such as utility trenches and footings to clear the area of storm water so work can be performed.

Dewatering can be performed with a suction pump or other device such as a skimmer. Dewatering of storm water from sediment traps or basins must be limited to removing only the top or surface water containing the least amount of sediment. When dewatering with a pump, the water should be pumped into a device such as a geotextile bag or temporary sediment trap to remove or settle the sediment and allow the treated or clearer storm water to be discharged.

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Recommended Minimum Requirements

It is best if the stored storm water in the trap or basin has been allowed to sit a minimum of 24 hours after the storm event. Depending on the types of soils and high clay content, additional settling time may be necessary before dewatering the trap or basin. If the intake must be close to the bottom of the excavated area it should be protected with a cloth or geotextile sock to reduce the amount of sediment particles exiting through the hose.

Water must be withdrawn from the top of the basin or treated through a geotextile bag or other treatment system before the storm water is allowed to leave the site.

Maintenance, Inspection and Removal

- Maintain the pump in proper operating condition and make sure the pump does not cause pollution to the surrounding area from fuels, oils, greases or other operating fluids. Monitor the dewatering and discontinue when the discharge begins to contain heavier sediment loads.
- Remove the temporary device and stabilize the site prior to filing *Form H - Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter 1 - Missouri Permit Requirements) for termination of permit coverage.

Troubleshooting

- Make sure the sediment has a proper settling time and sediment laden water is not discharging from the construction site.
- Make sure the geotextile bag (if used) is the proper size for the amount and velocity of flow going into the bag.
- Make sure the geotextile bag is located where it can be accessed for removal. The bag can be heavy, particularly when sediment is wet.
- It is also a good idea to have the dewatering bag placed so the discharged storm water can flow over a vegetated buffer strip or other area of vegetation, if possible.

Common Problems and Solutions

Problem	Solution
Pump loses suction – pump has lost its prime.	Reprime pump and begin dewatering activities.
Pump hose becomes clogged - the protective sock at the end of the hose has become saturated with sediment.	Clean or replace sock and keep the end off the bottom of the trap or basin and out of sediment laden water.
Erosion around the dewatering bag caused by locating the bag on an unstable surface.	Stop dewatering and move the bag to a stable (non-erodible) surface and continue the dewatering process.

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Slope Breaks and Surface Roughening

Figure 6.13 Lot benching can shorten slope length and prevent erosion while improving the homeowner's yard. Source: *C. Rahm, NRCS, St. Charles County*

Practice Description

Slope breaks and surface roughening are practices that reshape the ground surface during construction to slow the surface overland stormwater flow and reduce slope length to reduce surface runoff velocities, therefore minimizing soil erosion and sedimentation during construction. Slope breaks and surface roughening are inexpensive ways to provide erosion control during construction prior to establishment of permanent vegetative cover.

Slope breaks, such as diversions or benches, can be used to reduce the length of continuous slopes and reduce erosion (See Diversions).

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Recommended Minimum Requirements

Prior to start of construction, the site grading plan should be designed by a qualified professional. The grading plan should show disturbed areas, cuts, fills and finished elevations for all graded areas. The site superintendant and field personnel should refer to plans and specifications throughout the construction process. During construction and reshaping of the topography a slope can be roughened once it has been graded out and prior to reaching final grade and vegetation establishment.

Schedule construction activities so the least amount of area is disturbed at one time.

Slope Breaks

Refer to plan. Table 6.1 provides suggested guidelines for spacing of slope breaks.

Table 6.1 Guidelines for Spacing Slope Breaks

Slope	Spacing (ft.)
33-50%	20
25-33%	40
15-25%	60
10-15%	80
6-10%	120
3-6%	200
< 3%	300

Source: Adapted from North Carolina Field Manual, 1991

Soil Surface Roughening

There are many types of surface roughening techniques such as track walking with a dozer up and down a slope or using a sheep's foot to create dimples in the soil surface. This increases infiltration and slows overland flow.

Surface Runoff

Avoid disturbing natural drainage ways, if possible. At each slope break, intercept runoff and channel it to storm drains or stabilized watercourses. If runoff contains sediment, protect drain inlets with a filter or divert water to a sediment trap or basin according to the site grading plan (See Inlet Protection, Temporary Sediment Trap and Sediment Basin).

Erosion Control

Graded areas should be stabilized with mulch, vegetation, crushed stone, riprap or other measures as soon as work is completed, or if work is interrupted for 14 or more working days. Soil surface roughening is both an erosion and sediment control technique and should not be combined with devices such as erosion control blankets. Blankets should be applied to smooth, fine-graded soil surfaces and will fail if used to cover roughened soil surfaces.

Slopes to be Vegetated

2:1 or flatter; 3:1 or flatter where maintained by tractor or other equipment. Slopes should be roughened during grading operations to retain water, increase infiltration and promote vegetative growth. Slopes should be protected from surface runoff while vegetation is being established (See Diversions, Perimeter Protection).

Borrow and Disposal Areas

As shown on the grading plan; these should be no closer than 100 feet to a streambank or sensitive area (e.g., wetland, spring, cave, sinkhole) in the absence of a specification and should not be placed in an area of stormwater conveyance. Stockpiles should be stabilized if not being used for 14 or more days according to the state and local regulatory requirements. If borrow or disposal locations are off-site, they should also be permitted and have a copy of the permit authorization on-site at all times. This is necessary if the off-site borrow or disposal area is used for this construction project only and disturbs one acre or greater requiring permit coverage.

Outlets for Breaks and Diversions

Stabilized outlets should be provided for runoff from the disturbed area in order to retain sediment on-site.

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Construction

Site Preparation

- Erosion and sedimentation control measures should be installed as specified and in the sequence shown on the design plan.
- Prior to excavation activities of any type, call1-800-DIG-RITE (344-7483) to obtain utility locations.
- Remove and stockpile topsoil (see Topsoiling) if subsoils will not support plant growth.
- Clear and grub areas to be filled and remove trees, vegetation, roots and other debris.
- Check fill to make sure it is does not contain brush, rubbish, oversized rocks or other objectionable material.
- Place fill in layers and compact as specified by the grading plan. Do not use frozen, excessively soft or high organic content material.
- Do not place fill on frozen subgrade, as it may cause an unstable condition due to potential differential settlement when the soil thaws.

Grading

- Construct slope breaks as shown on the grading plan, or in accordance with the recommendations of Table 6.1. A typical slope break is illustrated in Figure 6.14.
- Keep diversions and other water conveyance measures free of sediment during all phases of development.
- Avoid grading and building in areas of seepage. If this cannot be avoided, then install subsurface drains (See Subsurface Drains) in areas where seepage interferes with the grading operations, or where required to improve slope stability or soil bearing capacity.
- Permanently stabilize graded areas immediately after final grading is complete. Use temporary stabilization measures on graded areas when work is to be interrupted or delayed for 14 working days or longer.

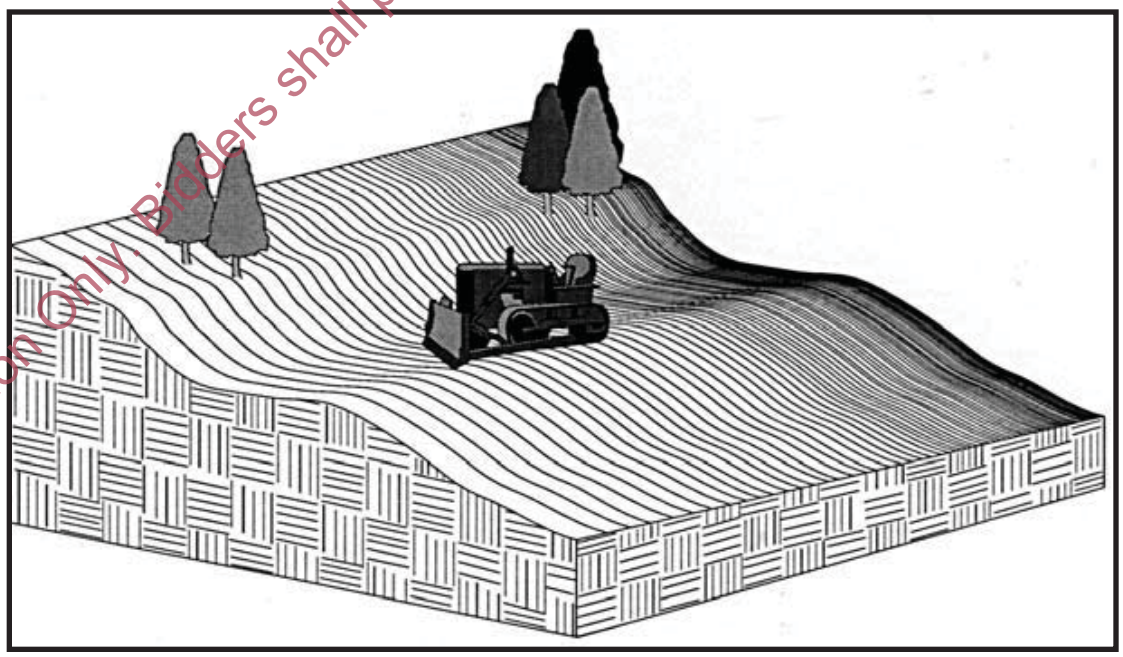

Figure 6.14 Typical Slope Break

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Construction Verification

Check all finished grades for conformance with grading plan and correct as necessary.

Figure 6.15 Track walking with a dozer up and down the slope provides horizontal grooves to reduce stormwater flow volumes and velocity therefore reduces potential for erosion of the slope. Source: *ABC's of BMPs, LLC*

Maintenance, Inspection and Removal

- Periodically inspect all graded areas and the related erosion and sedimentation control practices, as required by the construction general permit, especially after heavy rainfalls. Clean sediment out of diversions and other structures as needed. If washouts or breaks occur, repair them immediately.
- Remove this is a temporary device and stabilize the site *Form H - Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One - Missouri Permit Requirements).

Common Problems and Solutions

Problem	Solution
Variations in topography on-site indicate grading plan will be ineffective or unfeasible.	Consult with design professional
Seepage is encountered during construction.	It may be necessary to install drains. Dewatering shall be performed in accordance with regulatory requirements.
Design specifications for seed variety, seeding dates, erosion control materials or timeframes cannot be met.	Substitutions may be required. Unapproved substitutions could result in erosion and lead to failure of erosion control measures.
Prominent rill and gully erosion caused by slope breaks being too far apart.	Construct intermediate slope breaks.
Difficulties achieving proper compaction of fill caused by subgrade being soft, contains oversized rocks or has high organic content.	Undercut and replace unsuitable subgrade soil.
Slope is unstable or has reduced bearing capacity caused by a high water table	Install subsurface drains to lower water table.

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Hydroseeding

Figure 6.26: Hydroseeding over matt armoring on a steep slope to promote vegetation growth and prevent erosion.
Source: *Florida Erosion and Sediment Control Designer and Reviewer Manual*, June 2007

Hydroseeding is the application of a mixture of water, wood fiber (this could be paper or a 70/30 blend of wood fiber and paper), seed, fertilizer, and a soil stabilizer to temporarily and permanently protect exposed areas of soil from erosion due to wind, rain, and runoff. It is a way to establish grass where grass is the desired cover. This method is most often used in large-scale projects such as highway projects or steep slope areas where straw, sod and blankets are more challenging to use.

Hydroseeding is applied with a mechanical machine. Highway departments often use a boom machine with hoses that can shoot up to 100 feet or more, using soil stabilizers in the seed mix.

For most effective coverage, exposed soil surface should be loose (uncompacted) at time of application. Soil areas can be roughened by rolling the surface with a crimping or punching-type roller or by track walking to increase the soil surface area available for seeding. For best results, cover hydroseed layer (seed with soil stabilizer if used) with a mulch layer to keep applied seeds in place, retain soil moisture, and control soil temperature during seed establishment. The mulch acts as a blanket to protect the seed from wind and erosion.

Fertilizers should be included only when soil tests indicate a lack of adequate nutrients to establish and sustain the selected vegetation. However, there is much debate about whether starter fertilizers should be used at time of seeding. The important factor is to have adequate organic matter in the soil bed so that fertilizing is not necessary. Typically by time the seed

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germinates and starts to develop a root system, about 25 percent of the fertilizer has leached out or washed away except when one is using a “cross-linked polymer” or so called “water retention polymer”. The other exception is when you are using a growth stimulator that will increase germination therefore allowing more of the starter fertilizer to still be in the soil. There are also other options to using fertilizers, such as guar, biostimulants and other root inoculants.

- The application of a soil binder may be necessary to further stabilize hydraulic mulch and seed to allow for germination and continued growth of vegetation. Soil binders in this case are sold as a tackifier and dust palliative all in one – not soil specific. The soil binder reacts with the soil, binding the mulch, seed, fertilizer, and other additives to the soil, holding it together until vegetation is established. Open weave matting can be applied before hydroseeding areas, especially in areas with steep slopes or sandy conditions, to provide additional structural support, creating a highly erosion-resistant surface to support vegetation establishment. There are also additive products available that have a fibrous material in them to create the same high performance bonding of soil, seed and mulch which is may be cheaper and more efficiently applied through the hydroseeder. See precautions on WCCs under Chemical Application for Turbidity Reduction.

Loading of soil binders and other additives should be done in accordance with machine manufacturer procedures. The hydroseed mix should be applied to the soil as soon as possible following the loading of additives. Otherwise, slurry may become too thick, and the machine could become clogged – wasting time, product and money. Straw mulch, matting, or jute cover may be applied over the hydroseed application to further promote the vegetation and prevent erosion, but if too thick, the sun, oxygen and water cannot penetrate into the seed/soil.

Installation

- While construction activities are occurring.
- After construction activities are completed.
- Avoid application of hydroseed on existing vegetation, water bodies, sidewalks and roadways. Hydroseeding should not be used in areas where re-disturbance is expected within four to six weeks.
- In a manner that avoids overspray into water bodies, on sidewalks, and on roadways, where the products can end up polluting the water ways.
- Using appropriate hydroseeder equipment.
- Contact the local street department or the state transportation department for more information.

Inspected

- Inspect area at installation to ensure area is properly covered, and receiving waters are properly protected.
- Inspect area after a precipitation event and/or heavy wind for any removal of vegetation, mulch, or other stabilization material.

Maintenance Activities

- Repair coverage and re-apply hydroseed material as needed to maintain maximum protection against erosion.
- If plant seeds fail to germinate, or established plants die, area must be re-seeded. Consult with product distributor or SWPPP preparer for troubleshooting application problems.
- If the desired permanent seeding type is different from the temporary seed, temporary seeding may have to be removed prior to the application of permanent seeding

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Common Problems and Solutions

Problem	Solution
In some cases, grass has low germination percentage due to poor contact with soil.	Additives used in hydroseeding can enhance germination and root development, but cautions should be taken to ensure the additives do not make their way to the drainage system.
Hydroseeding application does not cover soil completely and erosion occurs.	Ensure initial application of hydroseeding is done in two directions for proper coverage. Ensure proper products and application rates are used correctly.

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Mulch and Hydromulch

Figure 6.27 It takes about two tons per acre of straw mulch to cover at least 75 percent of the ground surface. To prevent erosion and provide the best microclimate for seed establishment, straw mulch should be physically anchored (crimped) or tied down with a tackifier.

Practice Description

Mulch and hydromulch are the application of plant residues such as straw or other suitable materials to the soil surface to reduce erosion. Mulch protects the soil surface from the erosive force of raindrop impact and reduces the velocity of overland flow. It helps seedlings germinate and grow by conserving moisture, protecting against temperature extremes and controlling weeds. Mulch also maintains the infiltration capacity of the soil.

Hydraulic mulch consists of applying a mixture of shredded paper, wood fiber or a hydraulic matrix and a stabilizing emulsion or tackifier with hydroseeding equipment, which temporarily protects exposed soil from erosion by raindrop impact or wind.

Mulch should always be applied to seeded areas to help establish plant cover and protect the seed during establishment.

Recommended Minimum Requirements

Prior to start of construction, mulch requirements should be determined by a qualified professional. The site superintendant and field personnel should refer to plans and specifications throughout the construction process..

Material

As specified in the approved site plan. If not specified, select from mulch materials listed in Table 6.10. Base the choice upon soils, slope steepness and length, flow conditions and time of year (See Figure 6.29).

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Coverage
At least 75 percent of the soil surface.

Anchoring
Anchor the light materials, such as hay and straw mechanically using a crimping disc or with hydraulic tackifiers or netting. Heavy material mulches such as wood chips will not require anchoring unless on slopes of 4:1 or greater.

Installation
Site Preparation
- Divert runoff water away from areas above the site that will be mulched.
- Remove large dirt clods, stumps, roots and other debris from the construction area.
- Grade area as needed to permit the use of equipment for seeding, mulching and maintenance. Shape area so it is relatively smooth.
- If the area will be seeded, follow seeding specifications in the design plan (See Temporary and Permanent Seeding) and apply mulch immediately after seeding.

Mulching
Spread straw or cereal grain mulch uniformly over the area with a power blower or by hand. No more than 25 percent of the ground surface should be visible after spreading.

Apply at the rates shown in Table 6.10. Use higher rates for steep slopes and other erosive areas.

Anchor straw mulch by one of the following methods:
- Crimp with a weighted, straight, notched disc or a mulch anchoring tool to punch the straw into the soil.
- Tack with a liquid tackifier designed to hold mulch in place. Use suitable spray equipment and follow manufacturer's recommendations.
- Cover with netting, using a degradable natural or synthetic mesh to hold mulch materials in more erosive areas. Anchor the netting according to manufacturer's specifications (See Erosion Control Blankets).
- Anchor wood cellulose mulch with a liquid tackifier.

Figure 6.28 shows straw that that has been crimped with a disc blade as in Figure 6.27. Notice when the blade cuts the straw into the soil to anchor it, some of the straw may become vertical and thereby exposing the soil surface to raindrop impact. The vertical straw acts more like a sediment control and you lose some erosion protection. This can be remedied by increasing the amount of mulch used to 3 or 4 tons per acre if crimping will take place. Table 6.10 provides the application rates of different mulch materials.

Use heavy natural nets without additional mulch, synthetic netting with additional mulch or erosion control mats/blankets to control erosion on steep slopes and in areas needing a higher degree of protection such as waterways, swales and diversion channels. These commercial materials vary greatly in longevity, strength, heaviness and the rate of water flow they can handle.

Install netting and mats/blankets according to manufacturer's specifications making sure materials are properly anchored (See Erosion Control Blankets).

Construction Verification
Check materials and installation for compliance with specifications.

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Figure 6.27 Crimping disc. Source: ABCs of BMPs, LLC.

Figure 6.28 Crimped straw. Source: ABCs of BMPs, LLC.

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Table 6.10 Typical Mulching Materials and Application Rates

	Rate per Acre	Requirements	Installation Uses	Longevity
Organic Mulches				
Straw	3,000 - 4,500 lb./acre	Dry, unchopped, unweathered; free of weed seeds and rot	Spread by hand or machine, 1.5 to 2.5 inches deep; must be crimped or tacked with vegetative overspray	2 - 4 weeks
Paper, wood fiber, recycled newsprint	2,000 lb./acre	Can use paper on flatter areas, increase percentage of wood fiber as slopes steepen	To be used with hydroseeder, refer to seeding chart for dates to seed	2 - 4 months
Stabilized Fiber Matrix	Refer to manufacturers recommendations - usually 1,500 - 3,000 lb./acre	Typically requires wood fiber mulch to reduce rainfall impact. Requires 24-hour cure time-not used in concentrated flows	To be used on more erodible slopes, molecularly binds soil particles for improved erosion protection, can be used without seed for temporary soil protection	4 - 5 months
Bonded Fiber Matrix	Refer to manufacturers recommendations - 3,000 - 4,000 lb./acre depending on steepness of slope	24-hour cure time, can be used on slopes as steep as 2:1, not used in concentrated flows	Does not require smooth finish grade, can be used in soils with high rock content, can be used with out seed for temporary soil protection	4 - 6 months
Flexible Growth Medium	Refer to manufacturers recommendations - 3,000 - 4,500 lb./acre depending on steepness of slope	No cure time, can be used on slopes steeper than 1:1, not used in concentrated flows without TRM combination	Does not require smooth finish grade, can be used in soils with high rock content, molecularly binds soil particles, equivalent to short term erosion control blankets in many cases	up to 1 year
Wood Chips	10-20 Tons	Air dry, add nitrogen fertilizer	Apply with blower…	6 - 9 months
Bark	35 cubic yds.	Air dry…	Apply with…	6 - 9 months
Tackifiers				
Mulch tackifiers	Rates vary refer to manufacturers specifications	Powders, liquids, crystals, etc.; most are water soluble	Mix with organic mulches to hold together, heavier rates required for steeper slopes	1 - 3 months
Straw Tackifiers	750 lb./acre	Recycled newsprint with tackifier	Spray overtop of vegetative mulching to hold together for extended time.	1 - 3 months
Soil Binders				
Chemical and Biodegradable products: Many Trade Names	Follow manufacturers specifications	Use for temporary and longer term stabilization of non-vegetative soils	Some may be harmful to plant growth, check manufacturers recommendations for seeding limitations	30 days to 6 months depending upon rate

Source: ASP, Enterprises, 2009

* See Temporary Erosion Control Blanket section for nettings and mats.

**Enlist the assistance of a Certified Professional in Erosion and Sediment Control for specific recommendations.

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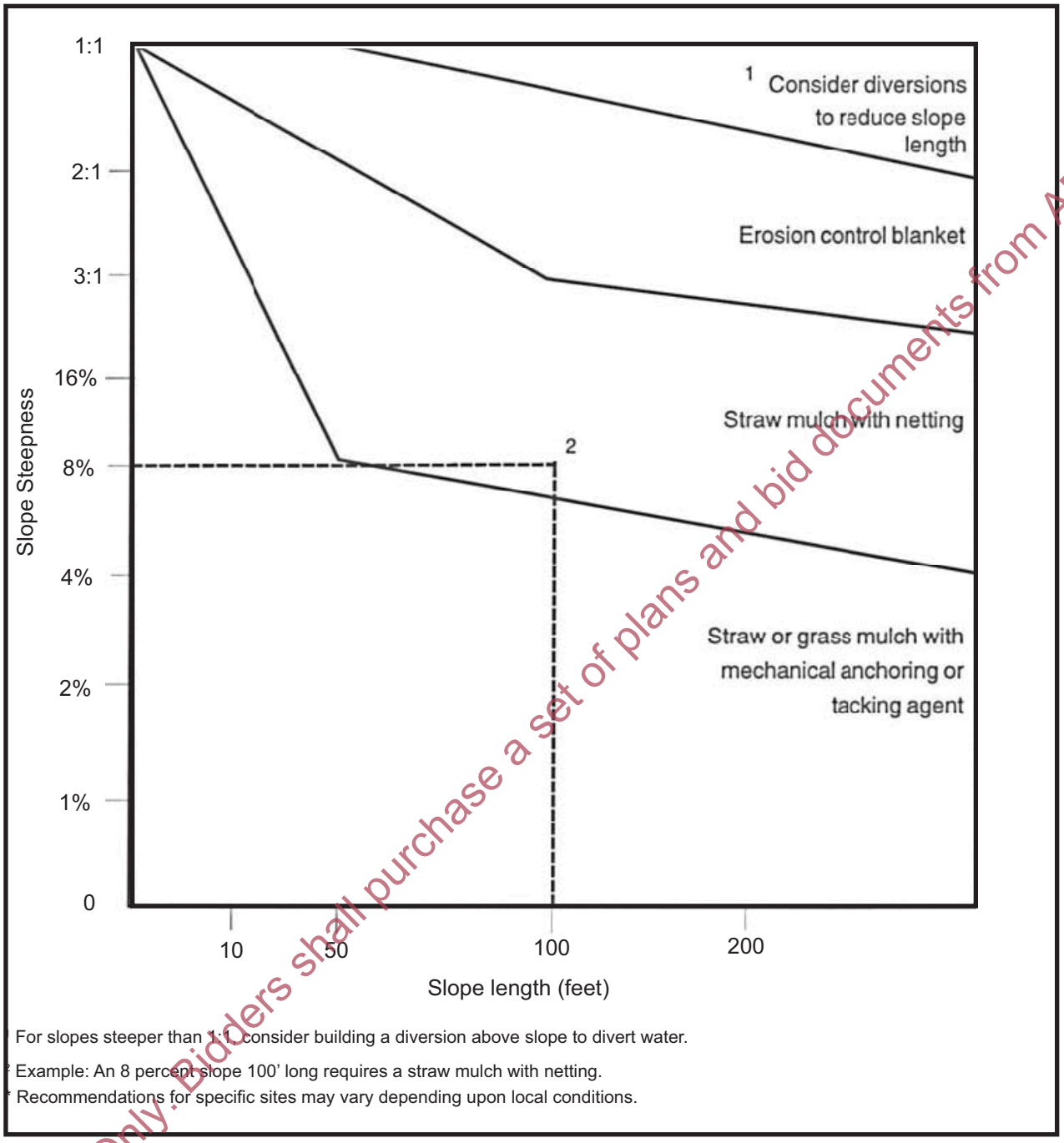

[1] For slopes steeper than 1:1 consider building a diversion above slope to divert water.

[2] Example: An 8 percent slope 100' long requires a straw mulch with netting.

[*] Recommendations for specific sites may vary depending upon local conditions.

Figure 6.29 General mulch recommendations to protect from splash and sheet flow. Source: Adapted from *Minnesota Protecting Water Quality in Urban Areas,1991*

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Troubleshooting

Consult with a qualified design professional if any of the following occur:

- Variations in topography on-site indicate the mulching materials will not function as intended; changes in the plan may be needed.
- Design specifications for mulching materials or seeding requirements cannot be met; substitution may be required. Unapproved substitutions could result in erosion or seeding failure.

Maintenance and Inspection

Inspect all mulched areas on a weekly basis and after rainstorms for erosion and damage to the mulch. Repair promptly and restore to original condition. Continue inspections until vegetation is well established. Keep mower height high if plastic netting is used to prevent netting from wrapping around mower blades or shaft.

Common Problems and Solutions

Problem	Solution
Erosion, washout and poor plant establishment.	Check for proper topsoil, repair eroded surface, reseed, remulch and anchor mulch.
Mulch is lost to wind or stormwater runoff.	Reapply mulch and anchor by crimping, netting or tacking.
Mulch not anchored in channel; resulting in channel bottom eroding	Repair damage, replace mulch and anchor or install appropriate turf reinforcement mat channel liner.
Mulch deteriorates before plant establishment.	Check for proper topsoil, reapply mulch, do not hydromulch in winter.

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SECTION 3: SURFACE STABILIZATION - EROSION CONTROLS

Temporary Seeding

Figure 6.24 Temporary vegetation is a relatively inexpensive way to stabilize construction sites in a hurry. As grass grows, the roots hold soil in place and the plant protects the soil surface from raindrop impacts. Source: N. Klopfenstein, NRCS. St. Charles Co.

Practice Description

Temporary seeding is the establishment of fast-growing annual vegetation to provide economical erosion control for up to 6 months and reduce the amount of sediment moving off the site. Annual plants that germinate rapidly and survive for only one growing season are suitable for establishing temporary vegetative cover.

This practice applies where short-lived vegetation needs to be established before final grading or in a season not suitable for permanent seeding.

Recommended Minimum Requirements

A qualified professional should specify plant materials, seeding rates and times of planting. The site superintendant and field personnel should refer to plans and specifications throughout the construction process. To ensure emergence, vigorous growth of seedlings and continued plant growth, prepare the seedbed and add soil amendments according to soil tests. Protect the soil and seed with mulch or other erosion control until the vegetation is fully established to a density of 70 percent over the entire vegetated area.

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Soil
Make sure there is a minimum of three inches of topsoil with a sufficient percentage of organic material to sustain vegetative growth.

Seedbed Preparation
Loosen soil to depth of 3-inches for broadcast seeding or drilling. If compacted, loosen soils for no till drilling. Avoid excessively wet conditions.

Amendments
Incorporate fertilizer and lime (if soil pH is less than 5.3) incorporated 3- to 6-inches into the soil. See Table 6.2.

Seed Quality
Use certified seed, tested within the past nine months.

Plants
Select recommended temporary erosion control plant species. Rate of application and seeding dates are listed in Tables 6.3 and 6.4.

Erosion Control
Cover the seeded area with approved mulching materials or other erosion control devices to protect the soil and seed until vegetation is fully established.

General
Inspect seeded areas 2 to 4 weeks after seeding for seed germination, vegetation establishment, erosion control and weed control. Repair and reseed as necessary.

Reseed
After six months if the site is not in permanent vegetation over the entire disturbed area to a density that impedes erosion.

Installation
Successful vegetative establishment is directly dependent on the nutrients in the soil. For optimum results, take soil samples from the top 6-inches in each area to be seeded. Submit samples to a soil testing laboratory for liming and fertilizer amendment recommendations.

Seedbed Preparation
- Seedbed preparation is essential for the seed to germinate and grow.
- For broadcast seeding and drilling, loosen the soil to a depth of approximately 3-inches.
- For no-till drilling, the soil surface does not need to be loosened unless the site has surface compaction.
- Use a disk, ripper, chisel, harrow or other acceptable tillage equipment to loosen compacted, hard or crusted soil surfaces. Avoid preparing the seedbed under excessively wet conditions.

Liming
- Acid soils with an extremely low pH can prevent seeding success. However, most of the recommended temporary vegetation is tolerant of low pH soils and will establish on all but the lowest pH soils.
- If soil pH in the region is known to be extremely low, conduct a soil pH test to determine if limestone is necessary for temporary seeding. Amend soils with lime according to information in Table 6.2. Soils with a pH above 7.0 should not be limed.

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Table 6.2 Liming Requirements for Temporary Sites

pH Test	Plant Response	Recommended Application of Agricultural Limestone
Below 6.0	Poor growth	Lime according to soil test
6.0 - 6.5	Adequate growth	No lime recommended
Greater than 6.5	Optimum	No lime recommended

Fertilizer

- The soil will most likely be deficient in nutrients required for growth. A soil test will provide the best guide for the amount and types of fertilizer to apply for optimum plant growth.
- A general recommendation is to broadcast Ntirogen, Phosphorus and Potassium at 90 lbs./acre for areas receiving more than 30 inches of precipitation and 50 lbs./acre in areas receiving less than 30 inches of precipitation.

  For example, to compute the bulk pounds of product to use - For 100 pounds of a 10-10-10 fertilizer mix you have 10 percent or 10 pounds of actual Nitrogen, Phosphorus and Potassium. The remaining 70 percent or 70 pounds of product in the bag is inert material that improves application consistency. You would need to apply 900 pounds of product per acre to provide 90 pounds of actual Nitrogen per acre.
- For best results incorporate the fertilizer into the top 3- to 6-inches before seeding.

Seeding

- Apply seed evenly with a broadcast seeder, drill, cultipacker seeder or hydroseeder. Plant small grains no more than 1½ inches deep. Plant grasses and legumes no more than ½ inch deep.
- Prior to mulching, harrow, rake or drag a chain to lightly incorporate broadcast seed into the soil to enhance germination. Cover applied seed with mulch (See Mulching).

Table 6.3 Temporary Seeding Plant Materials and Minimum Seeding Rate *

Species	Seeding Rate		Plant Characteristics
	lbs. per Acre	lbs. per 1,000 ft.^{2}	
Oats	80 lbs.	2 lbs	Not cold tolerant, height up to 2 feet
Cereals: Rye/Wheat	90 / 120	2 / 2.5	Cold tolerant, height up to 3 feet, low pH tolerant
Millets, Sudangrass	45 / 60	1 / 1.25	Warm season annual, aggressive growth, height up to 5 feet
Annual Ryegrass	75	2	May be added to mix, not heat tolerant, height up to 16 inches
Annual Lespedeza** plus Tall Fescue	15 plus 45	0.5 plus 1	Warm season annual legume, makes own nitrogen, tolerated low pH

* In areas receiving less than 30 inches of precipitation, use 75 percent of these rates.

** If there is any possibility the seeding will be required to control erosion for more than one year, then consider the addition of fescue or another permanent species as part of a mixture when seeding.

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Planting Dates

- Plant according to the design plan. In absence of a plan, choose a recommended temporary species or mixture appropriate for the season from Tables 6.3 and 6.4.
- Plant during optimum seeding dates if at all possible. Always use mulch or other erosion control practices to cover and protect seed and soil during vegetation establishment. Roll and cultipack broadcast seed for good soil-to-seed contact.
- Use high quality seed and for best results, use certified seed. When using uncertified seed, use the highest recommended seeding rate.

Table 6.4 Seeding Dates for Temporary Seeding

Species	Seeding Dates Optimum and Acceptable											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Oats												
Cereals: Rye/Wheat												
Millets, Sudangrass												
Annual Ryegrass												
Annual Lespedeza plus Tall Fescue[1]												

[1] If site may not be developed within one year, consider permanent species listed in Table 6.5.

Table Key
- Optimum Seeding Times
- Acceptable Seeding Times

Mulching

- Mulching conserves moisture and reduces erosion during seed germination and vegetation establishment.
- Evenly cover a minimum of 75 percent of the ground surface with mulch material specified in the design plan. Tack or tie down the mulch according to plan (See Mulching).

Construction Verification

Check materials and installation for compliance with specifications.

Maintenance and Inspection

- Check temporary seeding during each weekly inspection to monitor germination, growth and to see if stands are of adequate thickness (more than 70 percent density of the ground surface vegetation over the entire area to be stabilized). Stands should be uniform and dense for best results. Fertilize, reseed and mulch bare and sparse areas immediately to prevent erosion.
- Mowing is not recommended for cereals seeded alone. Cereals seeded with a grass can be mowed when height is greater than 12-inches. However, to prevent damage to grasses, do not mow shorter than 4-inches.
- Mow millets and sudangrass before height is greater than 6-inches to allow regrowth and continued erosion protection.
- Annual lespedeza and tall fescue may be mowed after height exceeds 8-inches. Do not mow shorter than 4-inches.
- Replant temporary or permanent vegetation within 12 months as annual plants die off and no longer provide erosion control (see Permanent Seeding). Consider no-till planting

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where possible.

