COLE COUNTY DEPARTMENT OF PUBLIC WORKS

BUSINESS 50 WEST IMPROVEMENTS – PHASE II
Project No. 2018-301-1

BID DATE: March 12, 2021

BIDDING DOCUMENTS

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ADVERTISEMENT FOR BIDS

NOTICE TO BIDDERS

SEALED PROPOSALS consisting of:

BUSINESS 50 WEST IMPROVEMENTS – PHASE II
PROJECT NO. 2018-301-1

Located on Business 50 West in and Sec 1, 2 and 12, T44N, R13W in Cole County, Missouri, and

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, March 12, 2021

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

The proposed work consists of removals, grading, excavating, drainage structures including inlets and pipes, curb and gutter, concrete driveway construction, asphalt paving, subgrade stabilization, seeding and mulching, erosion control, pavement striping, signing, retaining wall construction, pedestrian bridge and miscellaneous work for the reconstruction on approximately 6,750 feet of road on Business 50 West.

Plans and specifications may be viewed and downloaded online in the bids section at www.colecounty.org. A hard copy of the specifications will not be provided but an 11”x17” hard copy of the plans will be provided upon request in advance.

All contractors wishing to bid on this project shall submit the plan holder contact information form found in the specifications to ccpwprojects@colecounty.org prior to the bid opening.

A Pre-Bid Conference will be held on Friday, March 5, 2021, at 9:00 A.M. at the Cole County Fire Protection District “Training & Administration Building” located at 5206 Monticello Road, Jefferson City, MO 65109. All bidders are urged to attend.

The Owner reserves the right to reject any and all bids and to waive informalities therein, to determine the lowest and best bid and to approve the bond. E.O.E.

News Tribune: 02/14/21; 02/21/21 and 02/28/21

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, March 12, 2021**. 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 removals, grading, excavating, drainage structures including inlets and pipes, curb and gutter, concrete driveway construction, asphalt paving, subgrade stabilization, seeding and mulching, erosion control, pavement striping, signing, retaining wall construction, pedestrian bridge and miscellaneous work for the reconstruction on approximately 6,750 feet of road for:

BUSINESS 50 WEST IMPROVEMENTS – PHASE II
PROJECT NO. 2018-301-1

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 and downloaded online in the bids section at www.colecounty.org. A hard copy of the specifications will not be provided but a hard copy of the plans will be provided upon request in advance. All contractors wishing to bid on this project shall submit the plan holder contact information form found in the specifications to ccpwprojects@colecounty.org prior to the bid opening.

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.

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 one-year Performance and Guarantee Bond is required.

The County reserves the right to reject any or all bids and to waive informalities therein to determine which is the lowest and best bid and to approve the bond.

COUNTY OF COLE

Eric S. Landwehr, P.E.
Director of Public Works

INSTRUCTIONS TO BIDDERS

2-1 Scope of Work

The proposed work consists of removals, grading, excavating, drainage structures including inlets and pipes, curb and gutter, concrete driveway construction, asphalt paving, subgrade stabilization, seeding and mulching, erosion control, pavement striping, signing, retaining wall construction, pedestrian bridge and miscellaneous work for the reconstruction on approximately 6,750 feet of road on Business 50 West in western Cole County.

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 Qualifications of Bidders

The County of COLE may make such investigations as deemed necessary to determine the ability of the bidder to perform the work and the bidder shall furnish to the County of COLE all such information and data for this purpose as the County of COLE may request. The County of COLE reserves the right to reject any bid if the evidence submitted by the bidder or investigation of such bidder fails to satisfy the County of COLE that such bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein.

2-5 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.

2-6 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.

2-7 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.

All sales taxes which might lawfully be assessed against the County of COLE are to be paid by the Contractor from the monies obtained in satisfaction of his Contract, it being understood by the bidder that the bid prices submitted shall include the cost of such taxes.

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.

2-8 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.

2-9 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.

2-10 Approximate Quantities

In cases where any part or all of the bidding is to be received on a unit price basis, the quantities stated in the bid will not be used in establishing final payment due the successful Contractor. The quantities stated on which unit prices are so invited are approximate only and 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. Such estimated quantities, while made from the best information available, are approximate only. Payment on the Contract will be based on actual number of units installed on the completed work.

2-11 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.

2-12 Submission of Bids

The Bid and the Bid Security guaranteeing the same shall be placed in a sealed opaque envelope and marked **BUSINESS 50 WEST IMPROVEMENTS – Phase II, PROJECT NO. 2018-301-1**. The envelope shall be clearly marked with the project name, project number, and the bidder's name and address.

2-13 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.

2-14 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.

2-15 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, or to accept the bid or bids that in its judgment will be for the best interest of the County of COLE.

2-16 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.

2-17 Performance, Payment and One Year Guarantee Bond

A Performance, Payment and One Year Guarantee 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.

2-18 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."

2-19 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.

2-20 Nondiscrimination in Employment

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

2-21 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 Department of Labor and Industrial Relations of Missouri, pursuant to Sections 290.210 through 290.340, RSMo. 1986. (See Determination herewith included in Section 5.)

2-22 Guarantee

The Contractor guarantees 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 guaranteed to be free from defects in design.

Within the guarantee period and upon notification of the Contractor by the County, 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.
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.

The Contractor also extends the terms of this guarantee to cover repaired parts and all

replacement parts furnished under the guarantee provisions for a period of one (1) year from the date of installation thereof.

If within ten (10) days after the County 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 costs of the work shall be paid by the Contractor.

In the event of an emergency where, in the judgment of the County, delays would cause serious loss or damage, repairs or adjustments may be made by the County, or a third party chosen by the County, 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.

2-23 Notice to Proceed

A written notice to begin construction work will be given to the Contractor by the County of COLE after the contractor has executed the Contract Documents AND within ten (10) days after approval by the engineer of the Traffic Management Plan in accordance with Job Special Provision C.

2-24 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 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.

2-25 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.

2-26 Excessive Unemployment Law and Restrictive States

Bidders are hereby notified that the excessive unemployment law is in effect. During times of high unemployment, state law permits the Department's Division of Labor Standards to declare that excessive unemployment is in effect, allowing only workers from certain states to work on the Missouri's public works projects. Public works projects are construction projects funded wholly or partially from public funds, or are projects that benefit the public such as but not limited to schools, parks, fire houses, and government buildings. The excessive unemployment law does not apply to projects funded in part by Federal Funds.

Restrictive states have laws in place restricting Missouri workers to work on their public works projects. Workers from these states are also not allowed to work on Missouri's public works projects.

Only Missouri laborers and laborers from nonrestrictive states are allowed by law to be employed on Missouri's public works projects when the unemployment rate exceeds **5 percent** for two consecutive months. **(See Sections 290.550 through 290.580 RSMo)**.

Restrictive States- workers from these states are **NOT** allowed to be employed on Missouri public works projects: Alaska, Arizona, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Idaho, Illinois, Iowa, Maine, Massachusetts, Mississippi, Montana, Nevada, New Jersey, North Dakota, South Dakota, and the U.S. Virgin Islands, West Virginia and Wyoming.

Non-Restrictive States- workers from these states are allowed to be employed on Missouri public works projects: Alabama, Arkansas, Georgia, Hawaii, Indiana, Kansas, Kentucky, Louisiana, Maryland, Michigan, Minnesota, Nebraska, New Hampshire, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Utah, Vermont, Virginia, Washington and Wisconsin.

2-27 Contract Time

This contract shall be a completion date contract. The contract shall be completed by no later than **December 17, 2021**. Additional information pertaining to the completion date can be found in the Job Special Provisions.

2-28 Liquidated Damages

Liquidated damages shall be assessed if the project is not completed by the completion date in accordance with the provisions of the contract. There are additional liquidated damages for failure to complete the Route T intersection by the specified time.

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

2-29 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.

PLAN HOLDER CONTACT INFORMATION

COUNTY OF COLE, MISSOURI

BUSINESS 50 WEST IMPROVEMENTS – PHASE II
PROJECT NO. 2018-301-1

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:	Business 50 West Improvements – Phase II Project No. 2018-301-1
Bid Opening Date/Time:	March 12, 2021
Plans and Specifications:	Free Download Below

https://colecounty.org/Bids.aspx?CatID=29&txtSort=Category&showAllBids=on&Status

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

PROPOSAL FORM

COUNTY OF COLE, MISSOURI

BUSINESS 50 WEST IMPROVEMENTS – PHASE II
PROJECT NO. 2018-301-1

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, railroads, 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:

BID PROPOSAL FORM

ITEM	DESCRIPTION	UNITS	NO. OF UNITS	UNIT PRICE	AMOUNT
104-10.00	TEMPORARY AGGREGATE SURFACE	SY	3,000		
202-20.10	REMOVAL OF IMPROVEMENTS	LS	1		
202-20.15	REMOVAL OF EXISTING PAVEMENT	SY	16,458		
203-99.01	EARTHWORK	LS	1		
206-31.00	CLASS 3 EXCAVATION IN ROCK	CY	50.0		
210-10.06	SUBGRADE COMPACTION	STA.	47.2		
303-06.00	FURNISH & PLACE 18" ROCK BASE	SY	6,741.7		
304-05.04	4" TYPE 5 AGGREGATE BASE	SY	16,876.4		
310-07.03	6" AGGREGATE DRIVE	SY	1,983.3		
310-07.04	ADDITIONAL 6" AGGREGATE DRIVE	SY	175.0		
401-12.00	3" BITUMINOUS BASE, PG64-22	SY	22,493.8		
401-12.01	4 1/2" BITUMINOUS BASE, PG64-22	SY	19,015.4		
401-12.02	1 1/2" BITUMINOUS PAVEMENT PG64-22 (BP-1MIX)	SY	22,913.6		
401-30.10	VARIABLE DEPTH BITUMINOUS BASE, PG64-22	TON	112.9		
604-40.10	CONCRETE PIPE ANCHOR	EA	6		
604-40.13	TYPE C PIPE COLLAR	EA	4		
606-10.10	TYPE A GUARDRAIL	LF	215.0		
606-10-20	REPLACE EXISTING TYPE A GUARDRAIL	LF	806.5		
607-20.10	FENCING	LF	575		
607-99.01	PEDISTRIAN HANDRAIL, 4" RAIL SPACING	LF	631		
608-10.10	6" THICK CONCRETE SIDEWALK RAMP	SY	538.1		
608-10.12	TRUNCATED DOME PANELS	SF	461.8		
608-30.08	CONCRETE MEDIAN STRIP (8")	SY	315.2		
608-50.08	8" CONCRETE APPROACH	SY	2,619.1		
608-50.09	ADDITIONAL 8" CONCRETE COMMERCIAL APPROACH	SY	250.0		
608-60.04	4" THICK CONCRETE SIDEWALK	SY	4,921.4		
609-10.52	MoDOT TYPE B CURB AND GUTTER	LF	755.7		
609-10.55	TYPE A CURB AND GUTTER	LF	10,585.9		
609-70.00	ROCK LINING	CY	445.4		
616-10.00	CONSTRUCTION PHASING AND TRAFFIC MANAGEMENT	LS	1		
618-10.00	MOBILIZATION	LS	1		
620-00.01	PREFORMED MARKING TAPE, TYPE 2 - 6" WHITE	LF	286		

BID PROPOSAL FORM (CONTINUED)

ITEM	DESCRIPTION	UNITS	NO. OF UNITS	UNIT PRICE	AMOUNT
620-00.02	PREFORMED MARKING TAPE, TYPE 2 - 24" YELLOW	LF	59		
620-00.03	PREFORMED MARKING TAPE, TYPE 2 - 24" WHITE	LF	63		
620-00.04	PREFORMED MARKING TAPE, TYPE 2 - TURN ARROW WHITE	EA	8		
620-00.05	PREFORMED MARKING TAPE, TYPE 2 - BIKE/PED SYMBOL WHITE	EA	4		
620-60.01	ACRYLIC WATERBORNE PAINT, 4" SOLID WHITE	LF	886		
620-60.02	ACRYLIC WATERBORNE PAINT, 4" SOLID YELLOW	LF	14,658		
620-60.03	ACRYLIC WATERBORNE PAINT, 4" INTERMITENT YELLOW	LF	913		
620-60.04	ACRYLIC WATERBORNE PAINT, 6" SOLID WHITE	LF	500		
620-80.63	TEMPORARY PAVEMENT MARKING	LS	1		
621-46.00	FLOWABLE BACKFILL	CY	52.9		
622-10.01	VARIABLE DEPTH COLDMILLING (1.5" MAX.)	SY	1,964.5		
627-40.00	CONTRACTOR FURNISHED CONSTRUCTION STAKING	LS	1		
703-10.00	PRE-ENGINEERED PEDISTRIAN BRIDGE	LS	1		
720-10.00	SEGMENTAL BLOCK RETAINING WALL	SF	3,674		
725-03.15	15" ALUMINIZED CORRUGATED METAL PIPE (16 GA)	LF	218.0		
725-03.18	18" ALUMINIZED CORRUGATED METAL PIPE (16 GA)	LF	90.0		
725-03.24	24" ALUMINIZED CORRUGATED METAL PIPE (16 GA)	LF	316.0		
726-10.15	15" CLASS III REINFORCED CONCRETE PIPE	LF	620.3		
726-10.24	24" CLASS III REINFORCED CONCRETE PIPE	LF	295.1		
726-10.36	36" CLASS III REINFORCED CONCRETE PIPE	LF	77.7		
731-00.10	MoDOT 2.5'X3' TYPE T INLET	EA	2		
731-10.10	4'X3' TYPE A/AD INLET	EA	13		
731-10.20	6'X3' TYPE A/AD INLET	EA	1		
731-20.10	3'X3' AREA INLET	EA	1		
731-20.20	4'X4' AREA INLET	EA	1		
731-30.10	3'X3' JUNCTION BOX	EA	2		
731-30.20	4'X4' JUNCTION BOX	EA	6		
732-00.15	15" CORRUGATED METAL PIPE FLARED END SECTION	EA	14		
732-00.18	18" CORRUGATED METAL PIPE FLARED END SECTION	EA	4		
732-00.24	24" CORRUGATED METAL PIPE FLARED END SECTION	EA	2		
732-06.15	15" REINFORCED CONCRETE PIPE FLARED END SECTION	EA	7		
732-06.24	24" REINFORCED CONCRETE PIPE FLARED END SECTION	EA	9		
732-06.36	36" REINFORCED CONCRETE PIPE FLARED END SECTION	EA	5		
805-10.00	SEEDING AND MULCH	LS	1		

BID PROPOSAL FORM (CONTINUED)

ITEM	DESCRIPTION	UNITS	NO. OF UNITS	UNIT PRICE	AMOUNT
806-10.00	TEMPORARY SEED AND MULCH	AC	2.0		
806-20.00	TEMPORARY EROSION CONTROL	LS	1		
806-41.10	C125 EROSION CONTROL BLANKET	SY	1,028.9		
806-41.20	SC250 TURF REINFORCEMENT MAT	SY	44.2		
806-41.21	P550 TURF REINFORCEMENT MAT	SY	64.0		
806-99.01	SCOUR PROTECTION MAT	SF	944		
903-50.04	FLAT SHEET SIGNS	SF	92.25		
903-12.70	2" PERFORATED SQUARE STEEL TUBE POST	LF	97.2		
903-12.71	2.5" PERFORATED SQUARE STEEL TUBE ANCHOR	EA	9		
903-60.10	36" SURFACE MOUNT DELINEATOR POST (WHITE)	EA	9		
	TOTAL ROADWAY BASE BID (LINE A)				

PWSD #3 WATER MAIN ADJUSTMENTS
BID PROPOSAL FORM

ITEM	DESCRIPTION	UNITS	NO. OF UNITS	UNIT PRICE	AMOUNT
1	Abandonments, Removals, and Locating Existing Water Lines	LS	1		
2	Line Flushing, Pigging, Pressure Testing, and Disinfection	LS	1.0		
3	14" Steel Encasement with 8" PR200 Restrained Joint PVC (Open Cut)	LF	60.0		
4	8" PR200 Restrained Joint PVC (Open Cut)	LF	60.0		
5	8" C900 PR235 Restrained Joint PVC (Open Cut)	LF	400.0		
6	6" C900 PR235 Restrained Joint PVC (Open Cut)	LF	100.0		
7	8" Gate Valve & Box	EA	6.0		
8	8" Solid Sleeve	EA	3.0		
9	6" Solid Sleeve	EA	1.0		
10	8" Bend (all angles)	EA	8.0		
11	6" Bend (all angles)	EA	7.0		
12	8" Anchor Coupling	EA	4.0		
13	8" X 8" X 8" Anchor Tee	EA	2.0		
14	8" X 8" X 6" Anchor Tee	EA	1.0		
15	2" End Cleanout	EA	1.0		
16	Furnish and Install Fire Hydrant Assembly, Complete	EA	1.0		
	TOTAL WATER MAIN BID (LINE B)				

TOTAL BID (LINE A + LINE B)	**$**

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 **December 17, 2021,** subject to the stipulations of the regulations of the Contract and the Special Conditions.

It is understood that the specifications governing the construction of the work contemplated are those known and designated as the "Missouri Highway & Transportation Commission Standard Specifications for Highway Construction" approved by the Missouri Highways & Transportation Commission, together with the special provisions, job and general, if any attached to this proposal.

It is understood and agreed that if this Proposal is accepted, the prices quoted above include all applicable state taxes and that said taxes shall be paid by the Contractor.

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 for the sum of _____

_____

_____ ($_____)
Dollars (cashier's check), made payable to the County of COLE.

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

A CORPORATION:

Name of Corporation

Incorporated under the laws of the State of _____

Name and Title of Officer

Corporate License No._____

Business Telephone Number

(If a corporation organized in state other than Missouri, attach Certificate of ____ Authority to do business in the State of Missouri.)

Business Address	City, State & Zip Code
Signature of Officer	Date

ATTEST:

Signature of Secretary (SEAL)	Date

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: _____

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 _____

CONSTRUCTION CONTRACT

THIS CONTRACT, made and entered into this _____ day of_____, 2021, by and between **[INSERT CONTRACTOR'S NAME]**, 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:

BUSINESS 50 WEST IMPROVEMENTS – PHASE II
PROJECT NO. 2018-301-1

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 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 **ANNUAL WAGE ORDER NUMBER 27 - 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.

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 **[Insert Construction Amount].**

TOTAL CONTRACT AMOUNT.....$0,000,000

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

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.

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 ($2,000.00)** per 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 below, 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 W**.

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 6, 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.

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 **March 12, 2021** 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 **December 17, 2021**.

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.

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 **[INSERT 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.

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 _____, 2021.

Cole County Commission, Party of the First Part

_____
Cole County Commission

ATTEST:

_____ _____
County Clerk (SEAL) County Auditor
"I certify there is a balance otherwise unemcumbered 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 _____, 2021.

CONTRACTOR, Party of the Second Part

By _____

_____
Title

ATTEST:

_____
Secretary (SEAL)

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: _____

_____

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 _____, 2021, 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:

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.)

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MICHAEL L. PARSON, Governor

Annual Wage Order No. 27

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
Taylor Burks, Director
Division of Labor Standards

Filed With Secretary of State: **March 10, 2020**

Last Date Objections May Be Filed: **April 9, 2020**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$55.81
Boilermaker	*$25.41
Bricklayer	**$49.76**
Carpenter	**$44.85**
Lather	
Linoleum Layer	
Millwright	
Pile Driver	
Cement Mason	$40.96
Plasterer	
Communications Technician	$51.38
Electrician (Inside Wireman)	$51.47
Electrician Outside Lineman	$72.83
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Elevator Constructor	*$25.41
Glazier	$40.18
Ironworker	$57.64
Laborer	$38.62
General Laborer	
First Semi-Skilled	
Second Semi-Skilled	
Mason	$47.00
Marble Mason	
Marble Finisher	
Terrazzo Worker	
Terrazzo Finisher	
Tile Setter	
Tile Finisher	
Operating Engineer	$59.56
Group I	
Group II	
Group III	
Group III-A	
Group IV	
Group V	
Painter	$37.81
Plumber	**$58.66**
Pipe Fitter	
Roofer	$49.04
Sheet Metal Worker	**$52.79**
Sprinkler Fitter	$45.47
Truck Driver	$40.05
Truck Control Service Driver	
Group I	
Group II	
Group III	
Group IV	

*The Division of Labor Standards received less 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.

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	**$52.42**
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$72.83
Lineman Operator	
Lineman - Tree Trimmer	
Groundman	
Groundman - Tree Trimmer	
Laborer	**$44.45**
General Laborer	
Skilled Laborer	
Operating Engineer	**$56.64**
Group I	
Group II	
Group III	
Group IV	
Truck Driver	**$42.88**
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 less 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.

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.

JOB SPECIAL PROVISIONS - ROADWAY TABLE OF CONTENTS

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

2/12/21

Paul Samson, PE
PE-2002016730

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 Specifications for this project shall consist of the latest effective version of the Missouri Standard Specifications for Highway Construction 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 the City of Jefferson Standard Drawings for curb and gutter, storm inlets, manholes, entrances, sidewalks, and ADA ramps, except as modified or contradicted by the County's Contract, Special Provisions, General Provisions, and Plans.

2.1 Copies of the City of Jefferson Standard Drawings may be found on the City's website at http://www.jeffcitymo.org/publicworks/engineering.html and are available upon request from the County.

2.2 The standard drawings for all other items in this project shall consist of the latest effective edition of the Missouri Standard Plans for Highway Construction.

2.3 Copies of the Missouri Standard Plans for Highway Construction can be found at http://www.modot.org/business/standards_and_specs/currentstandardplans.htm and are available upon request from the County.

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 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 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 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 Contractor Work Zone Manager for this project in accordance with Job Special Provision 'C'.

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:

1. Project contact for property owners, renters and business owners within or near the project limits.

2. Project contact for the County.
3. Attend all meetings between the county and/or property owners, renters and business owners.
4. Submit all shop drawings for review.
5. Handle complaints from county and/or property owners, renters and business owners.
6. Review and approve pay estimates.

1.4 Property Owner Management. There are several property owners within the project limits and many of these are commercial retail businesses. 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.

1.5.1 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.

1.6 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 Contractor Work Zone Manager should make every effort to attend these meetings.

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

C. WORK ZONE CONSTRUCTION PHASING AND 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.

2.0 Project Requirements. Properties along Business 50 West predominately consist of retail commercial businesses with some residential properties. Due to the nature of the adjacent property uses, it is imperative that traffic be maintained through the construction area as much as is practical. In order to accomplish this, the Contractor shall be required to:

2.1 Designate a person to be the Contractor Project Manager. This person will be the primary contact to the engineer for all construction related issues. See Job Special Provision 'B'.

2.2 Designate a person to be the Contractor Work Zone Manager. This person will be the primary contact to the engineer for traffic management and work zone related issues including property owner access problems. This person shall be available 24 hours a day and shall be authorized to act on the Contractors behalf. The Contractor Project Manager and the Contractor Work Zone Manager shall not be the same person.

2.3 Notify the engineer **TWO WEEKS** prior to road closures or shifting traffic onto detours.

2.4 Notify the engineer of any delays due to weather, material, or other circumstances.

2.5 Phase construction activities to maintain one-lane, one-way traffic at a minimum at all times to residents and local businesses. Through traffic may be detoured as shown on the Traffic Control Plans.

2.6 Coordinate with adjacent property owners to schedule entrance construction. The 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 from the engineer.

2.7 Construct the intersection of Business 50 West and Route T between May 25, 2021 and August 20, 2021. (See Job Special Provision DD, Liquidated Damages Specified.)

2.8 Prepare a Construction Phasing and Traffic Management Plan incorporating all of the above requirements. The Construction Phasing and Traffic Management Plan shall be submitted to the engineer for approval as provided below.

3.0 Construction Phasing and Traffic Management Plan. The Contractor shall submit a Construction Phasing and Traffic Management Plan to the engineer prior to receiving the Notice to Proceed, and at least **ONE WEEK** prior to the Pre-construction Conference. The Construction Phasing and Traffic Management Plan shall, at a minimum, consist of the following:

3.1 Contact information for Contractor Project Manager.

3.2 Contact information for Contractor Work Zone Manager.

3.3 Identify specific phases of construction activities required to complete the project.

3.4 Detailed construction schedule (see below) identifying duration of each construction phase.

3.5 Traffic Management Plan for each construction phase with proposed traffic control measures including but not limited to signage, pavement markings, channelizers, location of concrete traffic barrier, lane closures and, detours; hours traffic control will be in place, and work hours.

3.5.1 The Traffic Management Plan must be approved by the engineer prior to receiving the Notice to Proceed.

3.5.2 The Traffic Management Plan for work within the Business 50 West & Route T Intersection shall be submitted to, and approved by MoDOT prior to beginning construction on that phase.

3.5.3 The Traffic Management Plan shall be signed and sealed by a Professional Engineer licensed by the State of Missouri.

4.0 Construction Schedule. The Contractor shall submit a Construction Schedule as part of the Construction Phasing and Work Zone Management Plan.

4.1 The Construction Schedule shall contain an activities schedule bar chart and may, at the Contractor's option, include a written narrative that breaks down into detail the time, in relation

to the project completion date, involved in performing all construction activities for the duration of the project. The schedule shall indicate all interdependencies between activities. The schedule shall correspond to the construction phasing plan required.

5.0 Traffic Congestion. The Contractor shall, upon approval of the engineer, take proactive measures to reduce traffic congestion in the work zone.

6.0 Traffic Delay. The Contractor shall be responsible for maintaining the existing local traffic flow through the job site during construction. If disruption of the traffic flow occurs and traffic is backed up in queues of 5-minute delays or longer, then the Contractor shall review the construction operations which contributed directly to disruption of the traffic flow and make adjustments to the operations to prevent the queues from occurring again.

7.0 Traffic Safety. When a traffic queue extends to a point where there is limited sight distance from approaching traffic to the end of the traffic queue, the Contractor shall deploy a means of providing advanced warning of the traffic congestion, as approved by the engineer.

8.0 Work Hour Restrictions: There are no work hour restrictions for this project. The Contractor shall notify the engineer of the anticipated working hours. The engineer shall reserve the right to modify the Contractor's working hours as necessary to ensure safe and efficient traffic flow. Working hours for evenings, weekends and holidays will be determined by the engineer.

9.0 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. 616-10.00, Construction Phasing and Traffic Management, per lump sum.

D. PROJECT CONTACT FOR CONTRACTOR/BIDDER QUESTIONS

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

Eric Landwehr, P.E., Project Contact
Public Works Director
Cole County Public Works
5055 Monticello Road
Jefferson City, MO 65109-9182

Telephone Number (573) 636-3614
Fax Number (573) 636-8389
e-mail elandwehr@colecounty.org

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

1.2 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 County 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.

1.3 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.

1.4 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 operation. The Contractor shall hold and save harmless the County from damages to any utility facilities interruption of service by it or its subcontractor's operation.

1.5 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.

2.1 Ameren Missouri – Electric
Derek Wekenborg
Office: 573-681-7526
Cell: 573-680-2188
dwekenborg@ameren.com

2.2 Ameren Missouri – Natural Gas
Brian Robinson
Office: 573-681-7550
Cell: 573-280-6841
brobinson@ameren.com

2.3 CenturyLink – Telephone, Fiber Optic, Television
Allen Groner
Office: 573-634-1692
Cell: 573-681-2503
allen.t.groner@centurylink.com

2.4 City of Jefferson – Sanitary Sewer
Eric Seaman
Office: 573-634-6443
eseaman@jeffcitymo.org

2.5 Public Water Supply District #1 - Water
Keith Kempker
573-893-2848
Pwsd1@embarqmail.com

2.6 Public Water Supply District #3 – Water
Kyle Landwehr – Bartlett & West
573-659-6727
Kyle.landwehr@bartwest.com

2.7 Suddenlink Central Missouri – Cable Television, Fiber Optic
1-800-490-9604

2.8 Three Rivers Electric - Electric
Ted Neuner
Office: 573-644-9055
tneuner@threeriverselectric.com

2.9 Sho-me Technologies – Telephone, Fiber Optic
Vernon Leighty
Office: 417-859-2615
Cell: 417-840-7205
vleighty@shomepower.com

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

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.

F. EMERGENCY PROVISIONS AND INCIDENT MANAGEMENT

1.0 The Contractor shall have communication equipment on the construction site or immediate access to other communication systems to request assistance from the police or other emergency agencies for incident management. In case of traffic accidents or the need for police to direct or restore traffic flow through the job site, the Contractor shall notify police 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 police services, the following agencies may also be notified for accident or emergency situation within the project limits.

Cole County Sheriff (573) 634-9160

Cole County EMS (573)-634-2616

Cole County Fire Protection District	911 (Emergency) (573) 634-9011 (Non-Emergency)
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 police agency.

2.2 The Contractor shall notify 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 enforcement and emergency agencies, a report shall be furnished to the engineer on the status of incident management.

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.

G. SEEDING, FERTILIZING AND MULCH

1.0 Final grade shall be established and seeded within 10 working days of proposed improvements being completed on a property unless approved otherwise by the Engineer.

1.1 All disturbed areas of the project not paved or concrete shall be seeded. The seed mixture shall be 80% Millennium Fescue, 10% Pizzazz Rye, and 10% Brooklawn Bluegrass. The seeding rate shall be 350 lbs/acre (0.72 lb/sy).

1.2 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 (P2O5) and soluble potash (K2O) 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.

1.3 Vegetative Mulch shall be applied at the rate of 1 ½ tons per acres.

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

- 50% paid after seeding and mulch is placed.
- 50% paid after seeding has been established and County accepts it.

3.0 Temporary Seeding and Mulch. In areas directed by the engineer, where grading operations have ceased, but have not been brought to final grade, temporary seeding and mulch shall be placed to provide a quick ground cover to reduce erosion until such time that grading operations resume.

2.1 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.

3.0 Basis of Payment. All costs incurred by the Contractor for labor, equipment and materials in compliance with the above requirements including seedbed preparation, liming, furnishing and placing fertilizer and mulch, shall be considered completely covered by the unit price for Item No. 805-10.00, Seeding and Mulch, per lump sum, or Item No. 806-10.00 Temporary Seeding, per acre.

H. CLEARING AND GRUBBING

1.0 There will be no direct payment for clearing and grubbing on this project. All costs shall be completely covered by the unit prices for Item No. 202-20.10, Removal of Improvements, per lump sum.

I. 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.

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

K. TOPSOIL IN AREAS TO BE SEEDED OR SODDED

1.0 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 or sodding and any deficiency shall be corrected prior to application.

2.0 Basis of Payment: All costs associated with the work specified under this provision shall be considered completely covered by the various items of work in the contract.

L. STORM DRAINAGE

1.0 Description: This work consists of providing enclosed storm drainage systems consisting of pipes, inlets, manholes, and flared end sections.

2.0 Requirements: Dimensions and details of the inlets and manholes shall be according to the City of Jefferson Standard Details. Inlets may be precast or cast in place. If precast inlets are used, the lid and gutter transition shall be cast in place.

2.1 The construction and materials for the precast concrete drop inlets and manholes shall conform to Section 731.

2.2 Installation of storm drainage pipes shall conform to Standard Plans 725.00, 726.30, and 730.00 as applicable. The trench width for corrugated metal pipe installations may be reduced to the pipe diameter plus 2.0'.

2.0 Method of Measurement: 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. Estimated quantities of Class 3 Excavation in Rock are included in the bid proposal. Payment will be made only for actual quantity of measured Class 3 Excavation in Rock.

4.0 Basis of Payment: Excavation and backfill shall be included with the 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 Item No. 206-31.00 "Class 3 Excavation in Rock", 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.

M. 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 No. 627-40.00, Contractor Furnished Construction Staking, per lump sum.

N. 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.
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. 608-50.08, 8” Concrete Commercial Approach, per square yard
Item No. 310-07.03, 6” Aggregate Drive, per square yard

O. CURB AND GUTTER; AND SIDEWALKS

1.0 Description. This work consists of constructing curb and gutter; and sidewalks along the project length.

2.0 Construction Methods. Dimensions and details of the sidewalks and curb and shall be according to the City of Jefferson Standard Details or Missouri Standard Plans for Highway Construction as specified.

2.1 The construction and materials for the sidewalk shall conform to Section 608.

2.2 The construction and materials for the curb and gutter shall conform to Section 609.

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.

3.1 Measurement of 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. 608-60.04, 4" Thick Concrete Sidewalk, per square yard
Item No. 608-10.10, 6" Thick Concrete Sidewalk Ramp, per square yard
Item No. 608-10.12, Truncated Dome Panels, per square foot
Item No. 609-10.52, MoDOT Type B Curb and Gutter, per linear foot
Item No. 609-10.55, Type A Curb and Gutter, per linear foot

P. BITUMINOUS PAVEMENT AND BITUMINOUS BASE

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

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 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.

9.1 Bituminous Pavement shall not be placed until all phases of construction are complete, with the exception of work within the Business 50 West / Route T intersection.

10.0 Method of Measurement. The quantities of bituminous pavement and bituminous base are calculated at the top of each pavement or base layer 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.

11.0 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. 401-12.00, 3" Bituminous Base, PG64-22, per sq. yd.
Item No. 401-12.01, 4 ½" Bituminous Base, PG64-22, per sq. yd.
Item No. 401-12.02, 1 ½" Bituminous Pavement, PG64-22 (BP-1 Mix), per sq. yd.
Item No. 401-30.10, Variable Depth Bituminous Base, PG64-22, per ton.
Item No. 620-80.63, Temporary Pavement Marking, per lump sum.

Q. DISPOSAL OF EXISTING PAVEMENT

1.0 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.

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

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

R. PRE-ENGINEERED PEDESTRIAN BRIDGE

1.0 General.

1.1 These specifications are for a fully engineered clear span bridge of welded steel construction and shall be regarded as minimum standards for design and construction as manufactured by Contech Engineered Solutions; 9025 Centre Pointe Dr.; West Chester, Ohio 45069; telephone 800-338-1122; or approved equal.

1.2 The bridge manufacturer shall have been in the business of design and fabrication of bridges for a minimum of five years and provide a list of five successful bridge projects, of similar construction, each of which has been in service at least three years.

1.3 The specific type bridge required will be a "EXPRESS Connector" style bridge as manufactured by Continental Bridge Company.

2.0 Dimensions.

2.1 Width: Inside clear width of bridge shall be 8'-0".

2.2 Span: End structure to end structure of bridge, excluding the expansion gap cover, shall be 100'-0". The difference in bearing elevation shall be as shown on the plans. All vertical members shall be perpendicular to the ground, (horizon).

2.3 Camber: Bridge shall not be cambered.

3.0 Design Loads. In addition to normal dead loads, the bridge shall be designed for the following:

3.1 Uniform Live Load: Pedestrian bridges shall be designed for an evenly distributed live load of 85 pounds per square foot as required by AASHTO.

3.2 Vehicle Load: Bridges shall be designed to withstand a moving concentrated load of 6,000 pounds plus 30% for impact loading.

3.3 Wind Load: All bridges shall be designed for a minimum wind load of 30 pounds per square foot (approximately 120 mph). The wind is calculated on the entire vertical surface of the bridge as if fully enclosed.

