Issue: **BID AWARD FOR CONSTRUCTION OF POLICE FIRING RANGE**

Date: May 9, 2022

Submitted By: Joe Campbell, Chief of Police

Background

As part of the 2022 police department budget a capital improvement project for the construction of the police firing range was approved. The approved budget for this project was $680,000.00 which included a firing range and a training building.

At the recommendation of Shaffer and Hines Inc., the project was addressed in a phased approach splitting the construction of the firing range and the construction of the training building into two separate projects which would be bid separately. The first phase of the project was the construction of the firing range.

In early May of 2022, a Request for Proposal was prepared by Shaffer and Hines Inc. and sent out by the City of Nixa Purchasing Department. Upon closure of the bid, only one construction company submitted a bid on the project.

D and E Plumbing and Heating Inc. submitted a bid for the project at a cost of $526,068.00. Clayton Hinds of Shaffer and Hinds Inc. reviewed the bid and noted he was seeing a lot of projects coming back with a "no Bid" which means no one bid the project at all.

The bid D and E Plumbing and Heating Inc. submitted is within the budgeted amount of the capital improvement project. Additionally, D and E Plumbing and Heating Inc. has successfully completed several city projects in the past for the City of Nixa.

The costs of the firing range will leave approximately $153,000.00 for the construction of the training building. Upon execution of the contract for the firing range. We will move forward with quotes and bids for the training building to complete the project.

Analysis

The one and only bid we received of the construction of the police firing range was from D and E plumbing Inc. Their bid was within the allocated amount for the capital improvement project, and they have a positive project history with the City of Nixa. I am requesting authorization for the City Administrator to award the bid the D and E Plumbing Inc. and execute the contract. The city attorney has reviewed the bid documents including the attached contract.

Recommendation

It is staff recommendation this resolution be passed.

RESOLUTION NO. 2022-059

A RESOLUTION OF THE COUNCIL OF THE CITY OF NIXA AUTHORIZING THE CITY ADMINISTRATOR TO EXECUTE A CONTRACT WITH D&E PLUMBING AND HEATING, INC. FOR THE CONSTRUCTION OF A POLICE FIRING RANGE.

_____

WHEREAS City staff have solicited proposals for the construction of a Police Department firing range; and

WHEREAS City Council desires to authorize the execution of the Contract, attached hereto as "Resolution Exhibit A," for the purpose described therein.

NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF NIXA, AS FOLLOWS, THAT:

SECTION 1: The City Administrator, or designee, is hereby authorized to execute the Contract attached hereto, and incorporated herein by this reference, as "Resolution Exhibit A," with D&E Plumbing and Heating, Inc. Said Contract shall be in substantially similar form as the document attached hereto as "Resolution Exhibit A."

SECTION 2: The City Administrator and the officers of the City are hereby authorized to do all things necessary or convenient to carry out the terms and intent of this Resolution.

SECTION 3: This Resolution shall be in full force and effect from and after its final passage by the City Council and after its approval by the Mayor, subject to the provisions of section 3.11(g) of the City Charter.

ADOPTED BY THE CITY COUNCIL THIS 23rd DAY OF MAY 2022.

ATTEST:

_____ _____

CITY CLERK PRESIDING OFFICER

APPROVED BY THE MAYOR.

ATTEST:

_____ _____

CITY CLERK MAYOR

APPROVED AS TO FORM: _____

DATE OF APPROVAL

_____

CITY ATTORNEY

RESOLUTION EXHIBIT A

CONTRACT AGREEMENT

THIS AGREEMENT is dated as of the ____ day of _____ in the year 2022,

by and between THE CITY OF NIXA hereinafter called (Owner)

and _____ hereinafter called (Contractor)

OWNER and CONTRACTOR, in consideration of the mutual covenants hereafter set forth agree as follows:

Article 1: WORK

CONTRACTOR shall complete all work as specified or indicated in the Contract Documents. The work is generally described as follows:

POLICE FIRING RANGE
FOR THE CITY OF NIXA, MISSOURI

Article 2: ENGINEER

The project has been designed by

SHAFFER & HINES, INC.