Common Problems and Solutions

Problem	Solution
Design specifications for seed variety, seeding dates or mulching cannot be met.	Substitutions may be required. Unapproved substitutions could lead to failure.
Vegetation is not sustainable as a permanent cover caused by a lack of topsoil resulting in a lack of organic material, nutrients and water holding capacity.	Add topsoil with a minimum of three percent organic material.
Poor seedling emergence and growth with erosion of the soil caused by inadequate seedbed preparation.	Repair gullies, prepare seedbed, fertilize, lime (if necessary), mulch and reseed.
Unsuitable choice of plant materials; resulting in poor germination or inadequate stand (less than 70 percent of the ground surface covered).	Choose plant materials appropriate for season, prepare seedbed and replant.
Poor or spotty stands of vegetative cover caused by inadequate mulching, washing away of the seed and erosion of the soil surface.	Poor plant vigor, yellow color and short height caused by a lack of nitrogen - add 50 lbs. of nitrogen fertilizer per acre. Do not apply over the top of existing plants from June 1 to Aug. 15 or on frozen ground.
Poor plant vigor, yellow color and short height caused by a lack of nitrogen.	Add 50 lbs. of nitrogen fertilizer per acre. Do not apply over the top of existing plants from June 1 to Aug. 15 or on frozen ground.
Dying plants caused by a lack of topsoil or soil compaction that limits root growth and water availability to plants.	Add organic material and loosen soil if reseeding is necessary or before seeding permanent vegetation.

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Permanent Seeding

Figure 6.25 Permanent vegetation can be used to stabilize many structures, such as this grassed waterway, ensuring that runoff is relatively sediment-free.

Practice Description

Permanent seeding is the establishment of perennial vegetation on disturbed areas for periods longer than 12 months. Permanent vegetation provides economical long-term erosion control and helps prevent sediment from leaving the site. This practice is used when vegetation is desired to permanently stabilize the soil or if future phases of a construction site will remain dormant for a significant period of time after grading. It is necessary to protect earthen structures such as dikes, channels and embankments. Particular care is required to establish a good, thick cover of permanent grass.

Recommended Minimum Requirements

A qualified professional should specify plant materials, seeding rates and times prior to start of construction. The site superintendant and field personnel should refer to plans and specifications throughout the construction process. To ensure germination and growth, prepare seedbed, add soil amendments according to soil tests, mulch all seeded areas and follow the seeding dates.

Seedbed Preparation

For broadcast seeding or drilling, loosen soil to depth of 3-inches. For no till drilling, loosen the soil if it's compacted. Avoid excessively wet conditions.

Soil Amendments

Incorporate fertilizer and lime (if soil pH is less than 6.0) incorporated 3- to 6-inches into the soil.

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Seed Quality
Use certified seed, tested within the past 9 months.

Planting Dates
Coordinate the construction schedule with planting dates appropriate for region and species (See Table 6.5).

Plants
Select from recommended erosion control plants (grass or grass/legume mixtures) as shown in Tables 6.5 and 6.6. Rate of application and seeding dates are shown in Tables 6.4, 6.7 and 6.8.

Mulch
Cover a minimum of 75 percent of the ground surface with approved material (See Mulching).

Inspection
Inspect seeded areas during each weekly inspection. Repair and reseed as necessary.

Installation
During final grading, take soil samples from the top 6-inches in each area to be seeded. Submit sample to a soil testing laboratory for liming and fertilizer recommendations.

Seedbed Preparation
- Seedbed preparation is essential for the seed to germinate and grow.
- For broadcast seeding and drilling, loosen the soil to a depth of approximately 3-inches.
- For no-till drilling, the soil surface does not need to be loosened unless the site has surface compaction.
- Loosen compacted, hard or crusted soil surfaces with a disk, ripper, chisel, harrow or other tillage equipment.
- Avoid preparing the seedbed under excessively wet conditions.

Liming
- Follow the recommendations resulting from the soil test. Apply ground agricultural limestone unless a soil test shows a pH of 6.5 or greater.
- Incorporate lime into the top 3- to 6-inches of soil.
- Do not add lime if the pH is 7.0 or greater.

Fertilizer
Remember: Phosphorus helps roots grow and develop to get the grass plants established. Nitrogen will only be taken up after the seed has germinated and the vegetation is growing. It may wash down stream if applied heavily during seeding.

Note: Fertilizer can be blended to meet exact fertilizer recommendations. Take soil test recommendations to local fertilizer dealer for bulk fertilizer blends. This may be more economical than bagged fertilizer.

For establishment and long-term growth, apply a complete fertilizer at rates recommended by soil tests or as specified in the design plan. In the absence of soil tests, use the following as a guide:

- A typical fertilizer blend for lawn grass mixes: Apply 10-24-18 which represents 10 percent of actual nitrogen – 24 percent of actual phosphorus and 18 percent of actual potassium within the fertilizer compound. If you had 100 pounds of a 10-24-18 blend you would have 10 pounds of actual nitrogen, 24 pounds of actual phosphorus and 18 pounds of actual potassium within the bag.

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- A typical application rate of fertilizer for initial establishment of vegetation after seeding is approximately 1 pound of actual nitrogen per 1,000 square feet. With the 10-24-18 fertilizer this would require the application of approximately 435 pounds of this fertilizer mix per acre since there are 43,500 square feet in an acre. This fertilizer would also provide more than 2 pounds of phosphorus per acre.
- Incorporate lime and fertilizer to a depth of 3- to 6-inches by disking or chiseling on slopes of up to 3:1.
- Grade soil to a smooth firm surface to enhance rooting of seedlings and reduce rill erosion.
- Subsequent fertilization with an additional 2 pounds per 1,000 square feet of actual Nitrogen approximately one month after initial seeding will help grass growth after germination to achieve the density of vegetation to prevent or minimize erosion. A typical fertilizer for a second application once vegetation is established would be a 20-10-5 mix at 435 pounds of fertilizer per acre.

Plant Selection

If not specified in the design plan, choose a suitable species of grass or a grass/legume mixture from Tables 6.5 and 6.6 appropriate for the season. Consider site conditions including soils, plant characteristics, region of the state and desired level of maintenance. The species shown are adapted for lawns and erosion control. If there are questions on species selection and how they may be adapted in wildlife habitat or wetland applications, contact your local Natural Resources Conservation Service or Extension office.

Developing a Mixture

A pure stand of grass provides the best erosion control. The advantage of a grass/legume mix is the legume provides nitrogen to the grass and often grows during hotter and drier months when the grass is dormant. Usually one grass and one or two legumes is sufficient in a mixture. More grasses can be mixed together, but may be of little use. Refer to Tables 6.5 and 6.6 for information about each grass and legume to determine the correct species for your site.

Nurse Crops (Temporary or Annual Species)

Nurse crops are temporary grains that have one growing season such as wheat, rye and oats and are sometimes used in a seeding mixture. These annuals can reduce weeds, control erosion and provide protection to young seedlings until the perennial species become established.

Plant nurse crops about 1-inch deep. Most permanent grasses and legumes are sown 1/4 inch deep. Permanent seedings should not be planted deeper than ¼ to ½ inch.

Aesthetic Plantings

A wide variety of native forbs and grasses are available that add diversity and beauty to permanent plantings (e.g., switchgrass as an accent). Contact your local Natural Resources Conservation Service office for species selection and seeding rates.

Planting Dates

If seeding dates are not specified in the design plan or construction has not proceeded according to schedule, use the seeding calendar shown in Table 6.5.

Plant during optimum seeding dates if at all possible. Always use mulch or other erosion control measures to protect the seed and reduce erosion until the vegetation is established. For dormant seeding dates, broadcast seed and immediately roll and cultipack for good soil-to-seed contact.

If unable to seed according to schedule, use temporary seeding until the preferred date for permanent seeding.

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Seeding Rates

If seeding rates are not specified in the design plan, use rates in Table 6.8 for grasses alone. Use rates in Table 6.9 for a grass or legume mixture. These rates are based on the poor growing conditions that typically exist on a development site, a need for dense growth and high germination rates.

For best results use certified seed. When using uncertified seed, use the highest recommended seeding rate. Higher seeding rates will not substitute for good seedbed preparation.

- Apply seed uniformly using a cyclone seeder, drop-type spreader, drill, cultipacker seeder or hydroseeder.
- When using a drill seeder, plant rye or other grains about 1-inch deep; plant grasses and legumes no more than ½ inch. Calibrate equipment in the field.
- Cover seed by raking, or dragging a chain, brush or mat. Then firm the soil lightly with a roller. Seed can also be covered with hydro-mulched wood fiber and tackifier or a rolled erosion control product.
- Legumes require inoculation with nitrogen-fixing bacteria to ensure good growth. Purchase inoculum from seed dealer and mix with seed prior to planting.

Table 6.5 Planting Dates Optimum and Acceptable* Planting Dates

Species	Seeding Dates Optimum and Acceptable											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Turf Fescue												
Tall Fescue												
Kentucky Bluegrass												
Perennial Ryegrass												
Ryetop												
Reed Canary												
Bermuda - Common												
Bermuda- Hybrid												
Buffalograss[1]												
Zoysia2												
Birdsfood Trefoil												
Common Lespedeza												
Red Clover												
White Clover												
Wheat/Rye[3]												
Oats[3,4]												

[1] Can also be sprigged.

[2] Usually sprigged. Space plugs every 6-, 8- or 12-inches; with 4,000, 2,250 or 1,000 sprigs/1000 ft^2 respectively.

[3] Check with your local Noxious Weed Department before planting.

[4] Nurse crop only.

[5] Provides a quick temporary cover or nurse crop even if planted in the fall.

Table Key

Optimum Seeding Times

* With Mulch Cover - Acceptable Seeding Times

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Table 6.6 Plant Characteristics

	Species	Kansas Adaptation	Missouri Adaptation	Maintenance	Fertility Needs	Establish-ment Ease
				L - M - H	L - M - H	P - M - G
Cool Season Grasses	Perennial ryegrass	E, C, W*	N, S	L	M	M
	Canada wildrye	E, C, W	N, S	M	L	G
	Tall fescue	E, C, W*	N, S	M	L - H	G
	Crested wheatgrass	E, C, W	N	M	L	M - G
	Kentucky bluegrass	E, C, W*	N, S	H	M - H[1]	M - G
	Bromegrass	E, C, W*	N, S	M	M - H[1]	M - G
	Redtop	S½ E	N, S	L	L	M
	Reed canary[1]	E, C, W*	N, S	H	L - M[3]	P
Warm Season Grasses	Common Bermuda	E, C, W*	S	L	L - M	M
	Hybrid Bermuda	E, C, W*	-	L	L - M	M
	Buffalograss[3]	E, C, W*	N, S	L	L	M
	Blue grama	E, C, W*	N, S	L	L	M
	Zoysia[4]	E, C, W*	-	M	M - H	M
	Sideoats grama	E, C, W*	N, S	M	L	G
	Little bluestem	E, C, W*	N, S	M	L	M
	Big bluestem	E, C, W*	N, S	M	L	M
	Indiangrass	E, C, W*	N, S	M	L	M
	Switchgrass	E, C, W*	N, S	M	L	M
Legumes[5]	Birdsfoot trefoil	E, C, W*	N, S	L	M	P - M
	Crownvetch	E, C, W*	N, S	M	M	P - M
	Annual lespedeza[6]	E, C, W*	N, S	M	M	P - M
	Red clover	E, C, W*	N, S	M	M	G
	White clover	E, C, W*	N, S	L	M	M - G
	Alfalfa	E, C, W*	N, S	M	L	P
Companion Crops/Cereal Grains	Wheat	E, C, W*			M	M
	Rye (cereal)	E, C, W*			M	M
	Oats	E, C, W*			M	M

* Adaptation limited to areas that receive additional moisture enhancement by irrigation, subirrigation or overland flow.

[1] Will be high maintenance in lawn – type or low rainfall (<30") settings.

[2] Adapted to shorelines, wet or frequently flooded areas.

[3] Responds well to fertilizer, but doesn't necessarily require it.

[4] Usually seeded, by can be sprigged.

[5] Usually sprigged, plugged or sodded.

[6] Legumes alone will not provide adequate erosion protection: use with a grass in a mixture.

[7] Will reseed each year if not mowed until after seed shatter in September.

Table Key

L = low
M = moderate,
H = high.
P = poor,
G = good.

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Table 6.7 Species Tolerance for Environmental Conditions

Species		Tolerance				
		Shade	Drought	Flooding	Traffic	Soil Wetness
Cool Season Grasses	Perennial ryegrass	L	L	M	M	M
	Canada wildrye	M	M	L	M	P
	Tall fescue	M	M	M	M	P
	Crested wheatgrass	L	H	M	M	G
	Kentucky bluegrass	L	L	M	H	G
	Bromegrass	L	M	L	H	M
	Redtop	L	L	M	H	G
	Reed canary	L	M	H	H	G
Warm Season Grasses	Common Bermuda	L	H	H	H	M
	Hybrid Bermuda	L	H	H	H	M
	Buffalograss	L	H	H	H	G
	Blue grama	L	H	L	M	P
	Zoysia	L	H	M	H	P
	Sideoats grama	L	H	M	H	M
	Little bluestem	L	H	L	L	P
	Big bluestem	L	H	M	L	M
	Indiangrass	L	M	L	M	P
	Switchgrass	L	M	M	M	G
Legumes[5]	Birdsfoot trefoil	L	H	L	M	G
	Annual lespedeza	L	L	M	L	M
	Red clover	L	L	L	M	P
	White clover	L	L	L	H	M
	Alfalfa	L	L	L	L	P

1 Legumes alone will not provide adequate erosion protection: use with a grass in a mixture.

Table Key

L = Low
M = Moderate
H = High
P = Poor
G = Good

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Table 6.8 Seeding Rates

Species		Kansas: Full Seeding Rate[1] lbs./acre (PLS)[2]	Missouri: Full Seeding Rate[1] lbs./acre (PLS)[2]
Cool Season Grasses	Perennial ryegrass	150	150
	Canada wildrye	21	24
	Tall fescue	150	150
	Crested wheatgrass	20	16
	Kentucky bluegrass	120	120
	Bromegrass	100	100
	Redtop	8	8
	Reed canary[1]	40	40
Warm Season Grasses	Common Bermuda	2	4
	Hybrid Bermuda	20 bu./acre	-
	Buffalograss[3]	8 (grain)	8 (grain)
	Blue grama	3	6
	Zoysia[4]	20 bu./acre	-
	Sideoats grama	15	15
	Little bluestem	9	13
	Big bluestem	17	16
	Indiangrass	12.5	16
	Switchgrass	8	9
Legumes[5]	Birdsfoot trefoil	5	10
	Annual lespedeza[6]	14	16
	Red clover	8	12
	White clover	3	4
	Alfalfa	9	9
Companion Crops	Wheat	1 bu./acre	1 bu./acre
	Rye (cereal)	1 bu./acre	1 bu./acre
	Oats	1.5 bu./acre	1.5 bu./acre

[1] Note: Rates based on typical construction site conditions where seedbed is normally less than ideal. Planned future use or specific site conditions may dictate an increase or a decrease in rates. Contact your local Natural Resources Conservation Service office or consulting agronomist for specific seeding rates within your county.

[2] PLS or Pure Live Seed = the amount of seed guaranteed to grow.

[3] Legumes alone will not provide adequate erosion protection: use with a grass in a mixture.

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Table 6.9 Example Seeding Mixtures for Critical Area Seeding

Grass - Legume Mixture	Seeding Rate (PLS) *	
	lbs./1000 ft.^{2} ***	lbs./acre
Reed canarygrass / White clover	5 + 0.1	40 + 1
Reed canarygrass / Red clover	5 + 0.25	40 + 2
Tall fescue** / Birdsfoot trefoil	10 + 0.25	80 + 2
Tall fescue** / White clover	10 + 0.1	80 + 1
Tall fescue** / Lespedeza	10 + 0.5	80 + 4
Tall fescue** / Lespedeza / White clover	10 + 0.25 + 0.1	80 + 4 + 1
Tall fescue** / Red clover	10 + 0.25	80 + 2
Tall fescue** / Red clover / White clover	10 + 0.25 + 0.1	80 + 2 + 1
Kentucky bluegrass / White clover	3 + 0.1	25 + 1
Kentucky bluegrass / Red clover	3 + 0.25	25 + 2
Kentucky bluegrass / Birdsfoot trefoil	3 + 0.25	25 + 2
Kentucky bluegrass / Lespedeza	3 + 0.5	25 + 4
Perennial ryegrass / Red Clover	8 + 1	70 + 10
Perennial ryegrass / Birdsfoot trefoil	8 + 0.5	70 + 5
Perennial ryegrass / Lespedeza	8 + 3	70 + 25
Big bluestem / Indiangrass / Switchgrass / Sideoats grama / Western Wheatgrass	-	3.4 + 2.5 + 2 + 3 + 4
Wheat / Rye (as nursery crop)	1.5	60
Oats (as nursery crop)	0.75	30

* PLS or Pure Live Seed = the amount of seed guaranteed to grow. To calculate amount of bulk seed needed: Read seed tag and multiply % purity X % germination = % PLS; then divide lbs of PLS recommended by % PLS. Example: 30 lbs of Reed canary is needed to seed a 1 acre waterway; 90% pure X 90% germination = 81% PLS; 30 lbs PLS / .81 = 37 lbs. bulk seed needed.

** Turf fescue may be substituted for fescue at the same rates.

***Note: Use lbs. / 1,000 ft.^{2} rate to establish dense vegetation for lawns.

Erosion Control

- Mulching or a rolled erosion control product is recommended to conserve moisture, reduce erosion and protect the seed.
- Cover at least 75 percent of the area with approved mulch materials. Crimp, tack or tie down mulch with netting. Mulching is extremely important for successful seeding (See Mulching).

Construction Verification

Check materials and installation for compliance with specifications.

Maintenance and Inspection

- Inspect seeded areas weekly and after rain events. Check for erosion and seed wash out.
- Expect emergence of grasses and legumes within 28 days after seeding, with legumes following grasses.
- Check permanent seeding at each regular weekly inspection. Look for:
  - Germination.
  - Vigorous seedlings.
  - Uniform density with at least 70 percent of the ground surface covered.
  - Uniformity with nurse plants, legumes and grasses well intermixed.
  - Green, not yellow, leaves. Perennials should remain green throughout the summer, at least at the plant bases.

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Reseeding

- Inspect seedings for die out for at least a year. Inspect the soil for erosional areas. To repair bare and sparse areas, fill gullies, refertilize, reseed and mulch. Consider no-till planting where possible.
- If stand is inadequate or plant cover is patchy, identify the cause of failure and take corrective action (e.g., choice of plant materials, lime and fertilizer quantities, poor seedbed preparation, lack of topsoil or weather.) If vegetation fails to grow, have the soil tested to determine whether pH is in the correct range or nutrient deficiency is a problem.
- Depending on stand conditions, repair with complete seedbed preparation, then overseed or reseed.
- If it's the wrong time of year to plant desired species, overseed with cereal grain or millets to thicken the stand until timing is right to plant perennials or use temporary seeding.

Fertilization

Satisfactory establishment may require refertilizing the stand in the second growing season.

- Do not fertilize cool season grasses in late May through July.
- Grass that looks yellow may be nitrogen deficient. An application of 500 lbs of 10-10-10 Nitrogen, Phosphorus, and Potassium per acre in early spring will help cool season grasses compete against weeds or grow more successfully.

Remember to convert actual pounds of nutrient needed when determining how many pounds of commercial fertilizer to buy.

- Do not use nitrogen fertilizer if stand contains more than 20 percent legumes.

Mowing

- Consider mowing after plants reach a height of 6- to 8-inches.
- Mow grasses tall, at least 3-inches in height and minimize compaction during mowing process.
- Monitor the late winter and early spring growth of nurse crops to be sure that they do not smother the permanent seeding. Mowing in April may reduce the competitiveness of the nurse crop and open the canopy to allow more sunlight to permanent seedlings that are beginning to grow.
- Vegetation on structural practices such as embankments and grass-lined channels need to be mowed only to prevent woody plants from invading.

Troubleshooting

Consult with design professional if the following occurs:

- Design specifications for seed variety, seeding dates or mulching cannot be met; substitutions may be required. Unapproved substitutions could lead to failure.

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Common Problems and Solutions

Problem	Solution
Poor stand of vegetation caused by inadequate topsoil.	Apply good topsoil with a minimum of 5 percent organic material and reseed.
Poor stand of vegetation caused by inadequate seedbed preparation.	Prepare well-tilled, limed and fertilized seedbed and reseed.
Vegetative stand failures caused by unsuitable choice of plant materials such as seeding Bermuda grass in the north or in the fall.	Select an appropriate species based on plant characteristics in Tables 6.8 and 6.9 and time of seeding.
Perennial vegetation overtaken by nurse crop with too high seeding mixture.	Limit rates to those shown in Table 6.9; eliminate old nurse crop, prepare seedbed and reseed.
Inadequate stand of vegetation caused by seeding at the wrong time of the year.	Consult Table 6.5 and reseed. If timing is not right, use temporary seeding to stabilize soil until preferred seeding dates.
Inadequate stand of vegetation, bare spots or eroded areas caused by inadequate mulching.	Prepare seedbed, reseed, cover seed evenly and tack or tie down mulch, especially on slopes, ridges and in channels (see Mulching).

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Sodding

Figure 6.34 A team is laying sod strips so the seams are not aligned and the ends and sides are against each other to reduce drying out of the roots. Source: N. Klopfenstein, NRCS. St. Charles Co.

Practice Description

Sodding is the use of a vegetative cover that includes both the grass plants as well as an established root system to provide immediate erosion control in disturbed areas. Sodding is well suited for stabilizing erodible areas such as grass-lined channels, stormwater detention basins, diversions, swales, slopes and buffer strips.

Recommended Minimum Requirements

Prior to start of installation, plant materials and amendments should be specified by a qualified professional. The site superintendant and field personnel should refer to plans and specifications throughout the construction process..

Plant Selection

Select high quality, healthy, moist, fresh sod. Select a variety that is well-adapted to the region, supports its intended use, and is appropriate for the desired level of maintenance.

Soil Amendments

Fertilizer and lime (if soil pH is less than 6.0) incorporated to a depth of 3- to 6-inches into the soil.

Soil Surface

Clear of clods, rocks, etc.; smooth and firm; not compacted clay or pesticide-treated soil.

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Irrigation
Temporary irrigation is required to ensure rooting and plant establishement.

Timing
Anytime of the year, except when the soil is frozen. Check with local sod farms for availability.

Installation
Soil supplied nutrients are critical to sod establishment and continued plant growth. Test soil for nutrients and pH. Soil testing can be done at University Extension offices and private labs.

Site Preparation
Apply amendments according to soil test recommendations.
In the absence of a soil analysis, apply fertilizer amendments at the following maximum rates:

- Fertilizer: Apply 500 pounds of a 10-10-10 Nitrogen, Phosphorus and Potassium.
- Consult a qualified professional who specializes in soils and soil amendments.

Apply ground agricultural limestone unless a soil test shows a pH of 6.0 or greater.
If soil test recommendations are not available and soil pH is less than 6.0, use:

- Ground agricultural limestone: 20 lb. ENM or ECC* /1,000 ft^2 or 800 lb. ENM or ECC/acre (approx. 2 tons/acre). Missouri state agricultural lime laws require ag lime be sold as units of Equivalent Neutralizing Material (ENM)/ton. For example, soil test requires 800 lbs ENM and lime producer's material tests at 400 lb. ENM. 800/400 = 2 tons to be applied. See MU Guide #9107 for details. In Kansas, ECC (Effective Calcium Carbonate) = ENM. (See Glossary for definition.)
- Incorporate amendments to depth of 4- to 6-inches with a disk or chisel plow.
- Rake or harrow to achieve a smooth, final grade on which to lay the sod. Surface should be loose, and free of plants, trash and other debris.
- Moisten the soil immediately prior to laying sod during high temperatures to cool the soil and reduce burning and dieback.

Table 6.13 Sod Species Adaptation to Regions of the State

Species	Kansas	Missouri
Kentucky Bluegrass	East and Central	Statewide
Turf Fescue	East and Central	Statewide
Bermuda		
common	South half, east, central	Southern half
improved	South half, east, central	Southern third
Zoysia	South half, east, central	Southern half
Buffalograss	Statewide	Statewide

Laying Sod
- For best results, place the sod as soon as possible after being cut. Ideally, sod is cut and laid the same day.
- To prevent roots from drying out, moisten the soil surface and lay sod joints tightly against each other.
- Lay the first row of sod in a straight line with subsequent rows placed parallel to and laying tightly against each other. Stagger joints to create a brick-like pattern and promote more uniform growth and strength. Ensure sod is not stretched or overlapped and that all joints are butted tight to prevent spaces which cause drying of the roots. (See Figure 6.35).

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- Do not lay sod on frozen soil surfaces.
- On slopes 3:1 or steeper, or wherever erosion may be a problem, lay sod with staggered joints and secure by stapling or pegging. Install sod with the length perpendicular to the water flow (on the contour).

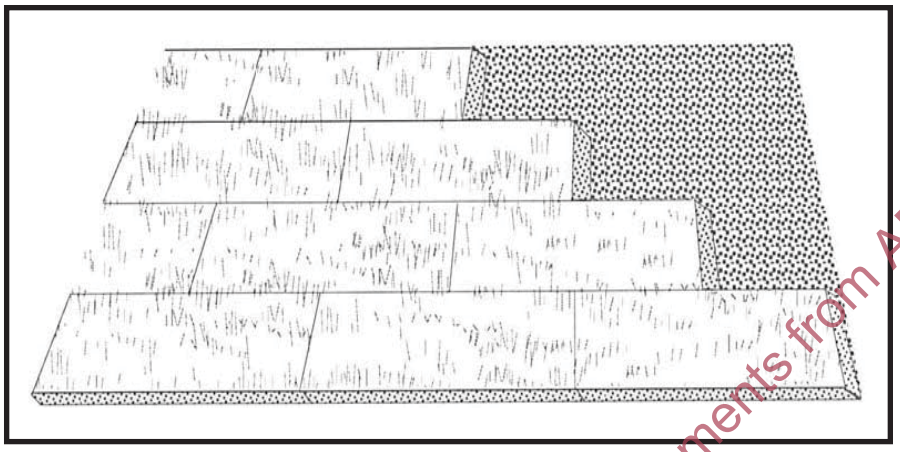

Figure 6.35 Typical installation of grass sod - lay sod in a staggered pattern with strips tightly against each other.

- Immediately after laying the sod, roll or tamp it to provide firm contact between roots and soil, then irrigate sod deeply so the underside of the sod pad and the soil 4-inches below the sod is thoroughly wet.
- Until a good root system develops, water sod as often as necessary to maintain moist soil to a depth of at least 4-inches.
- Wait until the sod is firmly rooted before mowing for the first time, usually two to three weeks. Not more than 1/3 of the grass leaf should be removed at any one cutting.

Sodded Waterways

- Sod provides quicker protection than seeding and may reduce the risk of early washout unless turf reinforcement mats are used.
- When installing sod in waterways, use the type of sod specified in the channel design.
- Lay sod strips perpendicular to the direction of water flow and stagger in a brick-like pattern. See Figure 6.36.
- Staple sod firmly at the corners and middle of each strip. Jute or synthetic netting may be pegged over the sod for further protection against washout during establishment.
- Channel velocity should not exceed 1.5 feet per second in a sodded waterway. Seek guidance from a qualified professional for additional control measures in high flow channels.

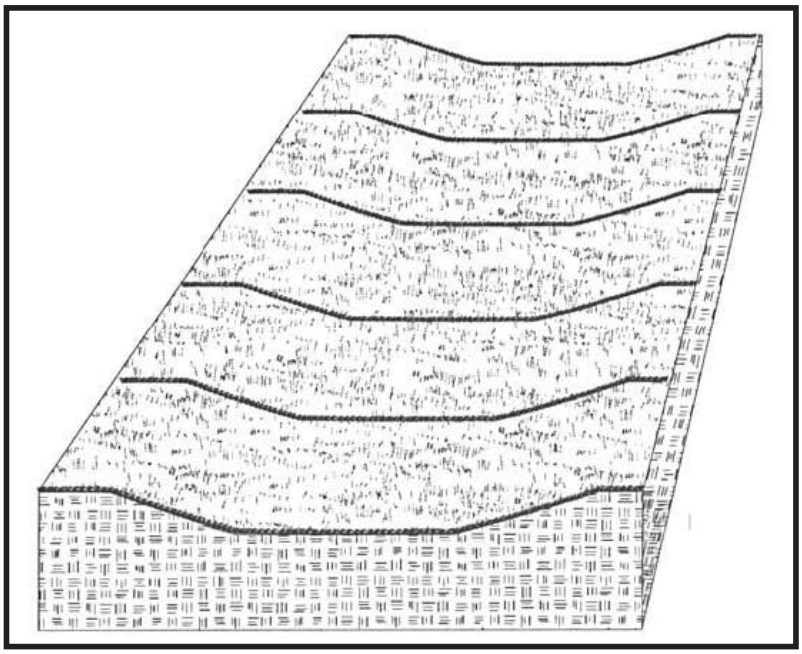

Figure 6.36 Installation of sod in waterways - lay sod across the direction of flow. Use pegs or staples to fasten sod firmly at the corners and in the center.

Construction Verification

Check materials and installation for compliance with specifications.

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Maintenance and Inspection

- Inspect the sod each week and after rain events.
- Keep sod moist until it is fully rooted. Lay the sod in place at least two weeks prior to filing a Notice of Termination to allow time for sod to take root. If sod can be pulled up by hand, it has not rooted sufficiently and the site land disturbance permit can not be terminated.
- Mow to a height of 2- to 3- inches after sod is well-rooted, in two to three weeks. Do not remove more than 1/3 of the leaf blade in any mowing.
- Permanent, fine turf areas require yearly fertilization. Fertilize warm-season grass in late spring to early summer; cool-season grass in late winter and again in early fall.

Troubleshooting

Consult with a qualified design professional if any of the following occur:

- Variations in topography on-site indicate the sodding materials will not function as intended; changes in the plan may be needed.
- Design specifications for sod variety cannot be met or irrigation is not possible; substitution or seeding may be required. Unapproved substitutions could result in erosion or the sods inability to establish a root system.

Common Problems and Solutions

Problem	Solution
Grass dies because it is unable to root caused by the sod being laid on poorly prepared soil or unsuitable surface.	Remove dead sod, prepare surface and resod.
Root dieback or grass does not root rapidly and is subject to drying out caused by sod not adequately irrigated after installation.	Irrigate sod and underlying soil to a depth of 4-inches and keep moist until roots are established.
Sod may be loosened by runoff during a rain event caused by not being properly anchored.	Replace damaged areas and anchor sod.
Yellowing of leaf blades and slow growth caused by a lack of nitrogen.	Fertilize sod, but avoid fertilizing cool season grasses from late May through August.
Sod picked up and removed from soil surface caused by the hydraulic limitations of sod that may have been exceeded in the waterway.	Evaluate actual hydraulic conditions and use alterative erosion control practice, (e.g., rip rap, turf reinforcement mat, transition mats).

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Materials Management

Material delivery, handling and storage can generate significant pollution. The site superintendent needs to ensure best management practices are followed to minimize or eliminate the discharge of material pollutants to the storm drain system or watercourse.

Inventory

The site superintendent should develop and maintain an inventory of materials that will be stored outside on the site during construction. For example:

- ☐ Pipe, fittings and joint compounds for underground utility piping.
- ☐ Gravel and stone bedding material.
- ☐ Concrete forming materials.
- ☐ Other. (Specify) _____

Delivery

Locations for delivery should be determined and clearly marked. Where beneficial, visibly place signs with delivery instructions for the drivers. Employees trained in emergency spill clean-up procedures need to be present when dangerous materials or liquid chemicals are unloaded.

Storage

Fuels, oils and other petroleum products (e.g., forming oils and compounds; fertilizers; pesticides) or any other hazardous or toxic compounds should be stored under cover and not allowed to come in contact with stormwater on the site. On-site storage should meet all local, state and federal secondary containment rules and regulations. Additionally, local ordinances may require fencing and security measures for storage of these products.

Do not store hazardous chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and under cover in secondary containment.

Do not store incompatible materials, such as chlorine and ammonia in the same temporary containment facility.

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Solid Waste Management

Figure 6.17 This dumpster is in need of routine maintenance and the trash and debris around the area must be disposed of in a proper manner. Source: ABC's of BMP's, LLC

The general contractor is responsible for disposing of all solid waste from the site in accordance with state and local laws and regulations. Dumpsters or other collection containers should be provided as needed and should be covered at all times to reduce the spread of litter and avoid public nuisance and vector concerns. Solid waste may not be buried on the site and may not be open burned except in conformance with the Missouri Air Conservation Law and regulations. Open burning violations are also a violation of the Missouri Solid Waste Management Law.

All solid waste removed from the construction site must go to a permitted transfer station or landfill and cannot be taken to another unpermitted location for consolidation or processing. Material may be sorted on-site and diverted to acceptable reuse or recycling.

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Deconstruction Waste Recycling

Recycling deconstruction waste is one way to minimize solid waste disposal costs and pollution. For information about local outlets for deconstruction materials, contact your area Solid Waste Management District.

There are 20 Solid Waste Management Districts in the State of Missouri. Search their contact information at:

- Solid Waste Management District Contacts located at www.dnr.mo.gov/env/swmp/swmd/swmdinfo.htm or by calling 800-361-4827.
- Missouri Construction and Demolition Waste Guidance www.dnr.mo.gov/env/cdwaste.htm.
- Additional information is available at:
    - Mid America Regional Council (Kansas City region) at 816-474-4240 or www.recyclespot.org.
    - Construction Industry Compliance Assistance Center at www.cicacenter.org/
    - Toolbase Services: Construction Waste Management at www.toolbase.org/Best-Practices/Construction-Waste/construction-waste-management.