3.4 Design Criteria: The design of the bridge shall be in accordance with the "American Institute of Steel Construction"; "Allowable Stress Design", June 1, 1989 or latest edition.

3.5 Seismic: All bridges shall be designed for seismic loads of the intensity required by local codes.

3.6 Temperature: Bridge shall be designed to accommodate a temperature differential of 120 degrees Fahrenheit. Slip pads of UHMW polyethylene shall be placed between the smooth surface of this setting plate and the smooth bearing plate of the bridge. At least 1" clearance shall be provided between the bridge and concrete abutments.

3.7 Deflection: The vertical deflection of the bridge due to pedestrian live load shall not exceed 1/400 of the span length.

4.0 Materials.

4.1 All structural members shall have a minimum thickness of material of at least 3/16".

4.2 Unpainted Weathering Steel bridges shall be fabricated from ASTM A242 or ASTM A588 steel for plates and structural shapes and ASTM A606 or ASTM A847 for tubular sections. Minimum yield (Fy) shall be greater than 50,000 psi.

4.3 Concrete Floors shall be completely formed by the bridge manufacturer with a minimum of 22 gauge galvanized composite floor deck. The floor deck shall be manufactured by a member of the Steel Deck Institute or have their deck properties certified by the Steel Deck Institute. The composite slab shall carry 200 pounds per square foot superimposed live load. The pouring and finishing of 4000 psi lightweight concrete (no additives allowed) and the furnishing of the temperature reinforcement shall be the responsibility of the Contractor.

4.4 Field splices shall be bolted with High Strength ASTM A325 or ASTM A490 bolts; type 3 bolts are required for weathering steel bridges.

4.5 Welding materials shall be in strict accordance with the American Welding Society (AWS) Structural Welding Code, D1.1. Filler metal as specified in 4.1 shall be used for the particular welding process required. Welders will be certified in accordance with AWS D1.1.

5.0 Fabrication.

5.1 Bridge fabricator shall be certified by the American Institute of Steel Construction to have the personnel, organization, experience, capability, and commitment to produce fabricated structural steel for Conventional Steel Structures and Simple Steel Bridge Structures with Sophisticated Paint Endorsement as set forth in the AISC Certification Program.

5.2 Workmanship, fabrication, and shop connections shall be in accordance with American Association of State Highway and Transportation Officials Specifications (AASHTO).

5.3 Welding operators shall be properly accredited experienced operators, each of whom shall submit satisfactory evidence of experience and skill in welding structural steel with the kind of welding to be used in the work, and who have demonstrated the ability to make uniform good welds meeting the size and type of weld required.

5.4 All welding shall utilize E70 or E80 series electrodes. The weld process used shall be Flux Core Arc Welding (FCAW) or Shielded Manual Arc Welding (SMAW). The Gas Metal Arc Welding (GMAW-S) short circuit welding process shall not be used for bridges as per AWS D1.5 "Bridge Welding Code."

6.0 Railings and Accessories.

6.1 All railings shall have a smooth inside surface with no protrusions or depressions. All ends of angles and tubes shall be closed and ground smooth.

6.2 Rub Rail: A 5/4” X 6” Ipe hardwood rub rail shall be placed on each side of the bridge. The top of the rub rail shall be 36 inches above the floor deck.

6.3 Safety Rails: Continuous rails shall be located on the inside of the trusses. The rails will be vertical picket rails with a maximum opening of 4 inches. The top chord shall be a minimum of 54 inches above the floor deck.

7.0 Finishes.

7.1 All boldly exposed surfaces of weathering steel bridges shall be sand blasted in accordance with the Steel Structures Painting Council (SSPC) Surface Preparation Specification No. 6 "Commercial Blast Cleaning".

8.0 Foundations.

8.1 The bridge manufacturer shall determine the number, diameter, minimum grade and finish of all anchor bolts. The anchor bolts shall be designed to resist all horizontal and uplift forces to be transferred by the superstructure to the supporting foundations. The Contractor shall install the anchor bolts in accordance with the manufacturer’s anchor bolt spacing dimensions.

8.2 The Contractor shall be responsible for the engineering design and construction of the supporting foundations based on end bearing reactions provided by the bridge manufacturer, and on-site soil properties. For bidding purposes, it shall be assumed that the on-site soil

bearing capacity is 3000 lb/sf. The contractor shall verify the on-site soil bearing capacity prior to footing design. For foundations constructed on fill placed by the contractor, there shall be no cost adjustments for bearing capacity less than 3000 lb/sf.

8.3 Engineering design of the supporting foundations shall include design of concrete abutment, pier, bracket and/or footings, and anchor bolt embedments. Foundation design plans shall be prepared by a Professional Engineer licensed by the State of Missouri, and shall be submitted to the engineer for approval.

8.4 The Contractor or his consultant shall procure all necessary information about the site and soil conditions.

9.0 Delivery and Erection

9.1 Bridges will be delivered by truck to a location nearest to the site accessible by roads. Hauling permits and freight charges are the responsibility of the manufacturer.

9.2 The manufacturer will notify the Contractor in advance of the expected arrival time. Information regarding delays after the trucks depart the plant such as inclement weather, delays in permits, re-routing by public agencies or other circumstances will be passed on to the Contractor as soon as possible but the expense of such unavoidable delays will not be accepted by the manufacturer.

9.3 The manufacturer shall advise the Contractor of the actual lifting weights, attachment points and all necessary information to install the bridge. Unloading, splicing, bolting, and proper lifting equipment is the responsibility of the Contractor.

10.0 Basis of Payment. All costs associated with the work specified under this provision shall be considered completely covered by Item No. 703-10.00, Pre-Engineered Pedestrian Bridge, per lump sum.

S. SEGMENTAL BLOCK RETAINING WALLS

1.0 Segmental Block Retaining Walls shall be designed and constructed in accordance with Section 720.

1.1 Segmental Block Retaining Wall shall be a Small Block Wall System per 720.4.1. The wall system shall be on the MoDOT Bridge Pre-qualified Products List as either a Small Block System or Combination System. The pre-qualified products list can be found at: https://www.modot.org/bridge-pre-qualified-products-list.

1.2 The 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.

2.0 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. 720-10.00, Segmental Block Retaining Wall, per square foot.

T. TEMPORARY SEEDING

1.0 Temporary seeding shall be used 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.

2.0 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. 806-10.17, Temporary Seeding and Mulching, per acre.

U. REMOVE AND REPLACE 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 fencing shall be installed prior to removal of existing fencing. The new fence type shall match the type of fence removed. New fence material shall conform to Section 1043, Fence Material.

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 No. 202-20.10, Removal of Improvements, per lump sum; and Item No. 607-20.10, Fencing, per linear foot.

V. LIQUIDATED DAMAGES FOR COMPLETION DATE

1.0 Description. The Contractor is advised that the project must be substantially complete by **December 17th, 2021.**

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

1.2 If the project is not substantially complete by **December 17, 2021**, 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.

2.0 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 17th, 2021.** This deduction will continue until such time as the project is substantially complete.

2.1 Revise Section 108.8.1.2 (a) and (b) and substitute the following for this project:

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

W. LIQUIDATED DAMAGES SPECIFIED

1.0 Description. The construction of the intersection of Business 50 West with Route T shall take place between **May 24, 2021 and August 20, 2021**. Work may be performed prior to May 24, 2021; 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 20, 2021. If the construction of the intersection of Business 50 Wwest with Route T, as described above is not complete and open to traffic prior to **August 20, 2021**, 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 intersection of Business 50 West with Route T 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 108.8.1.2 (a) and (b) and substitute the following for this project:

(c) Liquidated damages will be assessed form December 15 to March 15.
(d) Liquidated damages will be assessed for Saturdays, Sundays, and Holidays.

X. REMOVAL OF IMPROVEMENTS

1.0 This work shall consist of removing and disposing of all existing improvements as shown on the plans from within the limits of construction, except improvements designated to remain in place. The removals shown on the plans may not include all removals necessary to complete the project. There may be an undetermined number of improvements encountered. The Contractor shall determine the extent of work to be performed under this item.

1.1 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 offsite.

1.2 All road sign sheets within MoDOT Right of Way at the Business 50 West / Route T intersection shall remain the property of MoDOT. Sign Posts shall be disposed of by the Contractor. Sign Sheets shall be delivered to the MoDOT Jefferson City Maintenance Facility located at Red Eagle Drive.

1.3 All road sign sheets and sign posts not within MoDOT 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.

1.4 The Contractor shall use care when removing existing sign sheets and sign posts, as to not cause any damage.

2.0 Method of Measurement. This work will not be measured for payment but will be considered a lump sum unit.

3.0 Basis of Payment. Accepted removal of improvements will be paid for at the contract lump sum price. 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. 202-20.10, Removal of Improvements, per lump sum.

Y. ADDITIONAL QUANTITY FOR SPECIFIC BID ITEMS

1.0 The Contractor is made aware that bid items for additional quantities of the items listed below are included in the bid proposal to account for additional work that may become necessary during the construction of this project. These additional quantities are intended to be used on an as needed basis as directed by the engineer. The contract unit price for each item shall include removing existing improvements as well as replacing said item as well as any necessary additional grading, excavation, and seed and mulch.

- 6” Aggregate Drive – 175 sq. yd.
- 8” Concrete Commercial Approach – 250 sq. yd.

1.1 No payment shall be made on any additional work bid items unless Contractor receives prior authorization from the engineer.

1.2 Basis of Payment. Any expenses incurred by the Contractor by reason of their compliance with this provision shall be considered as completely covered by the following items:

- Item No. 310-07.04, Additional 6” Aggregate Drive, per sq. yd.
- Item No. 608-50.09, Additional 8” Concrete Commercial Approach, per sq. yd.

Z. TEMPORARY PAVEMENT PATCH

1.0 Description. Following excavations within existing roadway pavement, the pavement surface shall be restored as follows:

1.1 In areas where removal of the existing pavement surface will occur within two weeks following completion of the excavation, the trench shall be backfilled with compacted aggregate as required to the elevation of the existing pavement. Should any settlement occur, the Contractor shall compact additional aggregate or other material as approved by the engineer to maintain a smooth driving surface..

1.2 In areas where removal of the existing pavement surface will occur later than two weeks following completion of the excavation, the trench shall be backfilled with compacted aggregate as required to within 6” of the elevation of the existing pavement. Non-reinforced concrete shall be placed 6” thick to create a smooth driving surface. Should any settlement occur which causes the concrete to displace more than 1”, the concrete patch shall be removed and replaced.

2.0 Basis of Payment. All costs associated with the work specified under this provision shall be considered completely covered by the various items of work in the contract.

AA. 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.

1.1 In signing the contract, the contractor obligates himself to follow the provisions of the permit. The Contractor shall obtain a copy of the permit prior to beginning construction. 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 Missouri Department of Transportation. An application for a permit to work on MoDOT right-of-way will be submitted by the County. The Contractor shall provide all data necessary to assist the County in obtaining the permit. The Contractor's Work Zone Construction Phasing and Traffic Management Plan and the Traffic Control Plan for the Business 50 / Route T Intersection will have to be approved by MoDOT prior to the permit application. The Contractor shall be required to follow all provisions of this permit.

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

BB. EROSION CONTROL

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

2.0 The Contractor shall provide erosion control in accordance with Std. 806.10 of the Missouri Standard Plans for Highway Construction and the Missouri Department of Natural Resources field guild Protecting Water Quality which can be found at http://www.dnr.mo.gov/env/wpp/wpcp-guide.htm.

3.0 The erosion control measures may be subject to inspection by MoDNR and/or the County at any time. Any deficiencies noted during inspection shall be fixed immediately by the contractor subject to approval by the engineer.

4.0 Any silt material that enters the inlets and/or pipes from the construction site shall be the responsibility of the contractor to remove prior to project completion. No direct payment shall be made since silt should not be allowed to enter based on the provisions of this bid item.

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 unit price bid for Item No. 806-20.00, Erosion Control, per lump sum.

CC. EARTHWORK

1.0 Description. This work shall consist of excavating, disposing of, and compaction of all material necessary to achieve the typical roadway subgrade lines and grades in accordance with the plans and specifications. All earthwork shall be performed in accordance with Section 203. Unless noted elsewhere, all excavations shall be unclassified.

2.0 Volume quantities for cuts and fills have been shown on the plans but are provided for information only.

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 price bid for Item No. 203-99.01, Earthwork, per lump sum.

DD. QUALITY CONTROL (QC)

1.0 The County 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.

EE. SURVEY AND PROPERTY MONUMENTS

1.0 The Contractor shall be responsible for protecting all U.S. Land Survey Corners, Property Corners, Right of Way Monuments and 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 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.

END OF JOB SPECIAL PROVISIONS

GENERAL SPECIAL PROVISIONS

The General Special Provisions for this particular Cole County project shall consist of the currently corrected (2004) 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:

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.

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

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 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 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 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 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

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:

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 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 though 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.

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 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.

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 one (1) 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);

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.

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.

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.

TECHNICAL SPECIFICATIONS
(Roadway)

The Technical Specifications for this project shall consist of the currently effective version of the *Missouri Standard Specifications for Highway Construction*, Sections 201-1092.

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:	565135.257/4262453.882
Receiving Stream:	Tributary to Moreau R. (U)
First Classified Stream - ID#:	8-20-13 MUDD V1.0 (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)

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.

September 01, 2017
Issue Date

Edward B. Galbraith, Director
Division of Environmental Quality

June 22, 2022
Expiration Date

Chris Wieberg, Director
Water Protection Program

APPLICABILITY

1. This general 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. This general permit also authorizes the discharge of stormwater and certain non-stormwater discharges from smaller projects where the Missouri Department of Natural Resources (department) has exercised its discretion to require a permit [10 CSR 20-6.200(1)(B)].

2. This general permit is issued to a city, county, state or federal agency or other governmental jurisdiction for land disturbance projects performed by or under contract to the permittee.

3. A general stormwater control plan or stormwater pollution prevention plan (SWPPP) must be developed prior to issuance of this permit. These plans must include a narrative of the types and appropriate uses of Best Management Practices (BMPs) for erosion and sediment control and stormwater management. All water pollution controls on land disturbance sites shall conform to the storm water control program and/or SWPPP of the city, county or other governmental jurisdiction in which the land disturbance activity is occurring. The requirements of the stormwater control program and/or SWPPP must be at least as stringent as those described in this permit and 10 CSR 20-6.200.

4. 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 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 legal owner of the property, right-of-way or the holder of an easement on the property, and operator on which the site is located are responsible for compliance with this permit.

5. This permit authorizes discharges from construction support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) provided that appropriate stormwater controls are designed, installed, maintained and provided:
   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; and
   c. The support activity does not continue to operate beyond the completion of the construction activity at the project it supports.

   The permittee is responsible for compliance with this permit for any construction support activities.

6. This permit authorizes non-stormwater discharges from the following activities provided that these discharges are addressed in the permittee's specific SWPPP required by this general permit:
   a. Dewatering activities if there are no contaminants other than sediment present in the discharge, and the discharge is treated as specified in Requirements, Section 10.o. of this permit;
   b. Flushing water hydrants and potable water lines;
   c. Water only (i.e., without detergents or additives) rinsing of streets and buildings; and
   d. Site watering to establish vegetation.

7. This general permit does not authorize the:
   a. placement of fill materials in waters or floodplains
   b. obstruction of stream flow,
   c. redirection of stormwater across private property not owned or operated by the permittee, or

d. Changing the channel of a defined drainage course.

These actions may be regulated by other federal, state, or local entities, such as the U.S. Army Corps of Engineers or Federal Emergency Management Agency. This general permit addresses only the quality of the stormwater runoff and the minimization of off-site migration of sediments and other water contaminants.

8. This permit does not authorize land disturbance activity in jurisdictional waters of the United States, unless the permittee has obtained the required Clean Water Act Section 404 Department of the Army permit from the U.S. Army Corps of Engineers and its associated Section 401 Water Quality Certification from the department. Land disturbance activities may not begin in the affected waters of the United States until the required §404 permit and §401 water quality certification have been obtained.

9. This general permit prohibits any discharge of wastewater generated from air pollution control equipment or the containment of scrubber water in lined ponds to waters of the state.

10. This general permit prohibits any discharge of sewage or pollutants to waters of the state including but not limited to:
    a. Any hazardous material, oil, lubricant, solid waste or other non-naturally occurring substance from the site, including fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance;
    b. Soaps or solvents used in vehicle and equipment washing;
    c. Hazardous substances or petroleum products from an on-site spill or handling and disposal practices;
    d. Wash and/or rinse waters from concrete mixing equipment including ready mix concrete trucks, unless managed by an appropriate control. Any such pollutants must be adequately treated and addressed in the SWPPP, and cannot be discharged to waters of the state;
    e. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;
    f. Domestic wastewaters, including gray waters; or
    g. Industrial stormwater runoff.

11. The department reserves the right to revoke or deny coverage under this general permit to applicants for stormwater discharges from land disturbance activities at sites that have contaminated soils that will be disturbed by the land disturbance activity or where such materials are brought to the site to use as fill or borrow. A site-specific permit may be required to cover such activities.

12. If at any time the department determines that the quality of waters of the state may be better protected by requiring the owner/operator of the permitted site to apply for a site-specific or different general permit, the department may do so [10 CSR 20-6.010(13)(C)]. Examples of when this may occur:
    a. The permittee is not in compliance with the conditions of this general permit;
    b. The discharge no longer qualifies for this general permit due to changed site conditions and/or regulations; or
    c. Information becomes available that indicates water quality standards have been or may be violated.

    The permittee will be notified in writing of the requirement to apply for a site-specific permit or a different general permit. When issued to the authorized permittee, the applicability of this general permit to the permittee is automatically terminated upon the effective date of the site-specific or different general permit.

13. Any owner/operator authorized by a general permit may request to be excluded from the coverage of the general permit and apply for a site-specific permit [10 CSR 20-6.010(13)(D)].

14. 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; or the Resource Conservation and Recovery Act. Determination of applicability for the above mentioned acts is the responsibility of the permittee.

15. This permit does not supersede any requirement for obtaining project approval under an established local authority.

16. This permit is not transferable to other owners or operators.

EXEMPTIONS FROM PERMIT REQUIREMENTS

1. Facilities that discharge all stormwater runoff directly to a combined sewer system are exempt from stormwater permit requirements.

2. Land disturbance activity as described in 10 CSR 20-6.010(1)(B) and 10 CSR 20-6.200(1)(B).

3. Oil and gas related activities as listed in 40 CFR 122.26(a)(2)(ii).

REQUIREMENTS

1. Electronic Discharge Monitoring Report (eDMR) Submission System.
Per 40 CFR Part 127 National Pollutant Discharge Elimination System (NPDES) Electronic Reporting Rule, reporting shall be submitted by the permittee via an electronic system to ensure timely, complete, accurate, and nationally-consistent set of data about the NPDES program. All general permit covered facilities under this master general permit shall comply with the department's requirements for electronic reporting.
   a. Reporting Requirements.
      (1) Application to participate in the department's eDMR system is required as part of the application for general permit coverage in order to constitute a complete permit application and may be accessed at dnr.mo.gov/env/wpp/edmr.htm.
      (2) The permittee must electronically submit quarterly reports via the eDMR system.
   b. Other actions. The following shall be submitted electronically after such a system has been made available by the department:
      (1) General Permit Applications/Notices of Intent to discharge (NOIs);
      (2) Notices of Termination (NOTs);
      (3) No Exposure Certifications (NOEs); and
      (4) Low Erosivity Waivers and Other Waivers from Stormwater Controls (LEWs).
   c. Electronic Submissions. To access the eDMR system, use the following web link: https://edmr.dnr.mo.gov/edmr/E2/Shared/Pages/Main/Login.aspx.
   d. Waivers from Electronic Reporting.
      (1) The permittee must electronically submit reports unless a waiver is granted by the department in compliance with 40 CFR Part 127.
      (2) The permittee may obtain a temporary or permanent electronic reporting waiver by first submitting an eDMR Waiver Request Form (Form 780-2692: http://dnr.mo.gov/forms/780-2692-f.pdf, by contacting the appropriate permitting office or emailing edmr@dnr.mo.gov). The department will either approve or deny this electronic reporting waiver request within 120 calendar days of receipt.
      (3) Only permittees with an approved waiver request may submit reports on paper to the Department for the period that the approved electronic reporting waiver is effective.

2. Quarterly Reports: 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 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;
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 to the department quarterly via the department's eDMR system. When a permittee terminates permit coverage, the permittee shall submit with the request for termination, the final quarterly report for the current calendar quarter. 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

3. This permit is to ensure the design, installation and maintenance of effective erosion and sediment controls minimize the discharge of pollutants by:
   a. Controlling stormwater volume and velocity within the site to minimize soil erosion;
   b. Controlling 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 in the immediate vicinity of discharge points;
   c. Minimizing the amount of soil exposed during construction activity;
   d. Minimizing the disturbance of steep slopes;
   e. Addressing factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle size expected to be present on the site to minimize sediment discharges from the site;
   f. Providing and maintaining natural buffers around surface waters as detailed in 10.f,
   g. Directing stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration and filtering, unless infeasible; and
   h. Minimizing soil compaction and, unless infeasible, preserve topsoil. Minimizing soil compaction or preserving topsoil is not required where the intended function of a specific area of the site dictates that it be compacted or the topsoil be disturbed or removed.

4. Installation of Best Management Practices (BMPs) necessary to prevent soil erosion at the project boundary must be complete prior to the start of all phases of construction.

5. Install sediment controls along any perimeter areas of the site..
   a. Remove any sediment per the manufacturer's instructions or before it has accumulated to one-half of the above-ground height of any perimeter control.
   b. For sites where perimeter controls are infeasible, other practices shall be implemented to minimize discharges to perimeter areas of the site.

6. BMPs shall be maintained and remain in effective operating condition during the entire duration of the project, with repairs made within the timeframe specified in the Requirements Section 9of this permit, until final stabilization has been achieved.

7. Minimize sediment track-out from the site.
   a. Restrict vehicle traffic to properly designed exit points such as an aggregate stone with an underlying geotextile or non-woven filter fabric.

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.

8. SWPPP Development and Implementation: 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. The permittee shall fully implement the provisions of the SWPPP required under this part as a condition of this general permit throughout the term of the land disturbance project. **The SWPPP must be developed prior to issuance of the permit and must be updated with details specific to the land disturbance site prior to conducting any land disturbance activities at the site.** Either an electronic copy or a paper copy of the SWPPP must be accessible to anyone on-site at all times when land disturbance operations are in progress, or other operational activities that may affect the maintenance or integrity of the BMP structures and made available as specified under the Records Section of this permit.

9. The SWPPP must:
   a. List and describe all points of discharge to receiving water(s);
   b. Incorporate required practices identified below;
   c. Incorporate erosion control practices specific to site conditions;
   d. Provide for maintenance and adherence to the plan;
   e. Discuss whether or not additional authorizations, such as a Section 404 permit and associated Section 401 Water Quality Certification are required for the project; and
   f. Name the person responsible for inspection, operation and maintenance of BMPs.

   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; compliance with the Missouri Water Quality Standards; and compliance with the terms and conditions of this general permit.

   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/npdes/developing-stormwater-pollution-prevention-plan-swppp; and 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 is available on the department's internet site at http://www.dnr.mo.gov/env/wpp/wpcp-guide.htm.

   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 should be described and justified in the SWPPP.

10. SWPPP Requirements: The following information and practices shall be provided for in the SWPPP:
    a. Nature of the Construction Activity: The SWPPP briefly must describe the nature of the construction activity, including:
       (1) The function of the project (e.g., low density residential, shopping mall, highway, etc.);
       (2) The intended sequence and timing of activities that disturb the soils at the site;
       (3) Estimates of the total area expected to be disturbed by excavation, grading, or other construction activities including off-site borrow and fill areas; and
       (4) A general map (e.g., United States Geological Survey quadrangle map, a portion of a city or county map, or other map) with enough detail to identify the location of the construction site and waters of the state within one mile of the site.

b. Site Map: The SWPPP must contain a legible site map showing the site boundaries and points of discharge to receiving water(s) and identifying:
   (1) Direction(s) of stormwater flow and approximate slopes for all phases of construction activities;
   (2) 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);
   (3) Location of permanent and temporary structural and non-structural BMPs identified in the SWPPP;
   (4) Locations where stabilization practices are expected to occur;
   (5) Locations of off-site material, waste, borrow or equipment storage areas;
   (6) Locations of all waters of the state (including wetlands);
   (7) Locations where stormwater discharges to a surface water; and
   (8) Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

c. Site Description: In order to identify the site, the SWPPP shall include facility and points of discharge to receiving water(s) information. 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.

d. Selection of Temporary and Permanent BMPs: The permittee shall select, install, use, operate and maintain appropriate BMPs for the permitted site and list them in the SWPPP.

e. Preservation of trees and vegetation: The SWPPP shall require existing vegetation and trees to be preserved where practical.

f. Surface Water Buffers: For surface waters of the state, defined 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, located on or adjacent to the site," the permittee must comply with (1)-(3), except as noted in (4):
   (1) Provide and maintain a 50-foot undisturbed natural buffer;
   (2) 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
   (3) 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.
   (4) The permittee is not required to comply with (1), (2) or (3) above if one of the following exceptions apply and documentation is provided in the SWPPP:
      (a) As authorized per Clean Water Act Section 404 Department of the Army permit and its associated Section 401 Water Quality Certification from the department.
         1. The angle of any crossing shall be as perpendicular as feasible to the water course or natural stream buffer to minimize adverse impacts.
      (b) 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 your site. This includes situations where you have implemented permanent control measures that will prevent such discharges, such as a berm or other barrier.
      (c) 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.
         1. 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, you are required to comply with (1), (2), or (3) above.
      (d) For linear projects where site constraints make it infeasible to implement a buffer or equivalent provided you limit disturbances within 50 feet of any waters of the state and/or you provide supplemental erosion and sediment controls to treat stormwater

discharges from earth disturbances within 50 feet of the water of state.

(e) For small residential lot construction as defined as 'a lot being developed for residential purposes that will disturb less than 1 acre of land, but is part a larger common plan of development or sale,' one has the option of complying with (1), (2) or (3) above or one of the following alternatives:
   1. Tiered-technology approach where:
      a. A 50-foot or larger buffer is retained, no additional requirements are needed,
      b. The buffer is greater than 30 feet but less than 50 feet wide, implement double perimeter controls spaced a minimum of at least 5 feet apart between land disturbance and water of the state, or
      c. A less than or equal to 30-foot buffer is maintained, implement double perimeter controls between land disturbance and water of the state and stabilization activities completed with 7 calendar days of temporary or permanent cessation of land disturbance; or
   2. Sediment discharge risk based on the site's slope, location and soil type when combined with buffer width.

g. Measuring Buffer Width: 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.

h. Description of BMPs: The SWPPP shall include a description of both structural and non-structural BMPs used one or more times at the site, providing the following general information for each:
   (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 for the BMP.

i. Specific Instance of BMPs: 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) Where, in relation to other site features, the BMP is to be located;
   (3) When the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project; and
   (4) Site conditions that must be met before removal of the BMP if the BMP is not a permanent BMP.

j. Disturbed Areas: Slopes for disturbed areas must be defined in the SWPPP. A site map or maps defining the sloped areas for all phases of the project must be included in the SWPPP.
   (1) For soil disturbing activities that have 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.
   (2) 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.
   (3) Allowances to the 14 day completion period for temporary and final stabilization may be made due to weather and equipment malfunctions. In drought-stricken areas where initiating vegetative stabilization measures immediately are infeasible, alternative stabilization measures must be employed. The use of allowances shall be documented in the SWPPP.

(4) Interim stabilization 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. These BMPs may include a combination of sediment basins, check dams, sediment fences and mulch. 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) or if the slope is greater than 3% and greater than 150 feet in length, then the permittee shall establish interim stabilization within seven days of ceasing operations on that part of the site.

(5) In limited circumstances, stabilization may not be required if the intended function of a specific area of the site necessitates that it remain disturbed.

k. Installation: The permittee shall ensure the BMPs are properly installed at the locations and relative times specified in the SWPPP.

(1) Peripheral or border BMPs to control runoff from disturbed areas shall be installed or marked for preservation before general site clearing is started. Note that this requirement does not apply to earth disturbances related to initial site clearing and establishing entry, exit and access of the site, which may require that stormwater controls be installed immediately after the earth disturbance.

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

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

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

(5) If vegetative stabilization measures are being implemented, stabilization is considered "installed" when all activities necessary to seed or plant the area are completed.

l. Sedimentation Basins: The SWPPP shall include a sedimentation basin for each drainage area with ten or more acres disturbed at one time.

(1) The sedimentation basin shall be sized to a local 2-year, 24-hour storm. A 2-year, 24-hour storm event shall be determined for the project location using the National Oceanic and Atmospheric Administration's National Weather Service Atlas 14 which can be located at http://hdsc.nws.noaa.gov/hdsc/pfds/.

(2) Basins designed and initiated under the 2012 Area-Wide Land Distrubance General Permit MO-R100000 or prior authorizations shall comply with the requirements held in those authorizations. Any construction activities designed and initiated under this authorization shall comply with the local 2-year, 24-hour storm event by January 1, 2018.

(3) Accumulated sediment shall be removed from the basin when basin is 50% full.

(4) Utilize outlet structures that withdraw water from the surface when discharging from basins and impoundments unless infeasible.

(5) Discharges from the basin shall not cause scouring of the banks or bottom of the receiving stream.

(6) The SWPPP shall require the basin be maintained until final stabilization of the disturbed area served by the basin.

(7) 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.

(8) 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 delivery. 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.

m. Pollution Prevention Measures: The SWPPP shall include BMPs for pollution prevention measures. At minimum such measures must be designed, installed, implemented and maintained to:
   (1) Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
   (2) 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. Minimization of exposure is not required in cases where the exposure to precipitation and to stormwater will not result in a discharge of pollutants, or where exposure of a specific material or product poses little risk or stormwater contamination (such as final products and material intended for outdoor use);
   (3) Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures. Included but not limited to the installation of containment berms and use of drip pans at petroleum product and liquid storage tanks and containers; and

n. Roadways: Where applicable, upon installation of or connection to roadways, all efforts should be made to prevent the deposition of earth and sediment onto roadways through the use of proper BMPs.
   (1) Stormwater inlets susceptible to receiving sediment from the permitted land disturbance site shall have curb inlet protection.
   (2) Where stormwater will flow off the end of where a roadway terminates, a sediment catching BMP such as gravel berm or silt fence shall be provided.
   (3) Curb inlets shall be cleaned weekly or following a precipitation event that generates a run-off.

o. Dewatering: Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited unless managed by appropriate controls. The SWPPP shall include a description of any anticipated dewatering methods.
   (1) The SWPPP shall call for specific BMPs designed to treat water pumped from trenches and excavations and in no case shall this water be pumped off-site without being treated by the specified BMPs.

11. Good housekeeping practices shall be maintained at all times to keep waste from entering waters of the state. Solid and hazardous waste management include providing trash containers and regular site cleanup for proper disposal of solid waste such as scrap building material, product/material shipping waste, and food containers and cups, and providing containers and proper disposal of waste paints, solvents and cleaning compounds. The provision of portable toilets for proper disposal of sanitary sewage and the storage of construction materials should be kept away from drainage courses and low areas.

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

13. Hazardous substances that are transported, stored, or used for maintenance, cleaning, or repair shall be managed according to the provisions of the Missouri Hazardous Waste Laws and Regulations.

14. Containers: All paint, solvents, petroleum products, petroleum waste products and storage containers such as drums, cans, or cartons shall be stored according to BMPs. The materials exposed to precipitation shall be stored in watertight, structurally sound, closed containers. All containers shall be inspected for leaks or spillage during the inspection of BMPs.

15. Amending/Updating the SWPPP: The permittee shall amend and update the SWPPP as appropriate during the term of the land disturbance activity. The permittee shall amend the SWPPP at a minimum whenever the:
    a. 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;
    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 excessive sediment deposits in streams or lakes); and/or
    f. Department determines violations of water quality standards may occur or have occurred.

16. An individual shall be designated by the permittee as the lead for environmental matters. The lead individual for environmental matters shall have a thorough and demonstrable knowledge of the site's SWPPP and sediment and erosion control practices in general. The lead individual for environmental matters or a designated inspector knowledgeable in erosion, sediment and stormwater control principles shall inspect all structures that function to prevent pollution of waters of the state

17. Site Inspections: The permittee (or a representative of the permittee) shall conduct regularly scheduled inspections.
    a. 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.
    b. Inspections are only required during the project's normal working hours.
    c. For disturbed areas that have not been finally stabilized, all installed BMPs and other pollution control measures shall be inspected for proper installation, operation and maintenance.
    d. Areas on-site that have been stabilized must be inspected at least once per month.
        (1) For areas where disturbed portions have undergone temporary stabilization at the same time active construction continues on other areas, inspections shall occur at least once a month while stabilized and when re-disturbed shall follow either frequency outlined in subsection h. below.
        (2) For areas where disturbed portions have undergone final stabilization at the same time active construction continues on other areas, inspection frequency may be cease on the finally stabilized areas according to the following:
            (a) After the first monthly inspection, inspect once more within 24 hours of a storm event of 0.25 inches or greater.
            (b) If there are no issues or evidence of stabilization problems, further inspections may cease.
            (c) If unstable site conditions or sediment movement are observed, the site must be re-stabilized and monthly inspections shall occur until final stabilization is confirmed following a storm event of 0.25 inches or greater.
    e. All stormwater outfalls shall be inspected for evidence of erosion or sediment deposition.
    f. When practicable the receiving stream shall also be inspected for 50 feet downstream of the outfall.
    g. 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.
        (1) If weather conditions 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.
        (2) The documentation must be filed with the regular inspection reports.
        (3) The permittee shall correct the problem as soon as weather conditions allow.
    h. All BMPs must be inspected in accordance to one of the two schedules listed below, and any

changes to the frequency of inspections, including switching between the options listed below, must be documented in the SWPPP:

(1) At least once every seven 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 and within 72 hours if the event ceases during a non-work day such as a weekend or holiday; or

(2) Once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches or greater or the occurrence of runoff from snowmelt. To determine if a storm event of 0.25 inches or greater has occurred on-site, the permittee must either keep a properly maintained precipitation gauge on site, or obtain the storm event information from a weather station near the site.
   (a) Inspections shall be conducted within 24 hours once a storm event has produced 0.25 inches within a 24 hour period, even if the storm event is still continuing.
   (b) If the permittee has 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 is required to conduct an inspection within 24 hours of the first day of the storm and within 24 hours after the end of the storm.

18. The SWPPP must explain how the person responsible for erosion control will be notified when stormwater runoff occurs

19. Site Inspections Reports: A log of each inspection and copy of the inspection report shall be kept readily accessible and must be available upon request by the department. Electronic logs are acceptable as long as reports can be provided in a timely manner. If inspection reports are kept off-site, the SWPPP must indicate where they are stored. The inspection report shall be signed by the permittee or by the person performing the inspection if duly authorized to do so. The inspection report is to include the following minimum information:
    a. Inspector's name;
    b. Date of inspection;
    c. Observations relative to the effectiveness of the BMPs;
    d. Actions taken or necessary to correct the observed problem; and
    e. Listing of areas where land disturbance operations have permanently or temporarily stopped.