P.O. Box 493, Nixa, Missouri, 65714

who is hereinafter called ENGINEER and who will assume all duties and responsibilities and will have the rights and authority assigned to ENGINEER in the Contract Documents in connection with completion of the work in accordance with the Contract Documents.

Article 3: CONTRACT TIME

3.1 Unless otherwise agreed to the undersigned bidder agrees to enter into a contract within ten (10) days after acceptance of this bid, and further agrees to complete all work covered by the bid within 150 calendar days after the issuance of the Notice to Proceed.

3.2 Liquidated Damages: OWNER AND CONTRACTOR recognize that time is of the essence of this Agreement, and that OWNER will suffer financial loss if the work is not substantially complete within the time specified in paragraph 3.1, above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding that actual loss suffered by OWNER if the work is not substantially complete on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but

not as a penalty) CONTRACTOR shall pay OWNER Two Hundred and Fifty dollars ($250.00) for each day that expires after the time specified in paragraph 3.1 for substantial completion until the work is substantially complete.

Article 4: CONTRACT PRICE

4.1 OWNER shall pay CONTRACTOR for performance of the work in accordance with the Contract Documents in current funds as follows:

_____

Article 5: PAYMENT PROCEDURES

CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

5.1 Progress Payments: OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR'S Application for Payment as recommended by ENGINEER, on or about the 1st day of each month during construction as provided below. All progress payments will be on the basis of the progress of the work measured by the schedule of values provided for in Article 14, Paragraph 1 of the General Conditions.

5.1.1 Prior to Substantial Completion progress payments will be in an amount equal to:

90 % of the work completed.

5.1.2 Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 95% of the Contract Price in accordance with Paragraph 8 of the General Conditions, less such amounts as ENGINEER shall determine in accordance with Article 14 Paragraph 7 of the General Conditions.

5.2 Final Payment: Upon final completion and acceptance of the work in accordance with Article 14, Paragraph 13 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said Article 14 Paragraph 13.

Article 6: INTEREST

All monies not paid when due hereunder shall bear interest at the maximum rate allowed by law at the place of the project in accordance with Article 14, Paragraph 4 of the General Conditions.

Article 7: CONTRACTOR'S REPRESENTATIONS

In order to induce OWNER to enter into this Agreement, CONTRACTOR makes the following representations:

7.1 CONTRACTOR has familiarized himself with the nature and extent of Contract Documents, work, locality, and with all local conditions and federal, state, and local laws, ordinances, rules and regulations that in any manner may affect cost, progress or performance of the work.

7.2 CONTRACTOR has studied carefully all reports of investigations and tests of subsurface and latent physical conditions at the site or otherwise affecting cost, progress or performance of the work which were relied upon by ENGINEER in the preparation of the Drawings and Specifications and which have been identified in the Supplementary Conditions.

7.3 CONTRACTOR made or caused to be made examinations, investigations and tests and studies of such reports and related data in addition to those referred to in paragraph 7.2 as deemed necessary for the performance of the work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents; and no additional examination, investigations, tests reports or similar data are or will be required by CONTRACTOR for such purposes.

7.4 CONTRACTOR has correlated the results of all such observations, examinations, investigations, tests, reports, and data with the terms and conditions of the Contract Documents.

7.5 CONTRACTOR has given ENGINEER written notice of all conflicts, error or discrepancies that he had discovered in the Contract Documents and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

Article 8: CONTRACT DOCUMENTS

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR are attached to the AGREEMENT, made a part hereof and consists of the following:

8.1 This Agreement (page CA-1 - CA-5, inclusive).

8.2 Exhibits to this Agreement

Exhibit 1 – Affidavit of Compliance with Section 292.675 R.S.Mo., Et Seq.
Exhibit 2 – Affidavit of Compliance with Section 285.500 R.S.Mo., Et Seq.
Exhibit 3 – E-Verify Memorandum of Understanding
Exhibit 4 – Certificate of Liability

8.3 Performance & Payment Bonds in the amount of 100 percent of the project cost (pages PEB-1 to PEB-3 and PAB-1 to PAB-3)