Recommended Minimum Requirements

- Solid waste management procedures and practices are designed to minimize or eliminate the discharge of pollutants to the drainage system or to watercourses as a result of the creation, stockpiling or removal of construction site wastes.
- Construction projects should be designed and implemented to minimize the amount of wasted materials.
- Materials should be purchased with minimal packaging.
- Solid waste management procedures and practices must be implemented on all construction projects that generate solid wastes. Solid wastes that are commonly found on construction and demolition sites include but are not limited to:
    - Construction wastes (e.g., lumber, wood sheeting products, steel and metal scraps, sawdust, pipe and electrical cuttings, non-hazardous equipment parts, polystyrene (Styrofoam), wall board, miscellaneous types of insulation, roofing materials, empty containers and other materials used to transport and package construction materials).
    - Landscaping vegetation waste and landscape plant containers.
    - Packaging materials.
    - Litter, including food containers, beverage cans, coffee cups, paper bags, plastic wrappers and smoking materials, including litter generated by the public.

Employee Training

Employees should be trained and educated as part of good housekeeping and pollution prevention on a construction site.

- Instruct employees and subcontractors about identification of solid waste and hazardous waste.
- Educate employees and subcontractors about solid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures. incorporate procedures into regular safety meetings.

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- Require employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, Recycling and Disposal

- Construction and landscaping material waste should be recycled and reused as much as possible.
    - Landscaping vegetation should be shredded and used as mulch when possible.
    - Materials from demolished structures should be recovered for reuse or recycling when possible.

      Note: Any separating of recoverable materials for reuse or recycling must occur on the property of origin. Solid waste cannot be removed to another location for sorting or separating without a permit from the Department of Natural Resources' Solid Waste Management Program.
    - Salvage or recycle useful vegetation debris, packaging or surplus building materials when practical. For example, trees and shrubs from land clearing can be converted into wood chips, and then used as mulch on graded areas. Recycle wood pallets, cardboard boxes and construction scraps.
- Provide dumpsters of sufficient size and number to contain the solid waste generated by the project. Dumpsters should be covered at all times and be properly serviced.
- Provide trash receptacles in the permittee's yard, field trailer areas and at locations where workers congregate for lunch and break periods.
- Locate solid waste storage areas at least 50 feet from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding of water.
- Collect construction debris and litter from work areas within the construction limits of the project site on a daily basis and place in watertight dumpsters, regardless of whether the litter was generated by the permittee, the public or others.
- Empty dumpsters weekly from the site. Dispose of the contents in accordance with Missouri State solid waste regulations. While demolition and construction debris typically do not emit a lot of odors, food waste from workers can cause an odor problem and attract public complaints.
- Properly dispose of the waste at a permitted solid waste transfer station or a permitted sanitary or demolition landfill.
- Do not place collected litter and debris in or next to drain inlets, stormwater drainage systems or watercourses.
- Prohibit littering on the project site and perform periodic litter removal from the area to reduce public nuisance concerns from airborne and waterborne litter.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Remove construction debris and waste from the site as necessary to maintain a safe environment and to avoid public nuisance issues related to airborne and waterborne trash or vectors.

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- Store or stack construction material visible to the public in an orderly manner and manage it to protect the value of the material. Materials stored in a waste like manner are regulated by the Missouri Department of Natural Resources' Solid Waste Management Program or Kansas Department of Health and Environment's Bureau of Waste Management.
- Prevent stormwater run-on from contacting stored solid waste through the use of covered containers. Recovered or recycled materials should be covered, or the area in use should include berms, dikes, other temporary diversion structures or the use of measures to elevate waste from site surfaces to avoid contact with stormwater.
- Construction and highway planting waste not stored in watertight dumpsters need to be securely covered from wind and rain by covering the waste with tarps or plastic sheeting or protected in conformance with the applicable disturbed soil area protection section.
- Dumpster washout on the project site is typically not allowed by the permits.
- Notify trash hauling contractors that only watertight dumpsters are acceptable for use on-site.
- Store potentially hazardous waste from non-hazardous construction site waste.
- Keep the site clean of litter debris.
- Make sure that toxic liquid wastes (e.g., used oils, solvents, and paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Dispose of non-hazardous waste in accordance Missouri State solid waste regulations.
- Remove this temporary device and stabilze the site prior to filing *Form H - Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter 1 -Missouri Permit Requirements) for termination of permit coverage.

Maintenance, Inspection and Removal

- Inspect all dumpsters on a weekly basis and after rain events.
- Remove full dumpsters from the project site and dispose the contents in accordance with Missouri Solid Waste Management Law and regulations.
- Handle and dispose litter stored in collection areas and containers properly.
- Remove construction debris and waste from the site as necessary. The debris and waste cannot cause a public nuisance or health hazard.

Common Problems and Solutions

Problem	Solution
Trash and debris blowing out of dumpster caused by lack of a cover or overfilling.	Cover dumpster and debris with a tarp or other waterproof cover until the dumpster service provider can bring a new dumpster or empty the existing one. Insist on a unit with a properly working lid or cover, if not provided.

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Parking and Material Laydown Areas

Figure 6.10 Laydown and storage areas should be neat and fully stabilized. Source: *ABC's of BMP's*

Practice Description

Many construction sites have a designated area for a construction trailer, parking and storage of construction material usually referred to as a laydown area. The area itself is not considered a best management practice but management of the area is.

Recommended Minimum Requirements

This area should be within the permitted area to be disturbed and should be located no closer than 100 feet from streams, wetlands, natural drainageways or other environmentally sensitive areas. Although the tendency is to park vehicles in shaded areas, this area should not be placed within the canopy of plants expected to remain on-site. The root zone of plants is generally as broad as the canopy. The area should be stabilized with vegetation or a small rock and gravel base depending on the amount of traffic in the area and should not contribute pollutants to the stormwater discharge. The area should be clearly marked on the SWPPP site map.

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Construction

The parking and laydown areas as well as the traffic paths into and out of these areas should be stabilized. They are most often placed near the exit of the construction site and therefore can contribute to off-site sediment tracking if not managed properly.

Troubleshooting

Keep the area free and clear of trash and debris. Provide a location for trash disposal (e.g., dumpster) in an appropriate location. See the Solid Waste section under Pollution Prevention.

Maintenance, Inspection and Removal

- Inspect the area on a weekly basis and after rain events.
- Ensure that materials are properly stored and contained with Material Safety Data Sheets, or MSDS, information readily available.
- Removal of this temporary device must be performed and the site stabilized prior to filing *Form H - Request for Termination of a General Permit*, Form--MO 780-1409 (see Chapter One-Missouri Permit Requirements).

Common Problems and Solutions

Problem	Solution
Sediment is being transported onto a public street when exiting the parking or laydown area; the area is eroding or traffic carries mud to the street.	Add rock over the area to stabilize it.
Vehicles sink into the soil caused by a soft subgrade.	Lay a geotextile membrane over the area and add a layer of small rock or gravel.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Concrete Washout

Figure 6.21 Concrete washout pit with signage. Source: ABC's of BMP's, LLC

Concrete washout water is a pollutant due to the high pH solution of the wash water. Concrete wash water must be contained on a construction site, and the high pH water cannot be allowed to exit the site and enter a waterway. Alkalinity and chemical additives could be harmful to fish, stream bottom macroinvertebrates and wildlife.

Washing waste concrete into waters of the state or in a location where it is likely to enter waters of the state, such as a drainage ditch, is prohibited by State Law and Regulations (644.051 RSMo, 10 CSR 20-6.010). As long as state and local regulations allow, a concrete washout area can be as little as a depressional area where the concrete truck drivers can empty their trucks after use. This may not be allowed in areas of karst topography where cracks and fissures in the rock would allow the wash water to enter ground water easily. Lined pits may need to be used or other containment systems.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Recommended Minimum Requirements

- Procedures for concrete washout should be documented and referenced in the stormwater pollution prevention plan. The site superintendent and field staff should be trained on the procedures and should ensure they are practiced. Construct the concrete washout area to contain the concrete washout so the solids may harden. In approved locations, locate the washout area so the liquid portion of the washout may soak into the ground. The hardened material can then be disposed of properly with construction waste.
- Concrete washout area(s) need to be clearly marked with proper signage, and locations must be shown on the site map within the stormwater pollution prevention plan. The concrete washout area or device should not be placed within 50 feet of a stream or within 100 feet of a classified stream, losing stream or sinkhole.

Construction

- Unless otherwise noted by state and local requirements, the concrete washout can be contained in an excavated pit or bermed area and then buried on-site a minimum of 24 inches below finished grade. The depth must provide a minimum of 24 inches of topsoil over the disposed concrete to allow proper vegetative growth in the area. In areas where concrete wash water is not allowed to be disposed of in the soil, a lined container must be used and after the concrete hardens and there is no liquid as a possible pollutant, the material can be disposed of properly along with other construction waste.
- The number of washout facilities installed should depend on the expected demand for storage capacity. On large sites with extensive concrete work, place washouts in multiple locations for ease of use.
- Install signage adjacent to each washout facility to inform concrete equipment operators to use the proper facilities. Also locations of the washout facilities should be shown on the stormwater pollution prevention plan site map.
- Locate concrete washout on-site at least 100 feet from storm drains, water bodies (wet or dry), open ditches, etc.

Maintenance, Inspections and Removal

- Concrete washout pits must be inspected on a weekly basis and after each rainfall event that results in stormwater runoff. Cover the washout area before predicted rainfall events to prevent overflows. When the concrete reaches 75 percent of the storage capacity of the pit, the hardened concrete must be disposed of in an approved manner.
- These devices are temporary and should be removed from the site after all concrete has been poured and they are no longer necessary.

Figure 6.22 Concrete washout bag.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Common Problems and Solutions

Problem	Solution
Concrete wash water is hosed into a storm drain or directly to the creek due to lack of education or inattention to compliance.	Ensure all employees understand it is illegal to wash concrete water into storm drains and streams.
Concrete trucks are hosed out onto areas considered “in need of rip-rap”, due to a lack of education about the environmental harm caused by concrete wash water, the use of current engineering methods preferred over rip-rap or the thoroughly regulated nature of washout disposal.	Ensure employees and concrete truck operators are well informed of the requirement to properly dispose of concrete washout. Discuss concrete management techniques with the concrete supplier before and after deliveries are made. Make sure concrete truck drivers are aware of the presence of concrete waste management facilities.
Concrete wash water is not contained within the system due to inadequately sized storage area.	Ensure the wash water does not enter a water body. Clean dried material out of the system as needed to ensure adequate storage, or enlarge the system so wash water is fully contained until dry.

Figure 6.23 Concrete washout system that can be installed and maintained by vendor. Source: Concrete Washout Systems Inc.

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Petroleum and Hazardous Waste Management

Figure 6.19 This site has a designated vehicle maintenance area with all petroleum products located within secondary containment areas. Source: BFA, Inc.

Petroleum and hazardous wastes must be managed and controlled on a construction site to ensure they do not contaminate the stormwater flow and discharge from the site. The site superintendent and field personnel must ensure proper management of petroleum and hazardous waste by providing secondary containment of petroleum and hazardous substances, and by ensuring proper use, containment and disposal. Site superintendents and field personnel should strive to reduce, reuse and recycle materials as much as possible and avoid purchasing, storing and using more petroleum and hazardous waste material than necessary.

While this is a guidance document, some of the information in this section might actually be required under federal, state or local regulations. The general contractor and site superintendent need to ensure they have a clear understanding of federal, state and local requirements, and they should ensure all field personnel are properly educated and trained in these areas.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Recommended Minimum Requirements

Ensure hazardous waste management practices are implemented on construction projects that generate any waste from the use of:

- Petroleum products.
- Asphalt products.
- Concrete curing compounds.
- Pesticides.
- Acids.
- Paints.
- Stains.
- Solvents.
- Wood preservatives.
- Roofing tar.
- Soil binders
- Any materials deemed a hazardous waste according to federal and state laws and regulations.

More information about federal and Missouri laws and regulations is available on the Missouri Department of Natural Resources' Hazardous Waste Program Web page at www.dnr.mo.gov/env/hwp/lawsregs.htm or by calling 800-361-4827 or 573-751-3176

More information about Kansas laws and regulations is available on the Kansas Department of Health and Environment Web page www.kdheks.gov/waste/ or by calling 785-296-1600.

Documentation

Log all education, maintenance, inspection and removal activities in case questions arise during inspections and for reference when troubleshooting problems.

Education And Training

- Educate employees and subcontractors about potential dangers to humans and the environment from hazardous wastes.
- Train employees and subcontractors about hazardous waste delivery, handling, storage and disposal procedures.
- Instruct employees and subcontractors about:
  - Identification of hazardous and solid waste.
  - Safety procedures for common construction site hazardous wastes.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures along with safety procedures.

Petroleum Products

All vehicles kept on-site need to be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Leaking vehicles and construction equipment should be removed from service until the problem has been corrected. Petroleum products should be stored in tightly sealed containers are clearly labeled. Any asphalt substances used on-site should be applied according to the manufacturer's specifications and recommendations. Empty containers should be disposed of per manufacturer's recommendations and meet all federal, state and local regulations.

Fueling and Servicing

No fueling, servicing, maintenance or repair of equipment or machinery should be done within 100 feet of a stream, or within 150 feet of a classified stream, losing stream or sinkhole. Tarps or drop cloths and drip pads should be used when servicing, repairing or performing maintenance on construction equipment in the field. When work is complete, the contaminated materials should be disposed of appropriately.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Disposal of Petroleum and Hazardous Materials

No fuels, oils, lubricants, solvents, coolant, washer fluid or other hazardous materials can be disposed of on-site. All hazardous material must be properly disposed of in accordance with State law.

- For guidance, contact 800-361-4827 in Missouri or 785-296-1667 in Kansas.

Setup, Storage, Maintenance, Inspection and Removal

- Do not store hazardous chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and under cover in secondary containment.
- Incompatible materials, such as chlorine and ammonia, must not be stored in the same temporary containment facility.
- The site superintendent should keep an accurate, up-to-date inventory of material delivered and stored on-site.
- Minimize material inventory when stored on-site (e.g., only a few days supply).
- Employees trained in emergency spill clean-up procedures need to be present when dangerous materials or liquid chemicals are unloaded.
- Locate temporary storage areas away from vehicular traffic and in upland areas.
- Spill containment is highly recommended for chemical storage and transfer areas. (See Spill Prevention and Control).
- Locate an ample supply of appropriate spill clean-up materials near storage areas.
- Keep storage areas clean, well organized and equipped with ample clean-up supplies as appropriate for the materials being stored.
- Post proper storage instructions at all times in an open and conspicuous location. Storage areas should be clearly marked, directing placement of containers and materials.
- Store materials in their original containers. Maintain original product labels on the container where they can be easily seen. Damaged or otherwise illegible labels should be replaced immediately.
- Store bagged and boxed materials on pallets. Do not allow materials to accumulate on the ground. Cover bagged and boxed materials during non-working days and prior to rain events.
- Store materials exposed to precipitation in watertight, structurally sound, closed containers. All chemicals should be stored in approved containers and not exposed to stormwater.

Secondary Containment

Materials such as fuel (e.g., gasoline, diesel, kerosene), oil products (e.g., motor oil, transmission fluid, hydraulic oils, grease), miscellaneous liquids (e.g., windshield washer fluid, antifreeze, paint, concrete cure, liquid fertilizer, concrete sealer, calcium chloride, salt brine) should be stored in secondary containment. This represents a partial list.

- Throughout the rainy season, each secondary containment facility should have a permanent cover. The facility should at least be covered during non-working days, prior to rain events and during rain events. The cover should include side wind protection. The cover should be securely fastened to be effective during all rain events, overnight and during any extended period of time when the site will be left unattended.

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- No not allow rainwater to collect within the secondary container. Remove any rainwater waste that does collect within the structure immediately so it does not reduce the capacity to contain spills or leaks. Collect and properly dispose contaminated rainwater, spills and leaks in accordance with local, state and federal regulations. (See Spill Prevention and Control).
- Provide Adequate cover to the secondary container to prevent the entry of rainwater. Depending on the type of secondary container used, adequate cover could include a tarpaulin, fitted lid or roof.
- Provide a temporary containment facility for a volume able to contain precipitation from a 24-hour, 25-year storm event, plus the greater of 10 percent of the aggregate volume of all containers or 100 percent of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.

Provide sufficient separation between stored containers, secondary or otherwise, to allow for spill cleanup and emergency response access. (See Spill Prevention and Control).

Inspection

- Inspect all construction equipment prior to use each day for leaks or spills.
- Inspect all areas where petroleum and hazardous waste materials are stored.
  - Inspect weekly and after each rainfall event that results in stormwater runoff.
  - Repair or replace perimeter controls, containment structures, covers and liners as needed to maintain proper function.
- Collect and clean up spills, leaks or accumulated rainwater and dispose of appropriately.
- If a rain event causes secondary containment devices to fill with water, dewater the containment system in the appropriate manner.
- Make sure routine and timely disposal of waste materials occurs.

Removal

- Collect, remove and dispose hazardous waste only at authorized disposal areas.
- Remove and stabilize petroleum and hazardous materials stored on the construction site prior to filing *Form H - Request for Termination of a General Permit*, Form--MO 780-1409 (See Chapter 1 -Missouri Permit Requirements) for termination of permit coverage.

Common Problems and Solutions

Problem	Solution
Temporary containment device is full or overflowing after a rain event due to failure to dewater or lack of adequate storage volume.	Contain the discharge and ensure it does not leave the site. Ensure dewatering occurs in a timely manner following storm events. If necessary, enlarge the containment system to allow additional storage volume, and maintain the system appropriately.
Sheen shows up in dewater discharge, due to failure to remove sheen prior to dewatering.	Ensure there is no visible sheen on rainwater prior to dewatering. Use appropriate absorbents to recover materials to the extent possible. Properly dispose of absorbent materials and then finish dewatering.

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Spill Prevention and Control

Spill prevention and control procedures and practices are necessary to prevent and control spills in a manner that minimizes or prevents the discharge of spilled material to the drainage system or watercourses. This includes calling the spill hot line to report the spill.

It is not the intent of this guidance to supersede or replace normal site assessment and remediation procedures concerning hazardous materials. (See Petroleum and Hazardous Waste Management). Significant spills, releases or contamination warrant an immediate response by trained professionals.

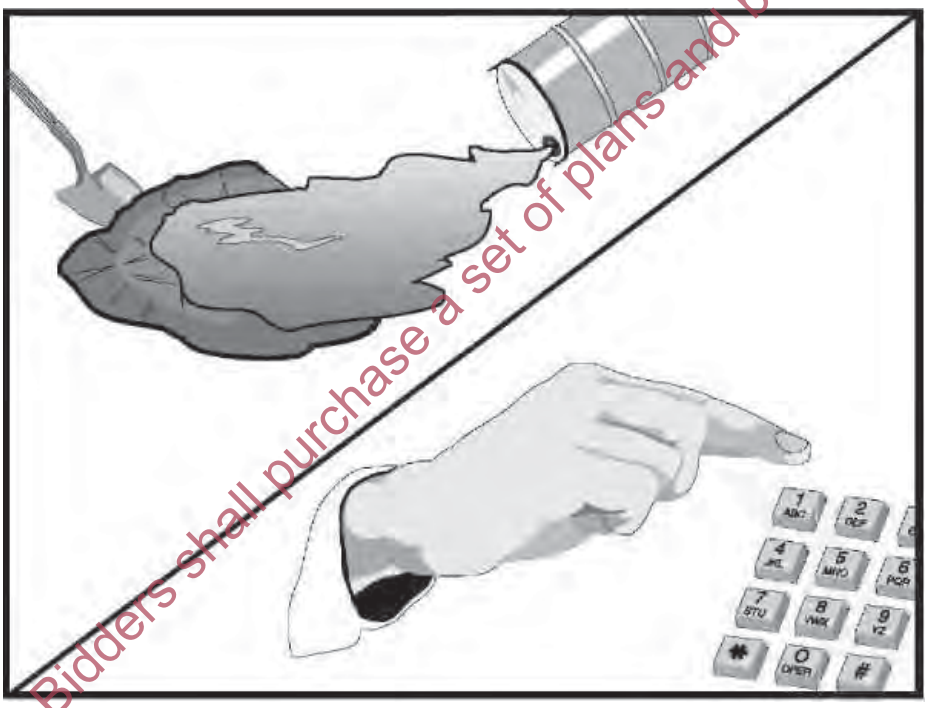

Figure 6.20 Contain spills and report them to the appropriate agency .

In Missouri, contact the department's emergency spill hot line at 573-634-2436.
In Kansas, contact the KDHE 24-hour spill hotline at 785-296-1679.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Recommended Minimum Requirements

Documentation

Log all education, maintenance, inspection, clean up and removal activities in case questions arise during inspections and for reference when troubleshooting problems.

Education and Training

- Ensure the contractor provides adequate training to the site superintendent and all field personnel about the proper protocol for reporting and cleaning up spills.
- Educate employees and subcontractors about potential dangers to humans and the environment from spills and leaks.
- Educate employees and subcontractors about what a “significant spill” is for each material they use and what is the appropriate response for “significant” and “insignificant” spills.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures. Incorporate disposal procedures into regular safety meetings.
- Establish a continuing education program to train new employees.

In addition to good housekeeping and material management practices listed previously, the following practices need to be followed for spill prevention and clean-up:

- The spill response plan should be documented and its availability should be referenced in the written stormwater pollution prevention plan or SWPPP.
- Clearly post methods on-site for storage and spill cleanup, including manufacturer’s recommendations.
- Make site superintendent and field personnel aware of the procedures and the location of material safety data sheets, or MSDSs, information and cleanup supplies. For federal requirements for Spill Controls and Countermeasure Plans, or SPCC, see 40 CFR Part 112 on the Web at www.campuserc.org/virtualtour/grounds/WasteOils/Pages/SPCCDetails.aspx.
- Keep material and equipment necessary for spill cleanup in the material storage area on-site. Equipment and materials include, but are not be limited to, brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust and plastic and metal trash containers specifically for this purpose.
- Clean up all spills immediately after discovery and properly containerize spills for proper disposal. Burial is not acceptable.
- Keep the spill area well ventilated. Personnel need to wear appropriate protective clothing to prevent injury from contact with a hazardous substance.

Reporting

Spills of toxic or hazardous material must be reported immediately to the appropriate state or local government agency, pursuant to reportable quantity regulations for specific materials or if a waterway is, or may be, impacted. Each county should have a Local Emergency Planning Committee, or LEPC. If you are unable to contact the committee directly, contact your local fire department, city hall or county courthouse. When permits are applicable, the permittee or authorized representative is required to notify the Missouri Department of Natural Resources or Kansas Department of Health and Enviroment’s Environmental Emergency Response in accordance with 40CFR117 and CFR302 as soon as they have knowledge of the discharge of any hazardous substance or petroleum product in excess of the reportable quantity.

- In Missouri, contact the 24-hour emergency spill hotline at 573-634-2436.
- In Kansas, contact the 24-hour emergency spill hotline at 785-296-1679.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

In Missouri, state law requires the responsible party (spiller) to report petroleum product releases greater than 50 gallons to the Missouri Department of Natural Resources at 573-634-2436 at the earliest practical moment after discovery. If the release is from an underground storage tank, or UST, or piping, the reportable quantity is 25 gallons or more. Reports are also required for above ground storage tanks, or AST, that have released 50 gallons or greater. Further, federal law requires the responsible party to report any release of oil if the oil reaches or threatens any waterway. The definition of waterway includes sewers, groundwater, wetlands, lakes, creeks, streams, rivers and areas that may not have running water in them at the time, such as road ditches that drain into other waterways.

Adjust spill prevention plan to include measures to prevent this type of spill from being repeated. The plan needs to show how to clean up the spill if another one does occur.

Hazardous Products

- Keep products in original containers unless they are not resealable. If product is transferred to a new container, mark and label properly.
- Retain original labels and material safety data sheets. (See Petroleum and Hazardous Waste Management).

Disposal

If surplus product or a container must be disposed of, disposal must be done in accordance with State law. For local disposal information, contact your solid waste district, your local emergency planning committee or:

- In Missouri call 800-361-4827.
- In Kansas call 785-296-1667.

Maintenance, Inspections and Removal

- Inspect spill kits on a weekly basis and after each rainfall event that results in stormwater runoff. Inspect the spill kit anytime after material from the kit is utilized and note what material will need to be replaced.
- Maintain the appropriate contents of the spill kit as necessary. List contents of spill kit and attach it to the underside of the spill kit lid or some other readily accessible location. Include on the list the name and phone number of the person or company to contact to replace spill kit items.
- Remove this temporary device and stabilize the site prior to filing *Form H - Request for Termination of a General Permit*, Form--MO 780-1409 (See Chapter 1 -Missouri Permit Requirements) for termination of permit coverage.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Common Problems and Solutions

Problem	Solution
Spills are not handled properly, due to site personnel being unaware of spill kit or its location.	Educate all contractors and subcontractors as they begin work on the site. Ensure they know the location of the spill kits and how to use them.
Spill went undetected for a significant period or was not reported, caused by lack of education, lack of inspections or inattention.	Educate all site personnel that all spills are to be reported to the site superintendent immediately and the spill should be contained and cleaned up immediately. Ensure all site personnel are properly trained.

Emergency Numbers

- **In Missouri:** Contact the department's emergency spills hotline at 573-634-2436. More information about federal and Missouri laws and regulations is available on the Missouri Department of Natural Resources' Hazardous Waste Program webpage at www.dnr.mo.gov/env/hwp/lawsregs.htm or by calling 800-361-4827 or 573-751-3176
- **In Kansas:** Contact the department's 24-hour spill hotline at 785-296-1679. More information about Kansas laws and regulations is available on Kansas Department of Health and Environment webpage at www.kdheks.gov/waste or by calling 785-296-1600

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Dust Control and Air Emissions

Prohibited Open Burning Under State Regulations

In Missouri, any waste generated by a business, trade, industry, salvage or demolition operation cannot be burned without a permit issued by the Department of Natural Resources or its delegated local agency. Permits will only be considered for untreated wood wastes. Wastes that may not be burned include but are not limited to tires, rubber products, hazardous materials, styrofoam, plastics, petroleum based products, demolition waste, treated wood and any asbestos containing material.

Required Open Burning Permits

In Missouri, the open burning of certain trade wastes, primarily untreated wood wastes such as pallets or crates, throughout the state, and vegetation from land clearing operations in the Springfield-Greene County area and the Kansas City and St. Louis Metropolitan areas, may be permitted only when it can be shown open burning is the only feasible method of disposal and disposal is in the public interest. In the St. Louis nonattainment area, permits will not be issued unless it can be shown emissions from open burning would be less than any other waste management or disposal method. The open burning permit requires the facility, in most cases, to use an air curtain destructor.

For more information in Missouri contact the Missouri Department of Natural Resources at 800-361-4827, or:

- Contact your nearest Missouri Department of Natural Resources' Regional Office. Contact information located on the Web at www.dnr.mo.gov/regions/regions.htm.
- See *Facts on Open Burning Under Missouri Regulations* fact sheet at www.dnr.mo.gov/pubs/pub2047.pdf.
- Visit the Missouri Department of Natural Resources' Air Pollution Control Program website at www.dnr.mo.gov/env/apcp/publications.htm or call 573-751-4817.
- Visit the Missouri Department of Natural Resources' Solid Waste Management Program webpage at www.dnr.mo.gov/env/swmp/index.htm, or call 573-751-5401.

In Kansas, open burning is regulated by the Kansas Department of Health and Environment. Any open burning of tree and brush typically requires a permit. For more information:

- *Open Burning of Wood Waste* - Technical Guidance Document BAR2000-01.
- *Open Burning for Tree and Brush Sites* - Technical Guidance Document 2002.
- Technical Guidance Document (burning of waste).

For more information in Kansas, contact your Kansas Department of Health and Environment district office, or call 785-296-1550.

Note: Local governments may have stricter laws and policies regarding burning or disposal of wastes.

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Dust Control Regulations

In Missouri, state regulation places limits on the amount of visible dust that can leave a property boundary. The general contractor is responsible for implementing control measures as necessary when handling, transporting or storing any material; construction, repair, cleaning or demolition of a building or its appurtenances; construction of use of a road, driveway or open area; or operation of a commercial or industrial installation without applying reasonable measures to prevent visible dust from leaving the property boundary.

For more information about this regulation:

- See 10 CSR 10-6.170 Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin at www.sos.mo.gov/adrules/csr/current/10csr/10csr.asp.
- Visit the Missouri Deparment of Natural Resources' Air Pollution Control Program website at www.dnr.mo.gov/env/apcp/publications.htm or call 573-751-4817.

Dust control measures used to protect air quality must not cause a violation of the water quality standards, permit conditions or other regulations. For more information about dust control measures, see Surface Stabilization – Erosion Controls.

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SECTION 10

U.S. ARMY CORPS OF ENGINERS
NATIONWIDE PERMIT NO. 14

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DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, KANSAS CITY DISTRICT
MISSOURI STATE REGULATORY OFFICE
515 EAST HIGH STREET, #202
JEFFERSON CITY, MISSOURI 65101

July 30, 2024

Missouri State Regulatory Office
(NWK 2008-00027)
(Cole, MO, NWP 14 and 58)

Mr. Matt Prenger
Cole County Public Works Department
5055 Monticello Road
Jefferson City, MO 65109

Dear Mr. Prenger:

This letter pertains to your application, on behalf of the Cole County Public Works Department, for a Department of the Army (DA) permit for proposed work activities in Wears Creek and an unnamed tributary of Wears Creek associated with the proposed extension of Wildwood Drive. Your application was received on March 11, 2024. The project is located in Section 16, Township 44 north, Range 12 west, in Cole County, Missouri (Lat.: 38.563932° N, Long.: -92.250136° W).

The proposed work activities include the construction of a 189-foot-long by 9-foot-wide by 5.5-foot-tall reinforced concrete box culvert crossing in an unnamed tributary of Wears Creek, deposition of a total of approximately 120 cubic yards of MoDOT Type II rock to armor 50 linear feet of the unnamed tributary Wears Creek immediately upstream of the inlet of the concrete box culvert and deposition of a total of approximately 146 cubic yards of MoDOT Type II rock to armor 80 linear feet of the unnamed tributary of Wears Creek immediately downstream of the outlet of the concrete box culvert. Approximately 11 cubic yards of MoDOT Type II rock is to be deposited as a rock blanket along 20 linear feet of the left descending bank of the unnamed tributary of Wears Creek to armor the bank at the outlet of a 42-inch-diameter reinforced concrete pipe. Approximately 20 linear feet of Wears Creek would be temporarily impacted for the installation of a new 8-inch-diameter sanitary sewer line via open trench method.

The Corps of Engineers has jurisdiction over all waters of the United States. Discharges of dredged or fill material in waters of the United States, including wetlands, require prior authorization from the Corps under Section 404 of the Clean Water Act (33 USC 1344). The implementing regulation for this Act is found at 33 CFR 320-332.

We have reviewed the information furnished and have determined that your project is authorized by nationwide permit **(NWP) 14** for the proposed stream crossing and rock riprap placement, and **NWP 58** for the new sanitary sewer line crossing, provided you ensure that the conditions listed in the enclosed copy of excerpts from the January 13, 2021, U.S. Army Corps of Engineers (Corps) (86 FR 2744 and the correction at 86 FR 27274), Reissuance and Modification of Nationwide Permits, are met. You must also comply with the Kansas City District Regional NWP Conditions posted at:
http://www.nwk.usace.army.mil/Missions/RegulatoryBranch/NationWidePermits.aspx

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In addition to the general and regional conditions of this NWP, a special condition has been added in order to replace the lost aquatic resources that result from the authorized project.

You project occurs within the Moreau/Loutre Ecological Drainage Unit (EDU). You must purchase 1,320 stream credits from an approved mitigation provider within this service area for the unavoidable impacts to 326 linear feet of the unnamed tributary of Wears Creek. At this time, credits may be obtained only from mitigation providers with available credits. Credit availability is subject to market change; therefore, you must contact this office to verify credit availability prior to completing the transaction. In order to satisfy this mitigation requirement in its entirety, the purchase of the compensatory stream mitigation must be completed, and a mitigation receipt signed by the mitigation sponsor, stating the date of purchase and the type and amount of credits purchased must be submitted to our office. Commencement of work within our regulatory jurisdiction may not begin until our office has received and acknowledged the signed mitigation receipt confirming that all required compensatory stream mitigation has been purchased.

You must submit a receipt of payment from the mitigation sponsor that includes the type and amount of credits purchased and the date of credit purchase. Receipts submitted by authorized agents will not be accepted. You can contact:

Mr. Shane Staten with Swallow Tail LLC at 314-984-0050 or by email at sstaten@swallowtailenvironmental.com.

Ms. Sherry Fischer at Missouri Conservation Heritage Foundation at 573-634-2080 or by email at mchf@mochf.org.

Please be aware that the endangered Indiana bat (*Myotis sodalis*), Gray bat (*Myotis grisescens*), and Northern long-eared bat (*Myotis septentrionalis*) may be present within your project area. To "not adversely" these listed species, you must not cut or clear trees during the bats' active season, April 1 – October 14th. If implementation of the seasonal tree cutting restriction is not possible, please contact the Corps of Engineers, Regulatory Branch, for further consultation with the United States Fish and Wildlife Service (USFWS).

The Missouri Department of Natural Resources has certified that these NWPs will not violate existing state water quality standards provided you comply with the conditions included in the attached Missouri Section 401 Water Quality Certification (WQC) document. All conditions included in the WQC are conditions of the NWP authorizations. Please review all conditions associated with these NWPs. Per 40 CFR Part 121.11(c) the Corps is responsible for enforcing WQC conditions that are incorporated into these permit verifications. If you have any questions concerning state WQC standards or compliance issues with the associated certification conditions, please contact the project manager at the phone number and/or email provided below.

General condition 30 requires you to sign and submit the enclosed "Compliance Certification"

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within 30 days of completing the authorized activity or the completion of the implementation of any required compensatory mitigation.

This NWP verification is valid until March 14, 2026. Should your project plans change or if your activity is not complete within the specified verification term, you must contact this office for another permit determination. Although the Corps has verified your project would meet the terms and conditions of a nationwide permit, other Federal, state and/or local permits may be required. You should verify this yourself.

We are interested in your thoughts and opinions concerning your experience with the Kansas City District, Corps of Engineers Regulatory Program. Please feel free to Complete our Customer Service Survey form on our website at: https://regulatory.ops.usace.army.mil/customer-service-survey/. You may also call and request a paper copy of the survey which you may complete and return to us by mail.