20. Notification to All Contractors: The permittee shall be responsible for notifying 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 action or precautions shall be taken while on-site to minimize the potential for erosion and the potential for damaging any BMP. The SWPPP shall contain a record of notification; for example, a list of contractors or entities given a copy of the SWPPP or education session sign-in sheet. The permittee is responsible for any damage a subcontractor may do to established BMPs and any subsequent water quality violation resulting from the damage.

21. Public Notification: The permittee shall post a copy of the public notification sign on page 15 of this permit at the main entrance to the site. 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 permit has been terminated.

OTHER DISCHARGES

A record of each reportable release of hazardous substance shall be retained with the SWPPP and made available to the department upon request. The department may also require the submittal of a written or electronic report detailing measures taken to clean up the spill within five (5) days of the spill. Such a report must include the type of material spilled, volume, date of spill, date clean-up was completed, clean-up method, and final disposal method.

SAMPLING REQUIREMENTS AND EFFLUENT LIMITATIONS

The department may require sampling and reporting as a result of illegal discharges, compliance issues, complaint investigations, or other such evidence of contamination from activities at the site. If such an action is needed, the department will specify in writing any sampling requirements, including such information as location, extent and parameters.

RECORDS

1. The permittee shall retain copies of this general permit, the SWPPP and all amendments for the site, results of any monitoring and analysis, and all site inspection records. The records shall be accessible during normal business hours. The records shall be retained for a period of at least three years from the date of the Letter of Termination.

2. The permittee shall provide a copy 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.

3. 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.

LAND PURCHASE AND CHANGE OF OWNERSHIP

1. If the permittee sells any portion of the 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.

2. Property of any size which is part of a larger common plan of development where the property has been stabilized and the original permit terminated will require application of a new land disturbance permit for any future land disturbance activity unless exempted per 10 CSR 20-6.010(1)(B), 10 CSR 20-6.200(1)(B), and 40 CFR 122.26(a)(2)(ii). .

3. If the entire tract is sold to a single entity, then this permit shall be terminated when the new owner obtains a new land disturbance permit for the site.

4. 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 while no permit is required for less than one acre of land sold.

TERMINATION

This permit may be terminated when all projects are stabilized. The project is considered to be finally stabilized 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, vegetation cover shall be at least 70% over 100% of the site. In order to terminate the permit, the permittee shall notify the department by submitting *Form H- Request for Termination of a General Permit* (http://dnr.mo.gov/forms/780-1409-f.pdf).

DUTY TO REAPPLY

Unless terminated, the permittee shall submit an application for the renewal of this permit by submitting *Form E-Application for General Permit* (http://dnr.mo.gov/forms/780-0795-f.pdf) and

Form G – Application for Stormwater Permit Under the General Permit: Land Disturbance (http://dnr.mo.gov/forms/780-1408-f.pdf) no later than thirty (30) days prior to the permit's expiration date. If a facility submits a timely and complete application in accordance with 10 CSR 20-6.010(5)(B), (5)(C), and (10)(E)1, as well as § 644.051.10, RSMo 2015, if the department is unable, through no fault of the permittee, to issue a renewal prior to expiration of the previous permit, the terms and conditions of the expired permit are administratively continued and will remain fully effective and enforceable until such time when a permit action is taken. Failure to submit a renewal application for a facility that is still in operation is a violation of the Missouri Clean Water Law. As part of the complete application and as required by the federal NPDES eReporting rule, participation in the department's Electronic Discharge Monitoring Report Submission System (eDMR) will be required. Facilities already participating in eDMR need not re-apply upon renewal. More information can be found at: http://dnr.mo.gov/env/wpp/edmr.htm. Failure to apply for renewal of a permit may result in termination of this permit and enforcement action to compel compliance with this condition and the Missouri Clean Water Law. This permit may be applied for and issued electronically once made available by the director in accordance with Section 644.051.10, RSMo.

MODIFICATION, REVOCATION, AND REOPENING

1. The full implementation of this operating permit shall constitute compliance with all applicable federal and state statutes and regulations in accordance with §644.051.16, RSMo, and the CWA section 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 Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a) (2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:
   a. contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
   b. controls any pollutant not limited in the permit.
2. 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.

STANDARD CONDITIONS

These Standard Conditions incorporate permit conditions as required by 40 CFR 122.41 or other applicable state statutes or regulations. These minimum conditions apply unless superseded by requirements specified in the permit.

1. 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.

2. 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.

3. Duty to Provide Information: The permittee shall furnish to the department, within a reasonable time, 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.

4. 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.

5. 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.

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

Missouri Department of Natural Resources
Fact Sheet
MO-R100000

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 (permit) 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 CFR124.8, 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 a permit.

This Fact Sheet is for a:

- ☐ Major
- ☐ Minor
- ☐ Industrial Facility
- ☐ Variance
- ☒ Master General Permit
- ☐ Permit with widespread public interest

Definitions

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.

Immediately: For the purposes of this permit, immediately should be defined as within 24 hours.

Infeasible: Infeasible means not technologically possible, or not economically practicable and achievable in light of best industry practices.

Larger Common Plan of Development or Sale: A contiguous area where multiple separate and distinct construction activities are occurring under one plan.

Non-structural Best Management Practice: Institutional, educational or pollution prevention practices designed to limit the amount of stormwater runoff or pollutants that are generated in the landscape. An example includes ordinance development.

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 should be defined as any activity that has been

ceased without any intentions of future disturbance.

Structural Best Management Practice: Physical controls working individually or as a group, appropriate to the source, location, and area climate for the pollutant to be controlled. Examples include moving earth for sedimentation basin and planting vegetation.

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 – Facility Information

Facility Type:	Industrial Stormwater
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 SWPPP requirement to minimize pollutants of concern from this type of facility or for all facilities covered under this permit. 10 CSR 20-6.200(6)(A)7. specifies that "general permits shall contain BMP requirements and/or monitoring and reporting requirements to keep the stormwater from becoming contaminated." 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 local conditions.

While drafting this permit for renewal, the department hosted four public meetings on January 27, February 24, April 18, and May 19, 2016, which allowed stakeholders to voice concerns about conditions within the permit and submit comments during the period of initial involvement. These concerns were taken into consideration when drafting the permit.

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:

Please mark all appropriate designated waters of the state categories of the receiving stream.

- ☒ 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 beneficial water uses shall be maintained in accordance with 10 CSR 20-7.031(4). The BMP requirement established by this permit are intended to be protective of all streams that fall within the categories of receiving water bodies indicated above. A general permit does not take into consideration site-specific conditions.

Part III – Applicability

Condition number 5 includes support activities. Those support activities are to become part of the land disturbance permitted area and included in the acreage calculations, whether the support activities are located adjacent to, on-site or off-site from the main land disturbance construction area. For example, if the main land disturbance site is 0.6 acres and the project needs fills that is gathered from a borrow site specific to this project which equals 0.5 acres, then the total acreage for this project is an acre or more and the conditions of this permit apply to both the main construction area and the borrow area.

Condition number 14 was expanded to include a more comprehensive list of state and federal requirements that must be taken into consideration.

If the proposed project encounters and will potentially affect a species of concern, please report it to the Missouri Department of Conservation and the United States Fish and Wildlife Service. For more information about requirements of the Endangered Species Act, please visit the following links:

1. To determine the potential for species of concern within or near a project, please visit the United States Fish and Wildlife Services' "Information, Planning and Conservation" website at http://ecos.fws.gov/ipac/.
2. If there are listed species in the county or township, check to see if critical habitat has been designated and if that area overlaps or is near the project area. Critical habitat designations and associated requirements may also be found at 50 CFR Parts 17 and 226. For additional information, use the map view tool at http://criticalhabitat.fws.gov/crithab/ to find data specific to the state and county.

The Missouri Department of Conservation's internet site for the Natural Heritage Review may be very helpful and can be found at the following link, https://naturalheritagereview.mdc.mo.gov/.

Part IV – Exemptions

Condition Number 2 was added to cite all state exemptions from permitting requirements, combining several previous cited exemptions into one condition and reference. This includes an exemption for linear construction where the entire disturbance, including clearing of land to access the linear disturbance, is less than two feet in width.

Condition Number 3 was added to cite federal regulations that exclude land disturbance projects related to the installation or maintenance work for oil and gas related activities.

Part V – Rationale of Technology Based Limitations & Permit Conditions

303(d) LIST & TOTAL MAXIMUM DAILY LOAD (TMDL):
Section 303(d) of the Federal CWA requires that each state identify waters that are 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 that are impaired but not addressed by normal water pollution control programs.

ANTI-BACKSLIDING:
A provision in the Federal Regulations [CWA Section 303(d) (4); CWA Section 402(c); 40 CFR Part 122.44(I)] that requires a reissued permit to be as stringent as the previous permit with some exceptions.

☒ Applicable: Backsliding proposed in this permit conforms to the anti-backsliding provisions of Section 402(o) of the CWA and 40 CFR 122.44. The department has determined that technical mistakes were made in the previous permit [CWA 402(o)(2)(B)(ii)]. The Department has determined that technical mistakes or mistaken interpretations of law were made in issuing the

permit under section 402(a)(1)(b).

Settleable Solids: The Settleable Solids limitation was removed since has been determined to not be a statewide technology or water quality based limitation given a variability of soil type in the state. Increased technology based best management practices have been included and are a more appropriate technology based requirement.

Water Quality Standard Narrative Prohibitions. The previous permit contained language which referenced narrative compliance with the water quality standards found in 10 CSR 20-7.031. In order to comply with 40 CFR 122.44(d)(1), the permit writer has conducted reasonable potential determinations for each general and applicable specific criterion and established numeric effluent limitations where reasonable potential exists. While the removal of the previous permit language creates the appearance of backsliding, the permit writer has evaluated discharges associated with this general permit as to whether reasonable potential to cause excursions of specific or general criteria on a statewide level and found that no reasonable potential exists given the proper implementation of a Stormwater Pollution Prevention Plan and associated best management practices and that the requirements of this permit are equally protective as compared to the previous permit. Therefore, given this new information, and the fact that the previous permit special condition was not consistent with 40 CFR 122.44(d)(1), an error occurred in the establishment of the general criteria as a special condition of the previous permit.

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 that the best avenue forward for implementing the Antidegradation requirements into general permits is by requiring the appropriate development and maintenance of a SWPPP. The SWPPP must identify all Best Management Practices (BMPs) that are reasonable and effective, 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 new BMPs that are reasonable and cost effective. New facilities seeking coverage under this permit are required to develop a SWPPP that includes this analysis and documentation of appropriate BMPs. Renewal of coverage for a facility requires a review of the SWPPP to assure that the selected BMPs continue to be appropriate.

☒ Applicable: The main pollutant of concern in this permit is sediment. Compliance with the technology-based limitations established in this permit for the protection of General Criteria, along with the evaluation and implementation of BMPs as documented in the SWPPP, meets the requirements of Missouri's Antidegradation Review [10 CSR 20-7.031(3), 10 CSR 20-7.031 Table A, and 10 CSR 20-7.015(9)(A)5].

STORMWATER POLLUTION PREVENTION PLAN (SWPPP):
In accordance with 40 CFR 122.44(3)(k) Best Management Practices (BMPs), BMPs are implemented 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 Developing Your Stormwater Pollution Prevention Plan, a Guide for Construction Sites (EPA 833-R-06-004; https://www3.epa.gov/npdes/pubs/sw_swppp_guide.pdf) published by the United States Environmental Protection Agency (EPA) in May 2007, BMPs are measures or practices used to reduce the amount of pollution entering waters of the state. BMPs may take the form of a process, activity, or physical structure. EPA developed resources and tools related to construction stormwater along with the BMPs to control and minimize stormwater (https://www.epa.gov/npdes/stormwater-discharges-construction-activities). Along with EPA's resources and tools, the International Stormwater BMP database (www.bmpdatabase.org/index.htm) may provide guidance on BMPs appropriate for specific industries.

Additionally in accordance with 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 stormwater discharges.

☒ Applicable: A SWPPP shall be developed and implemented for each site and shall incorporate required practices identified by the department with jurisdiction, incorporate erosion control practices specific to site conditions, and provide for maintenance and adherence to the plan.

The new permit has been revised to allow permittees to store SWPPP documents electronically as long as they can be provided in an expedient manner.

Release of a hazardous substance must be reported to the department in accordance with 10 CSR 24-3.010. If the spill occurs outside of normal business hours, or if the permit holder cannot reach regional office staff for any reason, the permit holder is instructed to report the spill to the department's 24 hour Environmental Emergency Response hotline at (573) 634-2436 at the earliest practicable moment after discovery. Leaving a message on a department staff member voice-mail does not satisfy this reporting requirement.

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.

SPECIFIC CRITERIA CONSIDERATIONS:
An evaluation of discharges associated with land disturbance activities has been conducted to determine if any pollutants discharged under this general permit would have reasonable potential to cause or contribute toward an excursion of specific water quality criterion. Pollutants discharged from land disturbance activities are not commonly associated with pollutants listed as specific criteria in the Missouri Water Quality Standards; therefore, reasonable potential to cause an excursion of a specific criterion does not exist.

GENERAL CRITERIA CONSIDERATIONS:
In accordance with 40 CFR 122.44(d)(1), effluent limitations shall be placed into the permit for those pollutants which have been determined to cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality. The rule further states that pollutants which have been determined to cause, have the reasonable potential to cause, or contribute to an excursion above a narrative criterion within an applicable State water quality standard, the permit shall contain a numeric effluent limitation to protect that narrative criterion. In order to comply with this regulation, the permit writer will complete reasonable potential determinations on whether the discharge will violate any of the general criteria listed in 10 CSR 20-7.031(4). These specific requirements are listed below followed by derivation and discussion [the lettering matches that of the rule itself, under 10 CSR 20-7.031(4)]. It should also be noted that Section 644.076.1, RSMo states that it shall be unlawful for any person to cause or permit any discharge of water contaminants from any water contaminant or point source located in Missouri that is 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.

(a) Waters shall be free from substances in sufficient amounts to cause the formation of putrescent, unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses. The SWPPP requires implementation of best management practices to store, prevent, or minimize stormwater and/or any related land disturbance activity discharges (namely sediment). If one follows their SWPPP and other permit conditions including timely inspections, no reasonable potential to cause an excursion of this narrative exists. Additionally, there had been no indication to the Department that a stream has had issues maintaining beneficial uses as a result of the controlled and managed stormwater discharges per the SWPPP. Therefore, based on the information reviewed during the drafting of this permit, no reasonable potential to cause or contribute to an excursion of this criterion exists.
(b) Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses. Please see (a) above as justification is the same.
(c) Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity, offensive odor or prevent full maintenance of beneficial uses. Please see (a) above as justification is the same.
(d) Waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life. This permit addresses discharges from land disturbance activities and it not expected to include an toxic pollutants. Best management practices are to be addressed in the SWPPP should any toxic pollutant of concern be on-site.
(e) There shall be no significant human health hazard from incidental contact with the water. Please see (a) above as justification is the same.
(f) There shall be no acute toxicity to livestock or wildlife watering. Please see (d) above as justification is the same.
(g) Waters shall be free from physical, chemical or hydrologic changes that would impair the natural biological community. Please see (a) above as justification is the same.
(h) Waters shall be free from used tires, car bodies, appliances, demolition debris, used vehicles or equipment and solid waste as defined in Missouri's Solid Waste Law, section 260.200, RSMo, except as the use of such materials is specifically permitted pursuant to section 260.200-260.247. Please see (a) above. Additionally, any solid wastes received or produced at this facility are wholly contained in appropriate storage facilities, are not discharged, and are disposed of offsite. Therefore, this discharge does not have reasonable potential to cause or contribute to an excursion of this criterion.

The settleable solids requirement was removed from this permit and was replaced with additional, more specific BMP requirements. The settleable solids limit was determined not to be protective of all waters across the state, therefore, it was removed. Examples of these BMPs include requirements to:

- Install and maintain perimeter controls along areas of the site that will receive pollutant discharges;
- Minimize sediment track-out from the site;
- Provide storage for runoff up to and including a 2-year, 24-hour storm event when designing sedimentation basins; and
- Direct stormwater to vegetated areas.

The minimum buffer width was increased from 25 feet to 50 feet. Studies have shown that a 50 foot vegetative buffer more adequately treats sediment from stormwater discharges. This appears to be standard in EPA's permit as well as in many other states. A literature review was conducted to assess the effectiveness of buffer widths in relation to sediment removal. In an early literature review on grass buffers in agricultural settings, Dosskey (2001) concluded that 40 -100% of sediment entering from cultivated fields was removed using buffer strips 0.5 to 20 meters. Liu *et al.* (2008) conducted an analysis of 85 estimates of sediment removal by vegetated buffers. They found that sediment removal efficiency (E_s, the percentage of inflowing sediment trapped within a buffer) increased with buffer width according to the relationship: $E_s = 13.4 \log_e (w)+56.9$ in

which w (m) is buffer width. This equation predicts that E_s increases from 78% for a 5 meter wide buffer to 88% and 97% at widths of 10 meters and 20 meters, respectively. Yaun *et al.* (2009; 93 estimates) and Zhang *et al.* (2010; 81 estimates) garnered similar results to Liu *et al.*

In order to design controls that match the sediment removal efficiency of a 50- foot buffer, first the permittee must know what this efficiency is for the 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 sediment controls used to reduce the discharge of sediment prior to the buffer.

Sediment removal efficiencies are based on the U.S. Department of Agriculture's RUSLE2 (Revised Universal Soil Loss Equation 2) model for slope profiles using a 100-foot long exposed slopes.

Sediment removal is defined as the annual sediment delivered at the downstream end of the 50-foot natural buffer (tons/yr/acre) divided by the annual yield from cleared area (tons/yr/acre).

Sediment removal is in part a function of (1) a perimeter control (i.e., silt fence) located between the disturbed portion of the site and the upland edge of the natural buffer and (2) stormwater flows traveling through a 50-foot buffer of undisturbed natural vegetation.

Additional guidance may be found at https://www.epa.gov/sites/production/files/2017-02/documents/2017_cgp_final_appendix_g_-_buffer_reqs_508.pdf.

Inspection frequencies: Site inspection frequencies have been changed from the previous permit based upon guidance from the USEPA and from stakeholder discussions. These frequencies will allow flexibility but will still allow for frequent enough inspections to ensure that all BMPs are adequately functioning.

Part VI – Effluent Limitations Determination

In this general permit, Technology-Based Effluent Limitations are established through the SWPPP and BMP requirements. Effective BMPs may have to be designed on a site-specific basis. The implementation of monitoring provides a tool for each facility to evaluate the effectiveness of BMPs to ensure protection of water quality.

Part VII – Land Purchase and Change of Ownership

A **"larger common plan of development or sale"** is a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan. This term is used in conjunction with common promotional plan, as defined in §644, RSMo.

Any portion of a project that is sold to a developer is still considered part of a larger common plan of development or sale and will require a permit.

If a portion of a site is sold to an individual for the purpose of building his or her private residence:

- A permit is required if the portion of land sold is equal to or greater than one acre.
- A permit is not required if the portion of land sold is less than one acre.

Part VIII – Termination

The word 'plant density' was removed from the first paragraph since the department determined that percent of vegetative cover more accurately describes the vegetative requirements of this permit. This decision was made after discussion within the department and with stakeholders.

It is preferable that temporary BMPs such as sediment fence be removed prior to permit termination to

eliminate potential solid waste issues that may occur as a result of unnecessary and unmaintained BMPs.

Additional options for winter site stabilization as part of the vegetation requirement may exist, such as using a seeded erosion control blanket.

Part IX – Duty to Reapply

This section has been revised to reflect the current applicable statutes which require applicants to submit an application for coverage 30 days prior to expiration of this permit. Currently, a paper application if required; however, applicants are to submit an application for coverage electronically as soon as they are made available by the director. The department will announce the availability status of the new permit and the process to reapply at least 60 days prior to the expiration of the existing permit.

Part X – Standard Conditions

This section was revised to only include the standard conditions that specifically apply to this permit. All other conditions have been removed.

Part XI – 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 NOTICE:
The department shall give public notice that 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 seeking comments on this permit occurred from March 31 to May 1, 2017.

DATE OF FACT SHEET: 06/16/2017

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Storm Water Pollution Prevention Plan

Cole County, Missouri
Unincorporated Areas

July 2012

Site Description

COLE COUNTY is located in central Missouri. It is bordered on the east by Osage County, the north by the Missouri River, the west by Moniteau County and the south by Miller County.

Population and Land Use

Cole County is 250,240 acres in size with an unincorporated urbanized area of 5,346 Acres. The county has a population of 72,757. The largest city is Jefferson City, with a population of 39,636. Approximately 8,796 people live in the urbanized area of unincorporated Cole County. (US Census, 2000).

Jefferson City is the home of the Lincoln University with 3,349 students. Other towns in Cole County include Wardsville (1,506), St. Martins (1,140), Taos (878), Russellville (807), Centertown (278), St. Thomas (263), and Lohman (163). (US Census 2010).

According to the 2007 US Agriculture Census, there are over 1,100 farms in Cole County with an average size of 164 acres. The total land used for farming is almost 180,840 acres.

Water Supply

Missouri-American Water Company – Missouri River; Cole County Public Water Supply District 1 – Wells; Cole County Public Water Supply District 2 – Wells; Cole County Water Supply District 3 – Wells; and Privately Owned Wells

Waste Water Treatment

City of Jefferson – Treatment Plant; Aqua-Missouri – Lagoons and Small Treatment Plants; and Individual On-Site Septic Systems

Watershed

North Moreau Creek to Moreau River to Missouri River; Grays Creek to Missouri River; and Wears Creek to Missouri River

Geologic Setting

Northern Edge of the Ozark Plateau – Bedrock is shallow bedded consisting of Ordovician carbonates

Average Rainfall

39.59 inches per year

Manufacturing

The County has the following manufacturing plants located with the urbanized areas:

1. Capital Quarries – Limestone Quarry Operations
2. Menu Maker Foods, Inc. – Food Packaging
3. Wren Enterprises – Security Hardware
4. J C Mattress Factory – Bedding Manufacturing

Best Management Practices

Temporary and Permanent Structural and Non-Structural BMPs

See Appendix A for a table outlining the temporary and permanent structural and non-structural best management practices that may be used in land disturbance activities.

Description of Best Management Practices

See Appendix B for descriptions of the best management practices that may be used in land disturbance activities.

Discharges to Valuable Resource Waters

Storm water discharges as described below shall be considered discharges to "valuable resource waters" and will not be allowed to have Total Settleable Solids in excess of 0.5 mg/L/hr.

- Storm water discharges within 1000 stream feet of:
  - Streams identified as a losing stream
  - Streams or lakes listed as an outstanding national or state resource water
  - Reservoirs or lakes used for public drinking water supplies
  - Streams, lakes, or reservoirs identified as critical habitat of endangered species
  - Streams, lakes, or reservoirs listed as impaired for sediment and/or unknown pollutants by standard MDNR methodology
- Storm water discharges:
  - Within 100 stream feet of a permanent stream (class P) or major reservoir (class L2)
  - Within two stream miles upstream of biocriteria reference locations
- Storm water discharges where:
  - Any of the disturbed area is defined as a wetland (class W), by CSR 20-7.031(1)(F)7
  - The storm water discharges to a sinkhole or other direct conduit to groundwater.

For the purpose of this SWPPP, the term "stream feet" shall mean the distance in feet following the nearest drainage channel from the land disturbance to the valuable resource water.

Disturbed Areas

- Slopes for disturbed areas must be defined for all projects.
- A site map or maps, defining the sloped areas must be included with all SWPPPs.
- Where soil disturbing activities cease in an area for 14 days or more, the contractor shall construct BMPs to establish interim stabilization
    - Interim stabilization consists of well established and maintained BMPs that are reasonable certain to protect waters of the state from sediment pollution.
- BMPs must be suited to the area disturbed, taking into account the drainage area, surfaces of drainage area, and steepness of slope.
- If the slope of the disturbed area is greater than 3:1 (H:V) or if the slope is greater than 3% and greater than 150 feet in length, then the contractor must establish interim stabilization within 7 days of ceasing operations on that part of the site.
- Delays in work caused by inclement weather or equipment malfunctions are not considered ceasing operations for the purpose of this section, as long as work resumes as soon as possible.

Installation

- Installation of all BMPs shall in accordance with the descriptions and details of that BMP as shown in Appendix B.
- Cole County will ensure the BMPs are properly installed at the locations are relative times specified in the SWPPP specific to that site.
- Peripheral or border BMPs to control runoff from disturbed areas shall be installed or marked for preservation before general site clearing is started. Storm water discharges from disturbed areas, which leave the site, shall pass through and appropriate impediment to sediment movement, such as a sedimentation basin, sediment traps, silt fences, etc. prior to leaving the land disturbance site.
- A drainage course change shall be clearly marked on a site map, included in the SWPPP specific to that site.

Sedimentation Basins

- The SWPPP for a specific site will require a sedimentation basin for each drainage area with 10 or more acres disturbed at one time.
- Sedimentation Basins shall be sized to contain a volume of at least 3600 cubic feet per each disturbed acre draining thereto.
- Accumulated sediment shall be removed from the basin as needed to ensure the minimum volume of 3600 cubic feet is maintained.
- Discharges from the basin shall not cause scouring of the banks or bottom of the receiving stream.

- The basin shall be maintained until final stabilization of the disturbed area served by the basin.
- Where the use of a sediment basin of this size is impractical, the SWPPP for a specific site will be allowed to use other similarly effective BMPs to be used to control erosion and sediment delivery. These similarly effective BMPs must:
    - Be selected from BMPs allowed by this SWPPP
    - Provide equivalent protection
- Both temporary and permanent sedimentation basins shall have a stabilized spillway to minimize the potential for erosion of the spillway or basin embankment.

Dewatering

Any dewatering practices that are to be employed on a specific site shall state in that site's SWPPP:

- Description of the method used
- Anticipated volume of water to be discharged
- Anticipated maximum flow rate of discharge (gpm)
- Method for treatment of the water from dewatering operations
    - For no reason shall water from discharging operations be discharged off site without treatment.

Roadways

- All efforts shall be made to prevent deposition of earth and sediment onto roadways through the use of proper BMPs.
- Where sediment is present on roadways, all storm water inlets shall have inlet protection.
- Where storm water will flow off the end of where a roadway terminates, a sediment catching BMP shall be provided
- Roadways and curb inlets shall be cleaned weekly or following a rainfall that generates runoff.
- Stabilized construction entrances shall be used to prevent sediment track out.

Amending/Updating the SWPPP

The SWPPP manager for the site shall amend and update the SWPPP as appropriate during the term of the land disturbance activity. The SWPPP manager shall amend the SWPP, at a minimum, whenever the:

- Design, operation, or maintenance of BMPs is changed
- Design of the construction project is changed that could significantly affect the quality of the storm water discharges
- SWPPP manager's inspections indicate deficiencies in the SWPPP or any BMP

- MDNR notifies Cole County in writing of deficiencies in the SWPPP
- The SWPPP is determined to be ineffective in significantly minimizing or controlling erosion and sedimentation
- Total Settleable Solids from a storm water outfall exceed 2.5 mg/L/hr (or 0.5 mg/L/hr if discharged to a valuable resource water)
- MDNR determines violations of Water Quality Standards may occur or have occurred

Site Inspection Reports

- Inspections of the site of land disturbance activities shall occur at a minimum of:
    - Once per 7 calendar days
    - Within 48 hours of any rainfall that produces runoff on the site.
- For sites that have not been final stabilized, the following must occur for each inspection:
    - All installed BMPs and other pollution control measures shall be inspected for proper installation, operation and maintenance
    - All storm water outfalls shall be inspected for evidence of erosion or sediment deposition.
    - Receiving streams shall be inspected for 50 feet downstream of the outfall.
    - Any problems shall be noted in an inspection report and corrected within seven calendar days of inspection.
- The SWPPP Manager will be responsible for being aware of rain events that cause runoff on the site. Local weather reports should be viewed, or crews in the vicinity of the site should be consulted if the SWPPP manager does not report to the site regularly.
- If weather conditions make it impossible to correct the problems within seven days, a detailed report of the problem (including pictures), must be filed with the regular inspection reports.
- BMP malfunctions shall be corrected as soon as the weather conditions allow.
- Parts of the site that have been finally stabilized may be inspected once per month. (A once per month inspection schedule may be implemented for a site with interim stabilization if Boone County makes a written request for the schedule and it is approved by the Department)
- A log of each inspection shall be kept.
- The inspection report is to include the following minimum information:
    - Inspector's name
    - Date of inspection
    - Observations relative to the effectiveness of the BMPs
    - Actions taken or necessary to correct the problems
    - Listing of areas where land disturbance operations have permanently or temporarily stopped.
    - Signature of inspector

Proper Operation and Maintenance

Cole County shall at all times maintain all pollution control measures and systems in good order to achieve compliance with the terms of the general permit.

Typical Activities

The following are activities that are typically conducted by Cole County that may require a SWPPP. Some of these activities may need to meet additional requirement of MoDNR and/or other agencies.

Street/Road Construction/Removal
Land Clearing and Grading
Tree Clearing
Storm Sewer Construction/Removal
Bank Stabilization
Drainage Channel Construction/Rehab.
Building Construction/Removal
Parking Lot Construction/Removal
Bridge Construction/Removal
Fill Material Stockpiling (Soil and Rock)

SWPPP Management Personnel

The following Cole County Public Works personnel may be in charge of the management of the SWPPP for projects in Cole County. Other people not listed below may also be involved with the SWPPP of a specific project as employment conditions change. Please see the SWPPP for each particular site for details.

Eric Landwehr	Greg Block	Spencer Coonce	Andy Myers
Bryan Boyce	Joe Braun	Brad Wyss	Kevin Bishop
Matt Prenger	James Rademan	Kevin Light	
Aaron Lock	Gene Berhorst	Mark Zimmerman	

Appendix A

Temporary and Permanent Structural and Non-Structural BMPs

The following table lists the BMPs that can be expected to be used on projects requiring a Land Disturbance Permit

Construction Site Best Management Practices (BMPs)

BMP No	Title	Environmental Category					Use	
		Erosion Control	Pollution Prevention	Runoff Management	Sediment Capture	Tracking Control	Temporary	Permanent
EC-1	Scheduling*	S	P				X	
EC-2	Preservation of Existing Vegetation*	S	P	S	S		X	
EC-3	Dust Control*	P					X	
EC-4	Hydraulic Mulch-bonded Fiber Matrix	P					X	
EC-5	Mulching*	P					X	X
EC-6	Seeding/Mulching*	P					X	X
EC-7	Sodding*	P						X
EC-8	Rolled Erosion Control Products	P					X	X
EC-9	Geotextiles and Plastic Covers	P					X	
EC-10	Outlet/Energy Dissipation Devices	P			S		X	X
EC-11	Temporary Stream Crossings	P					X	
RM-1	Check Dams			P	S		X	X
RM-2	Earth Berms/Drainage Swales			P				X
RM-3	Terracing	S		P	S			X
RM-4	Slope Drains	S		P			X	
RM-5	Soil Roughening*	S		P			X	
RM-6	Fiber Rolls/Wattles	S		P	S		X	
SC-1	Vegetated Filter Strip*	S		S	P			X
SC-2	Silt Fence	S		S	P		X	
SC-3	Straw Bale Dike	S		S	P		X	
SC-4	Compost Filter Socks				P		X	
SC-5	Compost Filter Berms				P		X	X
SC-6	Sediment Basins				P		X	
SC-7	Sediment Traps				P		X	
SC-8	Curb and Gutter Inlet Protection				P		X	
SC-9	Drop Inlet Protection				P		X	
TC-1	Construction Entrance/Exit		S			P	X	
TC-2	Washdown Station*		S			P	X	
PP-1	Non-Sediment Pollution Control*		P				X	

P - Primary BMP function; S - Secondary function *Non-Structural

BMP Guidelines

Erosion and Sediment Control Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Construction Sequence and Scheduling	A specified work schedule that coordinates the timing of land-disturbing activities and the installation of erosion and sedimentation control measures. The objective is to disturb only the immediate work areas.	To reduce on-site erosion and off-site sedimentation by performing land-disturbing activities and installing erosion and sediment control practices in accordance with a planned schedule.	All land-development projects that will disturb more than one contiguous acre.	The general order of construction and planning is: • Plan disturbances to coincide with work progress, • Order materials to avoid delays, • Build construction site access, • Implement sediment traps and barriers, • Apply runoff control (diversions), • Implement main runoff conveyance system, • Build stream crossings, • Land clearing and grading, • Surface stabilization, • Building construction, • Landscaping and final stabilization.	At a minimum, the construction sequence should include: • Erosion and sedimentation control practices to be installed, • Principal development activities, • What measures should be in place before other activities begin, • Compatibility with the general construction schedule of the contract. When changes in construction activities are needed, amend the sequence schedule as necessary to fit the changes.

Adapted from IECAs Tools for Rules: How to Select, Install and Inspect Construction Site BMPs for NPDES Compliance

BMP Guidelines

Erosion and Sediment Control Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Protect Existing Vegetation	A construction management tool that retains site vegetation where possible by designating areas on which vegetation will not be disturbed.	Vegetation helps prevent soil erosion in the following ways: • Roots hold soil together • Leaves and stems break up rainfall impact • Ground cover slows down runoff and filters sediment out of water • Plants evapotranspirate water from soil.	All land-development projects that will disturb more than one contiguous acre.	Conduct field survey to determine extent of development. Delineate areas of project where existing vegetation will be preserved. Provide a map outlining these areas to grading personnel.	At a minimum, areas of vegetation preservation should be shown on the grading map and instructions presented as to construction procedures to be followed in and around these sensitive areas, including: • Placement of safety fence along the perimeter of protected zones • Routine inspection schedule for compliance • Remedial measures for repair and maintenance

Adapted from IECAs Tools for Rules: How to Select, Install and Inspect Construction Site BMPs for NPDES Compliance

BMP Guidelines

Erosion Control Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Surface Roughening	Preparing the soil topography for the designed construction purpose while taking erosion and sediment control factors into consideration.	To leave the surface soil in a roughened condition to provide temporary soil stabilization and augment future erosion and sediment control practices.	To some extent, on most construction sites that require land disturbing activities, and in particularly where there are critical, erodible slopes.	Designate surface roughening practice based on site conditions and well as equipment availability.	Designing surface roughening techniques into the project is determined by: 1. Site conditions 2. Available equipment (i.e. bulldozers, tractors, etc.) 3. Supplemental BMP application (i.e. hydraulic mulch, erosion control blanket, etc.) 4. Final landscape design. Types of surface roughening techniques include: • Track walking • Sheepsfoot rolling • Ripping • Imprinting

Adapted from IECAs Tools for Rules: How to Select, Install and Inspect Construction Site BMPs for NPDES Compliance

BMP Guidelines

Erosion Control Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Bench Terracing	Erosion control accomplished by constructing benches or large steps across the land slope.	Reduce the length of slope and thereby the potential for soil erosion.	On steep slopes where erosive factors are very high and gully erosion is likely to take place.	Terrace spacing and slope maintenance need to be considered.	Reduce slope length proportional to the steepness of the slope. Control outlets from terraces so erosion is eliminated.
Slope Interrupter Devices	Tube-like devices composed of a mesh or netting enclosing a biodegradable plant fiber that are installed on the slope contour.	To reduce runoff water velocities and trap sediment particles, thereby ameliorating the impact of slope length and steepness on erosion.	On slopes steeper than 5:1	Follow manufacturer's instructions as to design and specification, particularly in terms of spacing.	Employ slope interrupter devices as a complimentary practice to supplement: • Surface roughening techniques • Revegetation • Surface mulches, including hydraulic applications and rolled erosion control products • Removal after slope stabilized is optional

Adapted from IECAs Tools for Rules: How to Select, Install and Inspect Construction Site BMPs for NPDES Compliance

BMP Guidelines

Erosion Control Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Temporary Seeding	Planting fast growing vegetation to provide temporary erosion control.	To provide stabilization on bare soil areas that will not be brought to final grade for a period of more than 30 working days.	May be used on cleared unvegetated areas where temporary erosion control is needed.	Selection of appropriate plant species, use of quality seed, proper bed preparation, and seed application method are important.	The area to be seeded should be uniform an loosened to a minimum depth of 3 inches. The area should be cleared of stones, roots and other debris.
Turf Reinforcement Materials (TRM)	Three-dimensional fabrics of synthetic materials placed in areas of concentrated flow to provide plant reinforcement.	To provide increased shear strength to allow plant material usage in drainage channels as a functional substitute for hard armoring.	Drainage channels, swales, slope drains and as separators between rip rap and underlying soil.	Follow manufacturer's recommendation as to design, specification and suitability of material for site.	Installation of TRMs is critical to their performance in the field. Follow manufacturer's recommendation as to design, specification and installation of the material in conjunction with its vegetative component.
Permanent Seeding/Planting of Grasses	Control of runoff and erosion with permanent vegetation.	To economically control erosion and sedimentation.	Used on graded or cleared areas where soil is unstable because of texture, structure, high water table, or slope.	Selection of appropriate plant species, use of quality seed, and proper bed preparation are important.	Planting should occur within 14 days of final grading.