8.4 Supplementary Conditions (pages 1A-1 to 1A-12, inclusive).

8.5 Construction drawings bearing the title:

POLICE FIRING RANGE
FOR THE CITY OF NIXA, MISSOURI

8.6 Addenda numbers, inclusive.

8.7 Contractor's bid (pages BF-1 through BF-4 inclusive).

8.8 Any modifications, including Change Orders, duly delivered after execution of Agreement. There are no Contract Documents other than those listed above in this Article 8. The Contract Documents may only be altered, amended or repealed by a Modification (as defined in Article 3 of the General Conditions.

8.9 General Conditions

Article 9: MISCELLANEOUS

9.1 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically but without limitation, monies that may become due and
monies that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

9.2 CONTRACTOR shall retain all required records for three years after the latter of OWNER (grantee) making final payment or all other pending matters are closed.

9.3 OWNER and CONTRACTOR each binds himself, his partners, successors, assigns and legal representatives to the other party hereto, his partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

CONTRACT AGREEMENT

IN TESTIMONY WHEREOF, the Contractor has hereunto set his hand and seal, and the City of Nixa executes this contract by its City Administrator.

THE CITY OF NIXA, MISSOURI

By: _____
Jimmy Liles, City Administrator

CONTRACTOR

By: _____
Contractor

Approved as to form:

_____
Nicholas Woodman, City Attorney

CERTIFICATE OF FINANCIAL OFFICER

I certify that this contract is within the purpose of the appropriation to which it is to be charged and that there is an unencumbered balance to the credit of such appropriation sufficient to pay therefore, and that the appropriate accounting entries have been made.

_____
Jennifer Evans, Financial Officer

Affidavit of Compliance with Section 292.675 R.S.Mo., Et Seq.
For any Public Works Project Contract
Effective August 28, 2009

STATE OF Missouri)
) ss.
COUNTY OF Christian)

Before me, the undersigned Notary Public, in and for the County of Christian,
State of Missouri, personally appeared Steve Eoff *(Name)*
who is President *(Title)* of D & E Plumbing & Heating, Inc
(Name of company), (a corporation), (a partnership), (a sole proprietorship), (a limited liability company),
and is authorized to make this affidavit, and being duly sworn upon oath deposes and says as follows:

(1) That said company has verified the completion of a 10-hour construction safety program with respect to the employees working in connection with the contracted services.

The terms used in this affidavit shall have the meaning set forth in Sections 292.675 R.S.Mo., et seq.

OK SE Steve Eoff
Signature

Name: Steve Eoff

Subscribed and sworn to before me this 28 day of April, 2022.

Ashlynne South
Notary Public

My commission expires: 4/1/23

ASHLYNNE SOUTH
Notary Public - Notary Seal
STATE OF MISSOURI
Christian County
My Commission Expires: April 1, 2023
Commission # 19370675

Affidavit of Compliance with Section 285.500 R.S.Mo., Et Seq.
For all Agreements in excess of $5,000.00.
Effective January 1, 2009

STATE OF Missouri)
) ss.
COUNTY OF Christian)

Before me, the undersigned Notary Public, in and for the County of Christian, State of Missouri, personally appeared STEVE EOFF *(Name)* who is President *(Title)* of D & E Plumbing & Heating Inc *(Name of company)*, (a corporation), (a partnership), (a sole proprietorship), (a limited liability company), and is authorized to make this affidavit, and being duly sworn upon oath deposes and says as follows:

(1) that said company is enrolled in and participates in a federal work authorization program with respect to the employees working in connection with the contracted services; and

(2) that said company does not knowingly employ any person who is an unauthorized alien in connection with the contracted services.

The terms used in this affidavit shall have the meaning set forth in Section 285.500 R.S.Mo., et seq.

Documentation of participation in a federal work authorization program is attached to this affidavit.