Mr. Kenny Pointer, Regulatory Project Manager, reviewed the information furnished and made this determination. If you have any questions concerning this matter, please feel free to contact Mr. Pointer at 816-389-3833 or by email at james.k.pointer@usace.army.mil. Please reference File No. NWK 2008-00027 in all comments and/or inquiries relating to this project. This letter is only being provided to you electronically at: mprenger@colecounty.org.

Enclosures

cc (electronically w/o enclosures):

Environmental Protection Agency,
Watershed and Grants Branch
U.S. Fish and Wildlife Service, Columbia, Missouri
Missouri Department of Natural Resources,
Water Protection Program
State Historic Preservation Office
Missouri Department of Conservation

Cody Darr, Central Missouri Professional Services, Inc.

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Excerpts for 2021 Nationwide Permits
General Conditions, District Engineer's Decision, & Further Information[1]

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his or her authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

[1]The 2021 Nationwide Permits, General Conditions, District Engineer's Decision, Further Information, and Definitions were published in the *Federal Register* on January 13, 2021 (86 FR 2744, and the correction at 86 FR 27274) and December 27, 2021 (86 FR 73522).

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4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

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13. Removal of Temporary Structures and Fills. Temporary structures must be removed, to the maximum extent practicable, after their use has been discontinued. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. (a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

(b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. Permittees shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.

(c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

17. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify designated critical habitat or critical habitat proposed for such designation. No activity is authorized under any NWP which "may affect" a listed species or critical

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habitat, unless ESA section 7 consultation addressing the consequences of the proposed activity on listed species or critical habitat has been completed. See 50 CFR 402.02 for the definition of “effects of the action” for the purposes of ESA section 7 consultation, as well as 50 CFR 402.17, which provides further explanation under ESA section 7 regarding “activities that are reasonably certain to occur” and “consequences caused by the proposed action.”

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA (see 33 CFR 330.4(f)(1)). If pre-construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat or critical habitat proposed for such designation, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation), the pre-construction notification must include the name(s) of the endangered or threatened species (or species proposed for listing) that might be affected by the proposed activity or that utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed activity. The district engineer will determine whether the proposed activity “may affect” or will have “no effect” to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps’ determination within 45 days of receipt of a complete pre-construction notification. For activities where the non-Federal applicant has identified listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have “no effect” on listed species (or species proposed for listing or designated critical habitat (or critical habitat proposed for such designation), or until ESA section 7 consultation or conference has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation or conference with the FWS or NMFS the district engineer may add species-specific permit conditions to the NWPs.

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(e) Authorization of an activity by an NWP does not authorize the “take” of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with “incidental take” provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word “harm” in the definition of “take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

(g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.nmfs.noaa.gov/pr/species/esa/ respectively.

19. <u>Migratory Birds and Bald and Golden Eagles</u>. The permittee is responsible for ensuring that an action authorized by an NWP complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting the appropriate local office of the U.S. Fish and Wildlife Service to determine what measures, if any, are necessary or appropriate to reduce adverse effects to migratory birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. <u>Historic Properties</u>. (a) No activity is authorized under any NWP which may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

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(b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)(1)). If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts commensurate with potential impacts, which may include background research, consultation, oral history interviews, sample field investigation, and/or field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect.

(d) Where the non-Federal applicant has identified historic properties on which the proposed NWP activity might have the potential to cause effects and has so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed. For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is

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required. If NHPA section 106 consultation is required, the district engineer will notify the non-Federal applicant that he or she cannot begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. Permittees that discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by an NWP, they must immediately notify the district engineer of what they have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, 52, 57 and 58 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed by permittees in the designated critical resource waters including wetlands adjacent to

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those waters. The district engineer may authorize activities under these NWPs only after she or he determines that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

(d) Compensatory mitigation at a minimum one-for-one ratio will be required for all losses of stream bed that exceed 3/100-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. This compensatory mitigation requirement may be satisfied through the restoration or enhancement of riparian areas next to streams in accordance with paragraph (e) of this general condition. For losses of stream bed of 3/100-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult-to-replace resources (see 33 CFR 332.3(e)(3)).

(e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. If restoring riparian areas

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involves planting vegetation, only native species should be planted. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

(2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f).)

(3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

(4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)). If permittee-responsible mitigation is the proposed option, and the proposed compensatory mitigation site is located on land in which another federal

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agency holds an easement, the district engineer will coordinate with that federal agency to determine if proposed compensatory mitigation project is compatible with the terms of the easement.

(5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan needs to address only the baseline conditions at the impact site and the number of credits to be provided (see 33 CFR 332.4(c)(1)(ii)).

(6) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

(g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

(h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

24. <u>Safety of Impoundment Structures</u>. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state or federal, dam safety criteria or have been designed by qualified persons. The district engineer may also

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require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. (a) Where the certifying authority (state, authorized tribe, or EPA, as appropriate) has not previously certified compliance of an NWP with CWA section 401, a CWA section 401 water quality certification for the proposed discharge must be obtained or waived (see 33 CFR 330.4(c)). If the permittee cannot comply with all of the conditions of a water quality certification previously issued by certifying authority for the issuance of the NWP, then the permittee must obtain a water quality certification or waiver for the proposed discharge in order for the activity to be authorized by an NWP.

(b) If the NWP activity requires pre-construction notification and the certifying authority has not previously certified compliance of an NWP with CWA section 401, the proposed discharge is not authorized by an NWP until water quality certification is obtained or waived. If the certifying authority issues a water quality certification for the proposed discharge, the permittee must submit a copy of the certification to the district engineer. The discharge is not authorized by an NWP until the district engineer has notified the permittee that the water quality certification requirement has been satisfied by the issuance of a water quality certification or a waiver.

(c) The district engineer or certifying authority may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). If the permittee cannot comply with all of the conditions of a coastal zone management consistency concurrence previously issued by the state, then the permittee must obtain an individual coastal zone management consistency concurrence or presumption of concurrence in order for the activity to be authorized by an NWP. The district engineer or a state may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its CWA section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is authorized, subject to the following restrictions:

(a) If only one of the NWPs used to authorize the single and complete project has a specified acreage limit, the acreage loss of waters of the United States cannot exceed

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the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

(b) If one or more of the NWPs used to authorize the single and complete project has specified acreage limits, the acreage loss of waters of the United States authorized by those NWPs cannot exceed their respective specified acreage limits. For example, if a commercial development is constructed under NWP 39, and the single and complete project includes the filling of an upland ditch authorized by NWP 46, the maximum acreage loss of waters of the United States for the commercial development under NWP 39 cannot exceed 1/2-acre, and the total acreage loss of waters of United States due to the NWP 39 and 46 activities cannot exceed 1 acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____
(Transferee)

_____
(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

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(a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the activity and mitigation.

The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. Activities Affecting Structures or Works Built by the United States. If an NWP activity also requires review by, or permission from, the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a "USACE project"), the prospective permittee must submit a pre-construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission and/or review is not authorized by an NWP until the appropriate Corps office issues the section 408 permission or completes its review to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. Pre-Construction Notification. (a) *Timing*. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to

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general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) *Contents of Pre-Construction Notification*: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4) (i) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures.

(ii) For linear projects where one or more single and complete crossings require pre-construction notification, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other waters (including those single and complete crossings authorized by an NWP but do not require PCNs).

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This information will be used by the district engineer to evaluate the cumulative adverse environmental effects of the proposed linear project, and does not change those non-PCN NWP activities into NWP PCNs.

(iii) Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial and intermittent streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45-day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(6) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands or 3/100-acre of stream bed and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(7) For non-federal permittees, if any listed species (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat (or critical habitat proposed for such designation), the PCN must include the name(s) of those endangered or threatened species (or species proposed for listing) that might be affected by the proposed activity or utilize the designated critical habitat (or critical habitat proposed for such designation) that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

(8) For non-federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

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(9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the “study river” (see general condition 16); and

(10) For an NWP activity that requires permission from, or review by, the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from, or review by, the Corps office having jurisdiction over that USACE project.

(c) *Form of Pre-Construction Notification*: The nationwide permit pre-construction notification form (Form ENG 6082) should be used for NWP PCNs. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

(d) *Agency Coordination*: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity’s compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity’s adverse environmental effects so that they are no more than minimal.

(2) Agency coordination is required for: (i) all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iii) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

(3) When agency coordination is required, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or e-mail that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity’s compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure that the net adverse environmental effects of the proposed activity are no more than minimal. The

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district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

District Engineer's Decision

1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If a project proponent requests authorization by a specific NWP, the district engineer should issue the NWP verification for that activity if it meets the terms and conditions of that NWP, unless he or she determines, after considering mitigation, that the proposed activity will result in more than minimal individual and cumulative adverse effects on the aquatic environment and other aspects of the public interest and exercises discretionary authority to require an individual permit for the proposed activity. For a linear project, this determination will include an evaluation of the single and complete crossings of waters of the United States that require PCNs to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings of waters of the United States authorized by an NWP. If an applicant requests a waiver of an applicable limit, as provided for in NWPs 13, 36, or 54, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in only minimal individual and cumulative adverse environmental effects.

2. When making minimal adverse environmental effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. He or she will also consider the cumulative adverse environmental effects caused by activities authorized by an NWP and whether those cumulative adverse environmental effects are no more than minimal. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic

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resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional or condition assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse environmental effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

3. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands or 3/100-acre of stream bed, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for NWP activities with smaller impacts, or for impacts to other types of waters. The district engineer will consider any proposed compensatory mitigation or other mitigation measures the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed activity are no more than minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse environmental effects are no more than minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure that the NWP activity results in no more than minimal adverse environmental effects. If the net adverse environmental effects of the NWP activity (after consideration of the mitigation proposal) are determined by the district engineer to be no more than minimal, the district engineer will provide a timely written response to the applicant. The response will state that the NWP activity can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

4. If the district engineer determines that the adverse environmental effects of the proposed activity are more than minimal, then the district engineer will notify the applicant either: (a) that the activity does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the activity is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal; or (c) that the activity is authorized under the NWP

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with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse environmental effects, the activity will be authorized within the 45-day PCN period (unless additional time is required to comply with general conditions 18, 20, and/or 31), with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation plan or a requirement that the applicant submit a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal. When compensatory mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

Further Information

1. District engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project (see general condition 31).

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US Army Corps
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Kansas City District

STATE OF MISSOURI
2021 NATIONWIDE PERMIT REGIONAL CONDITIONS

For All Nationwide Permits

1. Stream Crossings. In addition to requirements of General Condition 2 and General Condition 9 of the Nationwide Permits, the following guidelines for stream crossings apply for regulated activities in waters of the United States (WOTUS). The guidelines are available at:
https://www.nwk.usace.army.mil/Portals/29/docs/regulatory/NWP/2021/MO/MORC1Streams.pdf

- Corps Districts may waive RC 1 when project site geomorphology (i.e. bedrock, gradient) or existing alterations (i.e. adjacent impoundment, as part of a dry detention basin) creates conflict with the guidelines. The applicant must provide Pre-construction Notification (PCN) to the District Engineer for any waiver request.

2. Seasonal Restrictions for Activities Proposed in Spawning Areas. In addition to the requirements of General Condition 3 of the Nationwide Permits, the following specific seasonal restrictions apply for regulated activities in WOTUS. Between the closed dates listed in the Missouri Combined Stream Spawning List, the permittee must not excavate from or discharge into the listed waters. The list of waters with seasonal restrictions is available on request from the Corps or at:
https://www.nwk.usace.army.mil/Portals/29/docs/regulatory/NWP/2021/MO/MORC2SpawningArea.pdf

- Corps Districts may waive RC 2 when the applicant demonstrates imminent threats to public safety and health, or to property. The Corps will consult with the U.S. Fish and Wildlife Service and Missouri Department of Conservation before granting the waiver and may add additional special conditions to protect aquatic life during the operation. The applicant must PCN to the District Engineer for any waiver request.

3. Suitable Material. In addition to the specific examples in General Condition 6 of the Nationwide Permits, the following materials are not suitable for fill activities in WOTUS: garbage, tires, treated lumber products that do not comply with the Registration Documents issued by the U.S. Environmental Protection Agency (USEPA) under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and that are not in accordance with standards issued by American Wood Protection Association of the International Code Council, liquid concrete not poured into forms, grouted riprap, bagged cement and sewage or organic waste.

- Broken concrete used as bank stabilization must be reasonably well graded, consisting of pieces varying in size from 20 pounds up to and including at least 150-pound pieces to withstand expected high flows. Applicants must break all large slabs to conform to the well graded requirement. Generally, the maximum weight of any piece should not be more than 500 pounds. Gravel and dirt should not exceed 15% of the total fill volume when using broken concrete as fill. All protruding reinforcement rods, trash, asphalt, and other extraneous materials must be removed from the broken concrete prior to placement in WOTUS.

4. Priority Watersheds. The applicant must provide PCN to the District Engineer for any regulated activity in a priority watershed. The list of priority watersheds requiring notification is available on request from the Corps or at:
https://www.nwk.usace.army.mil/Portals/29/docs/regulatory/NWP/2021/MO/MORC4PriorityWaters.pdf

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5. Sensitive Aquatic Species. The applicant must provide PCN to the District Engineer for any regulated activity in waters listed at: https://www.nwk.usace.army.mil/Portals/29/docs/regulatory/NWP/2021/MO/MORC5AquaSpecies.pdf. The submitted PCN will be coordinated in accordance with General Condition 32(d) with the U.S. Fish and Wildlife Service as determined appropriate by the Corps.

For Specific Nationwide Permits:

6. Lake of the Ozarks. The applicant must provide a PCN to the District Engineer for any regulated activity associated with Nationwide Permit 12, 57, and 58 within Lake of the Ozarks. A copy of this notification must also concurrently be sent to Ameren Missouri. Nationwide Permits 29 and 44 are revoked in the Lake of the Ozarks. The Corps and Ameren Missouri, regardless of the request to use any Nationwide Permit, may verify the activity under the provisions of Regional General Permit 38M, which can be found at https://www.nwk.usace.army.mil/Missions/Regulatory-Branch/General-Permits/. Additional information on Ameren Missouri and Lake of the Ozarks permit requirements can be found at the following webpage: https://www.ameren.com/missouri/residential/lake-of-the-ozarks/permitting-process-forms.

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Note: PCN to the District Engineer must be in accordance with General Condition 32 of the Nationwide Permits.

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US Army Corps
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Kansas City District

General Guidelines for Stream Crossings
Regional Condition 1

For all Nationwide Permits that involve the construction/installation of culverts and low water crossings, measures will be included in the construction, design, and installation that will allow for the passage of flows and promote the safe passage of fish and other aquatic organisms. The following General Guidelines are required to supplement General Condition (2) Aquatic Life Movements and General Condition (9) Management of Water Flows.

Culverts:

- New or replacement culverts (e.g., box or tubular, pipes, etc.) must be designed, sized, and placed correctly. Culverts perched above the grade of the stream are not allowed. This includes other in-stream structures placed at the inlet with the purpose to reduce sedimentation within the stream crossing. It is acceptable for a portion of the water to pass over the structure if it is designed to be overtopped. Culverts must be the shortest length necessary to meet the project purpose, and a single culvert is encouraged.

- Drop boxes or other structures placed at the inlet with the purpose to reduce sedimentation within the stream crossing are not allowed. Culvert must be the shortest length necessary to meet the project purpose.

- New or replacement culverts, in conjunction with the associated fill material, shall have an appropriately sized opening that allows water flow through and over the crossing that is relative to the bankfull area (See Image 1). For purposes of this regional condition, bankfull area is defined as the height and width of the stream channel within the project to the top of the high bank(s). In addition, if elevations differ on both sides of the stream the lowest elevation shall be used as the height. The following basic guidelines shall be used when designing new or replacement crossing projects:

Stream Type	% of crossing profile that shall remain open
Perennial	Designed to allow an 85% opening to include the culvert(s) and area above the crossing up to the bankfull area.
Intermittent	Designed to allow a 50% opening to include the culvert(s) and area above the crossing up to the bankfull area.
Ephemeral	Placed at a depth below or at the natural steam bottom to provide for passage during low flow conditions.

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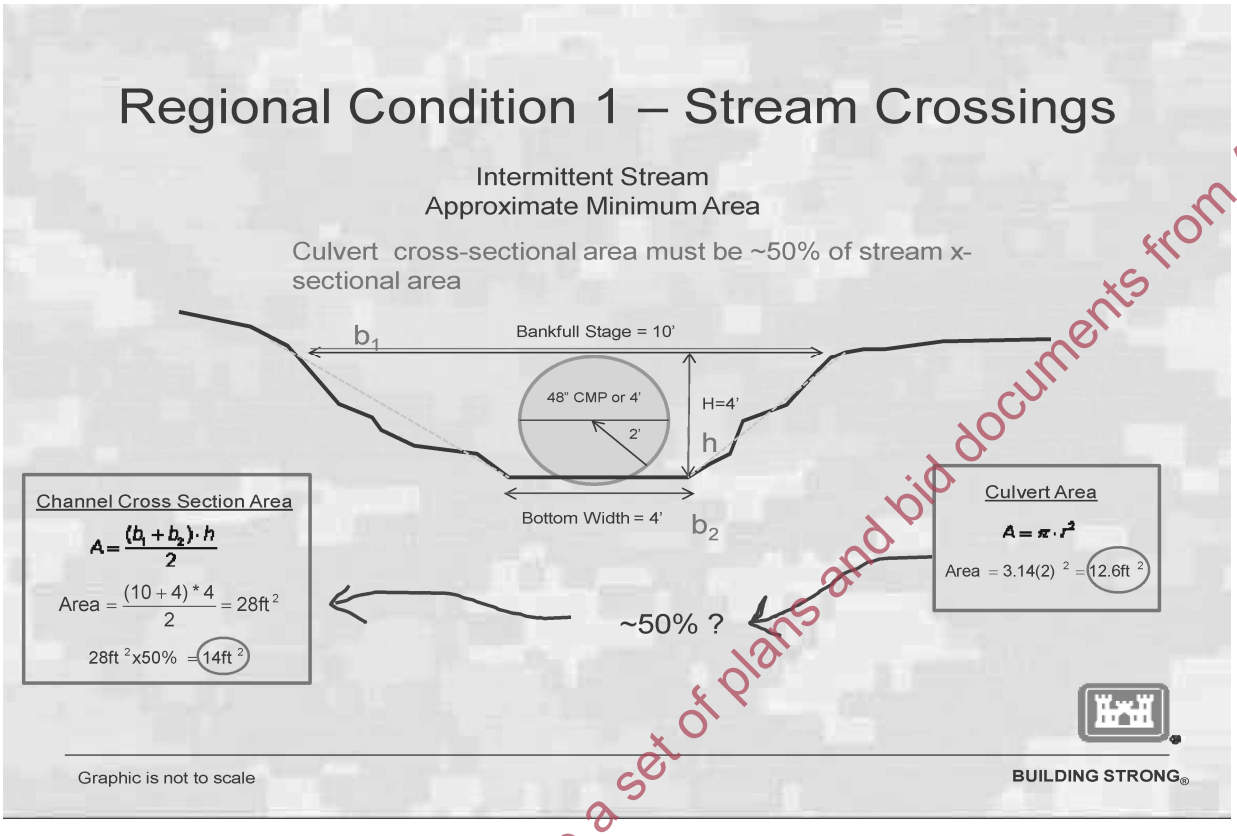
Image 1



- For permanent crossings, the culvert must be embedded and backfilled below the grade of the stream on both the upstream and downstream sides ≥ 1 foot for culverts >48 inches. On culverts ≤ 48 inches the bottom of the culvert must be placed at a depth below or at the natural stream bottom to provide for aquatic organism passage during low flow conditions. Culverts in streams with non-erodible beds (i.e. bedrock or stable clay) must be constructed flush with the stream bed, but do not need to be embedded. Culverts in streams with highly erodible beds must be embedded deeper to lessen the chance of future perching due to downstream degradation and may be accompanied with other grade control measures to prevent erosion while maintaining General Condition (2) Aquatic Life Movements.

Low Water Crossings:

- The applicant must notify the District Engineer when repairing, rehabilitating or replacing low water crossings when discharges of dredged or fill material would raise or lower the lowest elevation of the crossing.

- When replacing or removing low water crossings the applicant must propose and employ measures to mitigate for and minimize the potential of streambed headcutting where channel incision has occurred downstream of the structure and the structure is providing grade control that is preventing channel incision from migrating upstream.

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

Missouri Department of Natural Resources

CLEAN WATER ACT SECTION 401 WATER QUALITY CERTIFICATION
2021 GENERAL AND SPECIFIC CONDITIONS

Water Protection Program 10/2021

Division of Environmental Quality PUB2947

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Consistent with Section 401 of the Clean Water Act (CWA), 33 U.S.C. § 1341, the Missouri Department of Natural Resources (Department) has designed these precertified conditions to ensure activities carried out in Missouri pursuant to Nationwide Permits (NWPs) authorized by the U.S. Army Corps of Engineers (USACE) will comply with Missouri water quality requirements. Unless otherwise stated, these conditions are in addition to, not a replacement for, any federal requirements or conditions.

The conditions outlined in this programmatic WQC apply to those authorized projects where the project proponent has chosen to accept these conditions instead of pursuing an individual CWA Section 401 Water Quality Certification (WQC) for the following NWPs:

- Only General Conditions apply to projects authorized by NWPs 5, 6, 7, 13, 15, 16, 18, 19, 22, 23, 25, 27, 29, 30, 31, 36, 39, 40, 42, 43, 45, 46, 54, and 59.
- Both General and Specific Conditions apply to projects authorized by NWPs 3, 4, 12, 14, 20, 33, 41, 53, 57, and 58.

Alternatively, a project proponent may apply to the Department for individual WQC if it does not wish to accept the conditions outlined in this document.

NWPs 1, 2, 8, 9, 10, 11, 28, and 35 authorize projects pursuant to Section 10 of the Rivers and Harbors Act of 1899 only. These NWPs do not require CWA Section 401 WQC because they authorize activities which, in the opinion of the USACE, could not reasonably be expected to result in a discharge into waters of the United States. An activity needing only a Section 10 permit may require a WQC if that activity can reasonably be expected to result in any discharge either during construction or operation of the facility. Thus, if the USACE determines the activity is likely to result in a discharge during construction or operation, the Department has discretion to require a WQC for the Section 10 activity. The USACE may advise a Section 10 permit project proponent that it might need a WQC if there is a reasonable expectation that a discharge will occur either during the construction or operation of the project.

Pursuant to Section 644.037, RSMo, the Department shall certify without conditions NWPs as they apply to impacts on wetlands in Missouri. Because NWPs are minimal impact, Missouri does not have water quality standards specific to wetlands, and only the general criteria apply, discharges to wetlands from projects authorized by NWPs will comply with water quality requirements.

Pursuant to Section 644.038, RSMo, the Department shall certify without conditions all NWPs for impacts in all waters of the state for the construction of highways and bridges approved by the Missouri Highway and Transportation Commission. A Memorandum of Understanding between the Missouri Departments of Natural Resources and Transportation contains the requirements by which the Missouri Department of Transportation will design and construct such projects in order to protect the water quality of waters of the state. Therefore, as a result of this side agreement, the Department grants programmatic WQC for all NWPs without conditions for the construction of highways and bridges approved by the Missouri Highway and Transportation Commission, because any discharges from these projects will comply with water quality requirements.

GENERAL CONDITIONS

1. A stream's pattern, profile, and dimension, including but not limited to sinuosity, slope, and channel width, shall be maintained as much as practicable. Streambed gradient shall not be adversely impacted during project construction. No project shall accelerate bed or bank erosion. This will ensure compliance with the Missouri Water Quality Standards general criterion requiring waters to be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

2. Channelization of streams is not allowed under this precertification. Channelization includes but is not limited to reducing the length of the channel, widening the channel for increased water storage or flow, and/or construction of hard structures which concentrate flow. Unless necessary for a stream crossing associated with infrastructure projects and contained within an associated right-of-way, construction easement, or permanent easement, bank stabilization activities only along one bank of a stream are permitted, including but not limited to bank sloping and riprapping. The redirection of flow by excavation of the opposite bank or a streambed is considered a channel modification and is not authorized by this WQC. This will ensure compliance with the Missouri Water Quality Standards general criterion requiring waters to be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

3. No new or expanded wet stormwater retention basins or similar impoundment structures may be constructed unless they are located off-channel. In-channel dry stormwater detention basins are allowable if the stream channel is either temporarily or not adversely affected by the basin. This will ensure compliance with the Missouri Water Quality Standards general criterion requiring waters to be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

4. Only clean, nonpolluting fill shall be used. The following materials are not suitable where contact with water is expected and shall not be used due to their potential to cause violations of the general criteria of Missouri's Water Quality Standards [10 CSR 20-7.031(4)]:
   a. Earthen fill, gravel and broken concrete where the material does not meet the Suitable Material specifications stated in the "Missouri Nationwide Permit Regional Conditions" (https://usace.contentdm.oclc.org/digital/collection/p16021coll11/id/2662/) in locations where erosive flows are expected to occur on a regular basis, such as streambanks and/or lake shorelines.
   b. Asphalt.
   c. Concrete with exposed rebar.
   d. Tires, vehicles or vehicle bodies, and construction or demolition debris are solid waste and are excluded from placement in the waters of the state. Properly sized, broken concrete without exposed rebar is allowed.
   e. Liquid concrete, including grouted riprap, if not placed in forms as part of an engineered structure.
   f. Any material containing chemicals that would result in violation of Missouri Water Quality Standards general criteria [10 CSR 20-7.031(4)] or specific criteria [10 CSR 20-7.031(5)].

5. Waste concrete or concrete rinsate shall be disposed of in a manner that does not result in discharge to any jurisdictional water ways. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from unsightly bottom deposits [10 CSR 20-7.031(4)(A)]; substances resulting in toxicity to human, animal, or aquatic life [10 CSR 20-7.031(4)(D)]; and physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

6. Missouri Water Quality Standards antidegradation requirements dictate all appropriate and reasonable Best Management Practices related to erosion and sediment control, project stabilization and prevention of water quality degradation are applied and maintained; for example, preserving vegetation, streambank stability and basic drainage [10 CSR 20-7.031(3)(D)]. Best Management Practices shall be properly installed prior to conducting authorized activities and maintained, repaired and/or replaced as needed during all phases of the project to limit the amount of discharge of water contaminants to waters of the state. The project shall not involve more than normal stormwater or incidental loading of sediment caused by project activities so as to comply with Missouri's general water quality criteria [10 CSR 20-7.031(4)]; https://www.sos.mo.gov/cmsimages/adrules/csr/current/10csr/10c20-7a.pdf

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7. Clearing of vegetation and trees shall be the minimum necessary to accomplish the activity except for the removal of invasive or noxious species and placement of ecologically beneficial practices. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B)].

8. Care shall be taken to keep machinery out of the water way as much as possible. If work in the water way is unavoidable, it shall be performed in a way that minimizes the duration and amount of any disturbance to banks, substrate and vegetation to prevent increases in turbidity. Fuel, oil and other petroleum products, equipment, construction materials and any solid waste shall not be stored below the ordinary high water mark at any time or in the adjacent flood-prone areas beyond normal working hours. All precautions shall be taken to avoid the release of wastes or fuel to streams and other adjacent waters as a result of this operation. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B]) and Missouri Water Quality Standards general criteria requiring waters be free from substances preventing beneficial uses [10 CSR 20-7.031(3)(A)]; substances causing unsightly color or turbidity [10 CSR 20-7.031(4)(C)]; and physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

9. Petroleum products spilled into any water or on the banks where the material may enter waters of the state shall be immediately cleaned up and disposed of properly. Any such spills of petroleum shall be reported as soon as possible, but no later than 24 hours after discovery to the Department of Natural Resources' Environmental Emergency Response number at 573-634-2436 or website at http://dnr.mo.gov/env/esp/esp-eer.htm. This will ensure compliance with Missouri Environmental Improvement Authority to provide for the conservation of state water resources by the prevention of pollution and proper methods of disposal [Section 260.015, RSMo] and Missouri Water Quality Standards general criteria requiring waters be free from substances that prevent maintenance of beneficial uses; cause unsightly bottom deposits, color, turbidity or toxicity; and/or impair the natural biological community [10 CSR 20-7.031(4)(A), -(B), and -(H)].

10. All efforts shall be made to minimize exposure of unprotected soils. To the best of the project proponent's ability, project activity shall be conducted at times of little or no rainfall to limit the amount of overland flow and sediment disturbance caused by heavy equipment. This will ensure compliance with Missouri antidegradation requirements for Best Management Practices [10 CSR 20-7.031(3)(B)].

11. Programmatic WQC is denied for any NWP issued on a water that is listed for a sediment-related impairment, aquatic habitat alteration, channelization, or unknown impairment as listed in the most current Water Quality Report (Section 305(b) Report) at https://dnr.mo.gov/water/what-were-doing/water-planning/quality-standards-impaired-waters-total-maximum-daily-loads/impaired-waters. Although intended to result in minimal impacts, NWP authorizations in these waters may contribute to impairments and result in noncompliance with Missouri's general water quality criteria requiring waters be free from physical, chemical, and hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)] or exceedance of Missouri Water Quality Standards specific criteria [10 CSR 20-7.031(5)]. Since WQC General or Specific Conditions cannot be established to address all concerns from the variety of impairments and activities authorized by NWPs, individual review for WQC will be required. Requirements for individual WQC will be determined on a case-by-case basis based on the specific impairments, and additional testing, design, disposal, or BMP considerations may be required.

    To determine the location of the waters noted above, the Department's geospatial data is available upon request, and all published data is available on the Missouri Spatial Data Information Services website at msdis.missouri.edu/. Additional information to identify the project location, including stream reaches with listed impairments or special water designations, may be obtained from the Department's Water Protection Program at 573-522-4502.

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12. Programmatic WQC is denied for projects authorized by NWPs 17, 21, 32, 34, 37, 38, 44, 48, 49, 50, 51, 52, 55, and 56. Although intended to result in minimal impacts, these NWPs authorize activities that may contribute to impairments and result in noncompliance with Missouri's general water quality criteria [10 CSR 20-7.031(4)], including the requirement that all waters of the state shall be free from physical, chemical, and hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)], or noncompliance with Missouri's specific water quality criteria [10 CSR 20-7.031(5)]. Because programmatic WQC General or Specific Conditions cannot be established to address all concerns from the variety of impairments and activities authorized by these NWPs, the Department requires individual review for WQC for these NWPs. Requirements for individual WQC will be determined on a case-by-case basis based on the specific projects, and additional testing, design, disposal, or BMP considerations may be required.

13. Mitigation for loss of stream resources should be in conformance with the compensatory mitigation guidance currently approved for use in Missouri, including guidance provided by the Missouri Stream Mitigation Method. Stream impacts shall require compensatory mitigation with only instream or riparian corridor credits. Compensatory mitigation shall be within the state of Missouri. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)] Mitigation guidance documents can be located online at www.nwk.usace.army.mil/Missions/RegulatoryBranch/StateofMissouri.

SPECIFIC CONDITIONS

14. Nationwide Permit 3 *Maintenance*
    a. Silt, sediment, and debris removal shall be limited to a maximum of 200 LF upstream and 200 LF downstream of structures. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)].

15. Nationwide Permit 4 *Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities*
    Any inorganic or extraneous debris, such as may be found on Christmas trees shall be removed to qualify as clean, nonpolluting fill. This will ensure compliance with the Missouri's Water Quality Standards general criteria that waters shall be free from unsightly bottom deposits [10 CSR 20-7.031(4)(A)] and solid waste [10 CSR 20-7.031(4)(I)].

16. Nationwide Permit 12 *Oil and Natural Gas Pipeline Activities*,
    Nationwide Permit 57 *Electric Utility Line and Telecommunications Activities,* and
    Nationwide Permit 58 *Utility Line Activities for Water and Other Substances*
    a. For project crossings that must disturb a water body, work shall be conducted in such a manner as to seal off the work area from flow and minimize sediment transport. Material resulting from the activity shall not be sidecast into waters of the state for more than one month. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B) and general criteria requiring waters be free from substances that prevent maintenance of beneficial uses; cause unsightly color, turbidity, or toxicity; and/or impair the natural biological community [10 CSR 20-7.031(4)(B), -(C), and -(H)].
    b. If Horizontal Directional Drilling is used, drilling mud and/or other materials shall not be discharged into waters of the state. Best Management Practices shall be implemented to prevent possible discharges from reaching waters of the state. In the event materials are inadvertently discharged to waters of the state, notification to the Department of Natural Resources is required within 24 hours by calling 573-634-2436. This will ensure compliance with Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B)] and Missouri Environmental Improvement Authority [Section 260.015, RSMo] to provide for the conservation of state air, land and water resources by the prevention of pollution and proper methods of disposal.
    c. Project crossings shall be placed as close to perpendicular as possible and shall be limited to a maximum crossing length of no more than one and one-half times the width of the stream. This will ensure compliance with the Missouri antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)] and Best Management Practices [10 CSR 20-7.031(3)(B)].

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17. Nationwide Permit 14 *Linear Transportation Projects*
    a. The permittee shall propose and employ measures to mitigate the removal of impounded sediment (e.g., sand, gravel) in the unstable area upstream of a proposed project to prevent it from being transported downstream and/or construct a notched weir to slow the release of impounded sediment from upstream of the proposed project. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from substances causing unsightly color or turbidity [10 CSR 20-7.031(4)(C)] and physical chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)]. Accumulated gravel may be allowed to naturally deposit into downstream plunge pool voids. Consultation with a hydrologist or other scientist is recommended if the amount of accumulated unconsolidated gravel exceeds the volume of plunge pool voids.
    b. Where this NWP is used to authorize bridge and culvert structures, stream channel work shall be limited to a maximum of 200 feet upstream and a maximum of 200 feet downstream of the bridge or culvert. For purposes of this condition, a channel modification is any activity that alters the width, depth, length and/or sinuosity of a water way. This will ensure compliance with the Missouri antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)] and the Missouri Water Quality Standards general criterion requiring waters be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

18. Nationwide Permit 20 *Response Operations for Oil and Hazardous Substances*
    Oil and hazardous substance releases shall be reported to the Department of Natural Resources' Environmental Emergency Response number at 573-634-2436. Continue to report updates with regard to the containment and cleanup of releases. This will ensure compliance with Missouri Environmental Improvement Authority [Section 260.015, RSMo] to provide for the conservation of state water resources by the prevention of pollution and proper methods of disposal.