Adapted from IECAs Tools for Rules: How to Select, Install and Inspect Construction Site BMPs for NPDES Compliance

BMP Guidelines

Erosion Control Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Topsoiling	Stropping off, storing, and spreading the upper layers of soil over disturbed areas.	To provide a suitable medium for vegetation establishment and growth.	Wherever it is economically practical, this technique should be considered. Recommended for use in areas where subsoil is infertile and other methods will not produce or maintain a desirable stand of vegetation.	Recommended for placement on soils that do not have a deep rooting zone to support pants, and that may contain material toxic to plant growth, and where exposed subsoil is not suitable to produce adequate vegetation.	Should be applied on slopes 2:1 or flatter. Sample topsoil or duff material and apply lime and fertilizer as appropriate.
Permanent Ground Cover Plants	Control of runoff and erosion with trees, vines and shrubs by stabilizing soils in areas where vegetation other than grasses or legumes is preferred.	To economically control erosion and sedimentation.	Used on steep banks, graded cleared areas, and shady areas where turf maintenance is difficult. Also, can be used between terraces.	Selection of species should match soil characteristics. Quality stock should be selected and kept moist form time of receipt and planted as soon as possible.	Usually more effective when planted in clumps or blocks. Competitive vegetation should be pulled out of the areas where the plants are to be planted.

Adapted from IECAs Tools for Rules: How to Select, Install and Inspect Construction Site BMPs for NPDES Compliance

BMP Guidelines

Erosion Control Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Mulching	Use of a protective layer of straw, hay, wood chips, wood fibers, gravel, or synthetic materials on the soil surface to reduce rainfall impact and dislodgement of soil particles.	To protect the soil surface from the erosive forces of raindrop impact and overland or sheet flows. A secondary benefit of surface mulch is to retain soil moisture and moderate soil temperatures, aiding plant establishment.	As a temporary, non-vegetative surface erosion control treatment and/or in conjunction with a temporary or permanent re-vegetation technique, such as aerial or hydraulic seeding.	Application of temporary or permanent mulch materials should be planned to coincide with schedule of disturbance and final landscape design.	Organic mulches are most effective when uniformly spread and secured to the soil structure. • Cost • Longevity • Ease of installation • Erosion control effectiveness • Runoff vs. infiltration characteristics • Compatibility with revegetation strategy • Water quality impact Types of surface mulch materials/techniques include: • Straw or hay fibers • Paper or wood fibers • Gravel • Wood chips • Compost • Hydraulic matrices of cellulose fiber and tackifying agent • Bonded fiber matrices • Rolled erosion control products

Adapted from IECAs Tools for Rules: How to Select, Install and Inspect Construction Site BMPs for NPDES Compliance

BMP Guidelines

Erosion Control Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Sodding	Use of grass sod to permanently stabilize an area.	To rapidly prevent erosion and sedimentation.	May be used in areas requiring immediate and permanent vegetative cover, particularly in landscaping applications.	More costly than seeding, but can be established during times of the year when grass seed may fail. Irrigation may be necessary.	On slopes, sod should be applied with the long dimension perpendicular to the slope and pegged or stapled sufficiently to prevent movement.
Riprap or Aggregate	Permanent layers of loose angular stones or aggregate with a filter fabric or granular underlining placed over an erodible soil surface.	To protect the soil surface from the erosive flow of water, slow water flow velocity, and stabilize slopes.	Used when soil may erode under design flow conditions and cannot be protected by vegetative cover or other means. Riprap can be used at: • Storm drain outlets, • Channel banks and bottoms, • Roadside ditches, • Drop structures, • Toe of slopes, • Channel transitions	Graded riprap contains a mixture of stone sizes while uniform riprap is made up of stones of similar sizes. The size of stone used is directly related to the design flow velocity of the channel. Typically should be used for velocities in excess of 15 ft/sec.	The minimum riprap thickness is 2 times the maximum stone diameter but not less than 6 inches. The specific gravity of the individual stones should be at least 2.5. Maxim bank slope for application should not be steeper than 1.5:1.

Adapted from IECAs Tools for Rules: How to Select, Install and Inspect Construction Site BMPs for NPDES Compliance

BMP Guidelines

Erosion Control Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Outlet Protection	Structurally lined aprons or other acceptable energy dissipation devices placed at the outlets of pipes or paved channel sections.	To protect the soil surface from the erosive flow of water, slow the water flow velocity, and stabilize slopes or channels.	Used where the flow velocity at the design capacity will exceed the velocity of the receiving channel or area.	Geotextile fabrics in conjunction with vegetation create a natural outlet protection. Riprap aprons are relatively low cost and easy to install. Riprap stilling basins or plunge pools are used where overfalls exit the ends of popes where high flows would require excessive apron lengths.	Capacity: 10-year peak runoff or design discharge of conveyance, whichever is greater. Geotextile fabrics should be designed to handle peak flow rates and tractive forces. The depth of a riprap apron should be 2 times the max. stone diameter but not less than 6 inches.
Dust Control	Actions or methods which reduce the erosive effects of wind on dry soils.	To prevent soil particles in the form of dust from becoming airborne.	Used where open dry areas of soil, particularly in dryer climates or during the dry season, are exposed to the erosive factors of the wind.	The direction of the prevailing winds and careful planning of clearing activities are important.	Minimize the period of soil exposure through use of temporary ground cover and other stabilization practices. Some possible dust control measures are: • Vegetative cover, • Mulch or Stone • Spray-on adhesive • Calcium chloride • Sprinkling

Adapted from IECAs Tools for Rules: How to Select, Install and Inspect Construction Site BMPs for NPDES Compliance

BMP Guidelines

Sediment Control Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Sediment Basins	A suitably located temporary or permanent earthen embankment, barrier, dam, or excavated basin designed to capture sediment.	To retain sediment on the construction site and prevent sedimentation to off-site waterbodies, properties, etc.	Used where erosion control measures are not adequate to prevent off-site sedimentation on sites with disturbed area of 5 acres or more.	Hazard class must be considered so failure does not jeopardize property or lives. The location of the basin must be able to collect all of the site runoff.	Drainage area is between 5 and 150 acres. The flow length through the basin length to width ratio should be 2:1 or greater.
Temporary Sediment Trap	A small temporary ponding basin formed by constructing an embankment across a drainage swale, by excavating a pond or by rock fill.	To detain sediment-laden runoff form small, disturbed areas long enough to allow the majority of the sediment to settle out.	Used at the outlets of drains, diversions, channels, and other runoff conveyances. May be installed during early site development.	Access to trap must be maintained to periodically removed sediment for proper disposal. Structure life is limited to 18 months.	Used for drainage areas of 5 acres or less. Minimum storage area is fixed to meet 80% removal efficiency. Side slopes of the excavated trap should be 2:1 or flatter. Maximum height is 5 ft.
Silt Fence	Sediment barrier consisting of synthetic filter fabric stretched across posts with the bottom of the fabric being entrenched. In most cases the fabric should be reinforced with the support of a wire fence.	To catch and hold small amounts of sediment from disturbed areas by reducing the velocity of sheet flow to allow sediment deposition.	Used below small, disturbed areas less than 1/4 acre per 100 ft. of fence, and where runoff can be stored behind the fence without damaging the fence or the area behind it.	Should be located where shallow pools can be formed. Sediment deposition should be periodically removed and properly disposed of. Breaks in the fence should be used to minimize drainage areas.	Fence should be stable for the 10-yr storm. The slope should be no longer than 100 ft. and have a gradient of 2:1 or flatter. The minimum fabric height is 18 in. Maximum post spacing is 6 ft. Minimum post burial depth is 12 in.

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BMP Guidelines

Sediment Control Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Rock Ditch Checks	Small temporary dams constructed across a swale or drainage ditch to reduce the velocity of concentrated storm flows.	To reduce erosion of the channel by restricting the velocity of flow in the channel. Not to be installed in live channels or waters of the commonwealth.	Used as a temporary or emergency measure to limit erosion by reducing flow in a small open channel.	Ditch checks should not be used in live streams but are intended for temporary ditches and swales. Checks in grass channels may kill the vegetation. Ditch checks shall be promptly removed when their useful live has been completed.	Drainage area should not exceed 10 acres. The maximum height is 2 ft. at the center. The center should be at least 6 in. lower than the outer edges. The maximum spacing between checks should be such that the toe of the upstream check is at the same elevation as the top of the downstream check. The maximum size of stone used should be no greater than 8 in. in diameter.
Stabilized Construction Entrance	A gravel driveway or pad located at a point where vehicle enter and exit a construction site.	To reduce the amount of mud and soil transported onto public roads by traffic leaving the construction site.	Used wherever traffic leaves a construction site and enters a public right-of-way, street, alley, sidewalk, parking lot or other paved area.	Construction plans should limit all traffic to properly constructed entrances and exits.	Stone should be KTC #3 or larger. Pad thickness has a 6 in. minimum with a required geotextile fabric underlying the stone. The minimum width of the entrance shall be 24 ft. while the minimum length shall be 100 ft.

Adapted from IECAs Tools for Rules: How to Select, Install and Inspect Construction Site BMPs for NPDES Compliance

BMP Guidelines

Sediment Control Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Storm Drain Inlet Filters	A sediment filter or an excavated impounding area surrounding a storm drain inset.	To retain sediment on the construction site by slowing and filtering runoff before it enters the storm drainage system.	Used where storm drain inlets are to be made operational before permanent stabilization of the disturbed area occurs.	Must not be used near the edge of fill material and must not divert water over cut or fill slopes. • Filter Fabric Inlet Protection • Stone Bag Inlet Protection • Block and Gravel Drop Inlet • Protection • Gravel and Wire Mesh Inlet Sediment Filter	The drainage area must be no greater than 1 acre with a slope less than 5%.
Vegetated Filter Strips	Zones of vegetation through which sediment and pollutant-laden runoff are directed before being discharged to a concentrated flow channel.	Filter strips are used to remove sediment from overland sheet flow but are not effective in removing sediment from concentrated flows.	Used where runoff from land undergoing development needs to be filtered to reduce sediment damage to adjacent properties, streams or sinkholes.	Effectiveness can vary depending on vegetation, height, type and density, season of the year, soil eroded particle size characteristics, size of disturbed area, and site topography.	The General Design Criteria are: Min. Width = 15 ft. Max. Ground Slope = 1% Max. Ground Slope = 10%.

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BMP Guidelines

Temporary Flow Control and Conveyance Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Temporary Pipe Slope Drains	Flexible tubing or conduit extending temporarily from the top to the bottom of a cut or fill slope.	To convey concentrated runoff down the face of a cut or fill slope to a protected stable area without causing erosion.	Used on sites before permanent stormwater drainage structures are installed and where stormwater runoff above a cut or fill slope will cause severe erosion if allowed to flow over the slope.	Must be sized, installed, and maintained properly because failure results in slope gully erosion. The entrance must be securely entrenched with watertight connections , with securely staked conduit.	Should handle peak runoff from the 10-yr storm. The maximum drainage area per pipe is 10 acres. The entrance should be constructed of a standard flared end section of pipe or equivalent. Reinforced hold-down garments should be spaced at 10 ft. or less intervals.
Runoff Control Measures	A temporary ridge, excavated channel, or combination ridge and channel constructed across sloping land at a pre-determined grade.	To divert clean water around work sites to stable outlets and to divert sediment-laden water to sediment control structures such as sediment traps and basins.	• Above slopes to prevent clean runoff from flowing over unprotected soil, • Across unprotected slopes to reduce flow lengths, • Below slopes to divert runoff to a stable outlet, and • Within and below disturbed areas to direct sediment-laden water to control structures.	Design as a stable channel with a mild bed slope. Use of either uniform or a gradually increasing grade is preferred over sudden decreases or increases in grade. A permanent vegetative covering is required where the channel grade is between 0.2% and 3%.	Design drainage area is 5 acres or less based on the peak runoff from the 10-yr. storm. A channel lining is required if the average velocity is greater than 2 ft/sec. Channel side slopes are 2:1 or flatter. The berm must have side slopes of 2:1 or flatter, with a minimum top width of 2 ft. and a designed freeboard of at least 4 in.

Adapted from IECAs Tools for Rules: How to Select, Install and Inspect Construction Site BMPs for NPDES Compliance

BMP Guidelines

Permanent Flow Control and Conveyance Measures

BMP	Definition	Purpose	Where Applicable	Planning	Design Criteria
Subsurface Drains	A perforated pipe or conduit placed beneath the surface of the ground at a designated depth and grade.	Used to drain saturated soils by lowering the water table.	Used in areas free from tree roots where the soil layer depth is deep enough to allow proper installation.	Not recommended in areas where the drain will pass under heavy vehicle crossings.	Should be designed for required capacity. The minimum diameter should be 6 in. The line should be graded to achieve at least a velocity of 2.4 ft/sec to prevent silting.
Level Spreader	Structure that converts sediment-free channel flow and uniformly releases it over a stabilized area.	Provides stable outlets for diversion channels, basins, dikes and other structures.	Used where sediment free storm runoff can be released as sheet flow over a stable area.	Install in areas where the level lip can be constructed without using fill material. The discharge area should have a maximum 10% slope and be well-vegetated and stable for design flow conditions. There should be no traffic across a level spreader.	Capacity determined by peak flow from the 10-yr. storm. The maximum desirable flow into the spreader should not exceed 30 cfs. Spreader length, width and depth are designed based on flow. There should be a 20 ft. long transition section between the channel entrance and the design width of the spreader. The grade of the spreader invert and lip must be 0.

Adapted from IECAs Tools for Rules: How to Select, Install and Inspect Construction Site BMPs for NPDES Compliance

Appendix B

BMP Descriptions and Details

(Taken from Chapter 8 of the Boone County Storm Water Manual)

CHAPTER 8
EROSION AND SEDIMENT CONTROL

8.1 Introduction

These guidelines are intended to provide the designer, contractor and builder with design criteria and minimum standards for the installation of erosion and sediment controls to comply with the Erosion and Sediment Control Regulations. The regulations were enacted to protect the health, safety, and property of the citizens and to help protect area water resources from pollution due to erosion and transportation of sediment. The regulations are applicable to all land development and land disturbance activity within the regulated MS4 area where the area of disturbance is more than one acre. The regulations require that no person cause or allow sediment to be deposited in any public street, public land, or on any property not under their control as a result of land disturbance from construction activities.

You can comply with the regulations by meeting the following objectives:

a. Minimize the area disturbed by construction and development;
b. Provide for containment of sediment until areas are stabilized;
c. Stabilize disturbed areas as soon as practical after project completion; and
d. Provide permanent erosion, drainage, and detention controls.

8.2 General Design Guidelines

Erosion is a natural process where soil and rock are loosened and removed. Natural erosion normally occurs at a very slow pace, but when land is disturbed by vegetation removal, grading and other construction activities, the erosion rate often increases dramatically. When erosion occurs on a construction site the sediment is available for transport by either wind or stormwater runoff. The discharge of sediment and other construction site pollutants can negatively impact downstream water quality.

The purposes of erosion and sediment controls are to minimize the amount of erosion that occurs as a result of construction activities and to prevent the sediment from leaving the property. Effective erosion and sediment control requires that the soil surface be protected from the erosive forces of wind, rain, and runoff and that the eroded soil be captured and retained onsite.

When designing sediment and erosion controls, it is necessary to determine whether there is **sheet flow** or **concentrated flow** of stormwater on the property. Sheet flow occurs on gently sloping land without defined drainage ways. The stormwater tends to disperse evenly across the property, although the drainage may be in one direction due to the overall slope. Concentrated flow occurs where there are defined drainage ways that may range from gentle swales to clearly defined waterways. It is possible to have a combination of sheet flow and concentrated flow on the same property.

1. Erosion Protection

Proper planning will help identify potential erosion problems, particularly highly susceptible areas, such as areas of concentrated flow. Removing the vegetative cover and altering the soil structure by clearing, grading and compacting the surface increases an area's susceptibility to erosion. Scheduling can be a very effective means of reducing erosion by minimizing both the exposed area and the duration of exposure. Apply stabilizing measures as soon as possible after the land is disturbed. Plan and implement temporary or permanent vegetation, mulches, or other protective practices to correspond with construction activities. Protect channels from erosion forces by using protective linings and the appropriate channel design. Consider possible future repairs and maintenance of these practices in the design. In scheduling, take into account the season and the weather forecast.

Clearing existing vegetation reduces the surface roughness and infiltration rate and increases runoff velocities and volumes. This is particularly a concern in areas of concentrated flow. Use measures that break the slopes to reduce the problems associated with concentrated flow volumes and runoff velocities. Practical ways to reduce velocities include conveying stormwater runoff away from steep slopes to stabilized outlets, preserving natural vegetation where possible, and mulching and vegetating exposed areas immediately after construction.

2. Sediment Containment

Even with careful planning some erosion is unavoidable, and the resulting sediment must be trapped on the site. In areas where runoff occurs primarily as sheet flow, containment of sediment is relatively simple. In these areas, temporary containment devices may be sufficient. Where concentrations of flow occur, containment of sediment becomes more difficult as the rate and volume of flow increase. In these areas, more extensive or permanent control devices need to be provided. Areas of steep topography and cut or fill slopes need to be given special consideration. Due to the environmental sensitivity of streams, rivers, losing streams, sinkholes, and other Karst topographic features, special consideration also needs to be given to these areas. Plan the location where sediment deposition will occur and maintain access for periodic removal of accumulated sediment. Protect low points below disturbed areas by building barriers to reduce sediment loss. Sediment traps and basins should be constructed before other land-disturbing activities occur.

3. Temporary versus Permanent Controls

Temporary controls, such as straw bale dikes, silt fences, erosion control blankets, etc., are provided for the purpose of controlling erosion and containing sediment until construction is complete. Temporary controls are not needed after the area is stabilized.

Permanent controls consist of riprap, detention basins, etc., which will remain in place through the life of the development. It is possible for the same facility to serve both a temporary and permanent purpose.

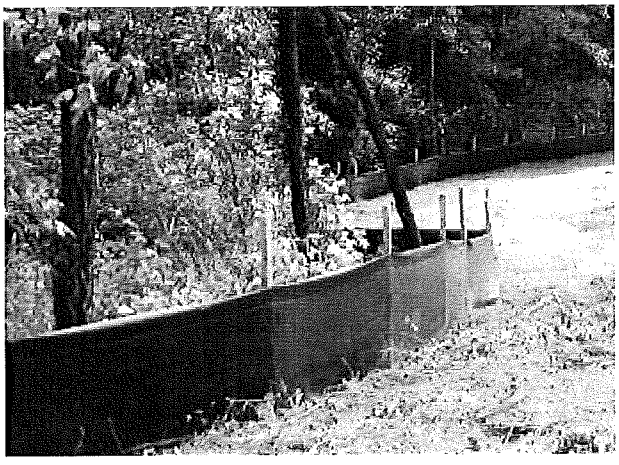
4. Maintenance

Regular inspection and maintenance of Best Management Practices (BMPs) are vital to the performance of erosion and sedimentation control measures. If not properly maintained, some practices may cause more damage than they prevent. Always evaluate the consequences of a measure failing when considering which control measure to use, since failure of a practice may be hazardous or damaging to both people and property. For example, a failure of a large sediment basin can have disastrous results, and low points in dikes can cause major gullies to form on a fill slope. It is essential to inspect all practices to determine that they are working properly and to ensure that problems are corrected as soon as they develop.

8.3 BMP Descriptions and Design Guidance

The following principles are effective when they are integrated into a system of control practices and management techniques to control erosion and prevent sedimentation offsite. As a matter of practicality, proprietary erosion and sediment control products are not specifically identified herein. However, the County encourages the use of these products when designed, specified and installed in accordance with manufacturer's recommendations. Sufficient details related to these products should be supplied to facilitate the review of the plans to ensure the suitability of the practice. The following is not meant to provide an exhaustive list of all acceptable erosion and sediment control practices accepted by the county, only as a general guidance document.

There may be instances where certain erosion control designs are beyond the scope of general civil engineering knowledge. Specifically, natural stream stabilization and/or restoration should only be done with specific expertise and experience with these systems. This manual is not intended to convey such a level of knowledge and therefore will not address this level of complexity.



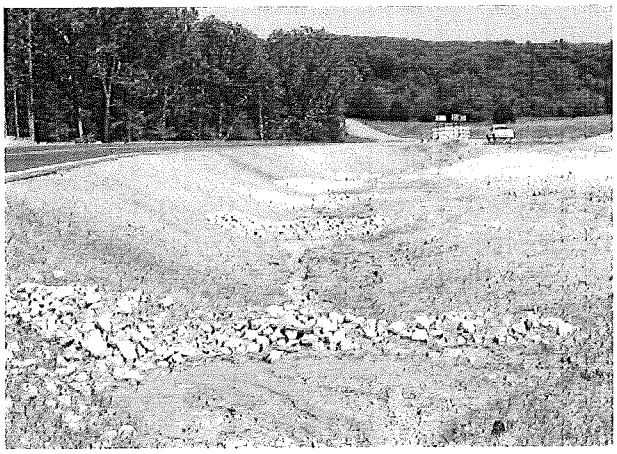


Figure 1. Silt Fences are placed at the perimeter of the job site to capture and prevent sediment from leaving the site.
Figure 2. Rock Check dams can reduce water velocities in areas of channelized flow.

EC-1 SCHEDULING

This BMP involves developing, a schedule that includes sequencing of construction activities with the implementation of construction site BMPs such as temporary soil stabilization (erosion control) and temporary sediment control measures for every project. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

APPROPRIATE APPLICATIONS:

Construction sequencing shall be scheduled to minimize land disturbance for all projects at all times.

CONDITIONS FOR EFFECTIVE USE:

All land disturbing activities.

WHEN BMP IS TO BE INSTALLED:

Scheduling should take place during the planning stages and be modified throughout the duration of the project.

STANDARDS AND SPECIFICATIONS:

Developing a schedule and planning the project are the very first steps in an effective storm water program. The construction schedule shall be incorporated into the SWPPP. Develop the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, pouring foundations, installing utilities, etc., to minimize the active construction area during the rainy season. Schedule major grading operations for the non-rainy season when practical. Incorporate staged seeding and re-vegetation of graded slopes as work progresses. Consider the appropriate planting time for specified vegetation when establishing permanent vegetation.

OPERATION AND MAINTENANCE PROCEDURES:

Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions. Amend the schedule when changes are warranted.

EC-2 PRESERVATION OF EXISTING VEGETATION

Preservation of existing vegetation is the identification and protection of desirable vegetation that provides erosion and sediment control benefits and includes establishing setbacks to protect stream banks according to the County stream buffer regulations.

APPROPRIATE APPLICATIONS:

Preserve existing vegetation at areas on a site where no construction activity is planned or will occur at a later date.

CONDITIONS FOR EFFECTIVE USE:

Protection of existing vegetation requires planning, and may limit the area available for construction activities.

WHEN BMP IS TO BE INSTALLED:

Existing vegetation to be preserved shall be identified on the plans. Measures to protect said vegetation (such as construction fencing and signage) should be installed prior to the commencement of clearing and grubbing operations or other soil-disturbing activities.

STANDARDS AND SPECIFICATIONS:

Minimize the disturbed areas by locating temporary roadways to avoid stands of trees and shrubs and to follow existing contours to reduce cutting and filling. Mark areas to be preserved with temporary fencing at least 3.2 ft. tall. The fence post spacing and depth shall be adequate to completely support the fence in an upright position. Construction materials, equipment storage, and parking areas shall be located where they will not cause root compaction. Keep equipment away from trees to prevent trunk and root damage. Employees and subcontractors shall be instructed to honor protective devices. No heavy equipment, vehicular traffic, or storage piles of any construction materials shall be permitted within the drip line of any tree to be retained. Trenching shall be as far away from tree trunks as possible, usually outside of the tree drip line or canopy. The ends of damaged or cut roots shall be cut off smoothly.

OPERATION AND MAINTENANCE PROCEDURES:

During the construction phase(s), limits of disturbance shall remain clearly marked at all times. If damage to protected trees occurs, the injured tree shall be attended to by an arborist.

SITE CONDITIONS FOR REMOVAL:

Temporary fencing shall be removed after final stabilization of the site has occurred.

EC-3 DUST (WIND EROSION) CONTROL

Wind erosion control consists of applying water and/or other dust palliatives as necessary to prevent or alleviate erosion by the forces of wind. Alternatives to applying water or other dust palliatives include mulch or vegetative cover, wind barriers, and minimization of soil disturbance.

APPROPRIATE APPLICATIONS:

This practice is implemented on all exposed soils subject to wind erosion.

CONDITIONS FOR EFFECTIVE USE:

Effectiveness depends on soil, temperature, slope, aspect, humidity and wind velocity.

WHEN BMP IS TO BE INSTALLED:

Dust control should be performed routinely, especially in advance of and during periods of dry weather.

STANDARDS AND SPECIFICATIONS:

Water shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution. Phase work to the extent practical to minimize concurrent areas of soil disturbance. For areas not subjected to traffic, vegetation provides the most practical method of dust control and should be established as early as possible. Wind barriers such as solid board fences, snow fences, burlap fences, crate walls, and similar materials can be used to control air currents and blowing soil. Barriers placed at right angles to prevailing wind currents at intervals of about 10 times their height are effective in controlling soil blowing. Paved areas that have soil on them from construction sites should be cleaned regularly. Mulching offers a fast and effective means of controlling dust when properly applied. Binders and tackifiers may need to be used on organic mulches. NOTE: If calcium chloride or spray-on adhesives are used for dust control, a permit may be required from MoDNR.

OPERATION AND MAINTENANCE PROCEDURES:

Check areas that have been protected to ensure coverage.

SITE CONDITIONS FOR REMOVAL:

Dust control should be implemented when soils are exposed until cover is established.

EC-4 HYDRAULIC MULCH-BONDED FIBER MATRIX

Hydraulic mulch consists of applying a mixture of shredded wood fiber or a hydraulic bonded fiber matrix (BFM) and a stabilizing emulsion or tackifier with hydroseeding equipment, which temporarily protects exposed soil from erosion by raindrop impact or wind. BFMs adhere directly to the soil, eliminating gaps between the product and the soil. A water-insensitive crust does not form; therefore plant growth is not inhibited. Mulch and BFMs will biodegrade completely into material beneficial to plant growth. Seed may be applied simultaneously with mulching.

APPROPRIATE APPLICATIONS:

Hydraulic mulch and BFMs are applied to disturbed areas requiring temporary protection until permanent vegetation is established or disturbed areas that must be re-disturbed following an extended period of inactivity.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow only.

Wood fiber hydraulic mulches and BFMs are generally short-lived (only last part of a growing season) and need 24 hours to dry before rainfall occurs to be effective.

WHEN BMP IS TO BE INSTALLED:

Hydraulic mulch or bonded fiber matrix should be applied immediately after completion of a phase of grading.

STANDARDS AND SPECIFICATIONS:

Follow manufacturer's recommendations to maximize usefulness. Avoid mulch over-spray onto the traveled way, sidewalks, and lined drainage channels. Materials for wood fiber-based hydraulic mulches and bonded fiber matrices shall meet environmental quality standards and not be a detriment to stormwater discharges from the site.

OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every storm until vegetation is fully established. Repair eroded areas and reapply product and vegetation.

SITE CONDITIONS FOR REMOVAL:

Typically these materials are left in place to degrade naturally.

EC-5 MULCHING

A layer of organic material designed to protect exposed soil or freshly seeded areas from erosion by eliminating direct impact of precipitation and slowing overland flows. Mulch materials may include, but are not limited to, grass, hay, straw, wood chips, wood fibers, and shredded bark.

APPROPRIATE APPLICATIONS:

Typically used for soil stabilization as a temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetation is established. Mulch can also be installed in land--scape areas for permanent use.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow only

The use of appropriate mulch will help ensure the vegetation is established under normal conditions and is essential to seeding success under harsh site conditions. General mulch recommendations to protect from raindrop splash and sheet flow include: straw applied at 2-2.5 tons/acre, wood fiber or wood cellulose applied at 0.5-1 ton/acre, wood chips applied at 5-6 tons/acre, and bark applied at 35 yd3/acre. Where slopes are 25 percent (4:1) or greater, hydromulch, bonded fiber matrix, or erosion control blankets are required.

WHEN BMP IS TO BE INSTALLED:

Mulch should be applied immediately after grading landscaped areas or seeding other areas.

STANDARDS AND SPECIFICATIONS:

Install upstream BMPs to protect area to be mulched. Rough grade area and remove all debris larger than 1 inch if area is to be vegetated and mowed in the future, larger than 2 inches if area is to be permanently mulched. If area is to be seeded, follow requirements of Seeding BMP. Spread mulch evenly.

OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every storm until adequate vegetation is established; annually for permanent mulch. Protect from vehicular and foot traffic. Repair damaged, degraded or eroded areas-reseed as needed and replace mulch.

EC-6 SEEDING/MULCHING

Establishment of vegetation by spreading grass seed designed to protect exposed soil from erosion by eliminating direct impact of precipitation and slowing overland flow rates. Once established, the vegetative cover will also filter pollutants from the runoff.

APPROPRIATE APPLICATIONS:

Exposed soil after a phase of rough or finish grading has been completed, or areas where no activity will occur for 14 days.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and concentrated flow (additional stabilization is necessary).

Minimum Rates: Permanent seeding should consist of 90% tall fescue and 10% annual ryegrass. Seed mixture should be applied at 400 pounds/acre. Temporary seeding shall consist of any combination of tall fescue, annual ryegrass, millet, wheat or oats. Seed mixture should be applied at 200 pounds/acre. Dormant season seeding, seed mix should consist of 80% tall fescue, 10% annual ryegrass and 10% spring oats. Seed mixture is to be applied at 600 pounds/acre.

Acceptable Dates: Permanent seeding may be done March 1 to June 1 and August 15 to November 1. Temporary seeding can occur during any season, however winter is the least tolerant. Dormant season seeding includes December 15 to February 29.

WHEN BMP IS TO BE INSTALLED:

Seed and mulch should be applied immediately after rough or finished grading is completed.

STANDARDS AND SPECIFICATIONS:

Install upstream BMPs to prevent erosion and protect the area to be seeded. Complete grading and remove all debris larger than 1 inch. Loosen compacted soils to a depth of 4 inches. Groove or furrow on the contour if necessary. Spread loose topsoil at a depth of 4 inches.

Soil amendments should be applied per soil tests. When these are not available, lime shall be applied at the rate of 1500 pounds effective neutralizing material per acre. Soils with a pH of six

or higher need not be limed. When soil tests are not available, a 13-13-13 grade fertilizer shall be appled at a rate of 500 pounds/acre for permanent seeding and a 10-10-10 grade fertilizer shall be applied at the rate of 200 pounds/acre. Mix soil amendments (lime, fertilizer, etc.) into the top 4 inches of soil.

Plant seed ¼ to ½ inches deep using a cyclone seeder, drill, cultipacker seeder, or hydro-seeder. Roll lightly to firm surface. Cover seeded area with mulch. Install additional stabilization (erosion control blankets, netting, bonded fiber matrix, etc.) on slopes steeper than 3:1 and in areas of concentrated flow. Water seeded area immediately. Provide enough water to soak 4 inches into the soil without causing runoff.

OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least weekly and after every storm. Protect seeded areas from vehicular and foot traffic. Reseed and mulch areas that have not sprouted within 21 days of planting. Repair damaged or eroded areas and reseed/mulch and stabilize as needed. Do not mow until 4 inches of growth occurs. During the first 4 months, mow no more than 1/3 the grass height.

EC-7 SODDING

Sod consists of a ¾ inch to 1 inch mat of vigorous turf, free from disease, insects and weeds. Sod prevents raindrops from disrupting the soil structure and causing erosion. Sod slows water runoff and acts as a filter when sediment laden runoff crosses over the sodded area.

APPROPRIATE APPLICATIONS:

Typically installed in areas requiring immediate erosion protection, such as swales or detention ponds and as filter strips, around inlets, and adjacent to curbs. Also installed in areas requiring immediate aesthetic appearance or function such as entrances to new subdivisions and off site construction areas.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and low concentrated flows with velocities less than 5 fps.

WHEN BMP IS TO BE INSTALLED:

Sod should be installed immediately after finish grading, installation of area inlets, and installation of underground services and foundations of new homes.

STANDARDS AND SPECIFICATIONS:

Rough grade area and remove all debris larger than ½ inch in diameter and concentrated areas of smaller debris. Soil preparation of area to be sodded shall be determined by tests to determine lime and fertilizer requirements. Scarify soil and level to provide an even grade. Soil should not be excessively wet or dry. Lay first row of sod perpendicular to the slope or direction of flow. Butt subsequent rows tight against previous rows with strips staggered in brick-like pattern. Fill minor gaps with good soil and roll entire surface to ensure contact. Stake, staple and/or net

corners and centers of sod strips as required, especially areas of concentrated flow. Water should be applied immediately after installation of sod. Provide enough to soak 4 inches into the soil without causing runoff.