Steve Eoff
Signature

Name: STEVE EOFF

Subscribed and sworn to before me this 28 day of April, 2022

Ashlynne South
Notary Public

My commission expires: 4/1/23

ASHLYNNE SOUTH
Notary Public - Notary Seal
STATE OF MISSOURI
Christian County
My Commission Expires: April 1, 2023
Commission # 19370675

E-Verify

Company ID Number: 177139

THE E-VERIFY PROGRAM FOR EMPLOYMENT VERIFICATION MEMORANDUM OF UNDERSTANDING

ARTICLE I

PURPOSE AND AUTHORITY

This Memorandum of Understanding (MOU) sets forth the points of agreement between the Department of Homeland Security (DHS) and **D & E Plumbing & Heating, Inc.** (Employer) regarding the Employer's participation in the Employment Eligibility Verification Program (E-Verify). This MOU explains certain features of the E-Verify program and enumerates specific responsibilities of DHS, the Social Security Administration (SSA), and the Employer. E-Verify is a program that electronically confirms an employee's eligibility to work in the United States after completion of the Employment Eligibility Verification Form (Form I-9). For covered government contractors, E-Verify is used to verify the employment eligibility of all newly hired employees and all existing employees assigned to Federal contracts.

Authority for the E-Verify program is found in Title IV, Subtitle A, of the Illegal Immigration Reform and Immigrant Responsibility Act of 1996 (IIRIRA), Pub. L. 104-208, 110 Stat. 3009, as amended (8 U.S.C. § 1324a note). Authority for use of the E-Verify program by Federal contractors and subcontractors covered by the terms of Subpart 22.18, "Employment Eligibility Verification", of the Federal Acquisition Regulation (FAR) (hereinafter referred to in this MOU as a "Federal contractor") to verify the employment eligibility of certain employees working on Federal contracts is also found in Subpart 22.18 and in Executive Order 12989, as amended.

ARTICLE II

FUNCTIONS TO BE PERFORMED

A. RESPONSIBILITIES OF SSA

1. SSA agrees to provide the Employer with available information that allows the Employer to confirm the accuracy of Social Security Numbers provided by all employees verified under this MOU and the employment authorization of U.S. citizens.

2. SSA agrees to provide to the Employer appropriate assistance with operational problems that may arise during the Employer's participation in the E-Verify program. SSA agrees to provide the Employer with names, titles, addresses, and telephone numbers of SSA representatives to be contacted during the E-Verify process.

3. SSA agrees to safeguard the information provided by the Employer through the E-Verify program procedures, and to limit access to such information, as is appropriate by law, to individuals responsible for the verification of Social Security Numbers and for evaluation of the E-Verify program or such other persons or entities who may be authorized by SSA as governed by the Privacy Act (5 U.S.C. § 552a), the Social Security Act (42 U.S.C. 1306(a)), and SSA regulations (20 CFR Part 401).

E-Verify™

E-VERIFY IS A SERVICE OF DHS

Company ID Number: 177139

To be accepted as a participant in E-Verify, you should only sign the Employer's Section of the signature page. If you have any questions, contact E-Verify at 888-464-4218.

Employer D & E Plumbing & Heating, Inc.

Steve W Eoff	
Name (Please Type or Print)	Title
Electronically Signed	01/07/2009
Signature	Date

Department of Homeland Security – Verification Division

USCIS Verification Division	
Name (Please Type or Print)	Title
Electronically Signed	01/07/2009
Signature	Date

BUSINESS ENTITY CERTIFICATION, ENROLLMENT DOCUMENTATION, AND AFFIDAVIT OF WORK AUTHORIZATION

BUSINESS ENTITY CERTIFICATION:

The bidder/contractor must certify their current business status by completing either Box A or Box B or Box C on this Exhibit.

BOX A:	To be completed by a non-business entity as defined below.
BOX B:	To be completed by a business entity who has not yet completed and submitted documentation pertaining to the federal work authorization program as described at http://www.dhs.gov/files/programs/gc_1185221678150.shtm.
BOX C:	To be completed by a business entity who has current work authorization documentation on file with a Missouri state agency including Division of Purchasing and Materials Management.