19. Nationwide Permit 33 *Temporary Construction, Access and Dewatering*
    a. The use of this NWP shall be limited to impacts of six months or less in duration. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirements for maintenance and protection of designated uses [10 CSR 20-7.031(3)]
    b. Any removal of accumulated sediment (e.g., sand, gravel) upstream of a proposed project shall be limited to the quantity necessary to relieve any obstruction or to protect downstream habitat. The permittee must propose and employ measures to mitigate the removal of impounded sediment in the unstable area upstream of a proposed project to prevent it from being transported downstream and/or construct a notched weir to slow the release of impounded sediment from upstream of the proposed project. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from substances causing unsightly color or turbidity [10 CSR 20-7.031(4)(C)] and physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].

20. Nationwide Permit 41 *Reshaping Existing Drainage Ditches*
    In-channel disposal of excavated material not used for reshaping activities is prohibited. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for Best Management Practices [10 CSR 20-7.031(3)(B) and general criteria requiring waters be free from substances that prevent maintenance of beneficial uses; cause unsightly color, turbidity or toxicity; and/or impair the natural biological community [10 CSR 20-7.031(4)(B), -(C), and -(H)].

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21. Nationwide Permit 53 *Removal of Low-Head Dams*
    a. The permittee must propose and employ measures to mitigate the removal of impounded sediment (e.g., sand, gravel) in the unstable area upstream of a proposed project to prevent it from being transported downstream and/or construct a notched weir to slow the release of impounded sediment from upstream of the proposed project. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from substances causing unsightly color or turbidity [10 CSR 20-7.031(4)(C)] and physical chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)]. Accumulated gravel may be allowed to naturally deposit into downstream plunge pool voids. Consultation with a hydrologist or other scientist is recommended if the amount of accumulated unconsolidated gravel exceeds the volume of plunge pool voids.
    b. Stream channel work shall be limited to a maximum of 100 feet upstream and a maximum of 100 feet downstream of the dam. This will ensure compliance with the Missouri Water Quality Standards antidegradation requirement for maintenance and protection of designated uses [10 CSR 20-7.031(3)] and the Missouri Water Quality Standards general criterion requiring waters to be free from physical, chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)].
    c. Restoration of the stream channel to its former, natural state is authorized. Individual WQC is required for non-natural channel modifications. This will ensure compliance with the Missouri Water Quality Standards general criteria requiring waters be free from physical chemical, or hydrologic changes that would impair the natural biological community [10 CSR 20-7.031(4)(H)]. For purposes of this condition, a channel modification is any activity that alters the width, depth, length and/or sinuosity of a water way.

Unless the Department agrees to an alternative, requests for WQC should be sent electronically to wpsc401cert@dnr.mo.gov [Section 644.026.1(26), RSMo and 10 CSR 20-6.060(5)]. A request for WQC shall include all required information for a complete request for certification in compliance with 40 CFR Part 121. The Department may request additional information prior to providing a WQC decision to ensure Missouri water quality requirements are met, such as a response to comments from the Department, other resource agencies, and/or the public; planned compensatory mitigation; and/or an analysis of practicable alternatives.

An issued WQC, whether programmatically or individually issued, becomes part of and expires with the Section 404 and/or Section 10 permit unless explicitly stated in the WQC.

Acquisition of NWPs and the attendant WQCs shall not be construed or interpreted to imply the requirements for other permits are replaced or superseded, including Clean Water Act Section 402 National Pollutant Discharge Elimination System Permits required under Missouri Clean Water Law [Sections 644.026.1 and 644.051, RSMo] for land disturbance or return water from material deposition. Permits or any other requirements shall remain in effect. Project proponents with questions are encouraged to contact the Department of Natural Resources' regional office in the project area. A regional office map with contact information is located at https://dnr.mo.gov/about-us/division-environmental-quality/regional-office.

Some localities are covered pursuant to Municipal Separate Storm Sewer System Permits with measures to control and possibly treat stormwater. If the project is located within one of these localities, project proponents must comply with all stormwater requirements of the locality's Stormwater Management Plan and any related ordinances. This ensures compliance with CWA Section 402 National Pollutant Discharge Elimination System Permit requirements and the Missouri Clean Water Law [Chapter 644, RSMo].

The Department encourages, but does not require, permittees to consider environmentally-friendly design techniques to include stormwater management strategies that maintain or restore the original site hydrology through infiltration, evaporation, or reuse of stormwater. Designs might include using porous pavement or creating vegetated swales and/or rain gardens. More information can be found at these websites: www.epa.gov/owow/NPS/lid/ and www.lid-stormwater.net/lid_techniques.htm.

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The Department encourages the use of native vegetation to protect impacted areas from future water quality concerns. Native vegetation has evolved with Missouri's geology, climate, and wildlife to occur within a region as a result of natural processes rather than human intervention. For areas where direct impacts to streams are to be avoided, the Department recommends a minimum riparian buffer strip width of 50 feet as measured from top of bank.

The Department encourages the use of Horizontal Directional Drilling for stream and wetland crossings when practicable. If properly utilized, Horizontal Directional Drilling is an alternative to more traditional, open-trench methods and can result in significant minimization and/or complete avoidance of aquatic resource impacts.

The following publication provides guidance on how to protect water quality through Best Management Practices on project sites. For more information, please read: "Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri and Kansas" dated January 2011 and located online at https://dnr.mo.gov/document-search/protecting-water-quality-field-guide.

To help determine if a proposed activity could encounter species or sites of conservation concern within or near a project, including those that have not been recorded, the project proponent is encouraged to visit:

- Missouri Department of Conservation's "Natural Heritage Review" website at https://naturalheritagereview.mdc.mo.gov/.
- U.S. Fish and Wildlife Service's "Information, Planning and Conservation" website at http://ecos.fws.gov/ipac/.

If the proposed project encounters and will potentially affect a species of concern, please promptly report it to the Missouri Department of Conservation and the U.S. Fish and Wildlife Service.

For more information
Missouri Department of Natural Resources
Water Protection Program
P.O. Box 176
Jefferson City, MO 65102-0176
wpsc401cert@dnr.mo.gov
800-361-4827 or 573-522-4502
https://dnr.mo.gov/water

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SECTION 11

FLOODPLAIN DEVELOPMENT PERMIT

For Information Only. Bidders shall purchase a set of plans and bid documents from ADS.

CITY OF JEFFERSON, MISSOURI
FLOODPLAIN DEVELOPMENT PERMIT / APPLICATION

APPLICATION #: DATE:

TO THE ADMINISTRATOR: The undersigned hereby makes application for a permit to develop in a floodplain. The work to be performed, including flood protection works, is as described below and in attachments hereto. The undersigned agrees that all such work shall be done in accordance with the requirements of the Flood Hazard Regulations of Jefferson City, Missouri and with all other applicable City, State of Missouri, and Federal laws and regulations.

City of Jefferson	Bartlet & West
Property Owner	Consultant/Builder
320 East McCarthy St	601 Monroe St Ste 201
Address	Address
Jefferson City, MO 65101	Jefferson City, MO 65101
City / State/ Zip	City / State / Zip
573-634-6410	573-634-3181
Phone	Phone

SITE DATA

1.	Location (Section, Township, Range) **16, 44N, 12W**				
	Subdivision, Lot # **N/A**				
	Street Address **N/A**				
2.	Development Type: **Roadway Extension**	Filling	Grading	Excavating	New Const.
	Substantial Improvement **Fill and Pavement construction for Road and Arch/Span Structure for Creek Crossing**		Non-Substantial Improvement		Other **Roadway Extension**
3.	Description of Development **Wildwood Drive is to be extended from Edgewood to Rock Ridge Road. This extension takes Wildwood over Wears Creek and adds better connectivity to the community.**				
4.	Premises: R/W	Structure size: 51 ft. x 10.3 ft. Arch		Area of site:	sq. ft./acres
	Principal use: **Roadway**		Accessory uses (storage, parking etc.): **N/A**		
5.	Value of Improvement (fair market) $ **900,000**		Pre-Improvement/Assessed Value of Structure $ **N/A**		
6.	Is property located in a designated **FLOODWAY?**		YES **X**		NO
If answered yes, certification must be provided prior to the issuance of a permit to develop verifying that proposed development will result in NO INCREASE in the base flood (100-year) elevation.					
7.	Is property located in a designated **FLOODPLAIN FRINGE?**		YES **X**		NO
8.	Elevation of the 100-year flood	**648 ft** MSL/NGVD			**FEMA** ID SOURCE
9.	Elevation of the proposed development site		**Top Pavement at CL = 652.72 ft** MSL/NGVD		
10.	Elevation / floodproofing requirement		MSL/NGVD		
11.	Other floodplain elevation information (ID and describe source)				
12.	Are other permits required?	U.S. Army Corps of Engineers 404 Permit:	Yes **X** No		
		Missouri Department of Natural Resources:	Yes **X** No		
		Other:			

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ALL provisions of Chapter 31, Article III, Flood Hazard Regulations shall be in compliance.

Signature of Property Owner	Signature of Consultant / Builder
	Austin K. Johnson Project Manager
Print Name and Title	Print Name and Title

PERMIT APPROVAL / DENIAL BY THE CITY OF JEFFERSON, MISSOURI

Plans and Specifications Approved / Denied this: _____ Day of _____, 20____

Signature of Authorizing Official	Print Name and Title

Approval by the City does not relieve the owner from fully complying with all FEMA / SEMA NFIP Floodplain / Floodway Development Regulations.

This permit is issued with the following conditions (1) that the lowest floor (including basement) of any new or substantially-improved residential structure will be elevated a minimum of one (1) foot above the base flood elevation. If the proposed development is a non-residential structure, this permit is issued with the condition that the lowest floor (including basement) of any new or substantially-improved non-residential structure will be elevated or floodproofed a minimum of one (1) foot above the base flood elevation and (2) that the developer/owner will provide certification by a registered engineer, architect, or land surveyor of the as-built lowest floor elevation of any new or substantially-improved structure covered by the permit.

cc: Engineering Division
Building and Inspection Services Division

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CITY OF JEFFERSON
John G. Christy Municipal Building
320 East McCarty Street, Jefferson City, MO 65101
Phone: (573) 634-6410 / Fax: (573) 634-6562

SECTION 12

SUBSURFACE INVESTIGATION, SOIL ANALYSIS AND FOUNDATION DESIGN RECOMMENDATIONS FOR WILDWOOD DRIVE EXTENSION PROPOSED BOX CULVERT, JEFFERSON CITY, MISSOURI

BY

ENGINEERING SURVEYS AND SERVICES

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SUBSURFACE INVESTIGATION, SOIL ANALYSIS
and
FOUNDATION DESIGN RECOMMENDATIONS
for
WILDWOOD DRIVE EXTENSION
PROPOSED BOX CULVERT
JEFFERSON CITY, MISSOURI

Prepared for

MR. ROBERT M. BATES, PE
CENTRAL MISSOURI PROFESSIONAL SERVICES
2500 EAST MCCARTY STREET
JEFFERSON CITY, MISSOURI

Prepared by

ENGINEERING SURVEYS AND SERVICES
802 EL DORADO DRIVE
JEFFERSON CITY, MISSOURI

JULY 29, 2008

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Engineering Surveys and Services

Consulting Engineers, Geologists, and Land Surveyors
Analytical and Materials Laboratories

Larry L. Hendren, PE, RG
David A. Bennett, PE
Timothy J. Reed, PLS
Morton L. Ratliff, PLS
Bruce A. Dawson, PE
Richard J. Rolsing, PE
Randall A. Lee, PE, RG
Timothy J. O' Connor, PE
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Clifford S. Jarvis, PE
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July 29, 2008

Mr. Robert M. Bates, PE
Central Missouri Professional Services
2500 East McCarty Street
Jefferson City, Missouri 65101

RE: Wildwood Drive Extension
Proposed Box Culvert
Jefferson City, Missouri

Dear Mr. Bates:

Please find enclosed our report of subsurface investigation and foundation design recommendations for the proposed box culvert to span Wears Creek for the extension of Wildwood Drive in Jefferson City, Missouri. This report contains the results of our investigation and evaluation, recommendations regarding foundation design parameters, and construction considerations for the proposed project.

We appreciate the opportunity to assist during this phase of the project, and hope to continue to serve you during construction. We are available during design and through construction with a full range of construction oriented engineering, surveying and laboratory services. If we can be of further assistance, please contact this office.

Prepared By:
Engineering Surveys & Services
Greg Nehring, EI

Reviewed By:
Engineering Surveys & Services
Bruce Dawson, PE

STATE OF MISSOURI
BRUCE DAWSON
NUMBER E-22331
REGISTERED PROFESSIONAL ENGINEER

cc: 5 Bates

7/29/08

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SUBSURFACE INVESTIGATION, SOIL ANALYSIS
and
FOUNDATION DESIGN RECOMMENDATIONS
for
WILDWOOD DRIVE EXTENSION
PROPOSED BOX CULVERT
JEFFERSON CITY, MISSOURI

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ABSTRACT

This report describes our geotechnical investigation, earthwork recommendations, and foundation design recommendations for the proposed box culvert serving the extension of Wildwood Drive in Jefferson City, Missouri and unincorporated Cole County, Missouri. We performed this investigation to evaluate the impact of subsurface conditions on design and construction of the proposed project, and to develop geotechnical design parameters and recommendations.

The following report and recommendations are based on the results of our geotechnical investigation and analysis, and the design concepts furnished by Central Missouri Professional Services. The conclusions and recommendations of this report represent our interpretation of subsurface conditions at this site, based on generally accepted geotechnical engineering practices.

The proposed box culvert will allow Wildwood Drive to traverse Wears Creek. The box culvert will be located approximately one hundred feet south of the existing intersection of Wildwood Drive and West Edgewood Drive. We recommend the proposed box culvert be supported on shallow foundations bearing on intact bedrock. Bedrock was encountered at approximately the bottom of the channel of Wears Creek.

PROJECT SCOPE

The scope of our geotechnical investigation and evaluation was as follows:

1. Evaluate feasible foundation systems, and provide appropriate foundation design recommendations and foundation performance estimates.

2. Determine the location of groundwater, if present, and determine its impact on geotechnical related design and construction.

3. Provide lateral earth pressure parameters for the box culvert and its wingwalls.

4. Evaluate the suitability of on-site materials for use as fill, backfill and subgrade material.

5. Provide engineering criteria for fill and backfill placement, and subgrade preparation.

6. Identify suitable and unsuitable fill materials in accordance with ASTM D 2487 classification.

7. Identify potentially deleterious materials that may interfere with construction progress or structure performance.

8. Provide Seismic Site Classification in accordance with the International Building Code (IBC 2003).

The investigation included a reconnaissance of the proposed site, review of all available subsurface data in the vicinity, subsurface exploration consisting of two soil and rock borings and two test pits, laboratory soil testing, and engineering analysis and evaluation of the foundation materials.

DESCRIPTION OF SITE AND PROJECT

Site Location

The proposed Wears Creek crossing is approximately 100 feet south of the existing intersection of Wildwood Drive and West Edgewood Drive. The site is more generally located in Section 16, Township 44 North, Range 12 West of the Fifth Principal Meridian. The Vicinity Map on page three of this report was developed from the Jefferson City and Cole County GIS website, *www.MidMoGIS.com*.

Site Conditions

At the time of our investigation, the area of the proposed box culvert was mostly undeveloped. Hardwood trees and thick underbrush line both sided of Wears Creek near the project area. At the time of the investigation, Wears Creek had several feet of water in the channel.

Existing fill materials were observed along the north side of Wears Creek. A small riprap lined tributary is located on the north side of Wears creek and west of the proposed construction. Jefferson City's "Greenway Trail" parallels West Edgewood Drive and Wears Creek. The trail is located approximately ten feet south of West Edgewood Drive in the vicinity of the project area.

Project Description

The proposed box culvert will allow Wildwood Drive to extend to the south. Maximum vertical and horizontal structural loads provided by Contech Construction Products were 17.7 kips and 5.5 kips, respectively.

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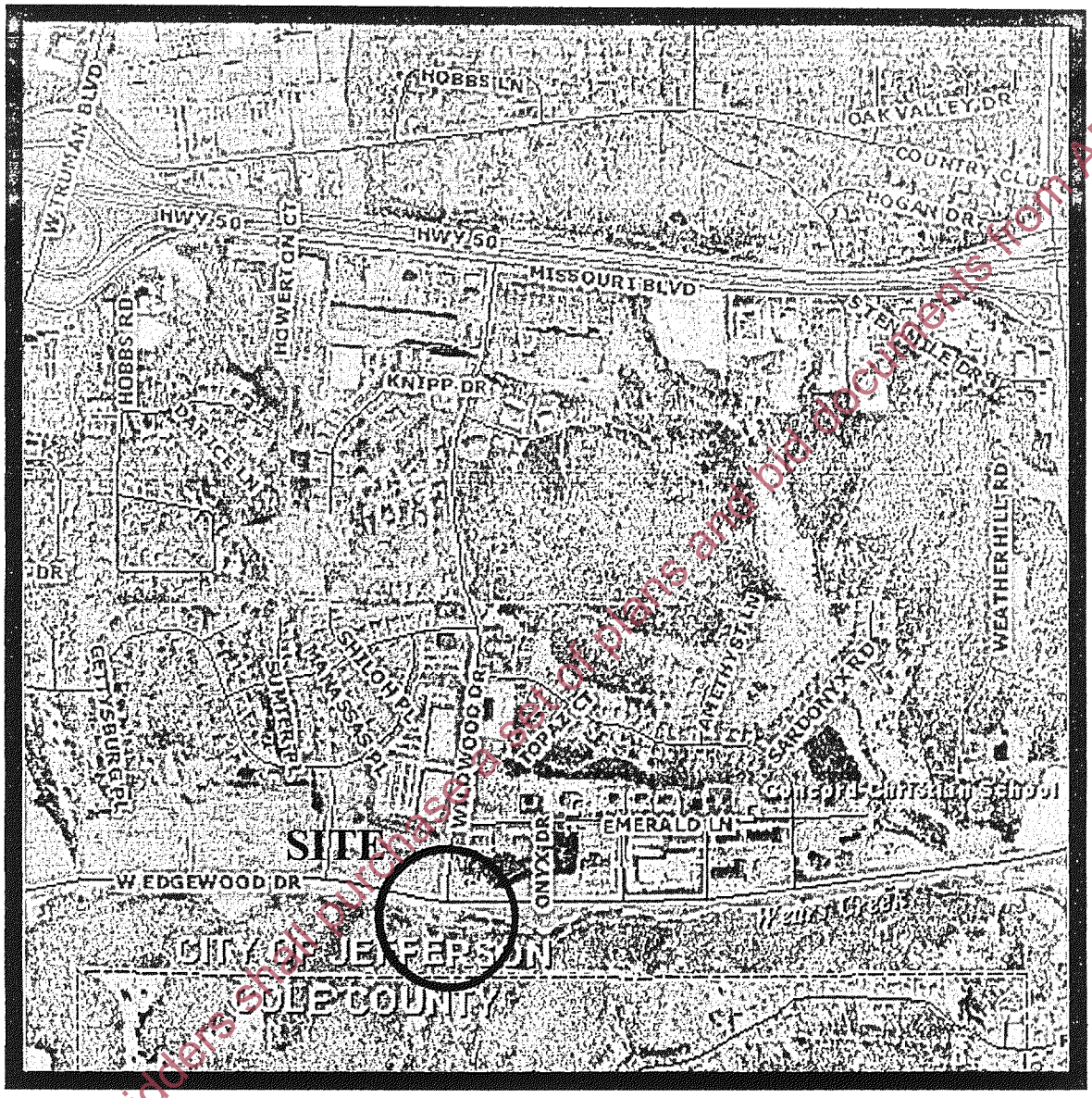

VICINITY MAP

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FIELD INVESTIGATION

Drilling and Excavation

The field investigation included a surface reconnaissance of the proposed site and the drilling of two soil and rock borings and the excavation of two soil and rock test pits located as shown on the Plan of Boring and Test Pit Locations in the Appendix. Borings B1 and B2 were advanced to intact bedrock on the north side of Wears Creek. A truck mounted rotary drill with four-inch diameter continuous flight augers was used to advance the borings to depths ranging from 10.5 feet at boring B2 to 16.5 feet at boring B1. A tracked excavator equipped with a 36-inch bucket was used to advance the test pits. Test pits TP3 and TP4 were excavated along the south side of the creek, and were taken to refusal on intact bedrock at depths of seven feet and five feet, respectively. Details of the borings, test pits and samples recovered are included in the Log of Borings and Test Pits in the Appendix. The borings and test pits were sampled, logged, and evaluated in the field by a geotechnical engineer of this firm.

Field Tests and Measurements

The ground surface elevations shown on the boring logs were determined by interpolating from the project site plan. These surface elevations are assumed to be accurate to within $\pm$ 1 feet. Groundwater observations were made at the time of drilling and are noted on the boring logs provided in the Appendix. Standard penetration tests were conducted during drilling in accordance with the methods of ASTM D 1586. Sample locations are indicated graphically on the Logs of Borings contained in the Appendix of this report. All samples were preserved and transported in accordance with the methods of ASTM D 4220.

LABORATORY INVESTIGATION

In conjunction with the field investigation, a laboratory investigation was conducted to quantify the probable range of engineering characteristics of the subsurface materials necessary in analyzing and predicting earthwork and foundation performance. The laboratory investigation included supplementary visual classifications and water content tests. All tests were conducted in Engineering Surveys and Services' laboratories in accordance with ASTM procedures.

GEOLOGY OF AREA

Jefferson City, Missouri lies near the northern edge of the Ozark uplift. The regional geology is characterized by dolomitic limestone bedrock of the Ordovician Jefferson City Formation overlain by gravelly residual soil and Pleistocene loess on the upland surfaces and by Holocene and older alluvium in the bottomlands.

Jefferson City Dolomite consists of dolomite, argillaceous dolomite, sandstone, and some thin shales. The lithologies may be thinly bedded with weathered seams of residual clay and are susceptible to groundwater movement. Solution cavities may be present with dimensions which vary

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from a few inches to tens of feet. These solutions features are often filled with undifferentiated Pennsylvanian deposits of sand, grave, or clay.

Soils in the region are typically derived from residual clay weathered from bedrock or from loess which occurs on the hilltops and undissected slopes. The soil stratigraphy of this site is characterized by deep alluvial soils in the low lying areas and wind blow loess across the rolling hills and upland areas.

SUBSURFACE CONDITIONS

We have visually classified the types of foundation materials encountered by the methods of ASTM D 2488. These materials are described in detail by the Boring and Test Pit Logs and Summary of Laboratory Test Results in the Appendix. The stratification lines represent approximate boundaries and the transitions may be gradual.

Borings and test pits were consistent, except for the fill materials encountered at borings B1 and B2. The fill materials consisted of a gravelly clay with cobbles. Fill materials extended to three feet and five feet at borings B2 and B1, respectively. Loamy silty clay was encountered underneath the fill materials in the borings, and at initial excavation in the test pits. Under the initial native soil layer, soils consisted of clay, silt, sand, gravel, cobbles and boulders in various proportions. Soils in this region appear to have high permeability, as observed during test pit excavation.

Limestone bedrock was encountered at each boring and test pit. Bedrock was consistent, ranging from elevations of 638 feet at TP3 to 641 feet at B2.

ENGINEERING ANALYSIS AND RECOMMENDATIONS

Preface

The design recommendations that follow are based on the findings of our geotechnical investigation, our interpretation of subsurface conditions at the site, our experience with the geology of this region, and the preliminary design information furnished by Central Missouri Professional Services. We recommend that Engineering Surveys and Services be retained during sitework and foundation construction to verify that subsurface conditions across the site are consistent with our interpretation of the borings and test pits. If the scope of the project is altered or differing geotechnical conditions are encountered, it would be advisable to review and update our recommendations in consideration of those changes or variations.

Foundation Recommendations

General. We recommend that foundations supporting the structure used to span Wears Creek bear on intact limestone bedrock. The structure should bear on intact bedrock with conventional shallow foundations extended to excavator refusal. Shallow foundations constructed directly on

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intact, slightly weathered limestone may be designed for an allowable bearing pressure of 10,000 pounds per square foot.

Ultimate passive pressure resistance of foundations notched into intact rock may be taken as 5,000 pounds per square foot, barring any significant jointing, weak partings, clay pockets or similar defects in the rock strata. Where passive pressure resistance is critical to long-term structural performance, footings may need to be chipped or "socketed" into intact rock a specified minimum depth to assure available passive pressure resistance.

Construction Observation. We recommend that Engineering Surveys and Services be retained to evaluate foundation bearing surfaces during excavation and to observe foundation construction. We recommend that excavation and construction be carefully monitored to verify that actual field conditions are compatible with recommended design criteria. If actual field conditions vary from our interpretation of subsurface data, recommendations can then be provided to maintain or improve design and construction quality and function.

Site Classification. In accordance with Section 1615 of the International Building Code (IBC 2003), the proposed site exhibits a soil profile characterized as "*Very Dense Soil and Soft Rock*" and is assigned a Site Class designation "C".

Retaining Systems

General. The proposed abutments will be subject to lateral earth pressures and are proposed to be designed as retaining structures. Retaining structure design should include a behind the wall drainage system, such as free draining granular backfill, a geotextile layer or mat, or drainage boards.

Equivalent Fluid Pressures. Free draining, cohesionless backfill is recommended for backfilling the proposed structure at this site. If the backfill zone extending 30 degrees off vertical from the base of the wall is backfilled with free-draining aggregate similar to Missouri Standard Specifications for Highway Construction (MSSHC) Section 1009, Grade 4, *Aggregate for Drainage*, an equivalent fluid pressure of 35 pounds per cubic foot (pcf) may be used in retaining structure design, but wall sections below the normal high water elevation should be designed for an equivalent fluid pressure of 70 pcf.

CONSTRUCTION CONSIDERATIONS

Foundation Excavation and Construction

Foundation elements should bear on intact, slightly weathered limestone bedrock and should be level or in level steps. Water seepage into foundation excavations should be de-watered to the greatest degree practical prior to concrete placement. The base of foundation excavations should be thoroughly cleaned to remove any loose rock or soil prior to concrete placement.

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Engineered Backfill

Materials. Free draining, cohesionless backfill is recommended for backfilling the proposed culvert structure at this site. If the backfill zone extending 30 degrees off vertical from the base of the wall should be backfilled with free-draining aggregate similar to Missouri Standard Specifications for Highway Construction (MSSHC) Section 1009, Grade 4, *Aggregate for Drainage*.

Placement and Compaction. Placement and compaction of clean rock aggregate base material should be monitored by a qualified geotechnical engineer or his representative. Clean rock fill with a thickness equal to or greater than 4 inches or in wall backfill applications should be compacted to a minimum relative density of 70 percent, as determined in accordance with ASTM D 4253 and 4254.

Quality Assurance Testing

Engineering Surveys and Services should be retained to observe all foundation bearing surfaces immediately after excavation and immediately prior to concrete placement. This firm should also be retained to sample and classify borrow materials in accordance with placement criteria, and to monitor backfill placement and compaction to assure that adequate compaction is achieved and proper methods are employed. The intent of engineering observations during construction is to assure compliance with geotechnical specifications and to verify that actual field conditions are compatible with recommended design criteria. If actual field conditions vary from our interpretation of subsurface data, recommendations can then be provided to maintain or improve design and construction quality and function.

Warranties and Limitations

This report has been prepared for the exclusive use of Central Missouri Professional Services and its clients and consultants for the specific project discussed, in accordance with generally accepted geotechnical engineering practices common to the central Missouri area. No other warranties, expressed or implied, are made.

This report is considered sufficient in detail and scope to provide a reasonable basis for final design of the recommended foundation systems. This investigation and report do not constitute a guarantee of subsurface conditions, groundwater conditions, excavation characteristics or construction conditions. Recommendations contained in this report are based on subsurface conditions and proposed designs as of this date. The above study and recommendations are applicable only for the conditions and locations described, and for the specific project mentioned. Any significant changes in plans or soil conditions should be brought to our attention. To assist in the interpretation and application of these recommendations, personnel from Engineering Surveys and Services will be available at any stage of design development and during construction.

Use of the data contained herein by others may require interpretation or analysis that was not contemplated by our investigation and analysis. The use of this data and any interpretations or conclusions developed by others are the sole responsibility of those firms or individuals.

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APPENDIX

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LAB NO.: 3057
PROJECT: Wildwood Drive Extension
Proposed Box Culvert
Jefferson City, Missouri

SYMBOLS AND TERMS

SAMPLE TYPES

Auger | Shelby Tube | Split Spoon | Sample | No Recovery | Roller Bit (Tri–Cone) | NX Core Boring | Down Hole Hammer

ABBREVIATIONS

⊗	Unconfined Compression (1)
●	Water Content (2)
+	Plastic (PL) & Liquid (LL) Limit (2)
USCS	Unified Soil Classification System
PI	Plasticity Index
ATD	At time of drilling
RQD	Rock Quality Designation
SS	Split Spoon – 1 3/8" I.D. – 2" O.D.
ST	Shelby Tube – 3" O.D.
GT	Giddings Tube
HA	Hand Auger
AS	Auger Sample
S	Sample
TV	Hand – Held Torvane

DEFINITIONS

Blows per ft. – Indicates blows per 6 inches of sampler penetration when driven by a 140–pound hammer falling freely 30 inches. The Standard Penetration Resistance is the number of blows for the last 12 inches of penetration of the split–spoon sampler.

NOTES

(1) Shear Strength Data plotted on Cohesion scale of Boring Logs.

(2) Classification and Index Properties plotted on Water Content Scale of Boring Logs.