OPERATION AND MAINTENANCE PROCEDURES:

Water sod daily for 3 weeks, enough to soak 4 inches into the soil without causing runoff. Reposition areas of sod that have moved along the slope. Remove sediment accumulations, replace sod if necessary. Repair any eroded areas, replace sod, and stabilize as needed. Do not mow until 3 inches of new growth occurs. During the first 4 months, mow no more than 1/3 the grass height.

EC-8 ROLLED EROSION CONTROL PRODUCTS

Rolled erosion control products include erosion control blankets and turf reinforcement mats. Erosion control blankets are pre-formed protective blanket of plastic fibers, wood fibers, straw or other plant residue designed to protect soil from the impact of precipitation and overland flow, and retain moisture to facilitate establishment of vegetation. Turf reinforcement mats include netting designed to anchor the root system of the vegetation growing through it.

APPROPRIATE APPLICATIONS:

These products may be installed on seeded areas for temporary or permanent use.

CONDITIONS FOR EFFECTIVE USE:

Several factors, such as soil conditions, steepness and length of slope, depth of flow, runoff velocities, and time required to establish desired vegetation, influence the choice of product. Manufacturer's recommendations should be followed. Products are available for a variety of uses: Netting-synthetic or natural fiber mesh installed over disturbed areas to hold organic mulch and/or seed in place, Biodegradable Erosion Control Blanket-natural fiber blanket held together by netting to provide temporary erosion protection on slopes and channels, and Permanent Erosion Control Blanket-synthetic blanket material which provides permanent erosion control on slopes and channels with increased water flow velocities.

WHEN BMP IS TO BE INSTALLED:

Rolled erosion control products should be installed immediately after completion of a phase of grading or installation of vegetation.

STANDARDS AND SPECIFICATIONS:

Follow manufacturer's recommendations and specifications, particularly noting requirements for check slots, fastening devices and need for firm contact with soil.

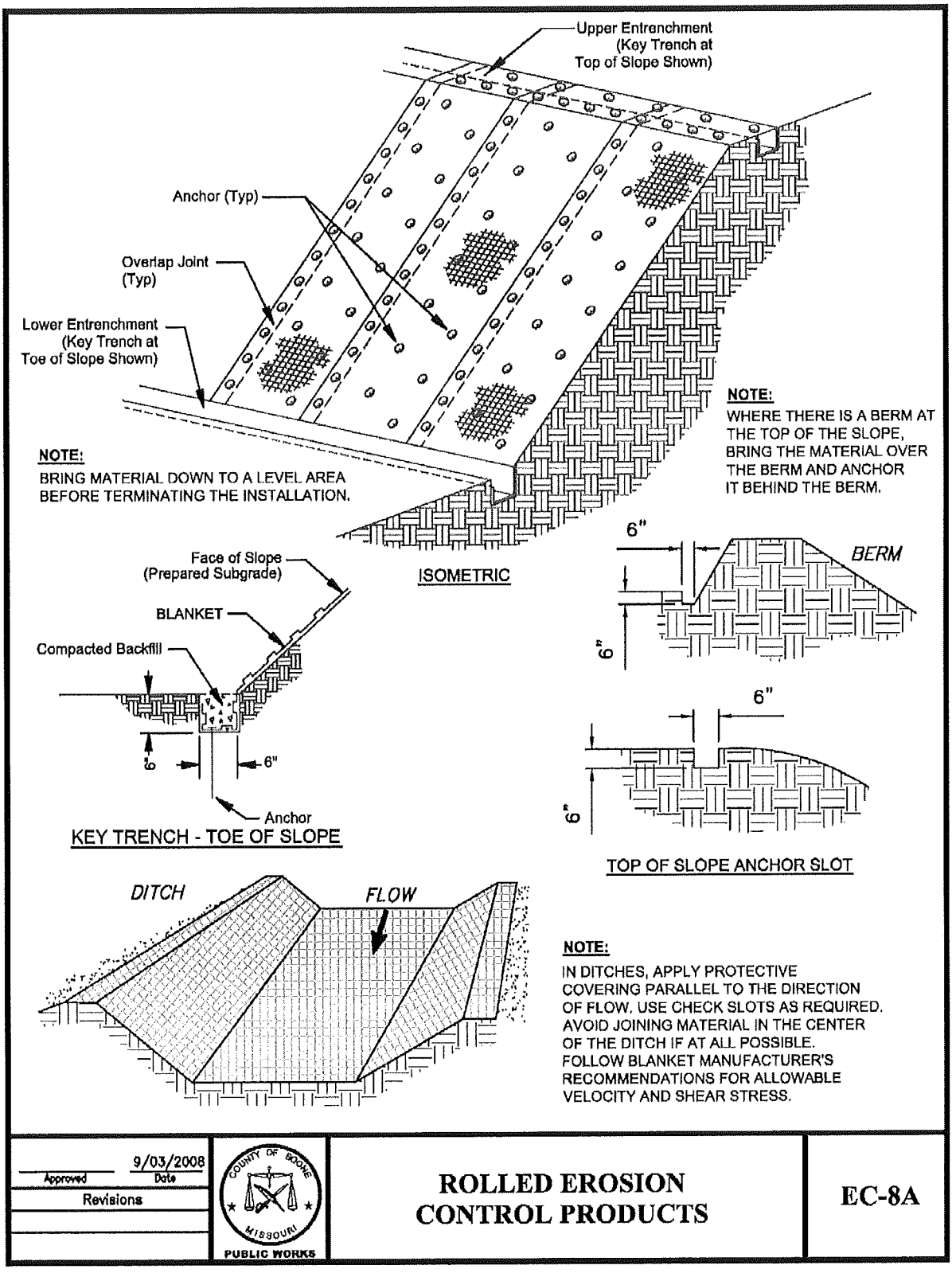
OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every storm until adequate vegetation is established. Repair erosion and/or undermining at top of slope. Repair undermining beneath blankets-pull back the blanket(s), fill compact eroded area, re-vegetate and then firmly secure the blanket(s). Reposition or replace blanket(s) that have moved along the slope or have been damaged.

SITE CONDITIONS FOR REMOVAL:

Temporary blankets will generally degrade naturally; permanent blankets remain in place.

STANDARD DRAWING: EC-8a and EC-8b


Upper Entrenchment
(Key Trench at
Top of Slope Shown)
Anchor (Typ)
Overlap Joint
(Typ)
Lower Entrenchment
(Key Trench at
Toe of Slope Shown)
NOTE:
BRING MATERIAL DOWN TO A LEVEL AREA
BEFORE TERMINATING THE INSTALLATION.
NOTE:
WHERE THERE IS A BERM AT
THE TOP OF THE SLOPE,
BRING THE MATERIAL OVER
THE BERM AND ANCHOR
IT BEHIND THE BERM.
ISOMETRIC
Face of Slope
(Prepared Subgrade)
BLANKET
Compacted Backfill
6"
6"
Anchor
KEY TRENCH - TOE OF SLOPE
6"
BERM
6"
6"
TOP OF SLOPE ANCHOR SLOT
DITCH
FLOW
NOTE:
IN DITCHES, APPLY PROTECTIVE
COVERING PARALLEL TO THE DIRECTION
OF FLOW. USE CHECK SLOTS AS REQUIRED.
AVOID JOINING MATERIAL IN THE CENTER
OF THE DITCH IF AT ALL POSSIBLE.
FOLLOW BLANKET MANUFACTURER'S
RECOMMENDATIONS FOR ALLOWABLE
VELOCITY AND SHEAR STRESS.
9/03/2008
Approved
Date
Revisions
PUBLIC WORKS
ROLLED EROSION
CONTROL PRODUCTS
EC-8A

EROSION CONTROL BLANKET NOTES:

A) SITE PREPARATION:
AFTER SITE HAS BEEN SHAPED AND GRADED, PREPARE A FRIABLE SEEDBED RELATIVELY FEE FROM CLODS AND ROCKS MORE THAN 1 1/2 INCHES IN DIAMETER AND ANY FOREIGN MATERIAL THAT WILL PREVENT UNIFORM CONTACT OF THE BLANKET WITH THE SOIL SURFACE.

B) PLANTING:
LIME, FERTILIZE, AND SEED IN ACCORDANCE WITH SEEDING OR PLANTING PLAN. WHERE GROUND COVERS ARE TO BE PLANTED, LAY THE PROTECTIVE COVERING FIRST AND THEN PLANT THROUGH THE MATERIAL AS PER PLANTING PLAN.

C) LAYING AND STAPLING:
1. START LAYING THE BLANKET FROM THE TOP OF THE CHANNEL OR SLOPE AND UNROLL DOWN-GRADE. ALLOW TO LAY LOOSELY ON SOIL; DO NOT STRETCH.
2. UPSLOPE ENDS OF THE BLANKET SHOULD BE BURIED IN AN ANCHOR SLOT NO LESS THAN 6-INCHES DEEP. TAMP EARTH FIRMLY OVER THE MATERIAL.
3. WHERE MULTIPLE WIDTHS ARE LAID SIDE BY SIDE, THE ADJACENT EDGES SHALL BE OVERLAPPED A MINIMUM OF 6 INCHES AND STAPLED TOGETHER.
4. STAPLES SHALL BE PLACED PER MANUFACTURER'S RECOMMENDATIONS.

D) TROUBLESHOOTING:
CONSULT WITH THE ENGINEER, IF ANY OF THE FOLLOWING OCCUR:
1. MOVEMENT OF THE BLANKET OR EROSION UNDER THE BLANKET IS OBSERVED.
2. VARIATIONS IN TOPOGRAPHY ON SITE INDICATE EROSION CONTROL MAT WILL NOT FUNCTION AS INTENDED; CHANGES IN PLAN MAY BE NEEDED, OR A BLANKET WITH A SHORTER OR LONGER LIFE MAY BE NEEDED.
3. 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.

E) MAINTENANCE & INSPECTION:
INSPECT CONTROLS AFTER EACH RAIN EVENT OF 1/2 INCH OR GREATER, AND EVERY 7 DAYS UNTIL VEGETATION IS ESTABLISHED. LOOK FOR EROSION OR UNDERMINING BENEATH THE NETTING, BLANKETS, OR MATS. IF ANY AREA SHOWS EROSION, PULL BACK THAT PORTION OF THE MATERIAL, ADD SOIL, AND RESEED; RESECURE THE MATERIAL IN PLACE. IF NETTING, BLANKETS OR MATS BECOME DISLOCATED OR DAMAGED, REPAIR OR REPLACE AND RESECURE IMMEDIATELY.

F) JOINING BLANKETS:
OVERLAP THE END OF THE PREVIOUS ROLL A MINIMUM OF 6 INCHES AND STAPLE. STAPLE ACROSS THE END OF THE ROLL JUST BELOW THE ANCHOR SLOT AND ACROSS THE MATERIAL EVERY 6 INCHES.

G) TERMINAL END:
AT THE POINT AT WHICH THE MATERIAL IS DISCONTINUED, OR WHERE THE BLANKET MEETS A STRUCTURE OF SOME TYPE, STAPLE A MINIMUM OF EVERY 12 INCHES.

H) FINAL CHECK:
THESE INSTALLATION CRITERIA MUST BE ADHERED TO:
1. ALL DISTURBED AREAS ARE SEEDED.
2. PROTECTIVE BLANKET IS IN UNIFORM CONTACT WITH THE SOIL.
3. ALL LAP JOINTS ARE SECURE.
4. ALL STAPLES ARE DRIVEN FLUSH WITH THE GROUND.

9/03/2008 Approved Date Revisions	PUBLIC WORKS	**ROLLED EROSION CONTROL PRODUCTS**	**EC-8B**

EC-9 GEOTEXTILES AND PLASTIC COVERS

This Best Management Practice (BMP) involves the placement of geotextiles or plastic covers to stabilize disturbed soil areas and protect soils from erosion by wind or water.

APPROPRIATE APPLICATIONS:

Limited applications include very small graded areas and stockpiles.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet and concentrated flows.

Geotextiles and plastic covers have maximum flow rate limitations; consult the manufacturer for proper selection. The use of plastic shall be limited to very short periods of time. The use of plastics and impermeable geotextiles results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased velocities and flow. Use these products with caution. Plastic sheeting is easily vandalized, easily torn, and photodegradable.

WHEN BMP IS TO BE INSTALLED:

Geotextiles and plastic covers should be installed immediately after completion of a phase of grading or while the stockpile is in place.

STANDARDS AND SPECIFICATIONS:

Geotextile blankets shall be secured in place with wire staples or sandbags and by keying into tops of slopes and edges to prevent infiltration of surface water under the geotextile. Plastic sheeting shall be keyed in at the top of the slope and firmly held in place with sandbags or other weights placed no more than 10 feet apart. Seams are typically taped or weighted down their entire length. Anchoring the sheeting is crucial to keeping it in place during windy weather.

OPERATION AND MAINTENANCE PROCEDURES:

All geotextile and plastic sheeting shall be inspected on a weekly basis and after storms to check for erosion, undermining, and anchorage failure. Any failures shall be repaired immediately. If washout or breakages occur, the material shall be re-installed after repairing the damage to the slope.

SITE CONDITIONS FOR REMOVAL:

Upon establishment of other temporary stabilizations or after permanent stabilization has occurred.

EC-10 OUTLETS/VELOCITY DISSIPATION DEVICES

These devices are placed at pipe outlets to prevent scour and reduce the velocity and/or energy of storm water flows. These devices protect the receiving area from erosion.

APPROPRIATE APPLICATIONS:

These devices may be used at the following locations: outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits or channels, outlets located at the bottom of mild to steep slopes, discharge outlets that carry continuous flows of water, outlets subject to short, intense flows of water, such as flash floods, points where lined conveyances to unlined conveyances, and at emergency overflows or outlet pipes of a sediment basin.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Concentrated flow

WHEN BMP IS TO BE INSTALLED:

Energy dissipation devices should be installed with the construction of the upstream BMP or pipe that creates a concentrated discharge.

STANDARDS AND SPECIFICATIONS:

Install riprap, concrete apron, etc. at selected outlet. Riprap aprons are best suited for temporary use during construction. Carefully place riprap to avoid damaging the filter fabric. Align the apron with the receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, place it in the upper section of the apron. If the size of the apron riprap is comprised of large rocks, protect the underlying filter fabric with a gravel blanket. Outlets on slopes steeper than 10% need additional protection.

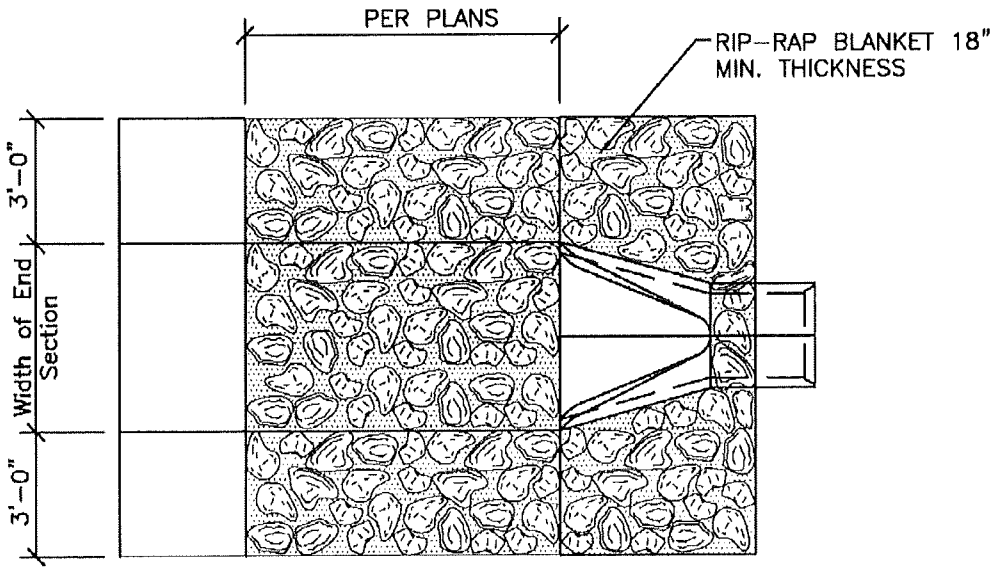
OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every storm during construction. Remove sediment and trash accumulation. Inspect apron for displacement of the riprap and/or damage to the underlying fabric. Repair fabric and replace riprap that has washed away. Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes immediately, extend the pad or place larger rock, as needed.

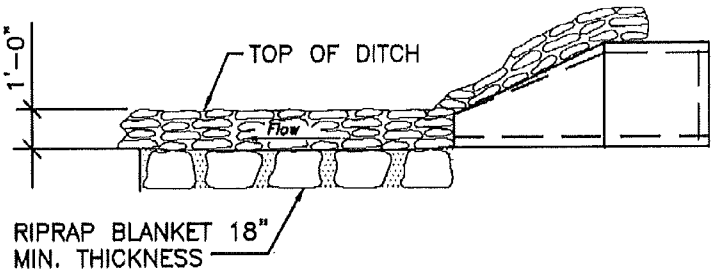
SITE CONDITIONS FOR REMOVAL:

Temporary devices need to be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.

STANDARD DRAWING: EC-10



PLAN



ELEVATION

Approved 9/03/2008 Date Revisions	COUNTY OF BOONE MISSOURI PUBLIC WORKS	**OUTLET/ENERGY DISSIPATION DEVICES**	**EC-10**

EC-11 TEMPORARY STREAM CROSSING

A temporary stream crossing is a structure placed across a waterway that allows vehicles to cross the waterway during construction, minimizing, reducing, or managing erosion and downstream sedimentation caused by the vehicles. Use of temporary stream crossings is discouraged. Crossings are a direct source of pollution and should be avoided if alternatives are feasible.

APPROPRIATE APPLICATIONS:

Temporary stream crossings are installed at sites: where appropriate permits have been secured (404, 401, etc.), where construction equipment or vehicles need to frequently cross a waterway, when alternate access routes impose significant constraints, and where construction activities will be less than 1 year.

CONDITIONS FOR EFFECTIVE USE:

Design considerations include: current and proposed watershed conditions, average and peak discharge (2 year, 24 hour storm), effect on water surface elevation off-site, velocity, sediment removal, and protection of fish and trees. Criteria for a Low Water Crossing includes: any constant flow less than 3" deep, light traffic, bank height less than 5 feet, and perpendicular to flow or with a slight upstream arc. Criteria for a culvert crossing includes: sized for 2 year, 24 hour storm with 1 foot freeboard and no flooding of offsite areas, pipe parallel to flow, embankment perpendicular to channel or with a slight upstream arc, riprap on exposed faces sized for overtopping during a peak storm period.

WHEN BMP IS TO BE INSTALLED:

The temporary stream crossing should be constructed during dry periods and may require dewatering or temporary diversion of the stream.

STANDARDS AND SPECIFICATIONS:

Procedures are specific to the type of crossing used. Generally, provide a stable means to bypass normal channel flow prior to disturbing channel, stabilize channel bottom, install culvert (if used), grade and compact access ramps and soil embankment, install fabric, stone, and riprap according to design.

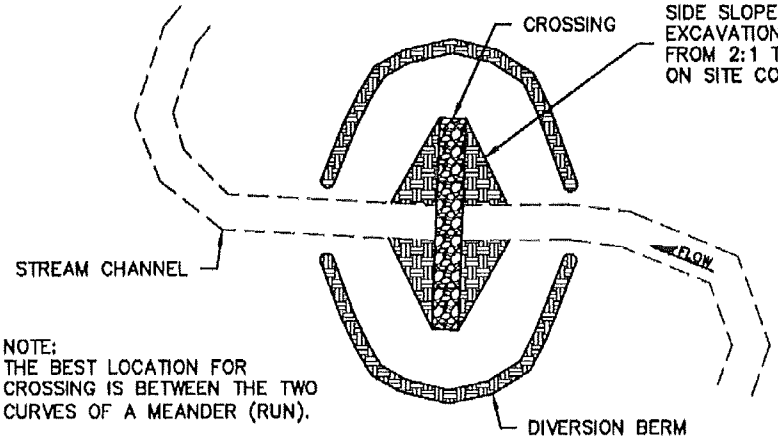
OPERATION AND MAINTENANCE PROCEDURES:

Inspect every week and after every storm-checking for: blockage in the channel, debris buildup, erosion of abutments, channel scour, riprap displacement, piping of soil, and structural weakening. Remove sediment and trash accumulation. Repair and stabilize eroded areas-extend riprap if necessary.

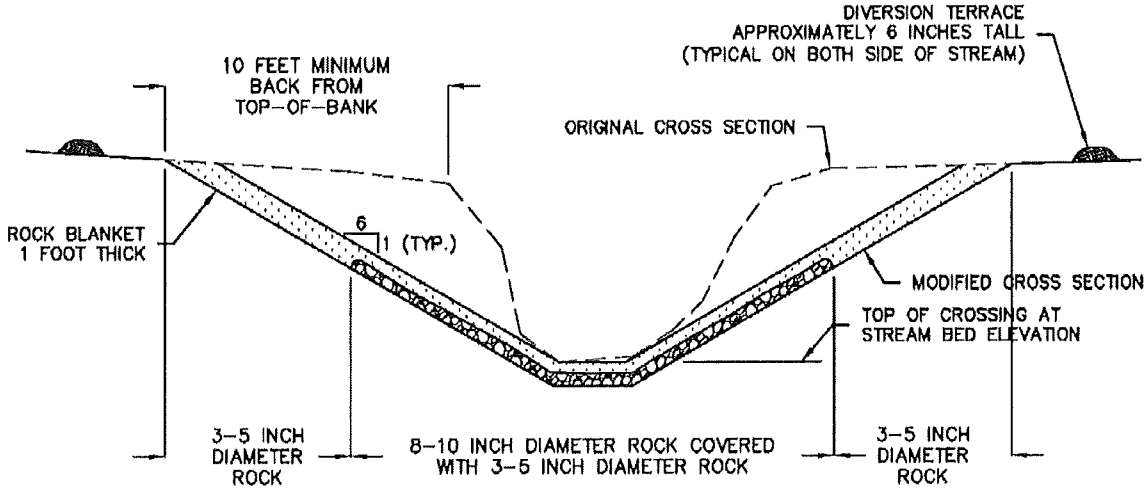
SITE CONDITIONS FOR REMOVAL:

Remove as soon as alternative access is available. All foreign materials should be removed from creek. The streambed/banks should be returned to the original contour and stabilized if necessary.

STANDARD DRAWING: EC-11a and EC-11b



REINFORCED STREAM CROSSING LAYOUT
NOT TO SCALE



REINFORCED STREAM CROSSING PROFILE
NOT TO SCALE

9/03/2008 Approved Date Revisions	COUNTY OF BOONE MISSOURI PUBLIC WORKS	**REINFORCED STREAM CROSSING**	**EC-11A**

GENERAL NOTES AND SPECIFICATIONS FOR TEMPORARY (REINFORCED) STREAM CROSSINGS:

1. THE STREAM BED FOR 0.5 MILE BELOW THE PROPOSED CROSSING MUST BE VERTICALLY STABLE. THE CHANNEL SHOULD NOT BE DOWNCUTTING (NO HEADCUTS DOWNSTREAM) OR RAPIDLY FILLING WITH SEDIMENT.
2. LOW FLOW WATER DEPTH SHALL BE LESS THAN SIX INCHES.
3. STREAM BANKS IN THE VICINITY (0.25 MILES UPSTREAM AND DOWNSTREAM) MUST BE STABLE.
4. THE CROSSING SHOULD BE LOCATED IN THE STRAIGHT REACH BETWEEN TWO BENDS.
5. APPROACHES SHOULD BE NO STEEPER THAN 6:1.
6. THE APPROACHES AND CROSSING SHOULD BE OVER EXCAVATED ONE FOOT THAN THE DESIRED SURFACE.
7. THE CROSSING AND THE APPROACHES FOR 10 FEET ON EITHER SIDE OF THE CROSSING SHOULD BE BACKFILLED WITH 8–10 INCH DIAMETER ROCK OR QUARRY RUN SHOT–ROCK TO WITHIN THREE TO FIVE INCHES OF THE DESIRED SURFACE. THE LARGE ROCK SHOULD BE COMPACTED INTO THE STREAM BED AND THE APPROACHES.
8. AFTER THE LARGE ROCK IS COMPACTED, THREE TO FIVE INCH DIAMETER ROCK SHOULD BE PLACED IN THE REMAINDER OF THE APPROACHES AND OVER THE LARGE ROCK TO PROVIDE A RELATIVELY SMOOTH SURFACE.
9. FINAL ELEVATION OF THE PORTION OF THE CROSSING SUBMERGED AT LOW FLOW SHALL NOT BE MORE THAN THREE INCHES ABOVE STREAM BED ELEVATION.
10. SIDE SLOPES OF THE APPROACH CAN RANGE FROM 2:1 TO 3:1 DEPENDING ON CONDITIONS AT THE SITE.
11. SIX INCH TALL DIVERSION BERM SHOULD BE BUILT AROUND THE CROSSING TO PREVENT OVERLAND FLOW FROM ERODING THE APPROACHES. THE DIVERSIONS SHOULD OUTLET AT STABLE LOCATIONS.
12. GROUTING (POURING CONCRETE OVER ROCK) IS PROHIBITED.
13. THE CROSSING SHOULD BE INSPECTED AFTER EACH FLOOD. BE ALERT FOR SIGNIFICANT SCOUR DOWNSTREAM OF THE CROSSING. THE SMALL DIAMETER ROCK MAY HAVE TO BE REPLACED OVER TIME. FREQUENT CLEARING OF SEDIMENT AND DEBRIS FROM THE APPROACHES WILL BE NECESSARY.

9/03/2008 Approved Date Revisions	PUBLIC WORKS	**REINFORCED STREAM CROSSING**	**EC-11B**

RM-1 CHECK DAMS

Check dams reduce scour and channel erosion by reducing flow velocity and encouraging sediment settlement. A check dam is a small device constructed of rock, gravel bags, sandbags, fiber rolls, or other proprietary product placed across a natural or man-made channel or drainage ditch.

APPROPRIATE APPLICATIONS:

Check dams can be placed at intervals along drainage swales or channels. The top of the downstream check dam should be level with the base of the upstream check dam. Check dams can also be used during the establishment of grass linings in drainage ditches or channels or in temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings. Not to be used in streams.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Moderate concentrated flow.

WHEN BMP IS TO BE INSTALLED:

Check dams can be installed prior to disturbance of natural vegetation in the contributing drainage area or immediately after construction of a drainage way.

STANDARDS AND SPECIFICATIONS:

Check dams should be placed at a distance and height to allow small pools to form behind them. Install the first check dam approximately 16 feet from the outfall device and at regular intervals based on slope gradient and soil type. For multiple check dam installation, backwater from the downstream check dam should reach the toe of the upstream dam. High flows (typically a 2-year storm or larger) should safely flow over the check dam without an increase in upstream flooding.

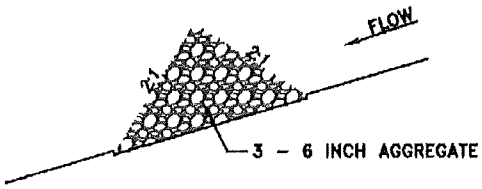
OPERATION AND MAINTENANCE PROCEDURES:

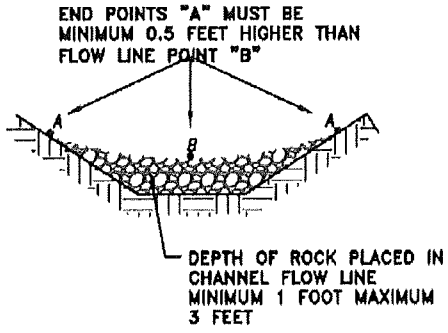
Inspect at least every week and after every storm. Remove trash and leaf accumulation. Remove sediment when depth reaches one-half of the check dam height. Repair/restore dam structure, if necessary, to original configuration to protect the banks.

SITE CONDITIONS FOR REMOVAL:

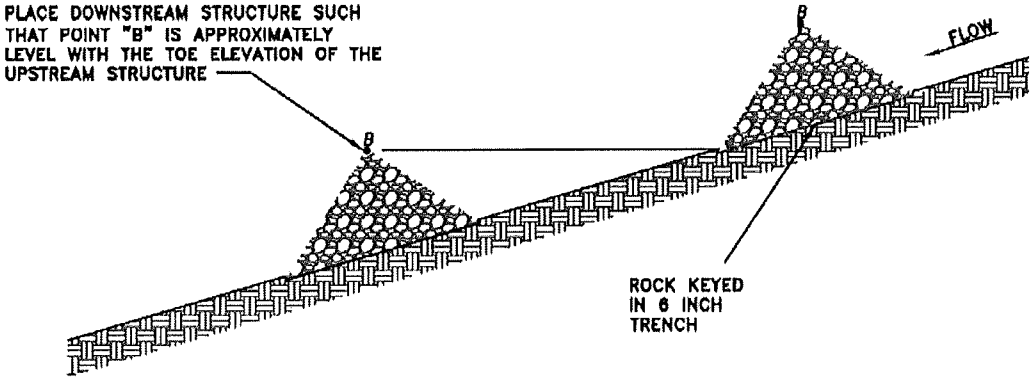
Remove after contributing areas have been adequately stabilized and vegetation is adequately established in drainage way. Regrade and vegetate the area.

STANDARD DRAWING: RM-1





FRONT VIEW



SIDE VIEW

NOTE:

ROCK CHECK DAMS SHALL BE USED ONLY FOR DRAINAGE AREAS LESS THAT 10 ACRES UNLESS APPROVED BY THE ENGINEER.

9/03/2008 Approved Date Revisions	PUBLIC WORKS	**CHECK DAMS**	**RM-1**

RM-2 EARTH BERMS AND DRAINAGE SWALES

A compacted earth, compost or gravel ridge, excavated channel or a combination of ridge and channel designed to direct runoff away from or around disturbed areas. Diversions built on a level contour are used in combination with temporary slope drains to provide adequate conveyance. Diversions built with positive drainage slopes release runoff into additional BMPs, such as sediment traps or level spreaders.

APPROPRIATE APPLICATIONS:

These features may be used to: convey surface runoff down sloping land, intercept and divert runoff to avoid sheet flow over sloped surfaces, divert and direct runoff towards a stabilized watercourse, drainage pipe or channel, intercept runoff from paved surfaces. Berms, swales, and lined ditches also may be used: below steep grades where runoff begins to concentrate, along roadways and facility improvements subject to flood drainage, at the top of slopes to divert run-off from adjacent or undisturbed slopes and at bottom and mid-slope locations to intercept sheet flow or to convey concentrated flows.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and low-volume concentrated flows.
Contributing Area: Contributing slope length-300 feet maximum; 100 feet for slopes greater than 5%.

WHEN BMP IS TO BE INSTALLED:

Berms and/or swales should be installed prior to disturbance of natural vegetation on slopes and at intervals during construction of fill slopes.

STANDARDS AND SPECIFICATIONS:

Care must be applied to correctly size and locate berms, swales, and ditches. Excessively steep, unlined berms and swales are subject to gully erosion. Grade and compact the channel and/or ridge. Provide stabilized outfall areas. Conveyances should be stabilized with vegetation or a protective lining. Other BMPs, such as check dams and erosion control blankets, may be necessary to prevent scour and erosion.

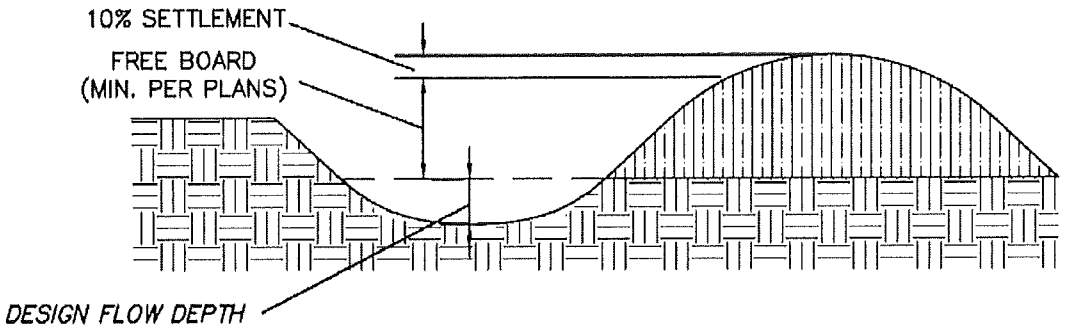
OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every storm. Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment, repair linings and embankments as needed-replace riprap, linings or soil stabilizers as needed.

SITE CONDITIONS FOR REMOVAL:

Temporary diversions should be removed as soon as the surrounding drainage area has been stabilized.

STANDARD DRAWING: RM - 2



NOTES:

1. TEMPORARY DIVERSION BERMS MUST BE INSTALLED AS A FIRST STEP IN THE LAND-DISTURBING ACTIVITY AND MUST BE FUNCTIONAL PRIOR TO LAND DISTURBANCE.

2. THE OUTLET OF THE DIVERSION SHALL BE LOCATED IN AN UNDISTURBED OR STABILIZED AREA.

3. TEMPORARY OR PERMANENT SEEDING AND MULCH SHALL BE APPLIED TO THE BERM IMMEDIATELY FOLLOWING ITS CONSTRUCTION.

4. ALL TREES, BRUSH, STUMPS, OBSTRUCTIONS, AND OTHER OBJECTIONABLE MATERIAL SHALL BE REMOVED AND DISPOSED OF SO AS NOT TO INTERFERE WITH THE PROPER FUNCTIONING OF THE DIVERSION.

5. THE DIVERSION SHALL BE EXCAVATED OR SHAPED TO LINE, GRADE, AND CROSS-SECTION AS REQUIRED AND FREE OF IRREGULARITIES WHICH WILL IMPEDE FLOW.

6. FILLS SHALL BE COMPACTED AS NEEDED TO PREVENT UNEQUAL SETTLEMENT THAT WOULD CAUSE DAMAGE IN THE COMPLETED DIVERSION. FILL SHALL BE COMPOSED OF SOIL WHICH IS FREE FROM EXCESSIVE ORGANIC DEBRIS, ROCKS, OR OTHER OBJECTIONABLE MATERIALS.

7. ALL EARTH REMOVED AND NOT NEEDED IN CONSTRUCTION SHALL BE SPREAD OR DISPOSED OF SO THAT IT WILL NOT INTERFERE WITH THE FUNCTIONING OF THE DIVERSION.

8. THE BERM SHOULD BE ADEQUATELY COMPACTED TO PREVENT FAILURE.

9. THE BERM SHOULD BE LOCATED TO MINIMIZE DAMAGES BY CONSTRUCTION OPERATIONS AND TRAFFIC.

9/03/2008 Approved Date Revisions	PUBLIC WORKS	**EARTH BERMS/ DRAINAGE SWALES**	**RM-2**

RM-3 TERRACING

Terracing involves defined swales constructed at regular intervals along the face of a slope designed to reduce erosion by capturing surface runoff and directing it to an adequate, stable outlet.

APPROPRIATE APPLICATIONS:

Typically installed on long steep slopes on which erosion is a concern. Terraces should not be constructed in sandy or rocky soil.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow.

Slope Characteristics: Maximum of 3:1 slope.

Contributing Slope Length: Maximum of 30 feet for slopes steeper than 4:1; maximum for 50 feet for 4:1 and flatter.