Business entity, as defined in section 285.525, RSMo, pertaining to section 285.530, RSMo, is any person or group of persons performing or engaging in any activity, enterprise, profession, or occupation for gain, benefit, advantage, or livelihood. The term "**business entity**" shall include but not be limited to self-employed individuals, partnerships, corporations, contractors, and subcontractors. The term "**business entity**" shall include any business entity that possesses a business permit, license, or tax certificate issued by the state, any business entity that is exempt by law from obtaining such a business permit, and any business entity that is operating unlawfully without such a business permit. The term "**business entity**" shall not include a self-employed individual with no employees or entities utilizing the services of direct sellers as defined in subdivision (17) of subsection 12 of section 288.034, RSMo.

Note: Regarding governmental entities, business entity includes Missouri schools, Missouri universities (other than stated in Box C), out of state agencies, out of state schools, out of state universities, and political subdivisions. A business entity does not include Missouri state agencies and federal government entities.

BOX A – CURRENTLY NOT A BUSINESS ENTITY

I certify that _____ (Company/Individual Name) **DOES NOT CURRENTLY MEET** the definition of a business entity, as defined in section 285.525, RSMo pertaining to section 285.530, RSMo as stated above, because: (check the applicable business status that applies below)

- ❒ I am a self-employed individual with no employees; **OR**
- ❒ The company that I represent employs the services of direct sellers as defined in subdivision (17) of subsection 12 of section 288.034, RSMo.

I certify that I am not an alien unlawfully present in the United States and if _____ (Company/Individual Name) is awarded a contract for the services requested herein under _____ (Bid/SFS/Contract Number) and if the business status changes during the life of the contract to become a business entity as defined in section 285.525, RSMo, pertaining to section 285.530, RSMo, then, prior to the performance of any services as a business entity, _____(Company/Individual Name) agrees to complete Box B, comply with the requirements stated in Box B and provide the _____(insert agency name) with all documentation required in Box B of this exhibit.

Authorized Representative's Name (Please Print)	Authorized Representative's Signature
Company Name (if applicable)	Date

(Complete the following if you DO NOT have the E-Verify documentation and a current Affidavit of Work Authorization already on file with the State of Missouri. If completing Box B, do not complete Box C.)

BOX B – CURRENT BUSINESS ENTITY STATUS

I certify that D & E Plumbing & Heating Inc (Business Entity Name) **MEETS** the definition of a business entity as defined in section 285.525, RSMo, pertaining to section 285.530.

Steve Eoff
Authorized Business Entity Representative's Name (Please Print)

Steve Eoff
Authorized Business Entity Representative's Signature

D & E Plumbing & Heating, Inc
Business Entity Name

4-29-22
Date

deplbg@1@yahoo.com
E-Mail Address

As a business entity, the bidder/contractor must perform/provide each of the following. The bidder/contractor should check each to verify completion/submission of all of the following:

☒ Enroll and participate in the E-Verify federal work authorization program (Website: http://www.dhs.gov/files/programs/gc_1185221678150.shtm; Phone: 888-464-4218; Email: e-verify@dhs.gov) with respect to the employees hired after enrollment in the program who are proposed to work in connection with the services required herein; AND

☒ Provide documentation affirming said company's/individual's enrollment and participation in the E-Verify federal work authorization program. Documentation shall include EITHER the E-Verify Employment Eligibility Verification page listing the bidder's/contractor's name and company ID OR a page from the E-Verify Memorandum of Understanding (MOU) listing the bidder's/contractor's name and the MOU signature page completed and signed, at minimum, by the bidder/contractor and the Department of Homeland Security – Verification Division. If the signature page of the MOU lists the bidder's/contractor's name and company ID, then no additional pages of the MOU must be submitted; AND

☒ Submit a completed, notarized Affidavit of Work Authorization provided on the next page of this Exhibit.

AFFIDAVIT OF WORK AUTHORIZATION:

The bidder/contractor who meets the section 285.525, RSMo, definition of a business entity must complete and return the following Affidavit of Work Authorization.