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LAB NO.: 3057

PROJECT: Wildwood Drive Extension
Proposed Box Culvert
Jefferson City, Missouri

SUMMARY OF LABORATORY TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (FEET)	USCS CLASS	NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION COHESION (TSF)	STRAIN %	REMARKS
B1	SS1	10.0 - 11.5		14							
B2	SS1	5.0 - 6.5		17							

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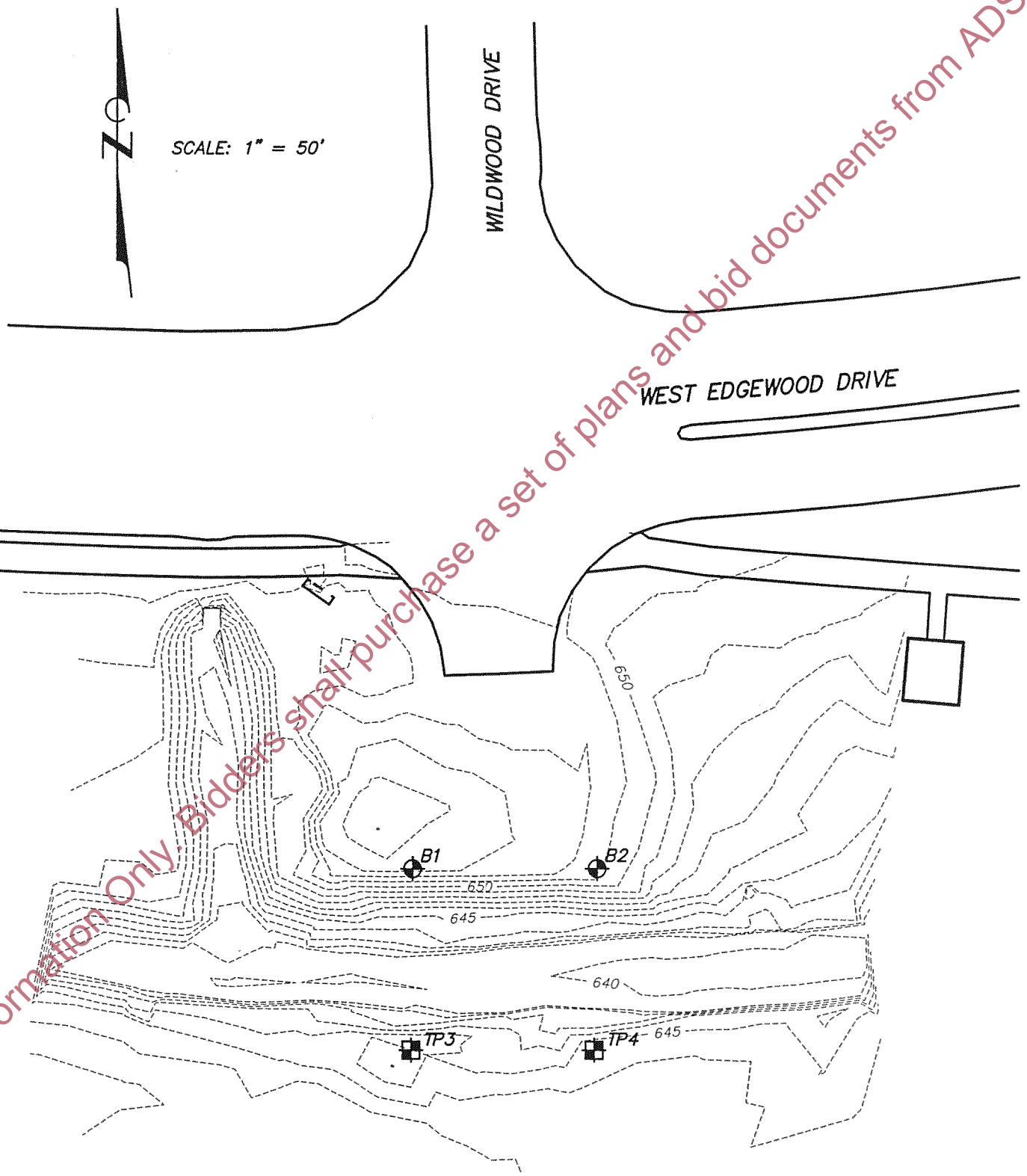
PROJECT: Wildwood Drive Extension
Proposed Box Culvert
Jefferson City, Missouri

PLAN OF BORING & TEST PIT LOCATIONS



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LAB NO.: 3057

LOG OF BORING NO. B1

PROJECT: Wildwood Drive Extension
Proposed Box Culvert
Jefferson City, Missouri

TYPE: 4" Auger

DEPTH, FT.	SAMPLE TYPE	SOIL DESCRIPTION TYPE, COLOR, MOISTURE & OTHER LOCATION: See Plan of Boring & Test Pit Locations SURF. ELEV.: 654.0'	BLOWS PER FT.	UNIFIED CLASSIFICATION	UNIT DRY WT. LB. / CU. FT.	COHESION, TON/SQ.FT. 0.2 0.4 0.6 0.8 1.0 1.2 1.4 PLASTIC LIMIT — WATER CONTENT,% — LIQUID LIMIT 10 20 30 40 50 60 70
2		FILL: Gravelly Clay; Medium brown, moist, firm, some cobbles				
4						
6		SILTY CLAY: Medium brown, moist, firm, loamy, friable				
8						
10						
12		GRAVELLY CLAY: Dark gray mottled brown, moist, firm, coarse sandstone gravel, fine creek gravel - wet	10			•
14						
16		LIMESTONE: Light gray, moist, medium hard - hard	25/½"			
18		AUGER REFUSAL @ 16.5' ON LIMESTONE				
20						

Completion Depth: 16.5'
Date: 12 June 2008

Depth to Water: 13.0'
Date: 12 June 2008

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LAB NO.: 3057

LOG OF BORING NO. B2

PROJECT: Wildwood Drive Extension
Proposed Box Culvert
Jefferson City, Missouri

TYPE: 4" Auger

DEPTH, FT.	SAMPLE TYPE	SOIL DESCRIPTION TYPE, COLOR, MOISTURE & OTHER	BLOWS PER FT.	UNIFIED CLASSIFICATION	UNIT DRY WT. LB. / CU. FT.	COHESION, TON/SQ.FT. (0.2 0.4 0.6 0.8 1.0 1.2 1.4) PLASTIC LIMIT — WATER CONTENT,% — LIQUID LIMIT (10 20 30 40 50 60 70)
		LOCATION: See Plan of Boring & Test Pit Locations SURF. ELEV.: 651.0'				
2		FILL: Gravelly Clay; Medium brown, moist, firm, some cobbles				
4		SILTY CLAY: Medium brown, moist, firm, loamy				
6		- some sand, some fine chert gravel, loose	4			•
8		- hard, some cobbles				
10		LIMESTONE: Light buff, dry, hard				
		AUGER REFUSAL @ 10.5' ON LIMESTONE				
12						
14						
16						
18						
20						

Completion Depth: 10.5'
Date: 12 June 2008

Depth to Water: None Encountered
Date: 12 June 2008

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LAB NO.: 3057

LOG OF TEST PIT NO. TP3

PROJECT: Wildwood Drive Extension
Proposed Box Culvert
Jefferson City, Missouri

TYPE: 36" Bucket

DEPTH, FT.	SAMPLE TYPE	SOIL DESCRIPTION TYPE, COLOR, MOISTURE & OTHER See Plan of Boring & LOCATION: Test Pit Locations SURF. ELEV.: 645.0'	BLOWS PER FT.	UNIFIED CLASSIFICATION	UNIT DRY WT. LB. / CU. FT.	COHESION, TON/SQ.FT. 0.2 0.4 0.6 0.8 1.0 1.2 1.4 PLASTIC LIMIT — WATER CONTENT,% — LIQUID LIMIT 10 20 30 40 50 60 70
1		SILTY CLAY: Medium brown, moist, firm				
2						
3						
4		SANDY CLAYEY GRAVEL: Medium brown, wet, dense, with cobbles and boulders				
5						
6						
7		EXCAVATOR REFUSAL @ 7.0' ON LIMESTONE				
8						
9						
10						

Completion Depth: 7.0'
Date: 24 June 2008

Depth to Water: 3.0'
Date: 24 June 2008

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LAB NO.: 3057

LOG OF TEST PIT NO. TP4

PROJECT: Wildwood Drive Extension
Proposed Box Culvert
Jefferson City, Missouri

TYPE: 36" Bucket

DEPTH, FT.	SAMPLE TYPE	SOIL DESCRIPTION TYPE, COLOR, MOISTURE & OTHER LOCATION: See Plan of Boring & Test Pit Locations SURF. ELEV.: 645.0'	BLOWS PER FT.	UNIFIED CLASSIFICATION	UNIT DRY WT. LB. / CU. FT.	COHESION, TON/SQ.FT. 0.2 0.4 0.6 0.8 1.0 1.2 1.4 PLASTIC LIMIT — WATER CONTENT,% — LIQUID LIMIT 10 20 30 40 50 60 70
1		SILTY CLAY: Medium brown, moist, firm, friable				
2		SANDY CLAYEY GRAVEL: Medium brown, wet, dense, with cobbles and boulders				
3						
4						
5		EXCAVATOR REFUSAL @ 5.0' ON LIMESTONE				
6						
7						
8						
9						
10						

Completion Depth: 5.0'
Date: 12 June 2008

Depth to Water: 1.5'
Date: 12 June 2008

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SECTION 13

PUBLIC WATER SUPPLY DISTRICT NO. 2
STANDARD SPECIFICATIONS FOR WATER MAIN CONSTRUCTION

BY

BARTLETT & WEST, INC.

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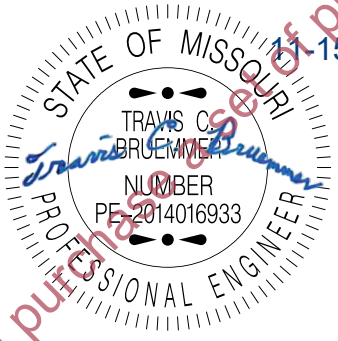
PUBLIC WATER SUPPLY DISTRICT NO. 2 OF COLE COUNTY, MISSOURI

STANDARD SPECIFICATIONS

FOR

WATER MAIN CONSTRUCTION



THIS SHEET HAS BEEN
SIGNED, SEALED, AND DATED
ELECTRONICALLY

TRAVIS C. BRUEMMER - PROFESSIONAL ENGINEER
LICENSE NO. PE-2014016933

BARTLETT & WEST, INC.
MISSOURI CERTIFICATE OF AUTHORITY NO. 000167 - ENGINEERING
601 MONROE STREET, SUITE 201
JEFFERSON CITY, MO 65101

NOVEMBER 2024
PROJECT NO. 7002.000

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Bartlett & West

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PART I
DISTRIBUTION

GENERAL

DS-1. INCLUSIVE CONDITIONS: All provisions of the "General Conditions", "Supplementary General Conditions" and "Section 1999DS" form a part of this section.

DS-2. SCOPE: The work included in these specifications consists of the construction of a new water system. The work consists of the complete and satisfactory construction, testing and sterilization of the system, ready for use as shown and specified. The work includes:

Furnishing all materials, tools plant and equipment, excavating, backfilling, furnishing and installing new water pipe, fittings, valves, hydrants, meters and all incidental and miscellaneous work necessary to accomplish the project.

DS-3. LICENSES, PERMITS, CERTIFICATES, LAWS AND ORDINANCES: Licenses, permits and certificates as required by law or other regulatory agencies shall be procured and purchased when necessary by the Contractor. The Contractor shall comply with all applicable laws, ordinances, safety provisions, rules and regulations relating to the work. Work done on state highways shall be located 2 feet away from R/W Line.

DS-4. TRESPASS: The Contractor shall inform affected property owners, even though easements have been obtained, before construction occurs on their property. Should the property contain farm crops, at least three days notice shall be given to allow for harvesting. Crops damaged without notice so given shall be paid for by the Contractor at current market value.

The Contractor shall obtain permission, in writing, before cutting fences and repair same to original condition or better. Fences shall be completely repaired the day they are taken apart. Fences left unrepaired may be fixed by the owner and cost deducted from monies due to the Contractor. If a controversy arises over fence cutting and Contractor does not have written permission, damages may be assessed against Contractor to return fence to original condition. Contractor shall use existing openings, insofar as practical to maneuver equipment.

DS-5. RECORD PLANS: Record plans shall be measured either as the work progresses or after the project is completed. These measurements will be measured by teams consisting of one man from the Contractor's organization and one man from the Engineer's organization. These measurements will be made at the discretion of the Engineer. Normally two teams will be working simultaneously. The Contractor shall be prepared to supply two men who will assist in performing these measurements as well as a vehicle and a driver who will assist by driving these teams over the job.

An alternate procedure for measuring may be used which consists of an electronic car-mounted measuring device. Such device shall be capable of being adjusted to correspond to an actual predetermined measured distance.

The Engineer and Contractor shall jointly manually measure a distance on the highway pavement and then run across it. Adjustments of electronic device shall be made until the device records the actual measured distance. The job shall then be measured. At the end of each days measuring, the device shall be again run over the test distance to assure that it has remained accurate. Lines will be presumed to run parallel with highways and roads and the distance as measured along these will be used for final pay quantities, except for those lines which run cross country. Cross country lines will be measured by normal chaining procedures. Lines installed, at the owners request, which swing around obstacles will be hand measured to determine excesses above the parallel line measurement procedures. The contractor will be paid for these excesses over and above the parallel line measurements via the electronic device. Lines

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which swing around obstacles because of the contractor's choice and without specific Engineer approval, will not receive payment.

DS-6. SHOP DRAWINGS AND/OR MATERIAL LIST: Before the Contractor begins work, six copies of shop drawings, parts diagrams material specification sheets, outline dimension prints and equipment performance characteristics for all items proposed to be used shall be submitted to the Engineer for approval for use on the project. Accompanying this submittal shall be the names and location of the manufacturer and the closest stocking supplier. Products shall not be utilized until written approval is given by the Engineer, who shall be the sole determinant of acceptability between similar items as made by different manufactures. The Contractor shall furnish products which are in complete compliance with the contract requirements; and approval of shop drawings and/or material lists shall not be construed as authorizing any deviations from the contract plans or specifications.

If it is the intent of the Contractor to provide products which deviate from the contract plans or specifications, such intent shall be made in writing accompanying the submittal of products for approval by the Engineer. The Contractor shall indicate those characteristics of the product which are in non-conformance, give reasons for said non-conformance and receive written approval of the Engineer for deviating from the requirements before utilizing the product in the work.

If subsequent investigation reveals a product was installed which deviated from the requirements without specific written approval for the deviation, then the Contractor at the request of the Engineer may be required to remove and replace such product at his expense. If the Contractor fails to act then the Engineer may require the change to be made by others and charged against the Contractor. If available, funds withheld from the Contractor may be used to pay necessary removals-replacements.

If the Contractor desires to receive payment for materials stored on the job, he shall submit invoices for the products upon which payment is requested. These invoices shall be on the supplying company's forms and shall show all unit prices, allowable discounts and proposed rebates; all as necessary for the Engineer to determine the actual price the Contractor will ultimately pay for the materials.

TRENCHING, EXCAVATION AND BACKFILL

DS-7. GENERAL: Materials shall be removed so that the pipe can be laid to the alignment and depth required. This work shall include:

Removal, handling and disposal of all materials so removed.

Stripping along the proposed alignment and other excavation sites including stumps, debris and roots.

Removal of all pavement, road surfacing, junk and structures or parts thereof as required for construction purposes.

Protection of adjacent property trees and structures; sheeting, shoring and bracing.

Protection and maintenance of existing pipelines, drains, conduits, sewers, poles and overhead utilities.

Preparation of subgrades, embedment of pipe, backfilling and disposal of excess excavating as required.

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DS-8. PIPE TRENCH EXCAVATION:

1. Alignment, Grade and Trench Preparation: Pipelines shall be located as shown on the drawings.

The water lines are, in general, located on air photos, tax maps or plans which have a large magnitude of scale. It is obvious that at this scale the width of the pencil or pen line depicting the water pipe can have a magnitude of 10 feet or more. While such scale distortion exists, the intent is to locate the line in the general area where the plan line is located and at the most desirable point to facilitate long term district advantages through decreased maintenance.

Manufacturers specify a maximum angular change that is allowed for the joining of their specific pipe type joint pipe. Placement on this job shall be such that only 80% of the pipe companies angular stipulated maximum change will be allowable. The contractor will be allowed the greatest amount of freedom in the methodology of pipe installation to maintain conformance with said 80% maximum angular change.

1A. JOB WITH NO BID ITEM FOR FITTINGS:

Fittings will not be indicated or bid as a separate bid item. It will be the contractors choice as to how to install the pipe for the angular change so long as the pipe remains in the R/W. The Contractor may install a fitting such as a 22½º - 45º bend, etc. with reaction backing as per normal installation of such a fitting (all without a specific bid item compensation) or the contractor may adjust trench depths or angular alignment to keep joint angular alignment in conformance with above stipulated while still maintaining a 42 inch cover. This procedure will be acceptable up to and including a depth of cover over the pipe of 8 feet. The contractor will be required to install a fitting (without added compensation) to maintain cover depth within said tolerance.

In certain instances fittings will be required by the nature of the job i.e. T, 90º bend etc. and these will be required as shown on the plans, but extra payment will not be made and the contractor shall include these costs in the pipe line unit prices.

1B. FITTING MATERIAL:

Couplings and fittings for three-inch and smaller pipe shall be made of the same material as the pipe. They shall have a minimum working pressure rating of 200 psi. However, in no case shall they have thinner walls than the pipe they are being used with nor shall they have a lesser pressure rating than the pipe. Couplings and fittings for PVC pipe over three inch size shall be ductile iron conforming to ANSI/AWWA C110, "Gray-Iron and Ductile-Iron Fittings, 3 in. through 48 in., For Water and Other Liquids" or ANSI/AWWA C153/A21.53 "Ductile-Iron Compact Fittings, 3 in. through 12 in., For Water and Other Liquids". Joints shall be in accordance with ANSI/AWWA C111/A21.11, "Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings." Couplings and fittings shall have a standard outside bituminous coating and a cement-mortar lining in accordance with ANSI/AWWA C104/A21.4, "Cement-Mortar Lining for Ductile-Iron and Gray-Iron Pipe and Fittings for Water." Ductile Iron couplings and fittings shall be Tyler or approved equal.

1C. UTILITIES:

The Contractor shall comply with Sec. 319.015 - 319.050 RS MO and shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures, both known and unknown, may be determined, and he shall be held responsible for the repair of such structures when broken or otherwise damaged because of carelessness on his part.

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Utilities names have been abstracted from the tax lists of the county involved. Utilities have been contacted and requested to furnish information and regulations regarding crossing their facilities. Utility representatives or contact individuals are listed on the plans and the Contractor shall communicate with them and abide by their rules to insure protection of their facilities.

The actual location of existing utilities is the sole responsibility of the Contractor. Those shown on the plans are given to call particular attention to areas of special concern. Contractor also contacts one call #1-800-DIG-RITE.

2. Depth of Pipe: Minimum depth of cover over pipe shall be forty-two inches (42 inches) as measured from the original ground level to the nearest surface of the pipe. Greater depths will be required to make smooth transitions at points of abrupt changes in the ground surface, also extra depths may be required under highways, railroads, and streams. These extra depth conditions will conform to the requirements as shown on the drawings, also those as provided by the agency involved.

If overdigging occurs, replaced material shall be thoroughly compacted. The Engineer may require granular fill under the pipe if he deems it necessary.

The bottom of the trench shall provide continuous and uniform bearing for the pipe except at the bell or joints at which a hole shall be dug to prevent the end from bearing.

3. Trench Width: The width of the trench shall be ample to permit the pipe to be laid and jointed properly, and the backfill to be placed and compacted as specified. Trenches shall be of such extra width, when required, as will permit the convenient placing of timber supports, sheeting and bracing and handling of specials.

Minimum trench width shall be at least 4 inches wider than the maximum dimension of any part of a pipe, a fittings, etc. in earth and 24 inches in rock.

4. Rock: The proposal form bid items shall indicate the status of rock with respect to payment. A bid form that contains an estimated quantity (of rock as a pay item) will be a classified bid. If no pay item exists the job will be a nonclassified job. For a nonclassified job the Contractor shall inform himself of the amount of rock on the job and adjust his unit prices accordingly. **THIS PROJECT IS NONCLASSIFIED.**

Rock shall be removed six inches (6 inches) below that which would be required for normal earth excavation and backfilled to provide uniform and continuous bearing.

Trench width for rock excavation shall be equal to the trench width for the pipe being installed except that a 24 inch width shall be used as a rock trench width for any pipe normally requiring a lesser trench width.

5. Poor Soil: Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, refuse, vegetable or other organic material, or large pieces or fragments of inorganic material that will not provide adequate long term support, the Contractor shall excavate any such unsuitable material by under-cutting and over-digging the width. Before the pipe is laid, the subgrade shall be made by backfilling with an approved material in three inch (3 inches) layers. These layers shall be thoroughly tamped to provide uniform and continuous bearing.

6. Protection of Excavation: Open cut trenches shall be sheeted and braced as required by any governing state laws and municipal ordinances and as may be necessary to protect life, property, or the work. Where sheeting and bracing are used, the trench width shall be increased accordingly. Trenches shall be kept free from water and pipe shall not be laid in water or on soggy material. The Contractor shall provide for the continuous flow of all water courses, drainage, drains, or sewers encountered or interrupted

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during the construction work. All ditches and water courses shall be restored to their original condition as soon as possible.

7. Protection of Property: All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Hydrants under pressure, valve pit covers, valve boxes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural water courses shall not be obstructed.

Trees, shrubbery, fences, poles, and all other property and surface structures shall be protected unless their removal is shown on the drawings or authorized by the Engineer. When it is necessary to cut roots and tree branches, such cutting shall be done under the supervision and direction of the Engineer.

Temporary support, adequate protection, and maintenance of all underground and surface structures, drains, sewers, and other obstructions encountered in the progress of the work shall be furnished by the Contractor at his expense and under the direction of the Engineer. Any structures that have been disturbed shall be restored upon completion of the work.

8. Railroad Crossings: Pipe line which passes under railroad tracks shall be constructed as necessary to meet the requirements of the railway company. The Contractor shall notify the railway company before construction on the crossing is started and organize the work to meet the railroad requirements.

9. Highway Crossings: A pipe line which passes under a highway shall be constructed as necessary to meet the requirements of the Missouri Department of Transportation (MoDOT), County Highway Dept., Special Road District, or Municipal Street Dept., as the case may be. The Contractor shall notify the appropriate agency before construction on the crossing is started and organize the work to meet the agency's requirements. Only one lane of traffic may be blocked at any time. Restrained Joint PVC needs to be installed from right-of-way to right-of-way on all highway crossings.

10. Stream Crossings: Pipe lines under streams, creeks, outflow lines of culverts and other places which exhibit severe cutting or erosion shall be directionally bored as indicated in the drawings. Encasement shall be placed at such points as located on the drawings. Crossing to include CertainTeed Yelomine PVC pipe, jointing, fittings, trenching above cost of normal trenching, clean-up, labor, equipment and other items required to install the crossing. See typical detail plan sheet. All designated stream crossings of each pipe size and class will be paid at the same price, regardless of length.

11. Barricades, Guards, and Safety Provisions: To protect persons from injury and to avoid property damage, adequate barricades, construction signs, torches, red lanterns, and guards, as required shall be placed and maintained during the progress of the construction work and until it is safe for traffic to use the highway. All material piles, equipment, and pipe that may serve as obstructions to traffic shall be enclosed by fences or barricades and shall be protected by proper lights when the visibility is poor. Safety rules and regulations of local authorities shall be observed.

12. Maintenance of Traffic and Closing of Streets: The Contractor shall carry on the work in a manner that will cause the least interruption in traffic and may close to through travel not more than two consecutive blocks, including the cross street intersected. Where traffic must cross open trenches, the Contractor shall provide suitable bridges at street intersections and driveways.

The Contractor shall post suitable signs indicating that a street is closed and necessary detour signs for the proper maintenance of traffic.

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DS-9. BACKFILLING:

1. General: All backfill material shall be placed so as to make the earth profile and surface conform as nearly as possible to the original condition. Exceptions to this will be necessary in the case unsuitable material is encountered.

When the type of backfill material is not indicated on the drawings or specified, the Contractor may backfill with the excavated material. If, in the opinion of the Engineer, the excavated material is unsuitable for backfill, the Contractor shall be required to obtain additional approved material to refill the trench. Extra compensation will be allowed for this work. If, as a result of improper handling, the Contractor mixes approved excavated material with unapproved material such that the resulting material is unacceptable, no extra compensation will be allowed for replacement of that portion of material which was originally acceptable.

For County road crossings use 1" clean rock backfill.

Use 40 foot section of PVC Pipe in all County Road Crossings, and all other roads where no encasement is required. Center pipe on road bed to eliminate a coupling under road.

In typical trench sections as well as where rock has been excavated, the lower six inches (6") of the trench to twelve inches (12") above the pipe shall be backfilled with either sand or limestone screenings (max. size ¼ inch) or select excavated material. The cost of this material replacement shall be included in the bid for rock excavation. Backfilling above this shall proceed as customary.

2. Backfill Over Pipe:

A. To One Foot Over Pipe: From the bottom of the ditch to a depth of one foot above the top of the pipe, the trench shall be backfilled by hand or by approved mechanical methods. The Contractor shall use special care in placing this portion of the backfill so as to avoid injuring or moving the pipe.

Backfilling material shall be deposited in the trench for its full width on each side of the pipe, fittings, and appurtenances simultaneously.

If the excavated material consists of sand or loam or clay which has been excavated in a manner to eliminate lumps or clods (e.g. excavation by a trenching machine) backfill may be accomplished by means of a road grader or similar device which will gently roll the material into the trench by multiple passes parallel to the trench. If this procedure is not used or where lumpy material exists or where it is possible to roll stones 2 inches or larger against the pipe, backfill shall be done by hand.

B. Backfill From One Foot Over Pipe To Ground Surface: Machine backfill will be allowed.

3. Backfilling Where Settlement is Unimportant: Where shown on the drawings or specified, the contractor may backfill the trench from one foot above the pipe to top of the trench with excavation material, and the backfill shall be neatly rounded over the trench to a sufficient height to allow for settlement to grade after consolidation. Locate dirt mound slightly to upgrade side of trench.

4. Backfilling Under Permanent Pavement: Where the excavation is made through permanent pavements, curbs, driveways, or sidewalks, or where such structures are undercut by the excavation, the entire backfill to the subgrade of the structures shall be one-inch (1") minus base rock compacted to 95% compaction, in six-inch (6") maximum lifts. Walks and driveways consisting of broken stone, gravel, slag, or cinders shall not be considered as being of a permanent construction. If approved by Owner and local authority, machine compacted backfill of satisfactory earth materials will be a satisfactory alternate backfill procedure. Compacted backfill will be required around valve boxes, fire hydrants and other items which project to ground surface to ensure continuity of proper alignment.

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When trenches have not been properly filled and where settlement occurs, refilling shall be required to bring the surface to conform with the adjacent ground.

5. Backfilling in Freezing Weather: Backfilling shall not be done in freezing weather except by permission of the Engineer, and it shall not be made with frozen material. No fill shall be made where the material already in the trench is frozen.

6. Excess Material: All completed lines shall be returned as nearly as possible to the original condition, including reseeding or resodding if necessary.

Excess excavated materials from trenches located in open fields shall be uniformly distributed within the construction limits.

Excess excavated materials within streets, driveways, parkways, highways and roads not required for backfilling or grading shall be removed from the site.

7. Testing of Pipeline: Hydrostatic testing of water lines shall be conducted in accordance with AWWA Standard C600 for ductile iron pipe and AWWA Standard C605 for PVC pipe.

Prior to performance of the test, all air shall be expelled from the pipeline to the satisfaction of the Engineer. This may be accomplished by means of air relief valves, blow-off valves, hydrants or other means. If required, taps shall be made at high points where air relief valves are not called for on the plans. Such taps shall be plugged after testing is complete. If possible, corporation stops should be installed before this test.

Apply a test pressure equal to the pipe rated design pressure. After the specified pressure has been reached, the pump shall be stopped and all pipe, fittings, valves, hydrants, joints, and appurtenances examined for leaks. Any visible leaks shall be repaired. After visible leaks are repaired, the pipe line shall be refilled with water and repressurized to the rated working strength of pipe. This pressure shall be maintained for a period of two hours. During this pressure test, a container of water shall be attached to the distribution line in a manner so as to allow the water in the container to flow into the pressurized lines. Water loss in the container shall be measured after the test. The installation will not be accepted if the amount of makeup water is greater than that determined by the following formulas.

For Ductile Iron Pipe (AWWA Standard C600):

$$L=(SD \times \sqrt{P}) / 148{,}000 *$$

Where: L=testing allowance, gallons per hour
S=length of pipe tested, feet
D=nominal diameter of pipe, inches
P=average test pressure, PSI

For PVC Pipe (AWWA Standard C605):

$$L=(ND \times \sqrt{P}) / 7{,}400 *$$

Where: L=testing allowance, gallons per hour
N=number of joints in the length of line tested
D=nominal diameter of pipe, inches
P=average test pressure, PSI

* Formulas are based on allowable leakages of 11.65 gpd/mi/in of nominal diameter for ductile iron and 10.5 gpd/mi/in of nominal diameter for PVC at a test pressure of 150 PSI. Tables containing the testing allowances are provided in AWWA Standards C600 and C605.

The system may be tested in whole or part as suits the Contractor's need; however, the Engineer may request the Contractor to complete the test on a portion of the system if he so desires.

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8. Removal, Restoration and Maintenance of Surface: The Contractor shall remove pavement and road surfaces as a part of the trench excavation, and the amount removed shall depend upon the width of trench specified for the installation of the pipe and the width and length of the pavement area required to be removed for the installation of valves, specials, manholes, or other structures. The width of pavement removed along the normal trench for the installation of the pipe shall not exceed the width of the trench specified by more than 6 inches on each side of the trench. The width and lengths of the area of pavement removed for the installation of appurtenances shall be equivalent to those for the associated pipe line or 6 inches wider than the appurtenance (whichever is greater). Wherever, in the opinion of the Engineer, existing conditions make it necessary or advisable to remove additional pavement, the Contractor shall remove it as directed by the Engineer and shall receive extra compensation therefor, provided such additional work is not shown in the drawings or specified. The Contractor shall use such methods, either drilling, chipping, or sawing as will assure the breaking of the pavement along straight lines. The face of the remaining pavement shall be approximately vertical.

If any pavement, trees, shrubbery, fences, poles, or other property and surface structures have been damaged, removed, or disturbed by the Contractor, whether deliberately or through failure to carry out the requirements of the Contract Documents, state laws, municipal ordinances, or the specific direction of the Engineer, or through failure to employ usual and reasonable safeguards, such property and surface structures shall be replaced or repaired at the expense of the Contractor. These damaged items shall be replaced, repaired or restored to a condition equal to that before the work began.

The Contractor shall restore all pavement, sidewalks, curbing, gutters, shrubbery, fences, poles, or other property and surface structures removed or disturbed as a part of the work to a condition equal to that before the work began, and shall furnish all incidental labor and materials. No permanent pavement shall be restored unless and until, in the opinion of the Engineer, the condition of the backfill is such as to properly support the pavement. Extra compensation will not be allowed unless a specific bid item exists.

9. Cleaning Up: Final cleaning up shall be completed as soon as practical.

All surplus water main materials furnished by the Contractor and all tools and temporary structures shall be removed from the site by the Contractor. All dirt, rubbish, and excess earth from the excavation shall be hauled to a dump provided by the Contractor and the construction site left clean to the satisfaction of the Engineer. All surplus water main materials furnished by the Owner and delivered to the site by the Contractor shall be removed and delivered by the Contractor to a location designated by the Owner. All surplus water main material furnished and delivered by the Owner shall be removed by the Owner.

The Engineer may require the Contractor to immediately rework the cleanup in areas where neglect is causing a nuisance. The Engineer shall be the sole judge of nuisance. Nuisance may result from a lack of improper workmanship at the time of pipe installation, or due to forces of nature after pipe has been installed. The notice shall be in writing and the re-cleanup shall be accomplished in 2 weeks from said notice. Cleanup so notified to be done and remaining undone after 2 weeks may be hired done by others and the cost deducted from monies due the Contractor.

General Condition 16 is further amplified to define a reasonable time for accomplishing repairs and replacement on roads, driveways, lanes, etc. to insure that they are kept passable; as follows:

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TIME NOTIFIED	REASONABLE TIME FOR WORK TO BE COMPLETED
WORK DAYS	
Notification during normal working hours before 2 P.M.	Within 2 hours after notification
Notification after 2 P.M.	By 9 A.M. next calendar day
HOLIDAYS, WEEKENDS	
Notification on non work days before 2 P.M.	Within 4 hours of notification
Notification after 2 P.M. or in evening before a non work day or in evening on non normal work day	By 11 A.M. next morning

If said repairs, replacements, etc. are not completed in the above allotted time they will be done by the Owner with charges for same to be taken out of money due Contractor. Notification may be by telephone call to Contractor or his representative on the job.

PIPE LAYING, PIPE AND FITTINGS

DS-10. HANDLING OF WATER MAIN MATERIAL INTO TRENCH: Implements, tools, and facilities shall be provided and used by the Contractor for the safe and efficient execution of the work. All pipe, fittings, valves, hydrants, and accessories shall be carefully lowered into the trench with suitable equipment in a manner that will prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. Pipe and accessories shall be inspected for defects prior to their being lowered into the trench. Any defective, damaged, or unsound material shall be repaired or shall be removed from the interior and machined ends of pipe and accessories before it is lowered into position in the trench. Pipe shall be kept clean during and after laying. HAND DIG BELL HOLE FOR ALL PIPE 8 INCHES OR LARGER. Excessive "crumblings" left in the ditch may be used for smaller pipe.

DS-11. JOINTS, END CLOSURE, AND FLOTATION: Joints shall be made in accordance with manufactures recommendations for the particular pipe being used. For a particular type of pipe the same type of joint shall be used throughout unless as otherwise specified.

When pipe laying is not in progress the open ends of installed pipe shall be closed to prevent entrance of trench water into the line. Enough backfill shall be placed on the pipe to prevent flotation. Any pipe that has floated shall be relaid as directed by the Engineer.

DS-12. DUCTILE IRON PIPE:

1. General: Ductile iron pipe and fittings as furnished by the Contractor shall be installed according to the manufacturer's recommendations and the specifications.

Metal thickness class, net weight of pipe without lining, length of pipe and name of manufacturer shall be clearly marked on each length of pipe.

Laying condition will be flat bottom trench, loose back fill Type 1 as per ANSI/AWWA C150/A21.50 with extra excavation for pipe bell so that weight rest on bottom of pipe body and is not elevated on one end by bell.

If the option to provide thrust restraint by use of pipe joint restraint is used, then laying conditions type 2 will apply with consolidation along distance of pipes as indicated in chart for specific restraint required. Consolidation therein is defined as placement of material under haunch and along side and

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bottom of pipe by shovel slicing or other means so that voids are eliminated and that material is consolidated to 90% Proctor along distances required. Consolidation shall be accomplished in maximum loose fill lifts of 8 inches.

For pipe in rock, placement of select material under pipe as described elsewhere shall be required.

2. Ductile Iron Pipe: Shall be ANSI/AWWA C150/A21.50; C151/A21.51; C115/A21.15 Class 50, except where otherwise specified. The pipe shall be cement lined and sealed ANSI/AWWA C104/A21.4. All pipe shall be installed in 40 foot lengths.

3. Coated Ductile Iron Fittings: Shall be ANSI/AWWA C110/A21.10, except shorter laying lengths will be acceptable ANSI/AWWA C153/A 21.53. Fittings to be 350 psi rated. Ductile iron fittings shall be coated with a 6-8 mil. nominal thickness fusion bonded epoxy conforming to the requirements of ANSI/AWWA C550 and C116/A21.16.

4. Flanged Joints:

A. Flanges: Shall be ANSI/AWWA C110/A21.10, C115/A21.15, ANSI B16.1, B16.5; or for steel C207 or U.S. Pipe "Flange-Type".

B. Bolts: Shall be ASTM A307, chamfered or rounded ends projecting ¼ to ½ inch beyond outer face of nut.

C. Nuts: Shall be ASTM A307, hexagonal, ANSI B18.2, heavy semifinished pattern.

D. Gaskets: Shall be ANSI/AWWA C111/A 21.11 and ASTM D1330, Grade I, red rubber, ring type, 1/8 inch thick; or U.S. Pipe "Flange-Type" 1/8 inch thick.

5. Mechanical Joints: shall be ANSI/AWWA C111/A21.11.

6. Push-on Joints: Shall be ANSI/AWWA C111/A21.11, except gaskets shall be neoprene or other synthetic rubber. Natural rubber will not be acceptable.

7. Couplings:

A. When plans indicate a coupling is required for jointing pipe without calling out a specific type of coupling, the following shall be used for the various type joints.

DI to DI	- Mechanical Joint Solid sleeve
DI to Steel or galvanized	- Mechanical Joint Solid sleeve with sleeve size changed to accommodate pipe OD
DI to PVC	- Mechanical Joint Solid sleeve with PVC adaptor with OD built up to correspond to DI pipe size or Flanged

Ductile iron bolted compression couplings may be used in lieu of the above. On 2 inch and under line sizes a ductile iron threaded compression coupling may be used.

B. Adaptor Couplings: To insure that slight misalignment will not create distortions in solid pipe runs, a Dresser Style 127 flanged adaptor will be required at locations as indicated on the plans. Large pipe will use Style 128 if 127 is not available.

On smaller lines (2 inches and under) a Dresser style 90 super service fitting with armored style gasket may be called out in lieu of other adaptor couplings.

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C. Tie backs will be required whenever the continuity of restraint has been made discontinuous by use of a coupling. When equipment is mounted on prefabricated skids, connection of piping to skids may be used in lieu of tie backs. Minimum tie back to be two 3/4 inch dia. all thread rod, bolt both sides of all flanges. Use more or larger tie backs if so indicated on plans.

D. When piping run is connected to a pump a vibration suppression attachment is required such as the adaptor couplings above. When pump end is in water an anti-electrolysis kit shall be included to bolt the pump to the piping.