WHEN BMP IS TO BE INSTALLED:

Terracing should be installed as fill is constructed. On existing slopes, terraces should be graded prior to removal of vegetation.

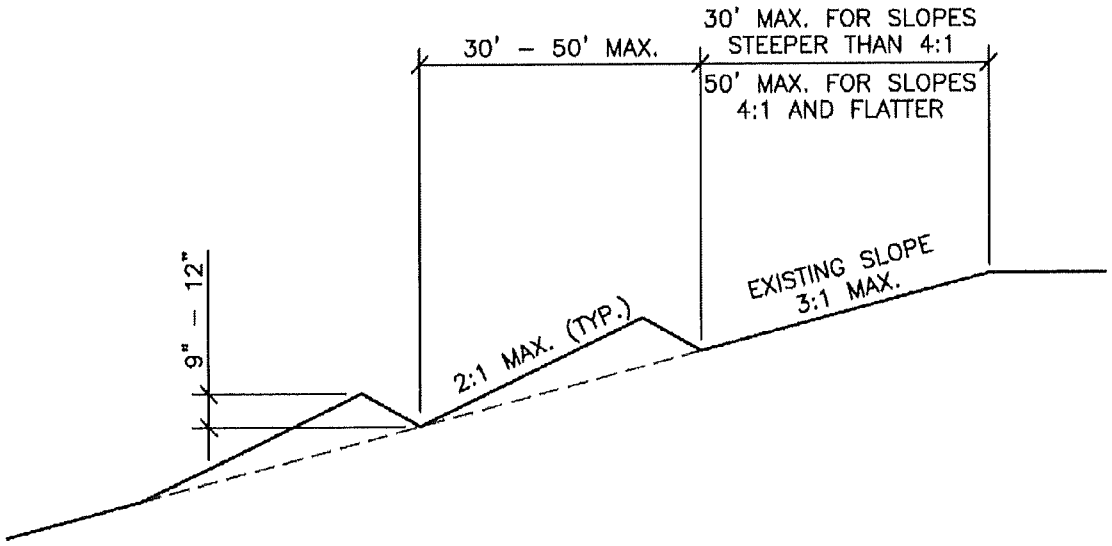
STANDARDS AND SPECIFICATIONS:

Grade terraces as required by the design. Construct the stable outfall as designed. Vegetate the slope and terraces immediately after BMP installation.

OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every storm during construction. Remove sediment accumulations along terraces. Repair settled and eroded areas. Remove sediment and stabilize eroded areas at outlet. Revegetate as needed

STANDARD DRAWING: RM - 3



NOTES:
1. MAXIMUM CONTINUOUS LENGTH OF 2:1 SLOPE SHALL BE 15'.
2. TERRACE SHALL HAVE A TRANSVERSE SLOPE AT 1% TO 3% AND DRAIN TO AN ADEQUATELY PROTECTED OUTLET.
3. TERRACES MAY ONLY BE FORMED BY CONSTRUCTION OF A BERM.

9/03/2008 Approved Date Revisions	COUNTY OF BOONE MISSOURI PUBLIC WORKS	**TERRACING**	**RM-3**

RM-4 SLOPE DRAINS

A slope drain is a flexible or rigid pipe which extends from the top to the bottom of a cut or fill slope. These structures are designed to protect exposed slopes from upstream runoff and can be used with other BMPs to intercept and direct surface flow away from disturbed slope areas. Slope drains typically extend beyond the toe of the slope to a stable area or outlet.

APPROPRIATE APPLICATIONS:

Slope drains may be used on construction sites where slopes may be eroded by surface runoff.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and concentrated flow. Contributing Area: Maximum of 5 acres per slope drain; pipe sized for 15 year, 20 minute storm.

WHEN BMP IS TO BE INSTALLED:

Slope drains should be installed concurrently with diversion devices as soon as cut and fill operations have occurred.

STANDARDS AND SPECIFICATIONS:

Slope drains must be installed and maintained properly because failure will usually result in severe erosion of the slope. Other points of concern are failure from overtopping due to inadequate pipe inlet capacity or blockage, and lack of maintenance of the upstream diversion device capacity. Generally install slope drain down the slope-perpendicular to slope contours, extending beyond toe of slope. Install flared end or t-section at pipe inlet. Section should be well entrenched and stable so water can enter freely. Place compacted fill over and around pipe in the area of diversion device. Ensure that all pipe connections are secure. Securely anchor the exposed section of the drain with stakes. Install flared end section at pipe outlet-discharge into a sediment trap or other stabilized outlet. Protect area around inlet with filter fabric. Protect outlet with riprap or other energy dissipation device.

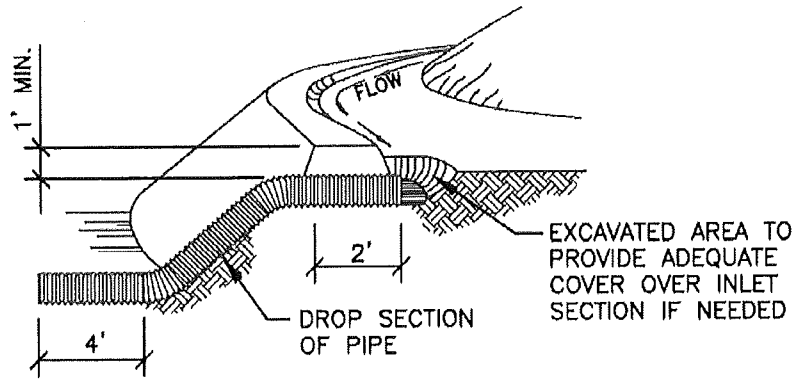
OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every storm during construction. Remove sediment and trash accumulation at inlet. Repair settlement, cracking, or piping holes. Repair leaks or inadequate anchoring along pipe. Remove sediment and stabilize eroded areas at outlet-extend if necessary.

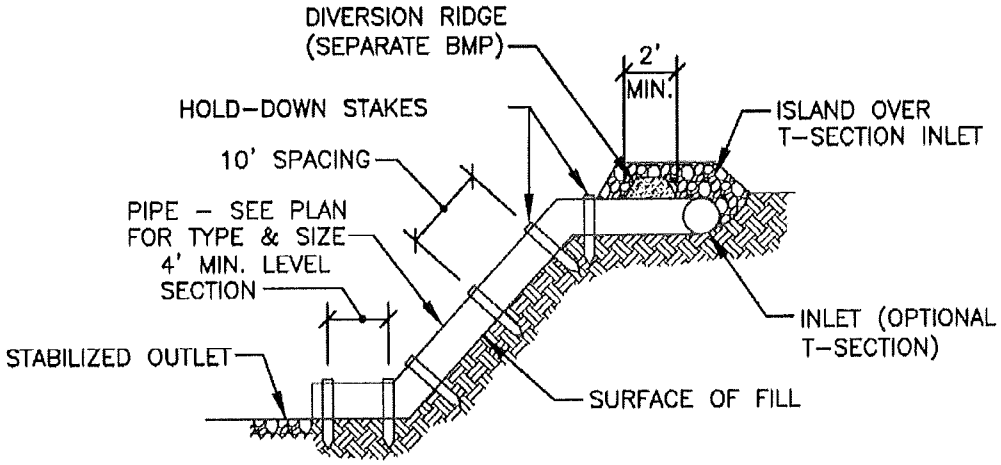
SITE CONDITIONS FOR REMOVAL:

Remove concurrently with upstream diversion device after slope has been stabilized. Stabilize the exposed areas where the slope drain and diversion device were removed.

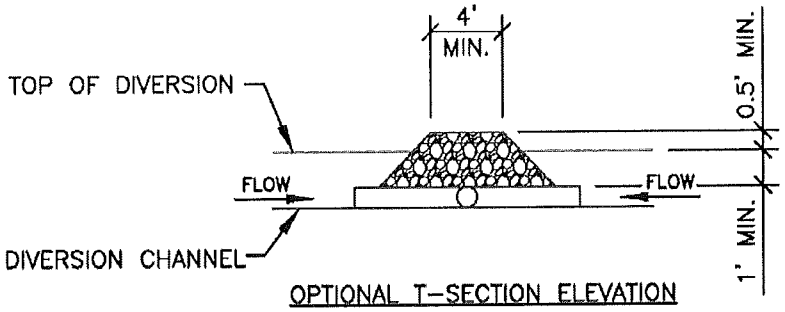
STANDARD DRAWING: RM - 4



PERSPECTIVE



PROFILE



OPTIONAL T-SECTION ELEVATION

Approved 9/03/2008 Date Revisions	COUNTY OF BOONE MISSOURI PUBLIC WORKS	**SLOPE DRAINS**	**RM-4**

RM-5 SOIL ROUGHENING

Soil roughening is a temporary erosion control practice often used in conjunction with grading. Soil roughening involves increasing the relief of a bare soil surface with horizontal grooves by either stair-stepping (running parallel to the contour of the land) or using construction equipment to track the surface. Slopes that are not fine graded and left in a roughened condition can reduce erosion by reducing runoff velocity, increasing infiltration, trapping sediment and preparing the soil for seeding and planting by giving seed an opportunity to take root and grow.

APPROPRIATE APPLICATIONS:

Soil roughening is appropriate for all slopes, but works especially well on slopes greater than 3:1, on piles of excavated soil, and in areas with highly erodable soils. This technique is especially appropriate for soils that are frequently disturbed, because roughening is relatively easy.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow.

Contributing Area: Unlimited on slopes <10%, slopes >10% require additional BMPs

WHEN BMP IS TO BE INSTALLED:

Soil roughening should be done immediately after rough grading; prior to seeding or mulching.

STANDARDS AND SPECIFICATIONS:

Methods for roughening soil differ depending on the type of slope and the available equipment. These methods include stair-step grading, grooving, and tracking. When choosing a method, consider factors such as slope steepness, mowing requirements, whether the slope is formed by cutting or filling, and available equipment. Soil roughening is not appropriate for rocky slopes. Tracked machinery can excessively compact the soil, therefore lightweight machinery should be used.

OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and immediately after every storm. Rework the slope and regroove after sediment buildup is deeper than ½ the groove depth, or if rills have formed across the roughened surface.

SITE CONDITIONS FOR REMOVAL:

The slope should be reworked to the design grades prior to final stabilization.

RM-6 FIBER ROLLS/WATTLES

Fiber rolls (also called fiber logs or straw wattles) are tube-shaped erosion-control devices filled with straw, flax, rice, coconut fiber material, or composted material. Each roll is wrapped with UV-degradable polypropylene netting for longevity or with 100 percent biodegradable materials like burlap, jute, or coir. These devices reduce erosion on long or steep slopes by breaking up the slope length.

APPROPRIATE APPLICATIONS:

Fiber rolls can be used in areas of low shear stress such as; along the toe, top, face, and at-grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow, at the end of a downward slope where it transitions to a steeper slope, along the perimeter of a project or stockpile, as check dams in unlined ditches, and downslope of exposed soil areas.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and concentrated flow.

WHEN BMP IS TO BE INSTALLED:

Wattles should be installed immediately after rough grading; prior to seeding or mulching.

STANDARDS AND SPECIFICATIONS:

On slopes, install fiber rolls along the contour with a slight downward angle at the end of each row to prevent ponding at the midsection. Turn the ends of each fiber roll upslope to prevent runoff from flowing around the roll. Determine the vertical spacing for slope installations on the basis of the slope gradient and soil type. A good rule of thumb is: 1:1 slopes=10 feet apart, 2:1 slopes=20 feet apart, 3:1 slopes=30 feet apart, and 4:1 slopes=40 feet apart. Stake fiber rolls securely into the ground and orient them perpendicular to the slope. Fiber rolls can also be used at projects with minimal slopes. Typically, the rolls are installed along sidewalks, on the bare lot side, to keep sediment from washing onto sidewalks and streets and into gutters and storm drains.

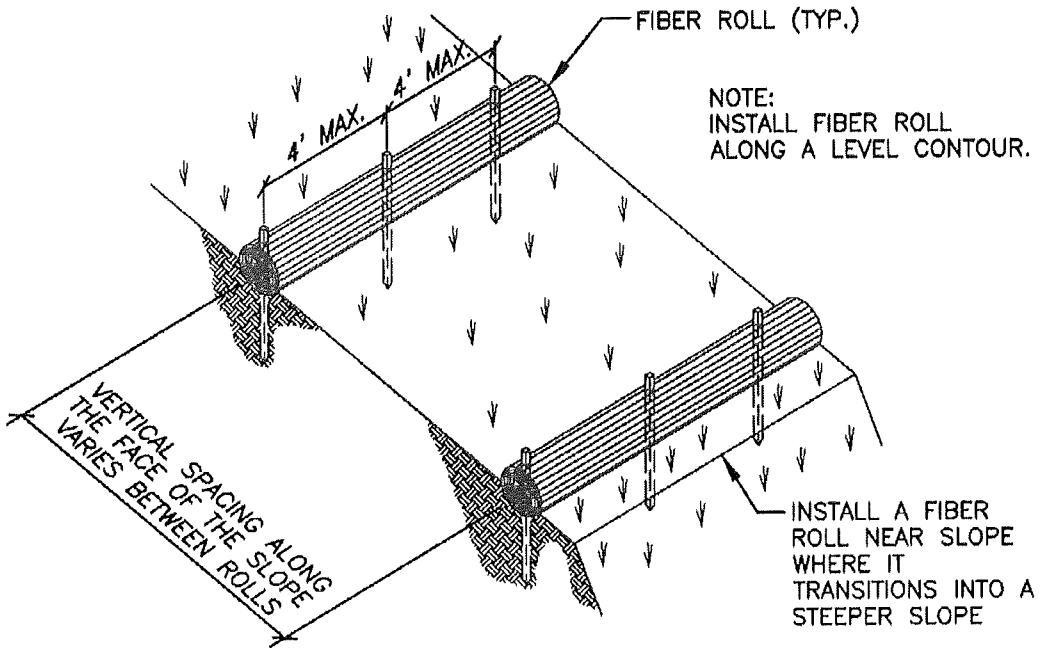
OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every storm. Remove sediment accumulation when it reaches ½ the height of the roll/wattle. Repair or replace split, torn, unraveled, or slumping fiber rolls.

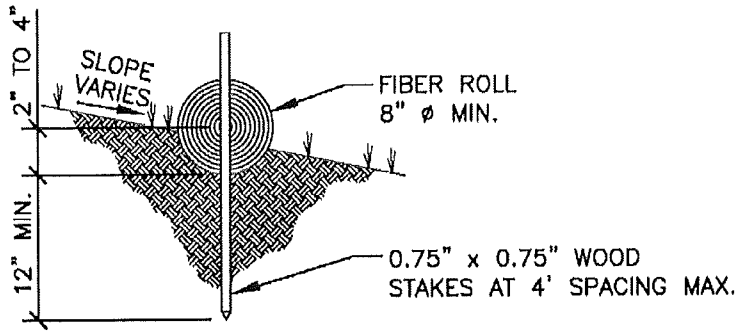
SITE CONDITIONS FOR REMOVAL:

Fiber rolls are typically left in place on slopes. If they are removed after stabilization has been achieved, collect and dispose of the accumulated sediment.

STANDARD DRAWING: RM-6



TYPICAL FIBER ROLL INSTALLATION



ENTRENCHMENT DETAIL

9/03/2008 Approved Date Revisions	COUNTY OF BOONE MISSOURI PUBLIC WORKS	**FIBER ROLLS/WATTLES**	**RM-6**

SC-1 VEGETATED FILTER STRIP

Vegetated filter strips or buffers are areas of natural or established vegetation maintained to protect the water quality of neighboring areas. Buffer zones slow stormwater runoff, provide an area where runoff can permeate the soil, contribute to ground water recharge, and filter sediment. Slowing runoff also helps to prevent soil erosion and streambank collapse.

APPROPRIATE APPLICATIONS:

Vegetated buffers can be used in any area able to support vegetation. They are most effective and beneficial on floodplains, near wetlands, along streambanks, and on unstable slopes. Filter strips can be used adjacent to low or medium density residential areas on gently sloping ground.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Overland sheet flow only-cannot treat high velocity flows.

WHEN BMP IS TO BE INSTALLED:

Filter strips can be established immediately after rough grading to trap sediment during construction and/or immediately after final grading as a permanent measure to control surface runoff.

STANDARDS AND SPECIFICATIONS:

Determine buffer widths after carefully considering slope, vegetation, soils, depth to impermeable layers, runoff sediment characteristics, type and amount of pollutants, and annual rainfall. Make sure buffer widths increase as slope increases. In areas where flows are more concentrated and fast, combine buffer zones with other practices such as level spreaders, infiltration areas, or diversions to prevent erosion and rilling. Fence off any undisturbed vegetated strips to be preserved. No activity, including parking/storing vehicles or equipment, shall be permitted in the vegetated/woody strip. If a grass filter strip is constructed, it must be completed and vegetated before construction in a contributing area is started.

OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every storm. Remove sediment accumulation once it reaches 6" in depth. Fill and compact eroded areas and reseed, mulch and fertilize or establish other vegetation in the affected areas. After improvements are complete, regrade and reseed the top edge of the filter strip to remove sediment trapped during construction and prolong the effective use of the filter strip.

SC-2 SILT FENCE

A silt fence is a length of filter fabric stretched between anchoring posts spaced at regular intervals along the site at low/downslope areas. The filter fabric should be entrenched in the ground at least 6". When installed correctly and inspected frequently, silt fences encourages the ponding of runoff and can be an effective barrier to sediment leaving the site.

APPROPRIATE APPLICATIONS:

Installed along slopes, at base of slopes, and around the perimeter of a site as a final barrier to sediment being carried off site. Silt fence should not be used in areas of concentrated flow or as check dams.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow only

Contributing Area: Drainage area should not exceed 0.25 acres per 100-foot fence length.

Slope Length: The slope length above the fence should not exceed 100 feet.

WHEN BMP IS TO BE INSTALLED:

Silt fence should be installed prior to disturbance of natural vegetation and at intervals during construction of fill slopes.

STANDARDS AND SPECIFICATIONS:

If a standard-strength fabric is used, it can be reinforced with wire mesh behind the filter fabric. This increases the effective life of the fence. The maximum life expectancy for synthetic fabric silt fences is about 6 months, depending on the amount of rainfall and runoff. The fence should be designed to withstand the runoff from a 10-year peak storm event. Generally, drive posts for fence line, dig trench to required dimensions in front of posts for fabric burial, attach wire mesh to posts (if necessary), attach fabric to posts-allowing required length below ground level to run fabric along bottom of trench, and backfill and compact soil in trench to protect and anchor fabric. Alternate (and actually preferred) construction procedures include installing the fence by slicing it into the ground with specialized equipment.

OPERATION AND MAINTENANCE PROCEDURES:

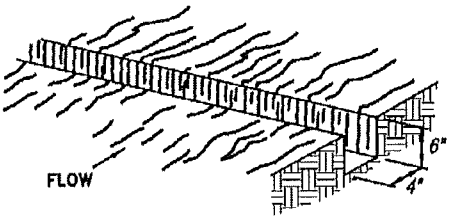
Inspect at least every week and after every storm. Monitor and remove sediment buildup that is deeper than ½ the fence height. Replace torn/clogged fabric; repair loose fabric. Repair unstable or broken posts. Stabilize any areas susceptible to undermining. Add additional fencing if necessary to provide adequate protection.

SITE CONDITIONS FOR REMOVAL:

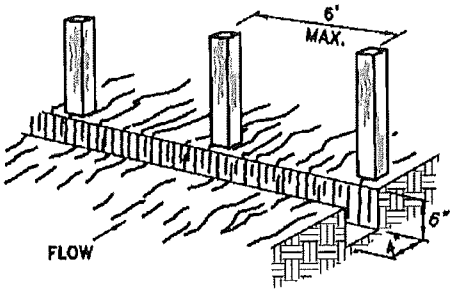
After permanent vegetation of slope is established, remove fence, regrade trench area and vegetate.

STANDARD DRAWING: SC-2a and SC-2b

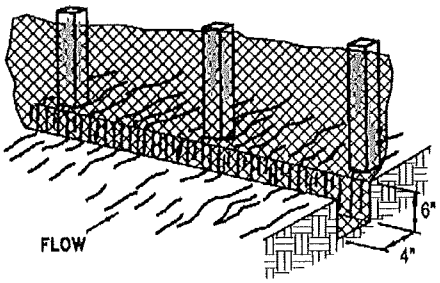
1. EXCAVATE A 6"x4" TRENCH



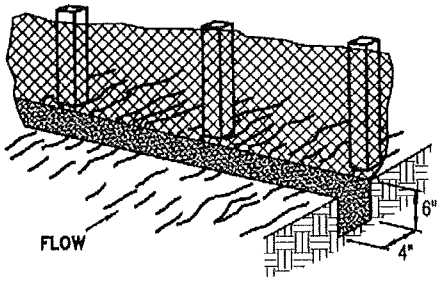
2. SET THE STAKES ALONG THE DOWN SLOPE SIDE OF THE TRENCH.



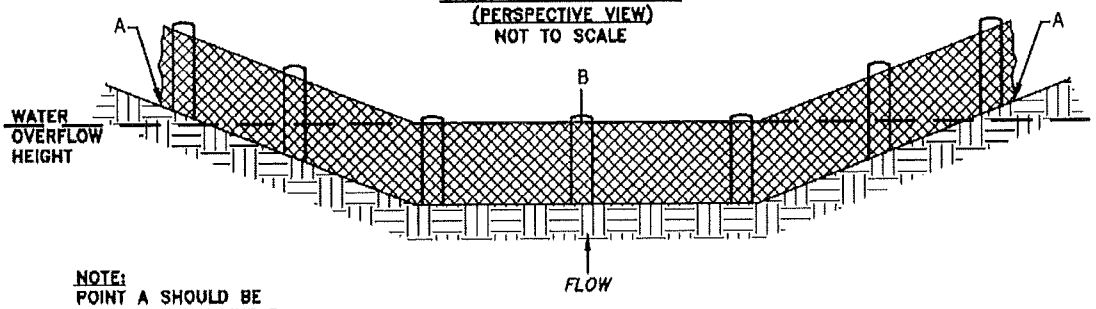
3. STAPLE GEOTEXTILE MATERIAL TO STAKES AND EXTEND IT INTO AND AROUND THE BOTTOM OF THE TRENCH.



4. BACK FILL AND COMPACT THE EXCAVATED SOIL OVER THE GEOTEXTILE IN THE TRENCH.



SHEET FLOW INSTALLATION
(PERSPECTIVE VIEW)
NOT TO SCALE



NOTE:
POINT A SHOULD BE HIGHER THAN POINT B.

DRAINAGE WAY INSTALLATION
(FRONT ELEVATION)
NOT TO SCALE

9/03/2008 Approved Date Revisions	PUBLIC WORKS	**SILT FENCE**	**SC-2A**

SILT FENCE NOTES:
A) INSTALLATION

1. THE HEIGHT OF SILT FENCE SHALL BE A MINIMUM OF 16 INCHES ABOVE THE ORIGINAL GROUND SURFACE AND SHALL NOT EXCEED 34 INCHES ABOVE THE GROUND SURFACE.
2. THE FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO LENGTH OF THE BARRIER TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE UNAVOIDABLE, FILTER CLOTH SHALL BE SECURELY SPLICED TOGETHER ONLY AT SUPPORT POSTS, WITH A MAX 6 INCH OVERLAP.
3. DIG A TRENCH AT LEAST 6 INCHES DEEP AND 4 INCHES WIDE ALONG THE TRENCH ALIGNMENT.
4. DRIVE POSTS AT LEAST 24 INCHES INTO THE GROUND ON THE DOWNSLOPE SIDE OF THE TRENCH. SPACE POSTS A MAXIMUM OF 6 FEET APART.
5. THE SEDIMENT FABRIC SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING A MINIMUM OF ONE INCH LONG, HEAVY-DUTY WIRE STAPLES OR TIE-WIRES, AND EIGHT INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. PLACE THE BOTTOM 1 FOOT OF FABRIC IN THE MINIMUM-OF-6-INCH DEEP TRENCH, LAPPING TOWARD THE UPSLOPE SIDE. BACK FILL WITH COMPACTED EARTH OR GRAVEL.
7. IF A SILT FENCE IS TO BE CONSTRUCTED ACROSS A DITCH LINE OR SWALE, IT MUST BE OF SUFFICIENT LENGTH TO ELIMINATE ENDFLOW, AND THE PLAN CONFIGURATION SHALL RESEMBLE AN ARC OR HORSESHOE, PLACED ON A CONTOUR, WITH THE ENDS ORIENTED UPSLOPE. EXTRA-STRENGTH SEDIMENT FABRIC SHALL BE USED WITH A MAXIMUM 3-FOOT SPACING OF POSTS.
8. TO REDUCE MAINTENANCE, EXCAVATE A SHALLOW SEDIMENT STORAGE AREA IN THE UPSLOPE SIDE OF THE FENCE. PROVIDE GOOD ACCESS IN AREA OF HEAVY SEDIMENTATION FOR CLEAN OUT AND MAINTENANCE.
9. SILT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
10. INSTALLATION WITH SLICING METHOD IS PREFERRED.

B) TROUBLESHOOTING:

1. DETERMINE THE EXACT LOCATION OF UNDERGROUND UTILITIES, BEFORE FENCE INSTALLATION SO UTILITIES ARE NOT DISTURBED.
2. GRADE ALIGNMENT OF FENCE NEEDED TO PROVIDE A BROAD, NEARLY LEVEL AREA UPSTREAM OF FENCE TO ALLOW SEDIMENT COLLECTION AREA.

C) INSPECTION MAINTENANCE:

1. INSPECT SILT FENCES AT LEAST ONCE A WEEK AND AFTER EACH 1/2" OF RAINFALL. MAKE ANY REQUIRED REPAIRS IMMEDIATELY.
2. SHOULD THE FABRIC OF A SEDIMENT FENCE COLLAPSE, TEAR, DECOMPOSE, OR BECOME INEFFECTIVE, REPLACE IT PROMPTLY.
3. REMOVE SEDIMENT DEPOSITS AS NECESSARY TO PROVIDE ADEQUATE STORAGE VOLUME FOR THE NEXT RAIN AND TO REDUCE PRESSURE ON THE FENCE. AVOID DAMAGING OR UNDERMINING THE FENCE DURING CLEANOUT. SEDIMENT ACCUMULATION SHOULD NOT EXCEED 1/2 THE HEIGHT OF THE FENCE.
4. 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 AND COMPLETELY STABILIZED.

9/03/2008 Approved Date Revisions	PUBLIC WORKS	**SILT FENCE NOTES**	**SC-2B**

SC-3 STRAW BALE DIKE

A straw bale dike consists of a series of straw (or hay) bales butted firmly end to end and anchored in place with stakes placed along the low/downslope areas of a site. The straw bales should be entrenched in the ground. When installed correctly and inspected frequently, straw bale dikes encourage the ponding of runoff and can be an effective barrier to prevent sediment from leaving the site in stormwater runoff.

APPROPRIATE APPLICATIONS:

Installed along slopes, at base of slopes, and around the perimeter of a site as a final barrier to sediment being carried off site. Straw bale dikes should not be used in areas of significant concentrated flow as check dams.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and minimal concentrated flow.

Contributing Area: Drainage area should not exceed 0.25 acres per 100-foot fence length. For minor swales where the dike will serve as a ditch check, the drainage area shall not exceed 2 acres.

Slope Length: The slope length above the fence should not exceed 100 feet. Reduce this as the area above the dike steepens.

WHEN BMP IS TO BE INSTALLED:

Straw bale dikes should be installed prior to disturbance of natural vegetation and at intervals during construction of fill slopes.

STANDARDS AND SPECIFICATIONS:

The maximum life expectancy for straw bale dikes is about 3 months, depending on the amount of rainfall and runoff. The dike should be designed to withstand the runoff from a 10-year peak storm event. The dike should be installed on level ground at least 10 feet from the toe of the slope. Excavate a trench at least 4" deep and a bale width wide and long enough that the end bales are upslope of the sediment pool. Anchor bales by driving two 36" long 2"x2" hardwood stakes through each bale until nearly flush with the top. Drive the first stake toward the previously laid bale to force the bales together. Wedge loose straw into any gaps between the bales. Backfill and compact the excavated soil against the bales to ground level on the downslope side and to 4" above ground level on the upslope side.

OPERATION AND MAINTENANCE PROCEDURES:

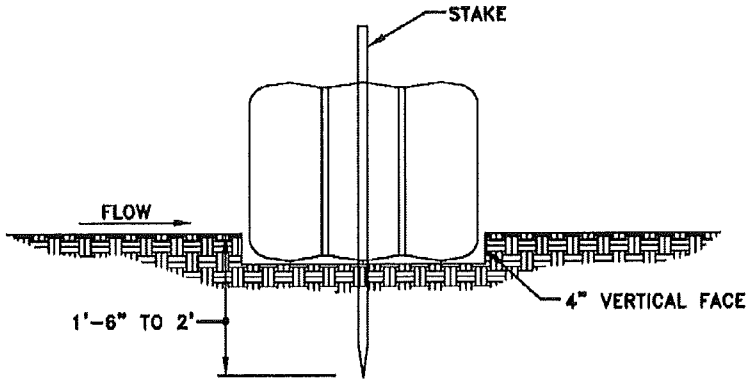
Inspect at least every week and after every storm. Remove sediment buildup that is deeper than ½ the dike height. Replace deteriorated or damaged bales. Repair unstable or broken stakes.

Stabilize any areas susceptible to undermining. Add additional bales if necessary to provide adequate protection.

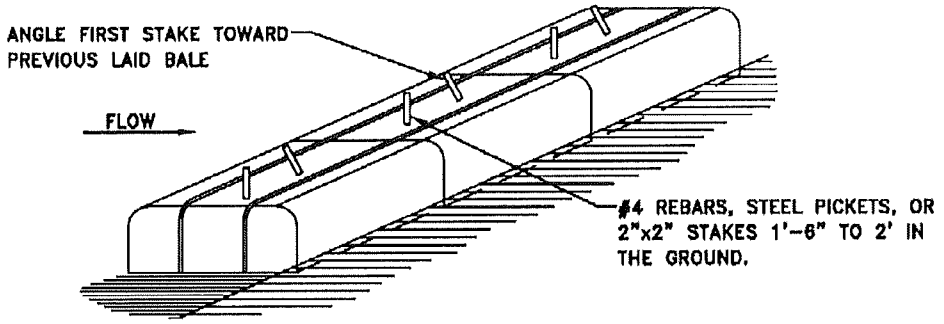
SITE CONDITIONS FOR REMOVAL:

After permanent vegetation of slope is established, remove the dike, regrade trench area and vegetate.

STANDARD DRAWING: SC-3



EMBEDDING DETAIL



ANCHORING DETAIL

1. BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4".
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
4. INSPECTION SHALL BE AT LEAST ONCE A WEEK AND AFTER EACH 1/2" RAIN. REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY.
5. BALES SHALL BE REMOVED BY THE OWNER WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

9/03/2008 Approved Date Revisions	PUBLIC WORKS	**STRAW BALE DIKE**	**SC-3**

SC-4 COMPOST FILTER SOCKS

A compost filter sock is a type of contained compost filter berm. It is a mesh tube filled with composted material that is placed perpendicular to sheet-flow runoff to control erosion and retain sediment in disturbed areas.

APPROPRIATE APPLICATIONS:

Compost filter socks are generally placed along the perimeter of a site, or at intervals along a slope, to capture and treat stormwater that runs off as sheet flow. Filter socks can also be used on pavement as inlet protection for storm drains and as small check dams to slow water flow in small ditches. Filter socks used for erosion control are usually 12 inches in diameter, although 8 inch, 18 inch, and 24 inch– diameter socks are used in some applications.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and small concentrated flow

Contributing Area: Drainage area should not exceed 0.25 acres per 100-foot fence length.

Slope Length: The slope length above the fence should not exceed 100 feet.

WHEN BMP IS TO BE INSTALLED:

Filter socks can be used prior to disturbance of natural vegetation and at intervals during construction of fill slopes.

STANDARDS AND SPECIFICATIONS:

The diameter of the filter sock will vary depending upon the steepness and length of the slope. In areas of concentrated flow, filter socks are sometimes placed in an inverted V going up the slope, to reduce the velocity of water running down the slope. The project engineer may also consider placing filter socks at the top and base of the slope or placing a series of filter socks every 15 to 25 feet along the vertical profile of the slope. Generally, the filter sock is filled, put in place, and anchored using stakes, so no trenching is required. During installation, the ends of the sock should be directed upslope

OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every storm. Remove sediment buildup that is deeper than ½ the filter sock height. Repair unstable or broken posts. Stabilize any areas susceptible to undermining. Add additional socks if necessary to provide adequate protection.

SITE CONDITIONS FOR REMOVAL:

Remove the sock after permanent vegetation of slope is established. Regrade trench area and vegetate.

SC-5 COMPOST FILTER BERMS

A compost filter berm is a dike of compost or a compost product that is placed perpendicular to sheet flow runoff to control erosion in disturbed areas and retain sediment. It can be used in place of a traditional control tool such as a silt fence or compost filter socks.

APPROPRIATE APPLICATIONS:

Vegetated compost filter berms are generally placed along the perimeter of a site, or at intervals along a slope. A filter berm also can be used as a check dam in small drainage ditches.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and small concentrated flow.

Contributing Area: Drainage area should not exceed 0.25 acres per 100-foot fence length.

WHEN BMP IS TO BE INSTALLED:

Install the compost berm prior to disturbance of natural vegetation and at intervals during construction of fill slopes.

STANDARDS AND SPECIFICATIONS:

The compost filter berm dimensions should be modified based on site-specific conditions, such as soil characteristics, existing vegetation, site slope, and climate, as well as project-specific requirements. Generally the berms are trapezoidal in cross section with the base twice the height of the berm. The compost should be uniformly applied to the soil surface, compacted, and shaped to into a trapezoid. Compost filter berms can be installed on frozen or rocky ground. The filter berm may be vegetated by hand, by incorporating seed into the compost prior to installation, or by hydraulic seeding following berm construction.

OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every storm. Remove sediment buildup deeper than ½ the filter berm. Any areas that have been washed away should be replaced. If the berm has experienced significant washout, the filter berm alone may not be the appropriate BMP for the area or the size of the berm may need to be increased.

SITE CONDITIONS FOR REMOVAL:

Vegetated filter berms are normally left in place and provide long-term filtration of stormwater as a post-construction best management practice (BMP). If temporary, break down the berm once construction is complete and spread the compost around the site as a soil amendment or mulch.

SC-6 SEDIMENT BASIN

A temporary settling basin designed to slowly release runoff, detaining it long enough to allow most of the sediment to settle out. Basins should be used in conjunction with additional BMPs, such as temporary seeding, to reduce the total amount of sediment washing into the structure. Sediment basins may also be designed to be converted from a temporary basin to a permanent storm water detention basin after construction has ended.

APPROPRIATE APPLICATIONS:

Should be located as close to the sediment source as possible. A sediment basin should not be used in areas of continuously running water (live streams) nor areas where failure of the embankment will result in loss of life, damage to homes or structures, or prevent the use of roadways or utilities.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and concentrated flow.