Comes now Steve Eoff (Name of Business Entity Authorized Representative) as President (Position/Title) first being duly sworn on my oath, affirm D & E Plumbing & Heating Inc (Business Entity Name) is enrolled and will continue to participate in the E-Verify federal work authorization program with respect to employees hired after enrollment in the program who are proposed to work in connection with the services related to contract(s) with the State of Missouri for the duration of the contract(s), if awarded in accordance with subsection 2 of section 285.530, RSMo. I also affirm that D & E Plumbing & Heating Inc (Business Entity Name) does not and will not knowingly employ a person who is an unauthorized alien in connection with the contracted services provided under the contract(s) for the duration of the contract(s), if awarded.

In Affirmation thereof, the facts stated above are true and correct. (The undersigned understands that false statements made in this filing are subject to the penalties provided under section 575.040, RSMo.)

Steve Eoff
Authorized Representative's Signature

Steve Eoff
Printed Name

President
Title

4-29-22
Date

deplbg01@yahoo.com
E-Mail Address

43-1118573
E-Verify Company ID Number

Subscribed and sworn to before me this 29th (DAY) of April 2022 (MONTH, YEAR) I am commissioned as a notary public within the County of Christian (NAME OF COUNTY), State of Missouri (NAME OF STATE), and my commission expires on March 14, 2025 (DATE)

Deborah K. Turner
Signature of Notary

4/29/22
Date

DEBORAH K. TURNER
Notary Public – Notary Seal
STATE OF MISSOURI
Christian County
My Commission Expires Mar. 14, 2025
Commission #13456520

(Complete the following if you have the E-Verify documentation and a current Affidavit of Work Authorization already on file with the State of Missouri. If completing Box C, do not complete Box B.)

BOX C – AFFIDAVIT ON FILE - CURRENT BUSINESS ENTITY STATUS

I certify that _____ (Business Entity Name) **MEETS** the definition of a business entity as defined in section 285.525, RSMo, pertaining to section 285.530, RSMo, and have enrolled and currently participates in the E-Verify federal work authorization program with respect to the employees hired after enrollment in the program who are proposed to work in connection with the services related to contract(s) with the State of Missouri. We have previously provided documentation to a Missouri state agency or public university that affirms enrollment and participation in the E-Verify federal work authorization program. The documentation that was previously provided included the following.

- ✓ The E-Verify Employment Eligibility Verification page OR a page from the E-Verify Memorandum of Understanding (MOU) listing the bidder's/contractor's name and the MOU signature page completed and signed by the bidder/contractor and the Department of Homeland Security – Verification Division
- ✓ A current, notarized Affidavit of Work Authorization (must be completed, signed, and notarized within the past twelve months).

Name of **Missouri State Agency** or **Public University*** to Which Previous E-Verify Documentation Submitted: _____

(*Public University includes the following five schools under chapter 34, RSMo: Harris-Stowe State University – St. Louis; Missouri Southern State University – Joplin; Missouri Western State University – St. Joseph; Northwest Missouri State University – Maryville; Southeast Missouri State University – Cape Girardeau.)

Date of Previous E-Verify Documentation Submission: _____

Previous **Bid/Contract Number** for Which Previous E-Verify Documentation Submitted: _____
(if known)

Authorized Business Entity Representative's Name (Please Print)	Authorized Business Entity Representative's Signature
E-Verify MOU Company ID Number	E-Mail Address
Business Entity Name	Date

FOR STATE USE ONLY

Documentation Verification Completed By:

Buyer	Date

Bid Date: 04/29/22

THE AMERICAN INSTITUTE OF ARCHITECTS

AIA Document A310

Bid Bond

KNOW ALL MEN BY THESE PRESENTS, that we D & E Plumbing & Heating, Inc
1112 Falcon Crest Court, Nixa, MO 65714
(Here insert full name and address or legal title of Contractor)

as Principal, hereinafter called the Principal, and **RLI Insurance Company**
(Here insert full name and address or legal title of Surety)

P.O. Box 3967 Peoria, IL 61612
a corporation duly organized under the laws of the State of Illinois
as Surety, hereinafter called the Surety, are held and firmly bound unto City of Nixa, Missouri
(Here insert full name and address or legal title of Owner)

715 W Mt. Vernon Street, Nixa, MO 65714

as Obligee, hereinafter called the Obligee, in the sum of Five (5%) Percent of the Amount Bid----------
Dollars (-------5%--------), for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for Police Firing Range
(Here insert full name and address and description of project)

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contact with another party to perform the Work covered by said bid, then this obligation shall be null and void; otherwise to remain in full force and effect.