8. Pipe Ends: Shall be clean and smooth.

9. Pipe Length: Shall be such that a space is left between pipe ends of not less than ¼ inch or more than 1 inch.

10. Tapping Saddles: Shall be brass with rubber sealing gasket, 250 psi pressure rating. If tapping saddles are installed on pipe containing polywrap, first place 3 wraps of polyethylene adhesive tape around pipe and then tap through tape and poly film. Repair any damage to wrap with tape and extra film as per ANSI/AWWA C105/A21.5.

After tap has been made, wrap and tape service line to 3 feet from main line and encase saddle with wrap and tape to 1 foot each side saddle on main line. Protect saddle and service line in this fashion irrespective of whether main line has been encased with polywrap. Use sintered teflon pipe dope or TFE tape on all screw threads.

11. Shop Coating and Lining:

A. Cement Lining: Shall be ANSI A21.4.

B. Bituminous Coating: Shall be manufacturer's standard. Provisions relating to characteristics of bituminous seal coat as to deleterious effect upon the quality, color, taste, or odor imparted to potable water shall be strictly observed. Standard pipe coating outside.

12. Pipe Cutting: Cut ends at right angles to pipe axis, cut with a mechanical cutters; dress cuts with a file to remove roughness and to taper end to slip into coupling, oxyacetylene cuts are not permitted.

13. Pipe Laying: As per manufactures requirements.

DS-13. PLASTIC PIPE:

1. General: Plastic pipe and fittings as furnished by the Contractor shall be installed in accordance with the manufacturers recommendations and these specifications.

Pipe shall be Polyvinyl Chloride as manufactured from virgin NSF approved ASTM Type I - Grade 1 impact improved resin and as approved by NSF for use in handling potable water. Pipe shall contain from one to two percent titanium dioxide.

Samples of pipe shall be submitted to the Engineer for his approval. Physical and chemical data sheets shall also be submitted to the Engineer and pipe shall conform to ASTM Specification D1784-60 T. Pipe shall be tested for sustained pressure in accordance with ASTM Specification D1598-63 T and for quick burst in accordance with ASTM Specification D1599-62 T.

All pipe as delivered shall conform with commercial standard CS256-63. Lack of "Marking and Declaration of Compliance" as contained in Sec. 8 thereof shall automatically cause rejection of pipe.

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PR200 pipe shall have a maximum design stress of 2000 psi and conform to SDR-21 as given in CS256-63. PR160 pipe (SDR26) and PR250 pipe (SDR17) shall be similar. All pipe shall be installed in 40 foot lengths.

All fittings, couplings and adaptors shall be manufactured out of materials conforming to the same standards as the pipe and having a design strength equal to or better than adjacent pipe. Reducers shall have smooth transition. Bushings reducers will not be allowed unless specifically called out.

All plastic pipe fittings will be NSF approved and marked.

MINIMUM DIMENSIONS

Pipe Size	Ave. Outside Diameter Steel Pipe Size	Wall Thickness SDR 21 PR200 PSI	wt/ft	Wall Thickness SDR 26 PR160 PSI	wt/ft	Wall Thickness SDR 17 PR250 PVC		wt/ft
3/4"	0.840	Sch 40 .109	0.21					
1"	1.315	Sch 40 .133	0.31					
1½"	1.900	Sch 40 .145	0.50					
2"	2.375	.113	0.51					
2½"	2.875	.137	0.74					
3"	3.500	.167	1.10	.135	.90		0.140	0.650
4"	4.500	.214	1.9	.173	1.48		0.169	0.950
6"	6.625	.316	4.2	.255	3.22		0.206	1.411
8"	8.625	.410	7.1	.332	5.47		0.265	2.34
10"	10.750	.511	11.1				0.327	3.57
12"	12.750	.606	15.6					
14"	14.000	.665	18.9					
16"	16.000	.760	24.9					
18"	18.000	.857	31.7					
20"	20.000	.952						
24"	24.000	1.143						
30"	30.000	1.428						

MINIMUM DIMENSIONS - ALTERNATE PIPE

Pipe Size	OD Cast Iron Size	Wall Thickness DR 25 167 PSI	wt/ft	Bell OD
14	15.3	0.612	19.24	18.2
16	17.4	0.696	24.95	20.4
18	19.5	0.780	31.52	22.9
20	21.6	0.864	39.17	25.6
24	25.8	1.032	56.05	30.4

MINIMUM DIMENSIONS - ALTERNATE PIPE

Pipe Size	OD Cast Iron Size	Wall Thickness DR 18 235 PSI	wt/ft	Bell OD
14	15.3	0.850	26.24	18.7
16	17.4	0.967	34.19	21.0
18	19.5	1.083	43.08	23.5
20	21.6	1.200	53.92	26.3
24	25.8	1.433	76.99	31.2

Above alternate pipe to conform to AWWA C905 and UNI-B-11. Some casing up sizing may be required with this pipe where used as a carrier as compared to chart these specs.

2. Certificate of Conformance: Before pipe may be installed on the job, the pipe supplier shall submit a Certificate of Conformance regarding the type and quality of the pipe to be supplied on the job. The Certificate of Conformance shall in effect state the material is PVC 1120 and meets the requirements

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of ASTM D2241-65 or latest revision thereof. Also included shall be approximate quantities and sizes to be supplied on the job and a reference to the name of the job in question. Included shall be an explanation of pipe marking code.

The statement shall be sent direct from the manufacturer on their letter head stationary to the following: 1 copy-Owner involved, 1 copy-State Highway Dept., if pipe is being laid on their right-of-way, and 1 copy-Engineer. Specifically unacceptable will be reproduced copies delivered by the Contractor.

3. Field Inspection: Joints may be cut out of the pipeline for inspection and testing. This does not imply that indiscriminate cutting of joints will be allowed. The Engineer may perform various tests at times that he deems necessary or desirable, including pressure tests with his own equipment. Pipe may be cut at such times to facilitate such tests and the Contractor shall perform such cuts and repairs as requested.

4. Pipe Jointing and Coupling:

A. General: Couplings shall conform to ASTM Spec D3139 and Uni Bell B-12. The (coupling-joint system) shall have been tested and approved by the National Sanitation Foundation and certification of said approval shall be submitted.

USE PVC COUPLINGS FOR PIPE SIZE 2 INCHES AND BELOW. USE MECHANICAL JOINT OR PUSH ON JOINT DUCTILE IRON FITTINGS FOR ALL SIZES ABOVE 2 INCHES.

Pipe shall have a ring painted around the spigot end in such a manner as to allow field checking of setting depth of pipe in socket.

If mfgrs. design is such that excessive homing of pipe is detrimental, then two rings shall be provided to indicate tolerances required and contractor shall back pipe up to maintain position required.

B. Rubber Gasket Joint: The push-on joint shall be a single rubber gasket joint designed to be assembled by the positioning of a continuous, molded, rubber ring gasket in an annular recess in the pipe or fitting socket and the forcing of the plain end of the entering pipe into the socket, thereby compressing the gasket radially to the pipe to form a positive seal. The gasket and the annular recess shall be so designed and shaped that the gasket is locked in place against displacement as the joint is assembled. Details of the joint design and assembly shall be in accordance with the joint manufacturer's standard practice.

Pipe may be furnished with a socket as an integral part of each piece of pipe or a coupling type socket with rubber gasket on each side may be provided. Ends of pipe intended to be inserted into a socket shall be factory beveled. In the event it is necessary to field cut a joint of pipe, the pipe shall be cut with a rotary cutter or with the aid of miter box to provide a square end. The end which will be inserted into a socket shall be beveled with a milled curved-tooth flat file or other approved device. Use a factory pipe end as a guide. Also mark a stop guide on the pipe by use of a pencil or crayon to provide visual observation for proper insertion depth.

The manufacturer shall furnish drawings of the joint and gasket. The coupling system shall be pressure rated equivalent to the pipe or better. The rubber O-ring joints for plastic pressure pipe shall conform with the requirements of ASTM D3139. The joints shall have been tested and approved by the National Sanitation Foundation and certification of said approval shall be submitted.

The dimensions of the bell, socket, and plain end shall be in accordance with the manufacturer's standard design dimensions and tolerances. Such dimensions shall be gauged at sufficiently frequent intervals to assure dimensional control and satisfactory joint assembly.

Gasket dimensions shall be in accordance with the manufacturer's standard design dimensions and tolerances. The gasket shall be of such size and shape as to provide an adequate compressive force against

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the spigot and socket after assembly to effect a positive seal under all combinations of joint and gasket tolerances. The trade name or trademark, size, mold number, gasket manufacturer's mark, and year of manufacture shall be molded in the rubber.

Gaskets shall be vulcanized natural or vulcanized synthetic rubber. No reclaimed rubber shall be used. When two hardnesses or rubber are included in a gasket, the soft and hard portions shall be integrally molded and joined in a strong vulcanized bond. They shall be free of porous areas, foreign material, and visible defects.

The required properties of the gasket rubber and the required method of test are given in the following table:

Property	ASTM Test Method	Main Body of Gasket	Harder Portion (if used)
Hardness, Durometer "A"	D676-59T at 76ºF±6	45-70	78-90
Min. ultimate Tensile - psi	D412-61T	2,000	1,200
Min. ultimate Elongation - percent*	D412-61T	300	125
Min. aging - percent +	D572-61º-	60	60

* Of original length.
+ Of original values of tensile and ultimate elongation.
º- Oxygen pressure method; after 96 hr at 70ºC±1 at 300 psi ±10.

The gasket manufacturer shall set up such quality control procedures as will insure the gaskets meeting the requirements of this standard.

C. Lubrication: Lubrication shall be water soluble, non-toxic, be non-objectionable in taste and odor imparted to the fluid, be non-supporting of bacteria growth, and have no deterioration effect on the PVC or rubber gaskets. Lubricant containers shall be labeled with the trade name or trademark of lubricant manufacturer or pipe manufacturer.

D. PVC to Ductile Iron or Steel: Use Dresser style 38 or 62 to couple different pipes. Cover with poly wrap and tape to 1 foot each side coupling.

E. PVC to Butterfly valves: All tapered ends of PVC pipe shall be cut off square before being placed into butterfly valves.

DS-14. RESTRAINED JOINT PVC PIPE: Certain applications will require plastic pipe with restrained joints to prevent joints pulling apart. Restrained joint pipe shall be used in locations such as in casings, river or creek crossings, etc., when specifically listed in the bid proposal form. Installations in casings will be as per ordinary PVC in casings and in creeks without casings, pipe to be laid as ordinary PVC is laid in creeks. Restrained joint PVC pipe will be used for all directional bored installations.

Restrained joint pipe will confirm to standards of ordinary PVC pipe with the following additions and/or differences. (Where difference is noted this will govern.) ASTM D2241, NSF NO14 certification, ASTM F477 Gasket, ASTM D1784 with cell classification 12454-B (PVC 1120). The restrained joint shall be made by machining matching grooves in the pipe and coupling and inserting a nylon spline into the

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groove to provide restraint. Pipe to be Certainteed Yelomine or equal. Couplings shall conform to pipe and be Certa-Lok by Certainteed.

W A L L T H I C K N E S S

SIZE INCH	PIPE OD	COUPLING OD	PIPE CLASS 160	PIPE CLASS 200	PIPE CLASS 250
2	2.375	3.200	---	.113	.140
3	3.500	4.380	---	.167	.206
4	4.500	5.470	.173	.214	.265
6	6.625	7.840	.255	.316	.291
8	8.625	10.190	.332	.410	.390
10	10.750	12.200	.511	---	---
12	12.750	14.420	.606	---	---

DS-15. BUTTERFLY VALVE: Valve shall conform to AWWA C504 Rubber-Seated Butterfly Valves and have protective epoxy interior coating according to AWWA C550. Valve to have slip or MJ end, horizontal hex shaft, underground operator with 2 inches nut. Closure turns similar to like size gate valve. M & H style 450 and 4500.

DS-16. GATE VALVES: Gate valves shall conform to AWWA Specification C509. Gate valves shall have: Fully Encapsulated Wedge nonrising stem; double "0" Ring Seal; 2 inches square operating nut opening counter clockwise; Mechanical joint or slip end; 250 psi design working pressure; 304 Stainless Steel nuts and bolts; C550 epoxy coated inside and out; wall thickness exceeding Cl53. Valve shall be set in concrete pad. Valve shall be set vertical and in true alignment.

All valves to have concrete thrust block placed underneath valve of same face area as shown in restraint chart for tee of similar pipe size; or pipe restraint method may be used in lieu thereof.

DS-17. VALVE BOX: Valve boxes shall be two piece cast iron screwed type with a 5¼ inch shaft and 9 inch bell. Lid and ring shall be of cast iron and ring shall slip over outside diameter of box top to prevent lateral movement of lid.

Valve boxes shall be set plumb, flush with the ground surface.

In certain rural settings (farm land areas) it may be desirable to leave the valve box stick up in the air about 3 feet above ground to allow the valve to be easily found. In this circumstance 6 inch PR200 PVC will be used as a valve box riser in lieu of the normal box. Valve cover and ring will be cast iron as in normal valve box. The Contractor shall be prepared to install either type box at the same bid price and to furnish 2 keys - one for the normal setting and one with the extended 3 foot length. Valves shall be installed directly under fences in so far as possible.

DS-18. CONCRETE:

1. Cement: Cement shall be ASTM C150 Type 1.

2. Aggregate: All coarse aggregate for concrete shall consist of sound durable rock particles, free from objectional coatings and frozen and cemented lumps.

Gradation coarse aggregate:

Passing	2"	100%
"	1½"	95 - 100%
"	3/4"	35 - 70%
"	3/8"	10 - 30%
"	No. 4	0 - 5%

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Fine aggregate for Portland Cement concrete shall be a fine granular material naturally produced by the disintegration of rock of a siliceous nature. Fine aggregate shall be free from injurious amounts of organic impurities.

Gradation:	Passing 3/8"	100%
	" No. 4	95 - 100%
	" No. 20	40 - 75%
	" No. 50	5 - 30%
	" No. 100	0 - 10%

3. Water: Water shall be reasonably clean, free from injurious amounts of oil, acid, alkali salt, organic matter, vegetable matter, and other deleterious substances.

4. Proportion: One yd^3 shall have 6.5 sacks of cement. Not more than 5.5 gal. of water per sack of cement. Strength - 3000 psi at 28 days.

5. Forms: Forms for concrete shall be build true to the lines and grades designated, and be mortar-tight and of sound materials adequate to prevent distortion during the placing and curing of concrete.

6. Placing Concrete: Placing concrete in any unit of a structure shall not begin until the forms, bracing, reinforcing steel and preparations for placing and finishing have been approved. Concrete shall be placed with minimum handling to avoid the segregation of aggregates and displacement of reinforcing steel. Walking or working on reinforcing steel protruding through transverse or longitudinal headers will not be permitted until the concrete has reached an age of 24 hours. Each placement shall be completed in a continuous operation with no interruption in excess of 45 minutes between the placing of continuous portions of concrete. Concrete shall be deposited in the forms in horizontal layers as near final position as possible, and shall be consolidated by continuous working with suitable tools and equipment. The concrete shall be vibrated immediately after it has been placed in the forms.

7. Reinforcing Steel: Reinforcing steel bars shall meet the requirements of ASTM A15 58T, Billet steel, intermediate and hard grades, or ASTM A16 59T, Rail steel, or ASTM A160 57T, Axle steel, intermediate and hard grades. All bars shall be deformed to conform to ASTM A305 56T. Welded steel wire fabric shall conform to requirements of ASTM A185 58T.

Splice lengths shall be 20 bar diameters. Reinforcing support shall be such that adequate cover is provided over all bars and proper spacing is maintained.

DS-19. END OF LINE CLEANOUT: Cleanouts shall be constructed as shown on the plans. Cleanout to be 2" with saddle and ford ball valve B11-777 or equal. Piping to be schedule 80 PVC.

DS-20. AIR RELEASE AND/OR WATER TEST PIT:

1. Air Release Valve: Air release valves shall be Apco 3/4 inch No. 65 connected to the top of the main line with a 3/4 inch corporation stop. The vent pipe shall be as shown on the details with a copper screen soldered over the opening. Valve to be located as shown on the plans or as directed by the engineer.

2. Pit: For air release use 18 inch PVC pipe with minimum 3/8 inch wall. For water test pit use 30 inch PVC. Cover for 18 inches pit to be 4 inches deep cast iron with 11 inches diameter recessed lid, including positive means to prevent sidewise movement of both ring and lid, lid weight 11 pounds, ring 25 pounds. Cover for 30 inches pit to be cast iron, Ford No. 30 Monitor cover, 20 inches lid, 7½ inches deep, weight 131 pounds.

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3. Water Test Pit: Assembly to be essentially a 3/4 inch water source on either side of a line size valve. The line size valve price shall not be included in the bid for the test pit. All other items shall be included in this bid. 3/4 inch water source shall consist of a tap (Saddle) onto the main line with a 3/4 inch corp stop, a short piece of 3/4 inch type K copper pipe to bring the water near the top of the pit and a ball valve shut off.

4. Tapping Pipe:

A. PVC: Use saddle for all PVC pipe, Ford Brass Saddle S70 for sizes including 8 inches. For 10 inches and above use Ford 202B.

B. Ductile: Tap corp stop directly into pipe or use Ford Ductile Iron Saddle F202. Any saddle placed on Ductile Iron shall be poly wrapped and taped to 1 foot each side of saddle.

If tapping saddles are installed on pipe with polywrap, first place 3 wraps of polyethylene adhesive tape around pipe and then tap through tape and poly film. Repair any damage to wrap with tape and extra film as per ANSI/AWWA C105/A21.5. After tap has been made wrap and tape saddle as above.

C. Corp Stop: Use 3/4 inch Ford Ball Corp with Buna N rubber seats with pack joint on outlet.

Use sintered teflon pipe dope or TFE tape on all screw threads from main line.

DS-21. POLY WRAP: Encase ductile iron pipe, fittings, valves, valve boxes and appurtenances in 8-mil thick polyethylene encasement installed according to ANSI/AWWA C105/A21.5.

Although the polyethylene encasement should prevent contact between the pipe and surrounding backfill and bedding material, it is not intended to be completely airtight or watertight. All lumps of clay, mud, cinders, or other materials that might be on the pipe surface should be removed prior to installation of the polyethylene encasement. Care should be taken to prevent soil or bedding material from becoming trapped between the pipe and the polyethylene.

The polyethylene film should be fitted to the contour of the pipe to effect a snug, but not tight, encasement with minimum space between the polyethylene and the pipe. Sufficient slack should be provided in contouring to prevent stretching the polyethylene when bridging irregular surfaces, such as bellspigot interfaces, jointed joints, or fittings, and to prevent damage to the polyethylene during backfilling operations. Overlaps and ends should be secured with polyethylene-compatible adhesive tape, tape at least every 4 feet.

For installation below the water table or in areas subject to tidal actions, it is required that both ends of the polyethylene tube be sealed as thoroughly as possible by wrapping circumferentially with adhesive tape or strapping at each joint overlap.

As with all protection methods, proper installation is vital to the success of polyethylene encasement. The actual installation sequence, however, is less important than the quality and care taken during installation.

DS-22. LOCATOR WIRE: Locator wire shall be THHN-12 gauge solid copper with blue cover. Locator wire shall be 2,500' (Ft.) rolls and be installed in such a manner to keep splices to an absolute minimum. Rolls of 500' (Ft.) are only acceptable on jobs of less than 500' (Ft.) in length. All connections or splices shall be fastened with Thumb Bolt splicing kit with electrical wrap tape to be with “3M Super 33+”. Wire

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to be installed along all lines, and services, and outside all valve boxes to extend 12" above top of valve box, see drawing. Wire to be duct taped to pipe or loop wire around each pipe one time.

DS-23. BORING: Borings shall meet all requirements of Missouri Department of Transportation (MoDOT) and Contractor shall obtain necessary permits and do all work in accordance with their requirements.

Borings shall be made so that line and grade of water line may be carried continuously through encasement. Boring encasement to be steel pipe with a wall thickness of a minimum as per table in TS44-9. Encasement to be new, unused steel pipe with yield strength of 35,000 psi conforming to ASTM A53-B. Casing diameter to be as shown in table unless specifically bid differently in bid proposal. Contractor may use larger casing size if he desires, but shall be responsible for any job variations encountered by this choice.

Contractor shall complete bore before other work is started so that slight misalignments can be compensated for in other work.

While quality of work is required, this job is set up with the boring done first as previously stipulated to take advantage of a relaxed specification for casing alignment and grade that is possible within the confinements of the overall project layout.

Casing shall be installed as boring equipment removes material from hole.

Random lengths of steel casing may be used; but all ends must be V grooved-butt welded to adjacent casing pipe around the complete perimeter of the pipe. Welds to be water tight and shall be equal to or stronger than adjacent pipe. Casing joining procedure must be such that concentricity of the entire completed casing will be maintained.

Boring to include all work of digging bore pit, casing and all items associated therewith, for the completed job.

In some layouts part of the casing may be installed by open cut methods and attached to the ends of the bored casing. This will be shown as a separate bid item where and if included on the job.

Borings on railroads shall follow similar procedures to above and meet railroad requirements.

DS-24. DIRECTIONAL BORING: Directional bores shall be completed using a directional boring machine supplied with an output signal to allow the Contractor to track the location of the drill head at all times. Size of drilling equipment shall be adequate for the job, but not grossly oversized such that an undue amount of thrust or torque is placed on the product pipe. Drilling fluids shall be selected for the site specific soil and ground water conditions. Confine free flowing (escaping) slurry or drilling fluids at the ground surface during pullback or drilling to prevent damage or hazardous conditions in surrounding areas. Remove all residual slurry from the surface and restore the site to pre-construction conditions.

All pipelines provided in the restrained joint area shall be installed to a minimum depth of 4 feet for creek crossings and 10 feet for river crossings. All work associated with installing restrained joint pipe in the designated areas and, if crossing wetlands, creeks, rivers, streams or other waterways, shall conform to all permit requirements and to state and federal regulations. The restrained joint areas depicted on the drawings are not to be considered exact and represent the generalized location of the restrained joint pipe. The actual location, length, and size of the restrained joint area will be determined in the field by the Owner's Representative and may differ from that shown on the drawings. The actual field location, length and size may differ due to, but not limited to, staking the pipelines alignment to avoid or minimize disturbance to surface obstructions, re-routes due to pipeline easement changes, re-routes authorized by the Owner or Owner's Representative based on actual field conditions, and or any other reasons deemed necessary by the Owner or Owner's Representative.

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A pilot hole shall be bored first, with an angle of entry not to exceed 20°, and proceed under the obstacle being crossed while maintaining the required soil cover (4-ft. for creek crossings, 10-ft. for river crossings). The pilot hole shall extend to the point of exit, on the other side of the obstacle, maintaining an angle of exit not to exceed 12°. The product pipe shall be restrained joint PVC pipe, as specified in this manual, unless stated otherwise on the plans.

The product pipe shall be assembled on the exit side of the bore, and installed by back-reaming in the reverse direction. Deviations from this method shall be approved by the Engineer. The pull section shall be adequately supported during pullback. Do not drag pipe on the ground. Above-ground pipe assembly shall be checked for suitability of installation before pullback. The borehole shall be reamed to approximately 1.5 times the outside diameter of the product pipe. Use sufficient drilling fluids and monitor pullback pressure to detect any problems before heaving of the bore path surface occurs. Product pipe may be deflected no greater than 80% of the manufacturer's maximum recommended deflection. Maintain the minimum cover required at each restrained joint area. Provide a written statement from the pipe manufacturer as to the minimum pipe bending radius and/or deflection allowed and as to the acceptance/requirements of using their pipe in the Directional Drilling method. Provide this information during the submittal phase of the project.

Use a swivel when back-reaming to prevent rotational torque (torsion) on the product pipe. Cap product pipe as necessary to prevent drilling fluids from entering.

Trace bore path by interpretation of electronic signals sent by a monitoring device. Submit to the Engineer a print out of the bore path with respect to the obstacle crossed for the development of as-built drawings and to exhibit that sufficient cover was achieved during the bore. The bore path print-out must be submitted prior to final pay request.

Fully repair any and all bore/relief pits constructed including vacuuming drilling fluids and compacting disturbed earth.

Provide the required long-body transitions, couplings and reducers as necessary to complete the connection to the adjoining pipe. The Contractor shall provide the required depth of cover over the pipe upon tying in the restrained joint pipe with the adjoining pipeline. A factory trained, licensed representative from the Contractor shall be on-site to complete the heat fusing of each section of polyethylene pipe, if used. The Contractor's representative shall be trained and licensed by the pipe manufacturer.

If, at the time of construction, any of the following conditions should appear, the Owner's Representative shall be notified:

a. Evidence of recent severe cutting or erosion.

b. Crossing of recent channel improvements where new stream location is not stabilized, such as pilot channels, newly constructed pond spillways, etc.

c. Crossing of proposed channel improvements.

The Owner's Representative shall review said areas following notification. If, in the opinion of the Owner's Representative, such areas warrant the addition of a restrained joint section, the Owner's Representative shall authorize the addition of the restrained joint area under the provisions of this section.

DS-25. PVC INSTALLED IN CASINGS: When PVC is installed in casings the following procedures shall be followed:

1. The entire casing shall be installed before any pipe is inserted into the casing. Inspection will be by lamping and a full circle shall be required to be seen to prove that the casing is concentric from end to end.

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2. Except as specifically shown otherwise on the plans, the depth to the top of the casing shall in general be 3 feet -6 inches below the lowest level of surface being crossed. If a ditch lies near to the required casing point such that lowering the casing would allow the PVC carrier pipe to be run on a straight line (rather than introducing multiple bends); then the casing shall be lowered a sufficient amount to allow for the PVC carrier pipe to be run straight.

3. A repair style coupling, dresser style coupling or similar device shall be installed on either side of the end of the casing in addition to the regular pipe joints to allow for future removal-repair of the PVC carrier pipe.

4. PVC carrier pipe shall be as long as possible (40 feet) to minimize the number of joints contained within the casing. If it is possible to install PVC without a joint in the casing (because of shortness of casing length), it will be unnecessary to place PVC pipe on skids and the pipe may be laid directly on the casing.

5. Whenever a PVC carrier pipe joint is required within the casing the PVC shall be placed on skids.

A. Skids shall be plastic.

B. Skids shall have a toothed male strap on one segment with female strap on other so multiple segments can be banded together.

C. Skid thickness to be sufficient to raise pipe bell off of casing so no weight rests on bell.

D. Use flux soap or drilling mud to lubricate skids.

E. Skids to be Raci by Recon or equal.

6. Table of pipe sizes and maximum skid support for PVC. In addition to tabular spacing split skid spacing dimensions so that a skid is located at least one foot from each end of casing.

7. The ends of casing shall be sealed with double 8 mil poly wrap and duct taped.

Nominal Pipe Size Inches	Casing Size Internal Diameter Inches	Casing Wall Thickness Inches		Maximum* ft. Spacing Between Adjacent Skids
		Highway Use	Railroad Use	
4"	10"	3/16	¼	4½'
6"	12"	3/16	¼	6'
8"	14"	3/16	5/16	7'
10"	16"	3/16	5/16	8½'
12"	18"	¼	5/16	9½'
14"	20"	¼	3/8	10'
16"	22"	¼	3/8	10'
18"	24"	3/8	7/16	10'
20"	26"	3/8	7/16	10'
	28"	3/8	½	
	30"	7/16	½	
24"	32"	7/16	½	10'
	34"	7/16	9/16	
30"	36"	7/16	9/16	10'
	40"	½	9/16	
	42"	½	9/16	
	44"	½	9/16	

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*Measurement from centerline to centerline of skid. Use at least 3 skids per pipe irrespective of chart values.

8. PVC pipe may be installed by using drawn cable or jacking. The force used to install the pipe must spread over the pipe end on which it bears, by use of a flat piece of wood or other similar force sustaining material.

9. Casings may be installed by boring or open cut methods as is needed in the specific circumstance. Random lengths of steel casing may be used; but all ends must be V grooved-butt welded to adjacent casing pipe around the complete perimeter of the pipe. Casing joining procedures must be such that concentricity of the entire completed casing will be maintained.

DS-26. DUCTILE IRON INSTALLED IN CASINGS: Procedures similar to PVC installation shall be used with the following additional requirements:

1. Minimum 3 skids required per nominal length of pipe irrespective of size.

2. Use same wall thickness of casing as per PVC table.

3. Table of casing size for DI pipe types.

Casing Size ID Inches	Pipe Size With Slip Joint End	Pipe Size With MJ End
12"	4"	---
14"	6"	4"
16"	8"	6"
18"	10"	8"
20"	12"	10"
22"	14"	12"
24"	16"	14"
26"	18"	16"
30"	20"	18"
32"	24"	20"
36"	---	24"
40"	30"	---
44"	---	30"

DS-27. RESTRAINED JOINT DUCTILE IRON:

1. River Crossing Pipe: Pipe designated as river crossing pipe shall be ductile iron and have a ball and socket type joint to meet severe requirements while in place with the allowance for free turning deflection while still maintaining a restrained joint.

Pipe and fittings shall be equivalent to Clow F-141-River Crossing pipe or US pipe Usiflex boltless flexible joint pipe. Pipe shall be cement lined. Laying length to be about 18 feet. The joint shall have a deflection allowance of 15º but pipe trench shall be dug such that a maximum to 10º deflection or less will be maintained.

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Pipe shall conform to the following minimums:

Size	ANSI Class	Nominal wt #/ft
4	4	21
6	4	25
8	5	34
10	5	45
12	5	56

Pipe end shall be closed as it is placed across river. Fill water, if needed, shall be potable. Pipe shall not leak and be pressure tested in place before remainder of line is joined up. Both ends of pipe shall have a short connecting piece. One end of connecting piece is to be compatible with flex joint and other end shall be push-on joint bell type.

Construct end joint restraint by digging a ditch across connecting piece and filling with concrete. Concrete to be 15 inches wide x 4 feet long x 4 feet high and have 4 sets No. 4 rebars built in a rectangular cage placed in concrete. Pipe to be in center of concrete block.

2. Restrained Push on Joint Pipe: Shall be capable of being deflected after assembly, shall provide means to stop pull out such as factory welded bead on the spigot end which is locked into bell, a friction assembly placed around the spigot end which is cinched into the pipe, which assembly is then restrained by being locked into the bell or devices similar to US Pipe TR Flex. This type joint is acceptable for use with optional restrained joint fittings, valves-wherein concrete thrust blocking is eliminated. Except for above optional use condition this pipe will have a specific bid item when used on the job.

DS-28. THRUST BLOCKING: Thrust blocking shall be built using redi-mix concrete (3,000 psi) or by using premix sacks which are field mixed with water in a portable mixer or other container such as a mud box or wheel-barrow before it is placed in the Trench. Specifically unacceptable is placing bags of premix in the trench in a bag.

Face dimensions (The face against unexcavated earth) shall be as given in "CHART FOR THRUST BLOCKING (hereinbelow)" these specs. The centerline of the Face dimensions shall be located at the centerline of the pipe and ½ of vertical concrete shall be above and below the centerline. Horizontal centerline shall likewise split the distance.

Valves shall have concrete placed below valve and face dimension to be equivalent to tee sizes. Use hairpin shaped rebars around valves embedded into concrete.

HORIZONTAL THRUST BLOCKING BEARING AREA

Design Pressure = 160 PSI
Soil Bearing Capacity = 2,000 PSF
Factor of Safety = 1.5

Minimum Bearing Area (Square Ft.)
Type of Fitting (Bends in Degrees)
Bend°

Pipe Size	11.25°	22.5°	45°	90°	Tee or Cap	Cross*
4" and Below	1.0	1.0	1.2	2.1	1.6	2.1
6"	1.0	1.3	2.6	4.8	3.8	4.8
8"	1.2	2.4	4.6	8.5	7.0	8.5
10"	1.9	3.7	7.2	13.3	10.6	13.3
12"	2.7	5.3	10.4	19.2	16.0	19.2
14"	3.6	7.2	14.1	26.1	16.0	26.1
16"	4.7	9.4	18.5	34.1	16.0	34.1
20"	7.4	14.7	28.9	53.3	16.0	53.3
24"	10.6	21.2	41.6	76.8	16.0	76.8
30"	16.6	33.1	64.9	120.0	16.0	120.0

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This table for concrete thrust blocks all pipe types. Block valves with area required for T. Height of block no greater than ½ total trench depth. Width (1 to 2) x height For vertical compression bends (down thrust) use same values in this table.

For valves on cast iron or concrete pipe, optional restraint is acceptable. Place concrete pad under valve so weight is not borne by adjacent pipe and lay pipes with restrained joints for pipe distances in restrained joint table and no thrust blocking will then be required.

VERTICAL UP THRUST BLOCKING GRAVITY WEIGHT

Design Pressure = 160 PSI
Factor of Safety = 1.5

Minimum Concrete Required (Cubic Ft.)
Type of Fitting (Bends in Degrees)
Bend°

Pipe Size	11.25°	22.5°	45°	90°
4" and Below	4.0	8.0	14.5	20.0
6"	9.0	17.5	32.0	45.0
8"	16.0	31.0	57.0	80.5
10"	24.5	48.0	89.0	126.0
12"	35.5	69.5	128.0	181.0
14"	48.0	94.5	174.0	246.0
16"	63.0	123.0	227.0	322.0
20"	98.0	192.0	355.0	503.0
24"	141.5	277.0	512.0	724.0
30"	221.0	433.0	800.0	1,131.0

Wrap 2 - #6 hairpin rebars around joint and reinforce with 2 - #4 stirrup and 4 - #4 rebars.

PIPE RESTRAINT
In Lieu of Concrete Thrust Block
For Ductile Iron Pipe
Number of Pipe Required Each Direction

Pipe Size	Bend°				
Inches	11¼	22½	45	90	Tee or End*
4 and Below	1	1	2	2	2
6	1	1	2	2	2
8	1	1	2	3	2
10	1	1	2	3	3
12	1	2	2	4	3
14	1	2	3	5	3
16	2	2	3	6	4
20	2	2	3	7	5
24	2	2	4	8	6
30	2	2	4	10	7

Contractor may install restrained joint pipe at bends and valves in lieu of concrete blocking. General procedure according to DIPRA but specific restraint devices must be approved by Engineer. Set screw retainer glands will not be acceptable. Pipe to be attached to bend and adjacent pipe to total number of pipe shown in table. Contractor must also compact trench for same length to 90 percent Proctor density for material to slightly above pipe centerline. Compact material in maximum loose lifts of 8 inches. Valves on ductile iron pipe may be restrained by using same pipe numbers as in chart for T. Place concrete pad under valve so weight is not borne by adjacent pipe and restrain joints similar to bends.