Basin Volume: Volume of 10 year, 20 minute storm plus silt load of 1800 cf/acre below riser top.

WHEN BMP IS TO BE INSTALLED:

Sediment basins should be placed prior to the disturbance of natural vegetation.

STANDARDS AND SPECIFICATIONS:

For permanent structures, a qualified professional engineer experienced in designing dams should complete the basin design. Excavate basin to length, width, depth and slopes specified on plans. Place and compact fill to construct dam to elevation at least 1 foot above crown of outlet pipe. Install outlet pipe and compact clay soil around pipe. Install the perforated riser pipe, wrap with fabric, and surround with uniformly graded gravel. Install energy dissipation at downstream end of outlet pipe. Complete installation of dam to an elevation 10% above design height to allow for settling. Grade and stabilize spillway. Install monitoring post near outlet of basin. Mark maximum allowable sediment depth.

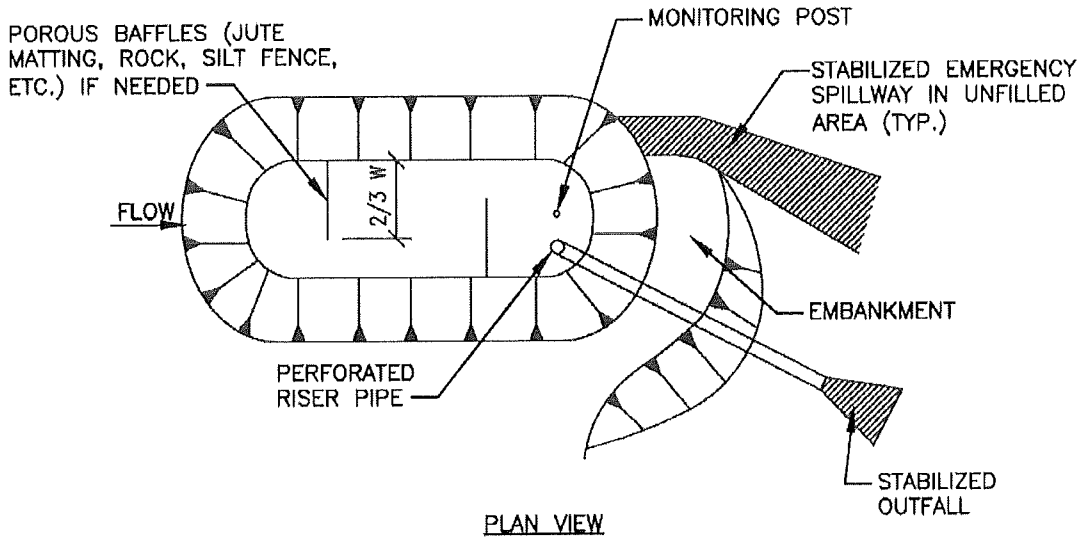
OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every ½" storm. Remove trash accumulation at outlet. Remove sediment accumulations once sediment reaches design depth, as indicated on monitoring posts. Repair and re-vegetate any erosion damage on spillway. Repair settlement, cracking, piping holes, or seepage at embankment. Replace gravel around riser if basin does not drain properly.

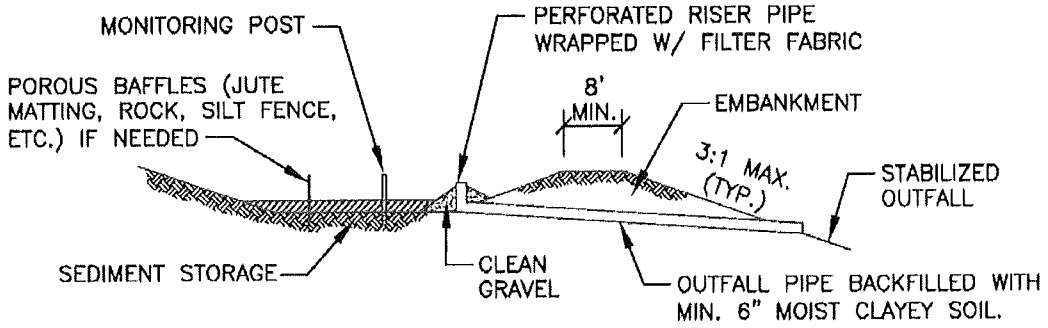
SITE CONDITIONS FOR REMOVAL:

Remove after upstream areas are stabilized. Regrade as appropriate and vegetate immediately.

STANDARD DRAWING: SC-6



PLAN VIEW



PROFILE

GENERAL NOTES:

1. TOP OF RISER SHOULD BE A MIN. OF 1' BELOW THE TOP OF THE EMBANKMENT AND 6" BELOW THE FLOW LINE OF ANY EMERGENCY SPILLWAY.
2. IF NO EMERGENCY SPILLWAY IS PROPOSED THERE SHALL BE A MINIMUM OF 1.5' OF FREEBOARD.
3. BAFFLE HEIGHT SHOULD BE GREATER THAN TOP OF RISER PIPE AND LESS THAN TOP OF EMBANKMENT.
4. SILT MONITORING POSTS SHALL BE INSTALLED NEAR THE OUTLET OF BASIN AND BE MARKED WITH MAXIMUM PERMISSABLE LEVEL OF SEDIMENT.

9/03/2008 Approved Date / Revisions	PUBLIC WORKS	SEDIMENT BASINS	SC-6

SC-7 SEDIMENT TRAP

A sediment trap is a temporary containment area that allows sediment in collected storm water to settle out during infiltration or before the runoff is discharged.

APPROPRIATE APPLICATIONS:

Sediment traps are commonly used at the outlets of stormwater diversion structures, channels, slope drains, construction site entrances, vehicle wash areas, or other runoff conveyances.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and concentrated flow.

Contributing Area: Maximum of 5 acres.

Trap Volume: Silt load of 1800 cf/acre.

WHEN BMP IS TO BE INSTALLED:

Install sediment traps prior to disturbance of natural vegetation.

STANDARDS AND SPECIFICATIONS:

Take care to situate sediment traps for easy access by maintenance crews. Excavate an area for the sediment trap, making sure the side slopes are no steeper than 2:1 and the embankment height no more than 5 feet from the original ground surface. Install dewatering pipe, if necessary. Place and compact fill to construct embankments and the spillway. To reduce flow rate from the trap, line the outlet with rip rap and gravel over the dewatering pipe, if necessary. The spillway weir for each temporary sediment trap should be at least 4 feet long for a 1-acre drainage area and increase by 2 feet for each additional drainage acre added, up to a maximum drainage area of 5 acres. Install monitoring posts in the trap which mark ½ the design depth for sediment accumulation.

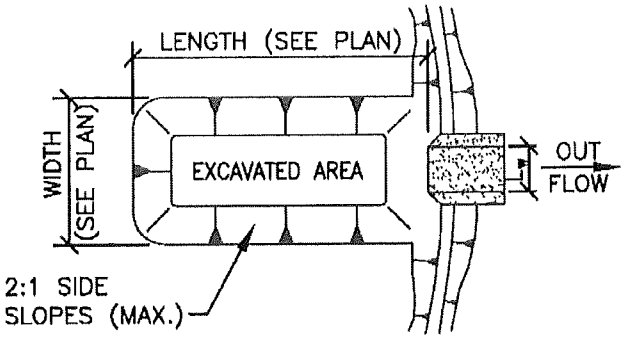
OPERATION AND MAINTENANCE PROCEDURES:

Inspect at least every week and after every ½" storm. Remove trash accumulation. Remove sediment accumulations once sediment reaches design depth, as indicated on monitoring posts. Repair and revegetate any erosion damage. Repair settlement, cracking, piping holes, or seepage at embankment.

SITE CONDITIONS FOR REMOVAL:

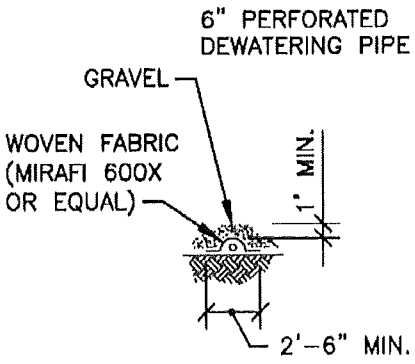
Remove after upstream areas are stabilized. Regrade as appropriate and vegetate immediately.

STANDARD DRAWING: SC-7a and SC-7b

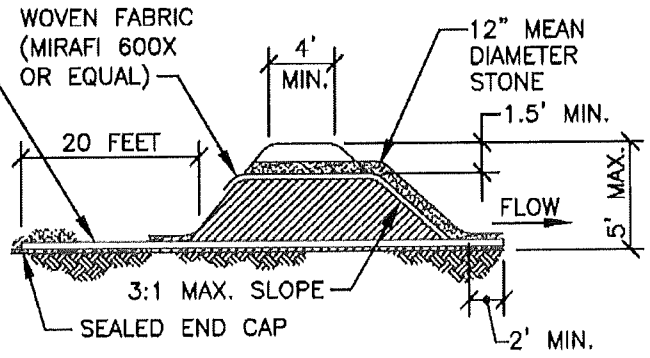


PLAN VIEW

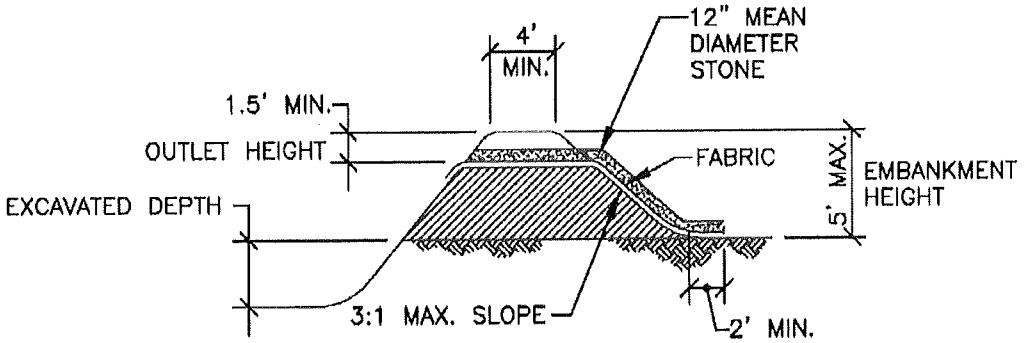
TRIBUTARY AREA (ACRES)	LENGTH OF SPILLWAY WEIR L_w (ft)
0–1.0	4
1.01–2.0	6
2.01–3.0	8
3.01–4.0	10
4.01–5.0	12



DEWATERING PIPE



OUTLET PROFILE



ALTERNATE OUTLET PROFILE

Approved 9/03/2008 Date			
Revisions	PUBLIC WORKS	**SEDIMENT TRAPS**	**SC-7A**

TEMPORARY SEDIMENT TRAP NOTES:

A) CONSTRUCTION SPECIFICATIONS:

1. THE AREA UNDER THE EMBANKMENT SHALL BE CLEARED, GRUBBED, AND STRIPPED OF ANY VEGETATION AND ROOT MAT.

2. FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS OR OTHER WOODY VEGETATION, ORGANIC MATERIAL, LARGE STONES, AND OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHOULD BE COMPACTED IN 6-INCH LAYERS BY TRAVERSING WITH CONSTRUCTION EQUIPMENT.

3. THE EARTHEN EMBANKMENT SHALL BE SEEDED WITH TEMPORARY OR PERMANENT VEGETATION IMMEDIATELY AFTER INSTALLATION

4. CONSTRUCTION OPERATION SHALL BE CARRIED OUT TO MINIMIZE EROSION AND WATER POLLUTION.

5. ALL CUT AND FILL SLOPES SHALL BE 2H:1V OR FLATTER EXCEPT FOR EXCAVATED, WET STORAGE AREAS WHICH MAY BE AT A MAXIMUM 1H:1V GRADE.

B) INSPECTION AND MAINTENANCE

1. INSPECT THE TEMPORARY SEDIMENT TRAP WEEKLY AND AFTER EACH STORM EVENT OF 1/2-INCH OR GREATER.

2. REMOVE AND PROPERLY DISPOSE OF SEDIMENT WHEN IT ACCUMULATES TO ONE-HALF THE DESIGN VOLUME.

3. PERIODICALLY CHECK THE EMBANKMENT, SPILLWAY, AND OUTLET APRON FOR EROSION DAMAGE, SETTLING SEEPAGE, OR SLUMPING ALONG THE TOE AND REPAIR IMMEDIATELY.

4. REPLACE THE SPILLWAY GRAVEL FACING IF IT BECOMES CLOGGED.

5. INSPECT VEGETATION AND RESEED IF NECESSARY.

6. REPLACE ANY DISPLACED RIPRAP SO THAT NO REPLACEMENT ROCK IS ABOVE THE DESIGN GRADE.

7. 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, AND GRADING THE SITE TO BLEND WITH THE SURROUNDING AREA; THEN STABILIZE.

9/03/2008 Approved Date Revisions	PUBLIC WORKS	**SEDIMENT TRAPS**	**SC-7B**

SC-8 CURB AND GUTTER INLET PROTECTION

A temporary sediment control barrier consisting of a filter media, such as compost filter socks, gravel and mesh, sandbags, gravel bags, etc., around a curb and gutter inlet designed to prevent sediment from entering the storm sewer. Shallow temporary ponding may occur during and after rainfall events.

APPROPRIATE APPLICATIONS:

Place protection at inlets where runoff may contain sediment-laden water.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and concentrated flow.

Contributing Area: Maximum of 1 acre.

WHEN BMP IS TO BE INSTALLED:

Install inlet protection immediately after installation of the inlet, or prior to land disturbing activities beginning on the contributing upstream area to the inlet.

STANDARDS AND SPECIFICATIONS:

Typical types of curb and gutter inlet protection include: fabricated inlet filters (follow manufacturer's instructions), compost filter sock (make sure that both ends of the sock are anchored accordingly), gravel and wire mesh (construct and anchor wood frame, fasten wire mesh and fabric to frame and place the gravel on top of the entire structure), sandbags and gravel bags (may be placed either as a j-hook on the upstream end of the inlet or as a full barrier, sometimes stacked 2 bags high, across the entire opening of the inlet). Incorporate an overflow bypass into the inlet protection structure in areas, such as heavy traffic streets, where excessive ponding of water around the inlet may become a safety issue. Sediment controls behind the curb will be necessary to prevent the discharge of sediment in these bypasses.

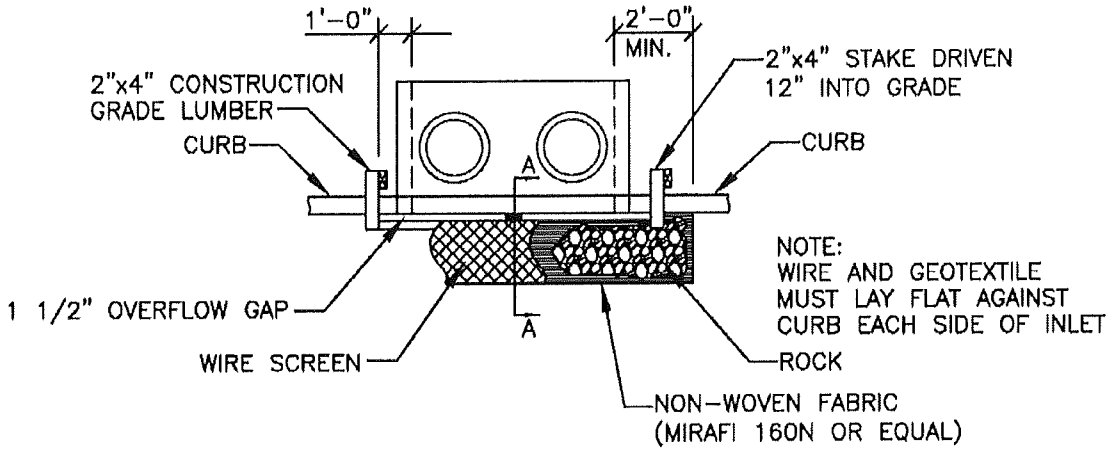
OPERATION AND MAINTENANCE PROCEDURES:

Inspect inlet protection of all media types weekly and after each ½" rainfall event to make sure they are functioning properly. Remove trash and debris. Remove sediment from the inlet protection when half of the protection structure height has been filled. Repair elements to original configuration as needed.

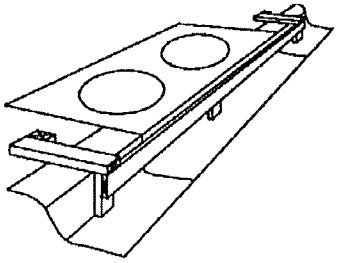
SITE CONDITIONS FOR REMOVAL:

Remove after contributing drainage areas have been adequately stabilized.

STANDARD DRAWING: SC-8

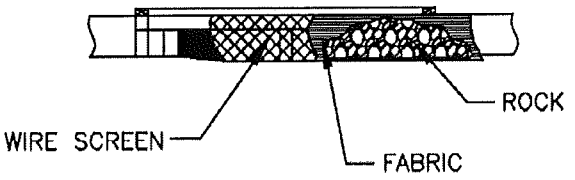


PLAN

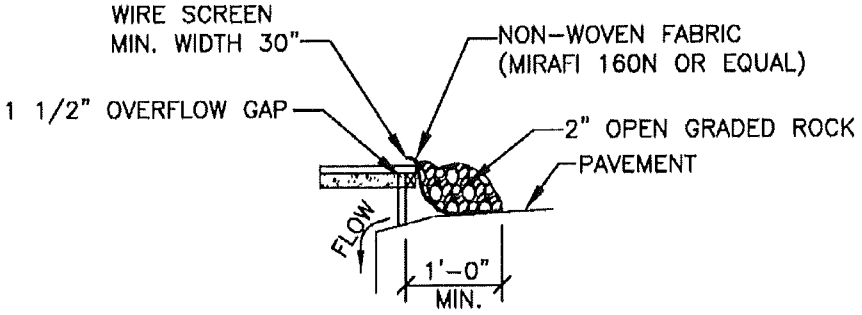


WOODEN FRAME ON VERTICAL CURB

NOTE: ALTERNATIVELY, ROCK CAN BE PLACED IN A FILTER FABRIC BAG (SIMILAR TO SANDBAG) AND PLACED IN THE OPENING WITHOUT THE WOODEN FRAME.



ELEVATION



SECTION A-A

Approved 9/03/2008 Date Revisions	COUNTY OF BOONE MISSOURI PUBLIC WORKS	**CURB and GUTTER INLET PROTECTION**	**SC-8**

SC-9 DROP INLET PROTECTION

A temporary sediment control barrier consisting of a filter fabric around a recessed area inlet designed to prevent sediment from entering the storm sewer. Shallow temporary ponding may occur during and after rainfall events.

APPROPRIATE APPLICATIONS:

At recessed area or yard inlets where runoff may contain sediment-laden water.

CONDITIONS FOR EFFECTIVE USE:

Type of Flow: Sheet flow and concentrated flow.

Contributing Area: Maximum of 1 acre.

WHEN BMP IS TO BE INSTALLED:

Place inlet protection immediately after installation of the inlet, or prior to land disturbing activities beginning on the contributing upstream area to the inlet.

STANDARDS AND SPECIFICATIONS:

Typical types of drop inlet protection include: manufactured filtering product or silt fence frames. Follow the manufacture's instruction for placement of proprietary products. For the silt fence protection, install a wood frame, dig a trench around the inlet for fabric to be buried, fasten fabric tightly to frame, backfill and compact trench. Alternatively, a sod filter can be installed by preparing and fertilizing the soil around the inlet and installing sod for a distance of at least 4 feet in each direction. The sod should be staked, stapled and/or netted at the corners and center of sod strips as required and then watered immediately. For safety, inlet protection structures which pond water onto streets, parking lots or driveways should be designed to have some method for allowing excess water from large storms to bypass or overflow.

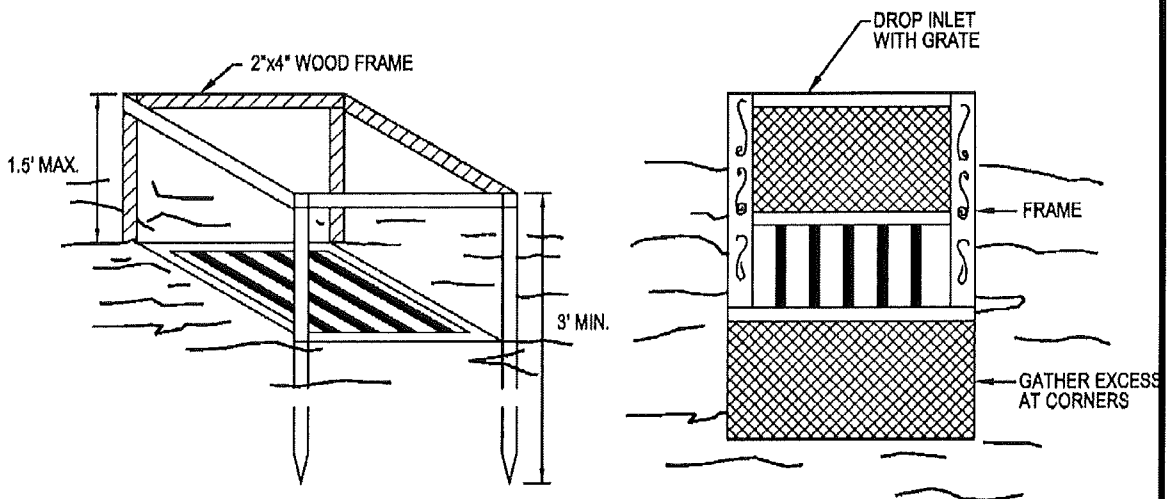
OPERATION AND MAINTENANCE PROCEDURES:

Inspect inlet protection of all media types weekly and after each significant rainfall event to make sure they are functioning properly. Remove trash and debris. Remove sediment from the inlet protection when half of the protection structure height has been filled. Repair elements to original configuration as needed.

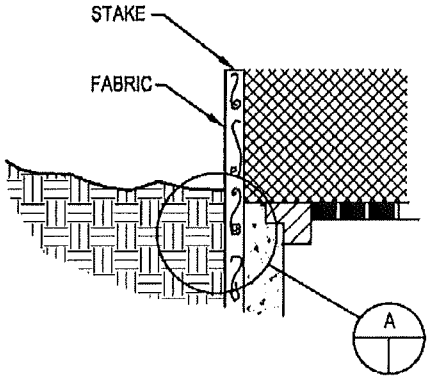
SITE CONDITIONS FOR REMOVAL:

Remove after contributing drainage areas have been adequately stabilized.

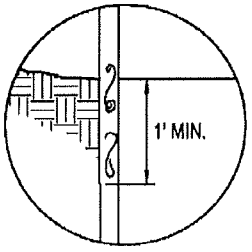
STANDARD DRAWING: SC-9a and SC-9b



PERSPECTIVE VIEWS
NOT TO SCALE



ELEVATION OF STAKE AND
FABRIC ORIENTATION



DETAIL A
NOT TO SCALE

Approved 9/03/2008 Date Revisions	COUNTY OF BOONE MISSOURI PUBLIC WORKS	**DROP INLET PROTECTION (SILT FENCE)**	**SC-9A**

SEDIMENT FENCE DROP INLET PROTECTION NOTES:

A) CONSTRUCTION SPECIFICATIONS:

1. SEDIMENT FENCE SHALL BE CUT FROM A CONTINUOUS ROLL TO AVOID JOINTS.
2. FOR STAKES, USE 2X4 WOOD OR EQUIVALENT METAL WITH A MINIMUM LENGTH OF 3 FEET.
3. 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.
4. TO PROVIDE NEEDED STABILITY TO THE INSTALLATION, FRAME WITH 2X4 WOOD STRIPS AROUND THE CREST OF THE OVERFLOW AREA AT A MAXIMUM OF 1.5 FEET ABOVE THE DROP INLET CREST.
5. PLACE THE BOTTOM 12 INCHES OF THE FABRIC IN A TRENCH AND BACK FILL THE TRENCH WITH 12-INCHES OF COMPACTED SOIL.
6. FASTEN FABRIC SECURELY BY STAPLES, OR WIRE IT TO THE STAKES AND FRAME. JOINTS MUST BE OVERLAPPED TO THE NEXT STAKE.

B) INSPECTION AND MAINTENANCE:

1. THE STRUCTURE SHALL BE INSPECTED WEEKLY AND AFTER EACH RAIN EVENT OF 1/2 INCH OR GREATER AND REPAIRS MADE AS NEEDED.
2. SEDIMENT SHALL BE REMOVED AND THE TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO ONE HALF THE DESIGN DEPTH OF THE TRAP. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA AND IN SUCH A MANNER THAT IT WILL NOT ERODE.
3. STRUCTURES SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE REMAINING DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.

9/03/2008 Approved Date Revisions	PUBLIC WORKS	**DROP INLET PROTECTION (SILT FENCE) NOTES**	**SC-9B**

TC-1 CONSTRUCTION ENTRANCE/EXIT

A stabilized entrance to a construction site which is designed to minimize the amount of sediment tracked from the site on vehicles and equipment. Mud and sediment fall off of tires as they travel along the stabilized entrance.

APPROPRIATE APPLICATIONS:

At locations where it is safe for construction vehicles and equipment to access existing streets, preferably at the location of future streets or drives.

CONDITIONS FOR EFFECTIVE USE:

Site conditions will dictate design and need. Ditches or pipes, if needed, sized for 15 year, 20 minute storm; HGL 6" below surface of entrance.

WHEN BMP IS TO BE INSTALLED:

Install stabilized construction entrance/exit prior to vehicles or equipment accessing unpaved areas. This will most likely the first BMP to be installed on the site.

STANDARDS AND SPECIFICATIONS:

Limit the points of entrance/exit to the construction site. Properly grade and compact each construction entrance/exit to prevent runoff from leaving the site. Install culvert under entrance if needed to maintain positive drainage. Place fabric and cover with aggregate, forming a diversion across the entrance, if needed, to direct runoff away from the roadway. Require all employees, subcontractors, and suppliers to utilize the stabilized construction access.

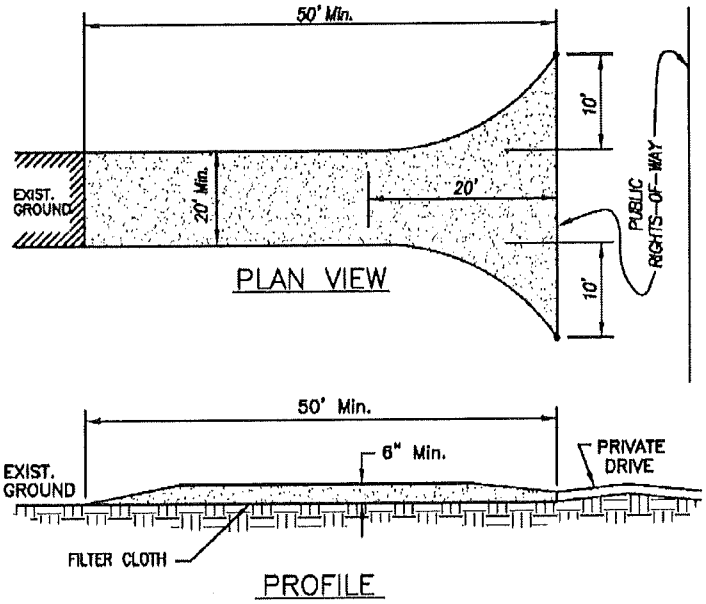
OPERATION AND MAINTENANCE PROCEDURES:

Inspect routinely for damage and assess effectiveness of the BMP. Remove sediment and clods of dirt from construction entrance continuously. Replace rock, as necessary, to maintain a clean surface for traffic. Repair any areas that have settled. Keep all temporary roadway ditches clear. Immediately remove any mud or debris tracked onto paved surfaces.

SITE CONDITIONS FOR REMOVAL:

Remove when vehicles and equipment will no longer require access to unpaved areas.

STANDARD DRAWING: TC-1



CONSTRUCTION SPECIFICATIONS

1. *STONE SIZE – USE 2" STONE.*
2. *LENGTH – AS REQUIRED, BUT NOT LESS THAN 50 FEET.*
3. *THICKNESS – NOT LESS THAN SIX (6) INCHES.*
4. *WIDTH – TWENTY (20) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.*
5. *FILTER CLOTH – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.*
6. *SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 3:1 SLOPES WILL BE PERMITTED.*
7. *MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.*
8. *PERIODIC INSPECTION AS NEEDED MAINTENANCE SHALL BE PROVIDED WEEKLY AND AFTER EACH RAIN EVENT GREATER THAN 1/2".*

9/03/2008 Approved / Date			
Revisions	PUBLIC WORKS	**CONSTRUCTION ENTRANCE/EXIT**	**TC-1**

TC-2 WASHDOWN STATION

An area located at stabilized construction access points to remove sediment from tires and undercarriages, and to prevent sediment from being transported onto public roadways.

APPROPRIATE APPLICATIONS:

Tire washes may be used on construction sites where dirt and mud tracking onto public roads by construction vehicles may occur.

CONDITIONS FOR EFFECTIVE USE:

A downstream sediment trapping BMP is needed to treat dirty runoff from the washdown station. These stations require a supply of wash water and a turnout or doublewide exit to avoid having entering vehicles drive through the wash area.

WHEN BMP IS TO BE INSTALLED:

Washdown stations should be installed along with the stabilized construction entrance/exit, prior to vehicles or equipment accessing unpaved areas.

STANDARDS AND SPECIFICATIONS:

Grade and compact area for drainage under washdown pad. Install wash rack, which should be designed and constructed/manufactured for anticipated traffic loads. Provide a drainage ditch, grade that will convey the runoff from the wash area to a sediment trapping device. The drainage ditch should be of sufficient grade, width, and depth to carry the wash runoff. Install water supply and hose. Post signs in advance of the station indicating that all muddy vehicles and equipment must use the station prior to exiting the site.

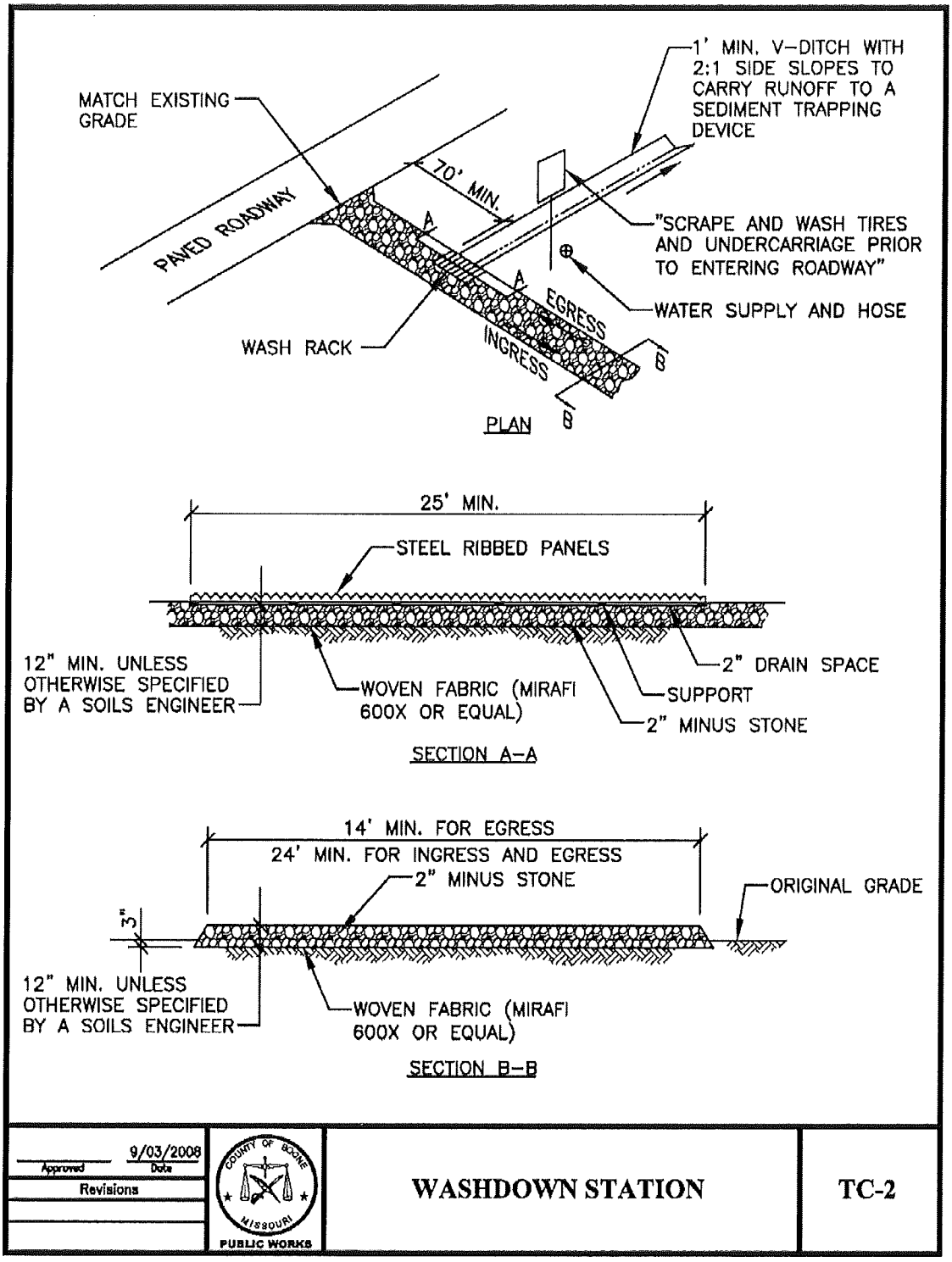
OPERATION AND MAINTENANCE PROCEDURES:

Remove accumulated sediment in wash rack and/or sediment trap on a daily basis or as needed to maintain system performance. Repair any areas that have settled. Replace rock if necessary to maintain a clean surface.

SITE CONDITIONS FOR REMOVAL:

Remove when vehicles and equipment will no longer access unpaved areas.

STANDARD DRAWING: TC-2


1' MIN. V-DITCH WITH 2:1 SIDE SLOPES TO CARRY RUNOFF TO A SEDIMENT TRAPPING DEVICE
MATCH EXISTING GRADE
70' MIN.
PAVED ROADWAY
"SCRAPE AND WASH TIRES AND UNDERCARRIAGE PRIOR TO ENTERING ROADWAY"
WATER SUPPLY AND HOSE
EGRESS
INGRESS
WASH RACK
A
A
B
B
PLAN
25' MIN.
STEEL RIBBED PANELS
12" MIN. UNLESS OTHERWISE SPECIFIED BY A SOILS ENGINEER
WOVEN FABRIC (MIRAFI 600X OR EQUAL)
SUPPORT
2" DRAIN SPACE
2" MINUS STONE
SECTION A-A
14' MIN. FOR EGRESS
24' MIN. FOR INGRESS AND EGRESS
2" MINUS STONE
ORIGINAL GRADE
3"
12" MIN. UNLESS OTHERWISE SPECIFIED BY A SOILS ENGINEER
WOVEN FABRIC (MIRAFI 600X OR EQUAL)
SECTION B-B
9/03/2008
Approved
Date
Revisions
PUBLIC WORKS
WASHDOWN STATION
TC-2

PP-1 NON-SEDIMENT POLLUTION CONTROL

These control measures are designed to prohibit chemicals, hazardous materials, solid waste, human waste and construction debris from polluting stormwater. Pollutants carried in solution or as surface films on runoff will be carried through most erosion control and sediment capture BMPs. Keeping substances like fuel, oil, asphalt, paint, solvents, fertilizer, soil additives, concrete wash water, solid waste, human waste and construction debris from polluting runoff can be accomplished to a large extent through good housekeeping on the site and following the manufacturer's recommendations for disposal.