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Material to be shovel sliced under pipe to insure all voids are eliminated and then area compacted as previously stipulated. Should contractor receive approval of this method but not be doing an adequate job the engineer may reject acceptance and contractor shall then use concrete reaction backing (*For a tee this is the branch run).

Tie backs shall be used to hold assemblies together such as at a tee which has a valve located on one or various sides and at other places where some type of restraint is required to prohibit movement and thus create a leak. Concrete reaction backing, discussed elsewhere, is required to transmit thrust to undisturbed earth and each specific item such as a tee or bend or valve has a specific concrete thrust block requirement for that individual item. When these items have been aggregated and made continuous by use of tie backs some of the concrete reaction backing (that which has been made redundant) may be eliminated. In these cases, the entire aggregated system may be treated as one for the purpose of concrete thrust blocking and the contractor may submit a system, approvable by the engineer, that will do the job with less concrete than would have been required if each item were separate.

Tie backs shall consist of 3/4 inch diameter all thread rods with nuts on both sides of all fittings, bolt holes, etc. which are a part of the aggregated system. The rods shall be run through the bolt holes in fittings, valves, etc. and slightly bowed to traverse around the body of these or devices may be added which hook into said holes so that rods may remain straight or anchor straps, socket clamp assemblies, etc. may be used as suits the contractors normal procedures. When the assembly has been completed a bitumastic coating (25 mils min. thickness) shall be applied to cover all of the rods, nuts, washers, etc. used in the assembly.

Use the following chart for water lines with 150 psi acting pressure and below. Higher operating pressures shall be prorated on the ratio of pressures. Assume area for root thread of rod to be 0.3 inches

Chart for Number of 3/4 inch rods vs. pipe size

Pipe Size	No. of Tie Back Rods
3" and Below	2
4" through 8"	4
10" through 14"	6
16" through 18”	8
20" through 24”	12

DS-29. COPPER PIPE: All copper water pipe shall conform with ASTM Specifications B88 "Type K". When a service line to the meter is copper, the size shall be 3/4 inch unless otherwise specified.

DS-30. JACKED COPPER: Missouri Department of Transportation (MoDOT) requires copper for water lines 2 inches and under crossing state highways. Contractor to use type K copper in maximum length obtainable and effort shall be made to keep joints from under the paved surface. Joining of copper pipe shall be accomplished by use of FORD pack joint.

Pack joint shall be used to couple plastic pipe with copper. For Pb or Pe pipe use pack joint with stainless steel insert. For PVC pipe use a schedule 80 PVC Nipple 12 inches long which is inserted into the pack joint and the other end is coupled to pipe line pipe with a standard PVC rubber ring coupling.

DS-31. POLYETHYLENE SERVICE PIPE: Pipe shall be manufactured from ultra-high molecular weight, high density, polyethylene (average molecular weight of 1,750,000) defined by ASTM D-1248-68 as PE Type III (3306). Pipe shall be made of all virgin material and shall conform to Commercial Standard CD-255-63.

Pipe shall be continuously imprinted with manufacturer's brand name, pipe size, Commercial Standard notation, identification of the National Sanitation Foundation approval, recommended working pressure and production code.

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Pipe dimensions and tolerances shall correspond with the values listed in U.S. Department of Commerce CS-255-63 for flexible plastic pipe with a standard dimension ration (SDR) of 7. All pipe shall be copper tube size and have the following nominal dimensions:

Nominal Size	OD	ID	Min Wall
3/4"	.875	.675	.097
1"	1.125	.865	.125
1½"	1.625	1.259	.230

Pipe shall have working pressure of 160 psi at 73.4ºF.

Pipe must be capable of maintaining pressures of 340 psi at 73.4ºF for 1000 hours.

Pipe surfaces shall be mirror smooth, and shall be free from bumps and irregularities. Workmanship shall be of the highest level compatible with current commercial practice. Material must be completely homogenous and uniform in appearance.

Pipe shall be packaged for protection against dirt and damage during shipment, handling and storage. Pipe package shall be fully labeled with brand name and manufacturer, NSF seal, size, coil length and part number.

Pipe shall be covered by a 50-year guarantee against rot, rust and electrolytic corrosion, and a 25-year cost-of-replacement warranty.

DS-32. CONNECTOR - POLYETHYLENE TO BRASS FITTINGS: Connect polyethylene service line to brass fittings with a stab type compression fitting. The end of the polyethylene pipe shall be beveled before insertion into the fitting. Body of fitting shall conform to ASTM B-62 Brass. The end of the fitting into which the polyethylene pipe is inserted shall have a reverse taper such that an increase in compression occurs when an attempt is made to extract the polyethylene.

Within the tapered portion of the fitting shall be a resilient "0" ring which provides a leak tight seal and a plastic "one way" grip ring which lets the pipe stab in easily then grips securely to prevent pullout. This fitting may be an integral part of a corp stop or meter yoke or it may be a separate piece which connects to these by means of appropriate threads. If a separate fitting is used pipe dope with sintered teflon shall be used on the threads.

DS-33. CORPORATION STOP: Corporation stop shall conform to AWWA Specification C800-55. Stops shall be 3/4 inch x 3/4 inch.

Inlet	Outlet	Specification Manufacture No.
Iron Pipe	Copper	Ford F-1100

DS-34. BRASS PIPE: Brass pipe shall conform to ASTM Specifications B43 for red brass pipe.

DS-35. METER YOKE: Meter yokes shall be copper or red brass with a 15 inches riser. The yoke shall be placed so the meter dials will be approximately 12 inches below the top of the meter well. Consumer end of yoke shall be of such length to be outside of meter box and allow hooking up without opening box. End of extended leg shall measure 15 inches from center line of yoke. End shall have a temporary cap.

Immediately adjacent to meter the inlet side of yoke shall be equipped with a padlock wing with incorporated shut off and discharge side of yoke shall incorporate a dual spring loaded check valve with full open waterway and be capable of inline repair. Check valve to be Ford HHCA31-313 or approved equal. Check valve shall be of the angle type. Yokes shall be Ford V92-15 with added features as above,

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also include bracing eye. Insert 12 inches piece of ½ inch Sch. 80 PVC pipe through yoke eye for stability. Inlet and outlet end connection shall normally be pack joint for PE pipe. When copper service line is required, inlet end shall conform to copper pipe.

DS-36. METERS: Service meters shall conform to AWWA Specification C700 61T. Meters shall have: bronze case with frost proof construction: 5/8 inch x 3/4 inch openings; straight reading register in U.S. gallons; magnetic drive; hermetically sealed register; and meters shall be Trident Model Number 10 or Invensys SRII with plastic bottom. Provide the tag device for each meter service to lock meter until water district allows water user to start using water.

DS-37. METER WELLS AND COVER: Meter wells shall be 18 inches inside diameter and 36 inches in depth, heavy duty corrugated tile by Midwest Distributors - Model A2000 or equal.

Meter wells for double setters shall be 24 inches in diameter.

Covers shall be cast iron 4 inches deep with an 11 inches diameter recessed lid. It shall be provided with a positive means for preventing sidewise movement of both ring and lid. Weight of lid shall be 11 pounds. Weight of ring shall be 25 pounds. The meter cover ring size shall be in accordance with the meter well. Clay-Bailey 2210.

DS-38. VALVES ON 1½ INCH AND UNDER LINES AND BOXES: Valves shall have: full round opening flow way, 2 piece cast brass or bronze body with a closed bottom (no opening), top and port O ring seals, tee head with removable plug for in line repair, top anti friction washer and bottom low friction plastic bearing insert with screwed ends, Mueller Oriseal III; or a ball valve with bronze body and tee head, double O ring stem seals, molded Bura N rubber port seals and ball seats, full round opening ball with screwed ends, Ford B11. Valve box shall be same as previous.

DS-39. FIRE HYDRANTS: Fire hydrants shall conform to AWWA Specification C 502 54 for material and workmanship. Hydrants shall have: Compression shutoff valve; 4 inches min. (or line size) mechanical joint inlet; Two 2½ inch hose nozzles with added pumper nozzle; 5 feet bury with use of S type gradelok (by Assured Flow Sales); National standard threads, Painted red; pentagon operating nut; Safety coupled stem and barrel; Self oiling reservoir. Hydrant shall be Mueller Centurion with 4 inch shoe "or approved equal". Include tamper proof valve stem. Hydrants shall be set vertical and on true alignment. All hydrants shall rest on a stone or concrete bearing pad of at least 300 square inches surface area and 4 inches minimum thickness. The concrete thrust block shall not interfere with the drain opening. Seven cubic feet of large aggregate shall be placed around the hydrant base.

DS-40. FLUSH HYDRANTS: Flush hydrants shall have: Compression shut off valve; 2 inches mechanical joint inlet; One 2½ inches hose nozzle; 4½ feet bury or equal to adjacent pipe; National standard threads; Open left; Painted red; 1½ inches pentagon operating nut; Reaction backing and drainage (Same as in Fire Hydrant). Hydrant shall be Mueller #A24058 or approved equal.

DS-41. YARD HYDRANTS: Yard hydrants shall be of frost proof construction. Being equal to adjacent pipe. Hydrant shall be capable of being locked.

DS-42. AIR RELEASE VALVE: Air release valves shall be Apco 3/4 inch No. 65 (or approved equal) connected to the top of the main line with a 3/4 inch corporation stop. The vent pipe shall be of galvanized pipe designed as shown on the details with a copper screen soldered over the opening. Valve to be located as shown on the plans or as directed by the engineer.

DS-43. PRESSURE REGULATOR VALVE: The valve shall maintain a constant downstream pressure regardless of fluctuations in demand. The valve shall be adjustable to vary the outlet pressure from 2-75 psi. It shall have a maximum inlet working pressure of 175 psi. The size shall be as specified on the plans and/or specifications. It shall be a Class 125, flanged, Clayton or approved equal.

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DS-44. SERVICE LINE PRESSURE REGULATOR: When in the estimation of the Engineer, the line pressure is in excess of that desired for suitable service a pressure regulator may be required. This regulator shall be placed immediately adjacent to the meter as shown on the plans. The regulator will be a 3/4 inch Mueller H 9300 No. 2 or approved equal.

DS-45. DISINFECTING WATER MAINS: Standard of reference shall be C601.68.

1. Preventive Measures During Construction:

A. Keeping Pipe Clean and Dry: Precautions shall be taken to protect pipe interiors, fittings, and valves against contamination. Pipe delivered for construction shall be strung so as to minimize entrance of foreign material. When pipe laying is not in progress, as, for example, at the close of the day's work all openings in the pipeline shall be closed by water tight-plugs. Joints of all pipe in the trench shall be completed before work is stopped. If water accumulates in the trench, the plugs shall remain in place until the trench is dry.

NOTE: Delay in placement of delivered pipe invites contamination. The more closely the rate of delivery is correlated to the rate of pipe laying, the less this delay.

If dirt that, in the opinion of the purchaser's engineer or job superintendent, will not be removed by the flushing operation (See 2) enters the pipe, the interior of the pipe shall be cleaned and swabbed as necessary, with a 5 percent hypochlorite disinfection solution.

B. Packing Materials and Joints: No contaminated material or any material capable of supporting prolific growth of microorganisms shall be used for sealing joints. Packing material shall be handled in such a manner as to avoid contamination.

Where applicable, packing materials must conform to AWWA Standards.

TABLE 1
Required Openings to Flush Pipelines*
(40 psi Residual Pressure)

Pipe Size In.	Flow Required to Produce 3.0 fps Velocity gpm	Orifice Size In.	Hydrant Outlet Nozzles	
			Number	Size In.
4	122	15/16	1	2½
6	264	1 3/8	1	2½
8	447	1 7/8	1	2½
10	695	2 15/16	1	2½
12	978	2 13/16	1	2½
14	1,178	3 1/4	2	2½
16	1,539	3 5/8	2	2½
18	1,948	4 3/16	2	2½

*With 40 psi residual pressure, a 2½ inches hydrant outlet nozzle will discharge approximately 1,000 gpm and a 4½ inches hydrant nozzle will discharge approximately 2,500 gpm.

Packing material for cast iron pipe must conform to AWWA C600. Yarning or packing material shall consist of molded or tubular rubber rings, rope of asbestos or treated paper. Materials such as jute or hemp shall not be used.

The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water. It shall be delivered to the job in enclosed containers and shall be kept clean.

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2. Preliminary Flushing: The main shall be flushed prior to disinfection. The velocities of flushing shall be as nearly to the above as possible.

NOTE 1: It is recommended that the flushing velocity be not less than 3.0 ft/sec. The rate of flow required to produce this velocity in various diameters is shown in Table 1. No site for flushing should be chosen unless it has been determined that drainage is adequate at that site.

NOTE 2: Flushing is no substitute for preventive measures taken before and during pipe laying (See 1). Certain contaminants, especially in caked deposits, resist flushing at any velocity. Furthermore, with diameters of 16 in. or more, even the minimum recommended flushing velocity of 3.0 ft/sec is sometimes difficult to achieve.

3. Form of Chlorine for Disinfection: The most common forms of chlorine used in the disinfecting solution are liquid chlorine (gas at atmospheric pressure), calcium hypochlorite granules, sodium hypochlorite solutions, and calcium hypochlorite tablets.

A. Liquid Chlorine:

a. Packaging: Liquid chlorine is packaged in steel cylinders usually of 100 lb, 150 lb, or 1 ton capacity.

b. Use: Liquid chlorine shall be used only when suitable equipment is available and only under the direct supervision of a person familiar with the physiological, chemical, and physical properties of this element and who is properly trained and equipped to handle any emergency that may arise. Introduction of chlorine-gas directly from the supply cylinder is unsafe and shall not be permitted.

NOTE: The preferred equipment consist of a solution feed chlorinator in combination with a booster pump for injecting the chlorine-gas water mixture into the main to be disinfected. Direct feed chlorinators are not recommended because their use is limited to situations where the water pressure is lower than the chlorine cylinder pressure.

B. Hypochlorites:

a. Calcium Hypochlorite: Calcium hypochlorite contains 70 percent available chlorine by weight. It is either granular or tabular in form. The tablets, 6-8 to the ounce, are designed to dissolve slowly in water (See 4-C). Calcium hypochlorite is packaged in containers of various types and sizes ranging from small plastic bottles to 100 lb. drums.

A chlorine-water solution is prepared by dissolving the granules in water in the proportion requisite for the desired concentration.

b. Sodium Hypochlorite: Sodium hypochlorite is supplied in strengths from 5.25 to 16 percent available chlorine. It is packaged in liquid form in glass, rubber, or plastic containers ranging in size from 1 qt bottles to 5 gal carboys. It may also be purchased in bulk for delivery by tank truck.

The chlorine-water solution is prepared by adding hypochlorite to water. Product deterioration must be reckoned with in computing the quantity of sodium hypochlorite required for the desired concentration.

c. Application: The hypochlorite solutions shall be applied to the water main with a gasoline or electrically-powered chemical feed pump designed for feeding chlorine solutions. For small applications the solutions may be fed with a hand pump, for example, a hydraulic test pump. Feed lines shall be of such

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material and strength as to withstand safely the maximum pressures that may be created by the pumps. All connections shall be checked for tightness before the hypochlorite solution is applied to the main.

4. Methods of Chlorine Application:

A. Continuous Feed Method: This method is suitable for general application and is the method that shall be used for small lines and only used after flushing. The Owner will consider the slug method for lines above 12 inches.

TABLE 2
Chlorine Required to Produce 50 mg/L Concentration
in 100 ft of Pipe by Diameter

Pipe Size in.	100 percent Chlorine	1 percent Chlorine Solutions
4	0.027	0.33
6	0.061	0.73
8	0.108	1.30
10	0.170	2.04
12	0.240	2.88

a. Water from the existing distribution system or other approved sources of supply shall be made to flow at a constant, measured rate into the newly-laid pipeline. The water shall receive a dose of chlorine, also fed at a constant, measured rate. The two rates shall be proportioned so that the chlorine concentration in the water in the pipe is maintained at a minimum of 50 mg/L available chlorine. To assure that this concentration is maintained, the chlorine residual should be measured at regular intervals in accordance with the procedures described in the current edition of "Standard methods and AWWA M12-Simplified Procedures for Water Examination" (see Appendix).

NOTE: In the absence of a meter, the rate may be determined either by placing a pitot gage at the discharge or by measuring the time to fill a container of known volume.

Table 2 gives the amount of chlorine residual required for each 100 ft of pipe of various diameters. Solutions of 1 percent chlorine may be prepared with sodium hypochlorite or calcium hypochlorite. The latter solution requires approximately 1 lb of calcium hypochlorite in 8.5 gal of water.

b. During the application of the chlorine, valves shall be manipulated to prevent the treatment dosage from flowing back into the line supplying the water. Chlorine application shall not cease until the entire main is filled with the chlorine solution. The chlorinated water shall be retained in the main for at least 24 hr, during which time all valves and hydrants in the section treated shall be operated in order to disinfect the appurtenances. At the end of this 24 hr period, the treated water shall contain no less than 25 mg/L chlorine throughout the length of the main.

B. Slug Method: This method is suitable for use with mains of large diameter for which, because of the volumes of water involved, the continuous feed method is not practical.

a. Water from the existing distribution system or other approved source of supply shall be made to flow at a constant, measured rate (See 4-a, Note) into the newly laid pipeline. The water shall receive a dose of chlorine, also fed at a constant, measured rate. The two rates shall be proportioned so that the concentration in the water entering the pipeline is maintained at no less than 300 mg/L. The chlorine shall be applied continuously and for a sufficient period to develop a solid column or "slug" of chlorinated water that will as it passes along the line, expose all interior surfaces to a concentration of at least 300 mg/L for at least 3 hr. The application shall be checked at a tap near the upstream end of the line by chlorine residual measurements made according to the procedures described in the Appendix.

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b. As the chlorinated water flows past tees and crosses, related valved and hydrants shall be operated so as to disinfect appurtenances.

C. Granular Compounds: The owner will allow the contractor to install granular chlorine (No Tablets) in the pipe line as installation proceeds but the contractor will still be required to chlorinate after preliminary flushing as herein outlined.

5. Final Flushing: After the applicable retention period, the heavily chlorinated water shall be flushed from the main until the chlorine concentration in the water leaving the main is no higher than that generally prevailing in the system, or less than 1 mg/L. Chlorine residual determination shall be made to ascertain that the heavily chlorinated water has been removed from the pipeline.

6. Bacteriologic Tests:

A. After final flushing, and before the water main is placed in service, a sample or samples shall be collected from the end of the line and tested for bacteriologic quality and shall show the absence of coliform organisms. If the number and frequency of samples is not prescribed by the public health authority having jurisdiction, at least one sample shall be collected from chlorinated supplies where a chlorine residual is maintained throughout the new main. From unchlorinated supplies at least two samples shall be collected at least 24 hr apart.

NOTE: In the case of extremely long mains, it is desirable that samples be collected the length of the line as well as at its end.

B. Samples for bacteriologic analysis shall be collected in sterile bottles treated with sodium thiosulphate. No hose or fire hydrant shall be used in collection of samples. A suggested sampling tap consists of a standard corporation cock installed in the main with a copper tube gooseneck assembly. After samples have been collected the gooseneck assembly may be removed, and retained for future use.

7. Repetition of Procedure: If the initial disinfection fails to produce satisfactory samples, disinfection shall be repeated until satisfactory samples have been obtained. The tablet method cannot be used in these subsequent disinfections. When the samples are satisfactory, the main may be placed in service.

8. Procedure After Cutting into or Repairing Existing Mains: The procedures outlines in this section apply primarily when mains are wholly or partially dewatered. Leaks or breaks that are repaired with clamping devices where the mains remain full of water under pressure present little danger of contamination and require no disinfection.

A. Trench "Treatment": When an old line is opened, either by accident or by design, the excavation will likely be wet and badly contaminated from nearby sewers. Liberal quantities of hypochlorite applied to open trench areas will lessen the danger from such pollution. Tablets have the advantage in such a situation because they dissolve slowly and continue to release hypochlorite as water is pumped from the excavation.

B. Main Disinfection:

a. Swabbing and Flushing: The following procedure is considered as a minimum that may be used.

a.1 Swabbing with Hypochlorite Solution: The interior of all pipe and fittings used in making the repair (particularly couplings and tapping sleeves) shall be swabbed with a 5 percent hypochlorite solution before they are installed.

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a.2 Flushing: Thorough flushing is the most practical means of removing contamination introduced during repairs. If valving and hydrant locations permit, flushing from both directions is recommended. Flushing shall be started as soon as the repairs are completed and continued until discolored water is eliminated.

b. Slug Method: Where practicable, in addition to the procedures of 8-a, a section of main in which the break is located shall be isolated, all service connections shut off, and the section flushed and chlorinated as described in 4-B, except that the dose may be increased to as much as 500 mg/L, and the contact time reduced to as little as ½ hr. After chlorination, flushing shall be resumed and continued until discolored water is eliminated.

C. Sampling: Bacteriologic samples shall be taken after repairs to provide a record by which the effectiveness of the procedures used can be determined. If the direction of flow is unknown, samples shall be taken on each side of the main break.

DS-46. CHLORINE RESIDUAL-DROP DILUTION METHOD: The drop dilution method of approximating total residual chlorine is suitable for concentrations above 10 mg/L, such as are applied in the disinfection of water mains or tanks. It is taken from AWWA M12 "Simplified Procedures for Water Examination", page 29.

Apparatus:

1. A graduated cylinder for measuring distilled water.

2. An automatic or safety pipet.

3. A dropping pipet that delivers a 1 ml sample in 20 drops. This pipet is for measuring the water sample and should not be used for any other purposes.

4. A comparator kit containing a suitable range of standards.

Procedure:

1. Ascertain the volume of the comparator cell and using an automatic or safety pipet add 0.5 ml of orthotolidine for each 9.5 ml of distilled water to be added.

2. Using a graduated cylinder, add a measured volume of distilled water.

3. With the dropping pipet, add the water sample, a drop at a time, allowing mixing, until a yellow color is formed that matches one of the color standards.

4. Record the total number of drops used and the final chlorine value obtained.

5. Calculate the milligrams per liter residual chlorine as follows:

a) Multiply by 20 the number of milliliters of distilled water used in Step 2.

b) Multiply this product by the final chlorine value in milligrams per liter recorded in Step 4.

c) Divide the product found in Step (b) by the total number of drops of water sample recorded in Step 4.

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DS-47. QUALITY ASSURANCE: If during the processes involved in the completion of this work some event happens which would indicate improper workmanship or inadequate materials have been incorporated into the work, then the owner shall have the right to have tests conducted to determine the adequacy of the products or workmanship and also determine the cause of failures, if any and the owner shall deduct costs of said investigations from moneys due the contractor.

DS-48. SEPARATION OF WATER MAINS, SANITARY SEWERS AND STORM SEWERS:

Parallel Installation

Water mains shall be laid at least ten feet horizontally from any existing or proposed line carrying non-potable fluids such as, but not limited to drains, storm sewers, sanitary sewers, combined sewers, sewer service connections, and process waste or product lines. The distance shall be measured edge to edge. In cases where it is not practical to maintain a ten-foot separation, the DNR-Public Drinking Water Branch may allow deviation on a case-by-case basis, if supported by data from the design engineer. Such deviation may allow installation of the water main closer to a non-potable line, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the non-potable line and on either case, at such an elevation that the bottom of the water main is at least 18 inches above the top of the non-potable line.

In areas where the recommended separations cannot be obtained, either the water line or the non-potable line shall be constructed of mechanical or manufactured restrained joint pipe, fusion welded pipe, or cased in a continuous casing. Casing pipe must be a material that is approved for use as water main. Conventional poured concrete is not an acceptable encasement.

Crossings

Water mains crossing sewers, or any other lines carrying non-potable fluids shall be laid to provide a minimum vertical clear distance of 18 inches between the outside of the water main and the outside of the non-potable pipeline. The water main shall always be installed above the non-potable pipeline. 18-inch separation is a structural protection measure to prevent the sewer or water main from settling and breaking the other pipe. At crossings, the full length of water pipe shall be located so both joints will be as far from the non-potable pipeline as possible but in no case less than ten feet or centered on a 20-foot pipe. In areas where the recommended separations cannot be obtained either the water line or the non-potable pipeline shall be constructed of mechanical or manufactured restrained joint pipe, fusion welded pipe, or cased in a continuous casing that extends no less than ten feet on both sides of the crossing. Special structural support for the water and sewer pipes may be required. Casing pipe must be a material that is approved for use as water main. Conventional poured concrete is not an acceptable encasement.

Exception

Any exception from the specified separation distances above (parallel and crossing) must be submitted to the department for approval.

Force Mains

There shall be at least a ten-foot horizontal separation between water mains and sanitary sewer force mains or other force mains carrying non-potable fluids and they shall be in separate trenches. In areas where the recommended separations cannot be obtained, either the water line or the non-potable line shall be constructed of mechanical joint pipe or cased in a continuous casing, be constructed of mechanical joint pipe, or be jointless or fusion welded pipe. Where possible, the water line shall also be at such an elevation that the bottom of the water main is at least 18 inches above the top of the non-potable line. Casing pipe must be a material that is approved for use as water main. Conventional poured concrete is not an acceptable encasement.

Sewer Manholes

No water line shall be located closer than ten feet to any part of a sanitary or combined sewer manhole. Where the separation cannot be obtained, the water line shall be constructed of mechanical or manufactured restrained joint pipe, fusion welded pipe, or cased in a continuous casing. Casing pipe must be a material that is approved for use as water main. The full length of water pipe shall be located so both joints will be

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as far from the manhole as possible, but in no case less than ten feet or centered on a 20-foot pipe. No water pipe shall pass through or come into contact with any part of a sanitary or combined sewer manhole.

Disposal Facilities

No water main shall be located closer than 25 feet to any wastewater disposal facility, agricultural waste disposal facility, or landfill. Water mains shall be separated by a minimum of 25 feet from septic tanks and wastewater disposal areas such as cesspools, subsurface disposal fields, pit privies, land application fields, and seepage beds.

DS-49. SPECIAL EXCAVATION AND BACKFILL PROCEDURES: To the maximum extent possible, the contractor shall use a trencher type excavation machine to dig the trench. Except on small jobs, specifically unallowable will be backhoe only excavation and the contractor will be allowed to use the backhoe only at points where a trencher is impractical. The replacement of backfill material into the trench shall be accomplished by running equipment parallel to the trench and a process of backing perpendicular to the trench with subsequent moves sideways along the trench and then pushing into the trench is prohibited. The effect of this will be to require a machine, such as a motor grader or other device with an adjustable angle blade, to be used for backfill. In yards with sod or turf type surfaces, the operator shall take special care and remove excavated materials without removing turf. Following behind this operation shall be manual laborers using a shovel to remove remaining small amounts of earth from turf so that the work areas (not the trench area) will be restored to their original condition the day the excavation occurs.

DS-50. LINE CLEANING: To insure that lines are clean prior to disinfection, a swabbing device (pig) shall be run through the line. The Contractor may do this in segments as suits his construction methodology but as a minimum, the contractor shall subdivided the pipe quantities into five (5) approximately equal segments and do this work as other work is completed. Less increments may be used if contractor can show adequate results. Pigging shall be done before disinfection.

Contractor to install and remove all temporary connections - devices required to perform the task and these shall be removed prior to disinfection. Pig shall be sized for the specific size of the pipe.

DS-51. EXECUTION:

1. General:

a. Pipe shall be of sizes indicated on the drawings and laid to the lines indicated thereon, in accordance with pipe manufacturer's specifications. Each section shall rest upon the pipe bed for full length of the barrel, with recesses excavated to accommodate joints. Any length that has had its line, grade or joint disturbed after laying shall be taken up and relayed. Pipe interiors shall be thoroughly cleaned of all foreign matter before lowering into trench. Under no circumstances shall pipe be laid in water nor when trenches or weather conditions are unsuitable for such work, unless otherwise directed. At all times when work is not in progress, all open ends of pipe and fittings shall be securely closed so that no trench water, earth, rodents or other substances may enter. Any section of pipe already laid but found damaged or defective shall be replaced with new pipe at no additional expense to the Owner.

b. Contractor is to have responsible trained employees on the job. The contractor is to run his own job. Inspectors or staff will not do so for them. If competent workers are not on the job, the job is subject to shut down until the problem is rectified.

c. Contractor is also to have machinery in good working condition. If not, the job will be subject to shut down until the proper equipment is on the job.

DS-52. EARTHWORK AND GRADING: Excavation to be to lines and grades as shown on the plan. All grading to provide drainage as well as a neat appearance.

Remove all rocks, rubble or unsuitable material from subgrade and repair turf as follows:

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FINE GRADING: Fine grade all areas to be seeded. The area shall be tilled by disking or harrowing and all clods, lumps, etc. broken to a size to allow future mowing. All stones, roots and debris shall be removed.

All disturbed areas to be finished with at least 1 inch topsoil.

SEEDING: Complete all earth work before seeding. Any area disturbed shall be seeded. Seed only when soil and climatic conditions are such so as to insure reasonable success.

First sowing shall be 20 pounds farm rye in the fall or 20 pounds oats in the spring per acre. Second sowing shall be 80 pound mixed seed per acre. Fertilize with 350 pounds fertilizer per acre. Lime with 500# per acre. Seed and fertilize to be as below.

Drill in rye or oats with farm drill or hand sow and rake. Drag with approved plank drag. Mix small grass seed and sow with cyclone seeder, harrow, or hand rake, then roll area so as to compact soil about seed.

FERTILIZER: Fertilizer shall be standard commercial product which, when applied at the proper rate, will supply the quantity of total nitrogen (N), available phospheric acid (P_20_5), and soluble potash (K_20), as specified. Material may be accepted on the basis of bag labeled analysis or supplier's certification, or on the basis of samples tested in the laboratory. For samples tested in the laboratory, tolerances in the nominal composition as shown by label or certification of minus 10 percent up to the maximum of two units (2% plant food) for the individual constituents, and minus 3 percent for the sum of the constituents, will be permitted. There is no limit on the plus tolerances for such samples. 12-12-12 grade fertilizer shall be used. Lime shall be agricultural limestone with not less than 90% passing a No. 4 sieve and containing at least 40% calcium carbonate or it may be hydrated lime to provide equivalent effectiveness.

SEED MIXTURE: Agricultural seed for cover crops shall comply with the requirements of the Missouri Seed Law. The following percentages for purity and germination will be the minimum requirements in the acceptance of seed, unless otherwise permitted by the Engineer.

40 lbs. Tall Fescue (Ky 31)	(95%-P; 85%-G)
10 lbs. White Clover	(95%-P; 85%-G)
10 lbs. Red Top	(90%-P; 80%-G)
20 lbs. Bluegrass	(80%-P; 65%-G)

MULCH (VEGETATIVE): Apply a light mulch over the seeded areas (1 ton per acre). The vegetative mulch shall be the cereal straw from stalks of oats, rye, wheat, or barley. The straw shall be free of prohibited weed seeds as stated in the Missouri Seed Law, and shall be relatively free of all other noxious and undesirable seeds. The straw shall be clean and bright, relatively free of foreign material, and be dry enough to spread properly. If the above straw specifications cannot be met practicable, the foliage of the following plants may, with the Engineer's approval, be substituted: Smooth brome, timothy, orchard grass, reed canary grass, tall fescue, red top, milo, trefoil and vetch.

Smooth brome, timothy, orchard grass, reed canary grass, tall fescue, red top, milo, trefoil and vetch.

The foliage shall be taken from areas of relatively pure stands of plants of the current season's growth. It shall be relatively free of noxious and undesirable seeds and foreign material.

All mulch shall be distributed evenly over the area to be mulched within 24 hours following the seeding operation. Following the mulching operation, precautions shall be taken to prohibit foot or vehicular traffic over the mulched area. Any mulch which is displaced shall be replaced at once, but only

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after the work preceding the mulching which may have been damaged as a result of the displacement, has been acceptably repaired.

DS-53. FITTING MATERIAL AND CATHODIC PROTECTION: Whether a bid item exists for a fitting or not, all fittings above 3 inches shall be cement lined ductile iron for both PVC and DI pipe, PVC pipe 3 inches and below shall use PVC fittings. All DI pipe shall use DI fittings.

All fittings and assemblies, such as valves, that are DI shall be wrapped with a 6 mil poly barrier prior to placement of concrete reaction backing. Duct tape poly to one foot onto adjacent pipe.

DS-54. SURFACE WATER CROSSINGS: Restrained joints shall be required in waterways and wet weather streams.

Above-Water Crossings

The pipe shall be adequately supported and anchored, protected from damage and freezing and accessible for repair or replacement.

Underwater Crossings

A Flowing Streams

A minimum cover of four feet shall be provided over the pipe. When crossing water courses are greater than 15 feet in width, the following shall be provided:

(i) The pipe shall be of special construction, having flexible watertight joints. Steel or ductile iron ball-joint river pipe shall be used for open cut crossings. Restrained joint pipe may be used for open cut crossings, provided it is encased in a welded steel casing. Restrained joint or fusion weld pipe shall be used for bored crossings.

(ii) Valves shall be provided at both ends of water crossings so that the section can be isolated for testing or repair; the valves shall be easily accessible and should not be subject to flooding; and the valve closest to the supply source shall be in an accessible location.

(iii) Permanent taps shall be provided on each side of the valve within the manhole to allow insertion of a small meter to determine leakage and for sampling purposes.

(iv) The stream crossing pipe or casing shall extend at least 15 feet beyond the upper edge of the stream channel on each side of the stream.

B Intermittent Flowing Streams

(i) Restrained joint pipe shall be used for all stream crossings.

(ii) The pipe shall extend at least 15 feet beyond the upper edge of the stream channel on each side of the stream.

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