APPROPRIATE APPLICATIONS:

Temporary sanitary facilities, collection, storage and fueling areas should be located onsite in an area that does not receive a substantial amount of runoff from upland areas and does not drain directly to lakes, creeks, streams, rivers, sewers, groundwater, wetlands, or road ditches.

CONDITIONS FOR EFFECTIVE USE:

An effective management system requires training and signage to promote proper storage, handling and disposal of materials, and follow up observations of actions and inspection of storage areas by management. Plans should contain notes clearly stating requirements for addressing potential pollutants.

WHEN BMP IS TO BE INSTALLED:

Pollution control practices should begin immediately and continue throughout the project.

STANDARDS AND SPECIFICATIONS:

Place waste receptacles near area of work. All fueling facilities present on the site shall adhere to applicable federal and state regulations concerning underground storage, above ground storage, and dispensers. Hazardous wastes shall be managed according to Missouri Hazardous Waste Laws and Regulations. Install appropriate signage. Post guidelines for proper handling, storage and disposal of materials, and emergency spill cleanup on site. Provide sufficient temporary toilet facilities to serve the number of workers on the site.

OPERATION AND MAINTENANCE PROCEDURES:

Inspect activities on a regular basis. Inspect storage areas and control devices at least every week and after every storm. Maintenance of temporary toilet facilities should be frequent and thorough. Make necessary corrections and repairs.

SITE CONDITIONS FOR REMOVAL:

Remove after contributing drainage areas have been adequately stabilized.

STANDARD NOTES:

General pollution notes:

1. Handling and disposal of hazardous materials:

DO: Prevent spills
Use up products completely
Follow label directions for disposal
Remove lids from empty bottles and cans when disposing in trash
Recycle wastes whenever possible

DON'T: Don't pour waste into sewers or waterways on the ground
Don't pour waste down the sink, floor drain or septic tanks
Don't bury chemicals or containers, or dispose of them with other waste
Don't burn chemicals or containers
Don't mix chemicals together

2. Containers shall be provided for collection of all waste material including construction debris, trash, petroleum products and any hazardous materials to be used onsite. All waste material shall be disposed of at facilities approved for that material.

3. No waste materials shall be buried on-site.

4. Mixing, pumping, transferring or otherwise handling construction chemicals such as fertilizer, lime, asphalt, concrete drying compounds, and all other potentially hazardous materials shall be performed in an area away from any watercourse, ditch or storm drain.

5. Equipment fueling and maintenance, oil changing, etc., shall be performed only in an area designated for that purpose. The designated area is equipped for recycling oil and catching spills.

6. Concrete wash water shall not be allowed to flow directly to storm sewers, streams, ditches, lakes, etc without being treated. A sump or pit shall be constructed to contain concrete wash water.

7. All paint, solvents, petroleum products and petroleum waste products, and storage containers (such as drums, cans, or cartons) shall be stored according to BMPs. The materials exposed to precipitation shall be stored in watertight, structurally sound, closed containers. All containers shall be inspected for leaks or spillage during the once per week inspection of BMPs. If substances such as oil, diesel fuel, hydraulic fluid, antifreeze, etc. are spilled, leaked, or released onto soil, the soil shall be dug up and properly disposed of. Spills on pavement shall be absorbed with sawdust, kitty litter or product designed for that purpose and disposed of at a licensed sanitary landfill. Hazardous or industrial wastes such as most solvents, gasoline, oil-based paints, and cement curing compounds require special handling. These materials will be removed from the site and recycled or disposed of in accordance with MoDNR requirements.

8. State law requires the party responsible for a petroleum product spill in excess of 50 gallons to report the spill to MoDNR (537-634-2436) as soon as practical after discovery.

Federal law requires the responsible party to report any release of oil if it reaches or threatens a sewer, lake, creek, stream, river, groundwater, wetland, or area, like a road ditch, that drains into one of the above.

9. Sufficient temporary toilet facilities to serve the number of workers on the site shall be provided. The facilities shall be serviced frequently to maintain a sanitary condition.

PUBLIC WATER SUPPLY DISTRICT NO. 3 OF COLE COUNTY, MISSOURI

TECHNICAL SPECIFICATIONS

FOR

BUSINESS 50 WEST WATER LINE RELOCATION

2-12-2021

THIS SHEET HAS BEEN
SIGNED, SEALED, AND DATED
ELECTRONICALLY

TRAVIS C. BRUEMMER, P.E.
LICENSE NO. PE-2014016933

BARTLETT & WEST, INC.
Certificate of Authority No. 000167 - Engineering
1719 Southridge Drive, Suite 100
Jefferson City, MO 65109

FEBRUARY 2021
Bartlett & West Project No. 7031.102

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Bartlett&West

DISTRIBUTION SYSTEM
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Bartlett & West

PART I
DISTRIBUTION SYSTEM

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 al 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 and within utility corridor.

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 costs 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 DRAWINGS: Record drawings 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 owner's 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 which swing around obstacles because of the contractor's choice and without specific Engineer or District approval, will not receive payment. All valves and fittings shall be referenced to three permanent topographic features.

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.

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 contractor's choice as to how to install the pipe vis a vis the angular change so long as the pipe remains in the R/W. The Contractor may install a fitting such as a 22½° - 45° 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, 90° 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 pipeline unit prices.

1B. JOB WITH FITTINGS BID:

Some jobs will be bid with prices taken for different fittings. Fittings used on this type of job will be paid for at the prices indicated on the bid proposal.

1C. FITTING MATERIAL:

Whether a bid item exists for a fitting or not, all fittings shall be cement lined ductile iron for both PVC and DI pipe.

1D. 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.

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 shall contact Missouri One Call at #1-800-DIG-RITE.

2. Depth of Pipe: Minimum depth of cover over pipe shall be forty-two inches (42") as measured from the final 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 over digging 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 15 inches in earth and 24 inches in rock. In addition, the trench shall be at least 4 inches wider than the maximum dimension of any part of a pipe, a fitting, etc.

4. Rock: Rock will not be considered as a separate pay item. This is an unclassified bid insofar as excavation is concerned. The Contractor shall inform himself of the amount of rock on the job and adjust his unit prices accordingly.

Rock shall be removed six inches (6") 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 width of 24 inches 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") 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.

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: Pipeline 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. See addenda, if any, and drawings for railroad instructions.

9. Highway Crossings: A pipeline 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. See addenda, if any, and drawings for instructions.

10. Stream Crossings: Pipelines under streams, creeks, outflow lines of culverts and other places which exhibit severe cutting or erosion shall be encased as indicated in the drawings. Encasement shall be placed at such points as located on the drawings. The Engineer may require additional locations to be encased. Extra compensation will be allowed for such additional work.

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.

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.

Where rock has been excavated, the lower six inches (6 inches) of the trench 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 - unit prices. 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 two inches (2") 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 made with sand or limestone screenings. Walks and driveways consisting of broken stone, gravel, slag, or cinders shall not be considered as being of a permanent construction. 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.

When trenches have not been properly filled and where settlement occurs, refilling shall be required to bring the surface to conform to 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 pipeline 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.

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 six inches (6") 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 pipeline or six inches (6") 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. Clean-Up: Final clean-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.

Listed below is a table to define a reasonable time for accomplishing repairs and replacement on roads, driveways, lanes, etc. to ensure that they are kept passable:

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 "crummings" 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 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.

3. 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. All fittings to be cement lined and sealed, ANSI/AWWA C104/A21.4.

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-Tyte".

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-Tyte" 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 is not 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 ensure 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.

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 diameter Stainless steel all-thread rods, 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 ductile iron with stainless steel straps and 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 thru 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 cutter; 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 manufacturer's 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.

Class 200 pipe shall have a maximum design stress of 2000 psi and conform to SDR-21 as given in CS256-63. Class 160 pipe (SDR26) shall be similar.

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.

All fittings for 4" and larger shall be mechanical joint ductile iron.

MINIMUM DIMENSIONS*

Pipe Size	Ave. Outside Diameter Steel Pipe Size	Wall Thickness SDR 21 CL 200 PSI inches	wt/ft	Wall Thickness SDR 26 CL 160 PSI inches	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
4"	4.500	.214	1.9	.173	1.48
6"	6.625	.316	4.2	.255	3.22
8"	8.625	.410	7.1	.332	5.47
10"	10.750	.511	11.1	.413	9.05
12"	12.750	.606	15.6	.490	12.76
14"	14.000	.665	18.9	.538	15.45
16"	16.000	.760	24.9	.615	20.30
18"	18.000	.857	31.7	.693	25.88
20"	20.000	.952		.770	32.33
24"	24.000	1.143		.924	46.75
30"	30.000	1.428			

* Alternate pipe minimum dimensions for ductile iron pipe size outside diameter shall conform to standards set forth in AWWA C900 for 4" through 12" and AWWA C905 for 14" through 48".

Above alternate pipe to conform to AWWA C900 (4" diameter through 12") or C905 (14" diameter through 48"). Larger sized casing may be required with this pipe where used as a carrier as compared to the charts contained in these specifications (Section DS-25).

A. PVCO (Molecular Oriented Polyvinyl Chloride): PVCO or Ultra-Blue plastic pipe shall conform to ASTM F1483 and ANSI/NSF 61. The rigid polyvinyl chloride compound shall have a cell classification of 12454B in conformance with ASTM D1784. Pipe joints shall be in accordance with ASTM D3139 and UNI-B-1. Pipe pressure class shall be 200 PSI, unless otherwise shown on plans.

MINIMUM DIMENSIONS FOR CLASS 200 PVCO PIPE*

Pipe Size (Inches)	Ave. Outside Dia. Steel Pipe Size (Inches)	Min. Wall Thickness CL 200 Pipe (Inches)	Approx. Weight (lbs./ft.)
6"	6.625	0.182	2.53
8"	8.625	0.236	4.20
10"	10.750	0.295	6.37
12"	12.750	0.349	8.93

* Alternate pipe minimum dimensions for PVCO ductile iron pipe size outside diameter shall conform to standards set forth in AWWA C909.

NOTE: FOR PUBLICLY BID PROJECTS, CONTRACTOR MUST RECEIVE PERMISSION FROM THE ENGINEER OR WATER DISTRICT PRIOR TO USING PVCO, UNLESS PVCO IS SPECIFIED ON PLANS.

2. Certificate of Conformance: Before pipe may be installed on the job, the pipe supplier may be required to 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 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-Missouri Department of Transportation (MODOT), 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 3 inches and below. Use MJ joint ductile iron fittings for all sizes above.

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 manufacturer's 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 the spigot and socket after assembly to affect 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 76°F±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 +	D572-61°-	60	60

* Of original length.
\+ Of original values of tensile and ultimate elongation.
°- Oxygen pressure method; after 96 hr at 70°C±1° at 300 psi ±10.

The gasket manufacturer shall set up such quality control procedures as will ensure 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.

F. PVC to Gate Valves and Ductile Iron Fittings: Joint restraints shall be used when connecting PVC water lines with diameters 4" and greater to gate valves and ductile iron fittings when anchor couplings are not used. Joint restraints shall be Uni-Flange Series 1500 "Circle Lock" by Ford Meter Box Co., Romagrip pipe restraint by Romac Industries, or approved equal. Only restraints similar in function to these specified above will be considered.

G. Tapping Saddles: Shall be Ford S70 Brass Alloy.

H. Tapping Sleeves: The tapping sleeve shall be a MJ tapping sleeve – Model 3490MJ as manufactured by Powerseal Pipeline Products Corporation or an approved equal, and shall be suitable for use with standard a standard mechanical joint x mechanical joint resilient wedge gate valve. Tapping sleeve shall be stainless steel. Gate valves shall be in accordance to Section DS 17.

a) The mechanical joint outlet shall be a one-piece casting having a plain end and a mechanical joint gland TIG and MIG welded a full 360 degree.

b) The tapping sleeve shall have a Mechanical Joint Outlet Gasket, Branch Sealing Gasket, and Complete Circle Gasket attached to the sleeve at the factory.

c) The tapping sleeve shall incorporate Drop-In, Square-Neck Track-Head bolts with a minimum of two (2) longer starter bolts.

d) The minimum quantity of drop-in bolts and mechanical joint outlet bolts per outlet diameter shall be:

Outlet Diameter	Bolt Qty.	MJ Outlet
2"	8	2
3"	8	4
4"	10	4
6"	10	6
8"	16	6
10"	20	8
12"	20	8
16"	36	12

e) The Branch opening shall be larger in diameter than nominal to allow the use of a full-size cutter.

f) All welding shall be passivated so as to return the welded stainless steel to its original corrosion resistant state.

g) There shall be no paper or plastic adhesive labels attached to the tapping sleeve, any information appearing on the sleeve shall be stenciled.

h) The tapping sleeve shall be factory hydrostatically tested on pipe to verify proper fit and weld integrity with zero leakage allowed.

i) The tapping sleeve shall also be air tested to 50 PSI prior to tap being made.

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, 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 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 groove to provide restraint. Pipe to be Certainteed Yelomine or equal. Couplings shall conform to pipe and be Certa-Lok by Certainteed.

WALL THICKNESS RESTRAINED JOINT PIPE

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. Provide 2 operating keys.

All valves to have concrete thrust block placed underneath valve of same face area as shown in restraint chart for T of similar pipe size; or pipe restraint method may be used in lieu thereof.

DS-16. GATE VALVES: Gate valves shall conform to AWWA Specification C509 or C515. Gate valves shall have: Fully Encapsulated Wedge nonrising stem; double "0" Ring Seal; 2 inches square operating nut opening counterclockwise; 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 be MJ, unless noted differently on plans, and shall have resilient seats.

All valves to have concrete thrust block placed underneath valve of same face area as shown in restraint chart for T of similar pipe size; or pipe restraint method may be used in lieu thereof.

DS-17. VALVE BOX: Valve boxes shall be two-piece, screwed type with a 5¼" shaft and a minimum 8½" bell. Box shall be cast iron with cast iron lid. This type of valve box will be used only when the valve is located in the traveled portion of roadway. Valve boxes shall be set plumb, flush with the road surface.

In most settings 6" CL 200 PVC will be used for valve box riser. Use the bell end of pipe on valve. Where possible the valve box shall be left up in the air about 2' above ground to allow valve to be easily located. Valve cover and ring shall be cast iron as per Clay & Bailey No. 2194 or equal. The Contractor shall be prepared to install either type box at the same bid price. A trench adapter with a telescoping design that allows for a variable adjustment length is an acceptable equal. The trench adapter must be a fully an adjustable valve box and extension stem system.

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 objectionable 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%

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. Concrete shall have a minimum strength of 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. Where concrete is used at valves, fittings, etc., wrap 8 mil plastic around bolts and all-thread rods to keep concrete off pipe and fittings.

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. WATER TEST PIT:

1. Pit: Contactor to 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.

2. 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 as it will be paid for under valves. 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.

3. 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-20. 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 affect 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 bell/spigot interfaces, bolted 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-21. LOCATOR WIRE: Locator wire shall be #12-gauge solid copper wire with PE-45 solid blue insulation as manufactured by Kris-Tech Wire Company; Republic Wire, Inc.; or an approved equal. Alternate manufacturer locator wire must be specified as locator or tracer wire and shall not be conductor wire for other purposes. Locator wire shall be 1,500' (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 made with a splice kit. Wire to be taped to top of pipe. See detail in plans. Wire to be installed along all lines and outside all valve boxes to extend 48" above ground. Locator wire installation, including signal loss, shall be warranted under the 1-year pipe and workmanship warranty.

Contractor must prove continuity of locator wire after installation is complete. Owner's representative must be present during continuity test.

DS-22. BORING: Borings shall meet Missouri Department of Transportation or Department of the Army requirements, as applicable. Borings on railroads shall meet railroad requirements. Contractor shall obtain necessary permits and do all work in accordance with their requirements. The plans shall indicate which bores are to be encased and which are to be directionally bored.

Borings shall be made so that line and grade of water line may be carried continuously thru encasement. Boring encasement to be steel pipe with a wall thickness of a minimum as per table in Section DS-25. 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.

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 watertight and shall be equal to or stronger than adjacent pipe. Casing joining procedures 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-23. 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 6 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.

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 (6-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 printout of the bore path with respect to the obstacle crossed for the development of record 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 transition 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 a restrained joint area under the provisions of this section.

DS-24. 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.

2. Except as specifically shown otherwise on the plans, the depth to the top of the casing shall in general be 3'-6" 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.

F. Use double spacers at ends of casing pipe and one each side of a joint. End spacers to be a minimum of 2 feet from end of casing pipe.

6. Table of pipe sizes and maximum skid support for PVC.

Nominal Pipe Size Inches	Casing Size Internal Diameter Inches	Casing Wall Thickness Inches		Maximum* feet Spacing Between Adjacent Skids
		Highway Use	Railroad Use	
2"	8"	3/16	¼	4'
2.5"	8"	3/16	¼	4'
3"	10"	3/16	¼	4'
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	

*Measurement from centerline to centerline of skid. Use at least 3 skids per pipe irrespective of chart values.

7. 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.

8. 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.

9. The ends of casing shall be sealed with 1/8" synthetic rubber wrap around end seal with stainless steel banding straps.

DS-25. 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
10"	2"	---
10"	2.5"	---
12"	3"	---
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-26. 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 15°, but pipe trench shall be dug such that a maximum to 10° deflection or less will be maintained.

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 of 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-27. SURFACE WATER CROSSINGS. Restrained joints shall be required in waterways and wet weather streams.

1. Above-water crossings. The pipe shall be adequately supported and anchored, protected from damage and freezing and accessible for repair or replacement.

2. 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:
      1. 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.
      2. 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.
      3. 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.
      4. 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.
      1. Restrained joint pipe shall be used for all stream crossings;
      2. The pipe shall extend at least 15 feet beyond the upper edge of the stream channel on each side of the stream.

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 wheelbarrow 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
Calculated using DIPRA, sixth edition, 2006

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	1.5	0.8
6"	1.0	1.3	2.6	4.8	3.4	1.7
8"	1.2	2.4	4.6	8.5	6.0	3.0
10"	1.8	3.7	7.2	13.3	9.4	4.7
12"	2.7	5.3	10.4	19.2	13.6	6.8
14"	3.6	7.2	14.1	26.1	18.5	9.2
16"	4.7	9.4	18.5	34.1	24.1	12.1
18"	6.0	11.9	23.4	43.2	30.5	15.3
20"	7.4	14.7	28.9	53.3	37.7	18.8
24"	10.6	21.2	41.5	76.8	54.3	27.1
30"	16.6	33.1	64.9	120.0	84.8	42.4

* Use at each corner

Design Pressure = 200 PSI
Soil Bearing Capacity = 2,000 PSF
Factor of Safety = 1.5
Calculated using DIPRA, sixth edition, 2006

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	1.4	2.7	1.9	1.0
6"	1.0	1.7	3.2	6.0	4.2	2.1
8"	1.5	2.9	5.8	10.7	7.5	3.8
10"	2.3	4.6	9.0	16.7	11.8	5.9
12"	3.3	6.6	13.0	24.0	17.0	8.5
14"	4.5	9.0	17.7	32.7	23.1	11.5
16"	5.9	11.8	23.1	42.7	30.2	15.1
18"	7.5	14.9	29.2	54.0	38.2	19.1
20"	9.2	18.4	36.1	66.6	47.1	23.6
24"	13.3	26.5	51.9	96.0	67.9	33.9
30"	20.8	41.4	81.2	149.9	106.0	53.0

* Use at each corner

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
Calculated using DIPRA, sixth edition, 2006

Minimum Concrete Required (Cubic Ft.)
Type of Fitting (Bends in Degrees)
Bend°

Pipe Size	11.25°	22.5°	45°	90°
4" and Below	3.9	7.7	14.2	20.1
6"	8.8	17.3	32.0	45.2
8"	15.7	30.8	56.9	80.4
10"	24.5	48.1	88.9	125.7
12"	35.3	69.2	128.0	181.0
14"	48.1	94.3	174.2	246.3
16"	62.8	123.1	227.5	321.7
18"	79.4	155.8	287.9	407.2
20"	98.1	192.4	355.4	502.7
24"	141.2	277.0	511.8	723.8
30"	220.6	432.8	799.7	1131.0

Design Pressure = 200 PSI
Factor of Safety = 1.5
Calculated using DIPRA, sixth edition, 2006

Minimum Concrete Required (Cubic Ft.)
Type of Fitting (Bends in Degrees)
Bend°

Pipe Size	11.25°	22.5°	45°	90°
4" and Below	4.9	9.6	17.8	25.1
6"	11.0	21.6	40.0	56.5
8"	19.6	38.5	71.1	100.5
10"	30.6	60.1	111.1	157.1
12"	44.1	86.6	159.9	226.2
14"	60.1	117.8	217.7	307.9
16"	78.5	153.9	284.3	402.1
18"	99.3	194.8	359.9	508.9
20"	122.6	240.4	444.3	628.3
24"	176.5	346.2	639.8	904.8
30"	275.8	541.0	999.6	1413.7

Wrap 2 - #6 hairpin rebars around joint and reinforce with 2 - #4 stirrup and 4 - #4 rebars.

MINIMUM BEARING AREA FOR VERTICAL BENDS

Design Pressure = 160 PSI
Factor of Safety = 1.5
Calculated using DIPRA, sixth edition, 2006

Minimum Concrete Required (Cubic Ft.)
Type of Fitting (Bends in Degrees)
Bend°

Pipe Size	11.25°	22.5°	45°	90°
4" and Below	1.0	1.0	1.0	1.5
6"	1.0	1.0	1.0	3.4
8"	1.0	1.0	1.8	6.0
10"	1.0	1.0	2.8	9.4
12"	1.0	1.0	4.0	13.6
14"	1.0	1.4	5.4	18.5
16"	1.0	1.8	7.1	24.1
18"	1.0	2.3	8.9	30.5
20"	1.0	2.9	11.0	37.7
24"	1.0	4.1	15.9	54.3
30"	1.6	6.5	24.8	84.8

Design Pressure = 200 PSI
Factor of Safety = 1.5
Calculated using DIPRA, sixth edition, 2006

Minimum Concrete Required (Cubic Ft.)
Type of Fitting (Bends in Degrees) Bend°

Pipe Size	11.25°	22.5°	45°	90°
4" and Below	1.0	1.0	1.0	1.9
6"	1.0	1.0	1.2	4.2
8"	1.0	1.0	2.2	7.5
10"	1.0	1.0	3.5	11.8
12"	1.0	1.3	5.0	17.0
14"	1.0	1.8	6.8	23.1
16"	1.0	2.3	8.8	30.2
18"	1.0	2.9	11.2	38.2
20"	1.0	3.6	13.8	47.1
24"	1.3	5.2	19.9	67.9
30"	2.0	8.1	31.1	106.0

PIPE RESTRAINT
IN LIEU OF CONCRETE THRUST BLOCK FOR DUCTILE IRON PIPE

Design Pressure = 250 PSI
Laying Condition = Type 3
Bury Depth = 4 feet
Factor of Safety = 1.5
Soil Type = Cohesive/Granular
DI – Polywrapped

Number of Pipe Required Each Direction
Bend°

Pipe Size	11.25°	22.5°	45°	90°	T or End
4" and Below	1	1	1	2	3
6"	1	1	1	2	4
8"	1	1	1	3	5
10"	1	1	1	3	6
12"	1	1	2	4	8
14"	1	1	2	4	9
16"	1	1	2	5	10
18"	1	1	2	5	11
20"	1	1	2	6	12
24"	1	1	3	7	14
30"	1	2	3	8	17

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.
bends.

Tie backs shall be used to hold assemblies together such as at a T 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 T 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 contractor's 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

Anchor couplings may be used in lieu of tiebacks.

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: 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 polybutylene or polyethylene 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 pipeline pipe with a standard PVC rubber ring coupling.

DS-31. POLYETHYLENE SERVICE PIPE Pipe shall be PE 3408/PE 3608 manufactured from ultra-high molecular weight, high density, polyethylene (average molecular weight of 1,750,000) and a minimum cell classification of 345464C as defined by ASTM D3350-05. Polyethylene service line 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.

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 ratio (SDR) of 9. All pipe shall be copper tube size (CTS) and have the following nominal dimensions:

Nominal Size	OD	ID	Min Wall
3/4"	0.875	0.675	0.097
1"	1.125	0.865	0.125
1½"	1.625	1.253	0.181
2"	2.125	1.629	0.236

Pipe shall have working pressure of 200 psi at 73.4°F.

Pipe must be capable of maintaining pressures of 340 psi at 73.4°F 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-1000

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" riser. The yoke shall be placed so the meter dials will be approximately 12" 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" 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 HA31-323 or approved equal. Check valve shall be of the angle type. Yokes shall be Water District standard, Ford VH92-15W-41-33-H or approved equal. Insert 12" piece of ½" 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" x ¾" openings; straight reading register in U.S. gallons; magnetic drive; hermetically sealed register. Meters shall be Invensys SR II.

The Water District uses radio read technology for meter reading purposes. All meter installations shall contain the necessary components for use with the District's current system. Contractor shall contact Water District prior to construction to determine the required ordering information.

DS-37. METER WELLS AND COVER: Meter wells shall be 18" inside diameter and 30" in depth, heavy-duty corrugated tile by Midwest Distributors - Model A2000 or equal.

Meter wells for double setters shall be 24" in diameter.

Covers shall be cast iron 4"deep with a 11" 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. Meter ring and lid shall be Water District standard, Clay & Bailey 2210 non-locking, or approved equal.

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, T 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 T 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 be American Darling No. B-84-B or Equal.

Hydrants must be a traffic model with dry barrel and compression. Valve to open and close against pressure. Must also meet AWWA C-502.

Two 2-½" hose connections and one 4-½" pumper connections with nozzle threads to meet National American Standard Fire Hose Specs, with caps and no chains.

Main valve opening shall not be less than 5-¼" and so designed that internal parts can be removed through the top for inspection and repairs. Foot piece to be a 6" opening and mechanical joint.

There shall be a minimum of two (2) internal ports and four (4) drain port outlets to the exterior of the fire hydrant. Drain shutoff to be by direct compression closure.

Fire hydrants shall be red in color with a factory applied paint system. Any fire hydrants delivered to the job site that are not red in color shall be rejected.

Fire hydrant settings in residentially zoned subdivisions shall be located at 500' spacings.

In commercially or industrially zone subdivisions, spacing to be not more than 300'.

Operating threads shall be sealed and lubricated. A 1-½" Pentagonal Nut to be opened counterclockwise.

Hydrant 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" 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. POST HYDRANTS: Post hydrants shall have: Compression shut off valve; 4" mechanical joint inlet, one 2½" hose nozzle; 4½' bury or equal to adjacent pipe; National standard threads; Open left; Painted red; 1½" pentagon operating nut; Reaction backing and drainage (Same as in Fire Hydrant). Hydrant shall be the Eclipse Model No. 2 as manufactured by the Kupferle Foundry Company, Mueller Co. #A24058, or approved equal.

DS-41. YARD HYDRANTS: Yard hydrants shall be of frost proof construction. Hydrants shall be equal to adjacent pipe. Hydrant shall be capable of being locked.

DS-42. END OF LINE CLEANOUT: Cleanouts for lines smaller than 4-inches, cleanout shall be #77 Mainguard Hydrant by Kupferle or approved equal. Cleanout shall have a traffic break-away for easy break at ground level, a locking cover for the valve, brass construction for all moving parts, and have full draining capabilities to prevent freezing. See construction detail.

Cleanouts on lines 4-inch and larger shall be ductile iron. Locate valves as shown on plans or by owner/Engineer approval. See construction detail.

DS-43. AIR RELEASE VALVE

1. 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 ¾ 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.

2. Pit: For air release valve use 18-inch PVC pipe with minimum 3/8-inch wall. 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.

DS-44. 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.

DS-45. SERVICE LINE PRESSURE REGULATOR: When in the estimation of the Engineer and/or the Water District, 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 shall be a ¾" Watts 25AUB or approved equal.

DS-46. DISINFECTING WATER MAINS: Standard of reference shall be AWWA C651.

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 watertight 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.
2	34			
2.5	50			
3	74			
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.

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 consists 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 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".

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.

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 pipeline 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 outlined in this section apply primarily when mains are wholly or partially dewatered. Leaks or breaks that are repaired with clamping devices while 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.

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-48. 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.

DS-48. 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-49. 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 waterline 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 waterline 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 waterline 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 waterline 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 waterline shall be located closer than ten feet to any part of a sanitary or combined sewer manhole. Where the separation cannot be obtained, the waterline 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 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-50. 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-51. LINE CLEANING: To ensure 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 subdivide 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 and devices required to perform the task. These temporary connections and devices shall be removed prior to disinfection. Pig shall be sized for the specific size of the pipe.

The Water District may waive this part of the work if they feel that the pipe was installed clean and free of foreign matter.

DS-52. EXECUTION:

1. General:

a. Pipe shall be of sizes indicated on the drawings and laid to the lines indicated thereon, in accordance with pipe manufacturers 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-53 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:

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 ensure 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 phosphoric acid ($P_2 0_5$), and soluble potash ($K_2 0$), 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.

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 after the work preceding the mulching which may have been damaged as a result of the displacement, has been acceptably repaired.

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WATER LINE CONSTRUCTION

A. All water line construction shall be in accordance with the standard specifications of PWSD No. 3 of Cole County, MO, (Water District) which are included in these bid documents. If the water line specifications conflict with the standard specification or job special provisions for construction affecting the roadway, the standard specifications or job special provisions shall control. Contractor shall verify any conflicts with Engineer prior to proceeding with work.

B. Water line construction may be observed by the Water District. Terri Bascom, Water District Clerk (573-893-4262), shall be notified by the contractor one week prior to the start of water line construction.

C. Payment for water line construction shall be considered completely covered by the associated pay items listed in the bid form and as further detailed herein:

D. **Abandonments, Removals, Locating Existing Pipelines, and Salvaging Items to Owner**

1. **Description:** This work consists of locating, abandoning, capping and/or plugging, removing infrastructure as shown on the Plans, and salvaging items to Owner as designated on the Plans. This work includes, but is not limited to, existing valves, fire hydrants, end cleanouts, fences, trees, stumps, brush, vegetation, cutting and capping existing water lines, abandonment or removal of existing water lines, removal and disposal of existing pavement for open-cut roadway crossings, and other removals necessary to install the new distribution system piping and appurtenances. Also includes any and all work needed to locate existing water lines, appurtenances, etc., and any clean-up and restoration associated with this work not included in other items. All pipeline to be abandoned that is within proposed right-of-way or under proposed or existing driving surfaces shall be removed unless otherwise noted on the plans.

2. **Basis of Payment:** All costs for equipment, material, labor, and time required to fulfill this provision in accordance with the plans and specifications, shall be paid for at the contract lump sum price for "Water Line Abandonments, Removals, Locating Existing Pipelines, and Salvaging Items to Owner." The percentage complete for this item each month will be calculated by taking the total linear feet of water line installed divided by the total bid quantity for all water lines. The resulting percentage from this calculation will be rounded to the nearest percent.

E. **Line Flushing, Pigging, and Testing**

1. **Description:** This work consists of cleaning, flushing, pigging, disinfecting, and pressure testing water lines. Item also includes temporary installation of structures, temporary thrust blocking, temporary piping, appurtenances necessary to introduce the poly-pig to the pipes to be cleaned, an adequate source of water to project the pig through the pipes, and a catching mechanism to extract the pig. Item also consists of chlorination, de-chlorination, and bacteriological testing.

2. **Basis of Payment:** All costs for equipment, material, labor, and time required to fulfill this provision in accordance with the plans and specifications, shall be paid for at the contract lump sum price for "Line Flushing, Pigging, and Testing" after completion of pressure testing and passing of bacteriological testing.

F. Furnish and Install Fire Hydrant Assembly, Complete

1. **Description:** This work consists of all items necessary to install new fire hydrant, isolation gate valve, fittings, piping, required excavation and backfill, concrete blocking, aggregate, and other appurtenances to complete installation of fire hydrants as shown on the Plans.
2. **Basis of Payment:** All costs for equipment, material, labor, and time required to fulfill this provision in accordance with the plans and specifications shall be measured and paid for at the contract unit price bid per each fire hydrant installed corresponding to "Furnish and Install Fire Hydrant Assembly, Complete" on the bid form.

G. Pipe Fittings

1. **Description:** This work consists of all items necessary to install tees, crosses, bends, reducers, anchor couplings, sleeves, joint restraints, plugs, caps, couplings, cleanouts, and other fittings not included in other pay items. Item also includes all excavation, bedding, backfilling, compaction, concrete thrust blocking, polyethylene wrap, locator wire, and joint restraints as necessary.
2. **Basis of Payment:** All costs for equipment, material, labor, and time required to fulfill this provision in accordance with the plans and specifications and accepted by the Engineer, shall be measured and paid for at the contract unit price bid for each fitting as designated on the bid form.

H. Gate Valve and Box

1. **Description:** This work consists of all items necessary to install gate valves including but not limited to, the valve (stainless steel stem and nut), mechanical joint valve setting, valve box riser and lid, locator wire access within valve box, concrete blocking, rebar, installation, and other fittings not included in other pay items. This work applies to both water and wastewater gate valves.
2. **Basis of Payment:** All costs for equipment, material, labor, and time required to fulfill this provision in accordance with the plans and specifications shall be measured and paid for at the contract unit price bid for each gate valve and box as designated on the bid form.

I. Pipelines

1. **Description:** This work consists of installing water pipelines as shown on the Plans. This work includes all trenching, rock excavation (if required), bedding, pipe installation, casing installation, spacers, end seals, backfilling, compaction, pipe gaskets, polyethylene wrap, joint restraints, thrust blocking, excavated material removal and disposal, rough grading, connecting to existing water line or valves, coordination with property owners, coordination with utilities for temporary bracing as needed during construction, locator wire, site preparation, and all other items necessary for the installation. Deep installation pipeline shall meet OSHA standards to safely excavate, install, and backfill for the pipeline. Full-depth aggregate backfill is required for all portions of pipeline installation under proposed or existing roadways. Aggregate backfill is incidental to the bid price for this item. Installation of locator wire will be considered incidental to the price of the pipe installation and includes the following items: installation, wire, tape,

and splices for placement on pipe, in valve boxes, and in tracer wire access boxes.

2. **Basis of Payment:** All costs for equipment, material, labor, and time required to fulfill this provision in accordance with the plans and specifications shall be measured and paid for at the contract unit price bid per linear foot of pipeline installed corresponding to pipeline bid items for water and sanitary sewer as listed on the bid form.