Signed and sealed this 29th day of April, 2022.

D & E Plumbing & Heating, Inc
1112 Falcon Crest Court, Nixa, MO 65714
(Principal) (Seal)

RLI Insurance Company
(Surety) (Seal)

Emily Berg — Attorney in Fact

POWER OF ATTORNEY

RLI Insurance Company
Contractors Bonding and Insurance Company

9025 N. Lindbergh Dr. Peoria, IL 61615
Phone: 800-645-2402

Know All Men by These Presents:

That this Power of Attorney is not valid or in effect unless attached to the bond which it authorizes executed, but may be detached by the approving officer if desired.

That **RLI Insurance Company** and/or **Contractors Bonding and Insurance Company**, each an Illinois corporation, (separately and together, the "Company") do hereby make, constitute and appoint:

Luke Nixon, Roger Lindstrom, Aaron Sharpe, Greg Lindstrom, Mark Gambon, Kellie Sansom, Emily Berg, Sheryl C. Amos, Jared Ballard, jointly or severally

in the City of Springfield, State of Missouri its true and lawful Agent(s) and Attorney(s) in Fact, with full power and authority hereby conferred, to sign, execute, acknowledge and deliver for and on its behalf as Surety, in general, any and all bonds and undertakings in an amount not to exceed **Twenty Five Million** Dollars (**$25,000,000.00**) for any single obligation.

The acknowledgment and execution of such bond by the said Attorney in Fact shall be as binding upon the Company as if such bond had been executed and acknowledged by the regularly elected officers of the Company.

RLI Insurance Company and/or **Contractors Bonding and Insurance Company**, as applicable, have each further certified that the following is a true and exact copy of a Resolution adopted by the Board of Directors of each such corporation, and is now in force, to-wit:

> "All bonds, policies, undertakings, Powers of Attorney or other obligations of the corporation shall be executed in the corporate name of the Company by the President, Secretary, any Assistant Secretary, Treasurer, or any Vice President, or by such other officers as the Board of Directors may authorize. The President, any Vice President, Secretary, any Assistant Secretary, or the Treasurer may appoint Attorneys in Fact or Agents who shall have authority to issue bonds, policies or undertakings in the name of the Company. The corporate seal is not necessary for the validity of any bonds, policies, undertakings, Powers of Attorney or other obligations of the corporation. The signature of any such officer and the corporate seal may be printed by facsimile."

IN WITNESS WHEREOF, the **RLI Insurance Company** and/or **Contractors Bonding and Insurance Company**, as applicable, have caused these presents to be executed by its respective Vice President with its corporate seal affixed this 12th day of November, 2021.

CONTRACTORS BONDING AND INSURANCE COMPANY — CORPORATE SEAL — ILLINOIS

RLI INSURANCE COMPANY — CORPORATE SEAL — ILLINOIS

RLI Insurance Company
Contractors Bonding and Insurance Company

By: B. W. D.
Barton W. Davis — Vice President

State of Illinois
County of Peoria } SS

On this 12th day of November, 2021, before me, a Notary Public, personally appeared Barton W. Davis, who being by me duly sworn, acknowledged that he signed the above Power of Attorney as the aforesaid officer of the **RLI Insurance Company** and/or **Contractors Bonding and Insurance Company** and acknowledged said instrument to be the voluntary act and deed of said corporation.

By: Catherine D. Glover
Catherine D. Glover — Notary Public

CATHERINE D. GLOVER
OFFICIAL SEAL
Notary Public - State of Illinois
My Commission Expires
March 24, 2024

CERTIFICATE

I, the undersigned officer of **RLI Insurance Company** and/or **Contractors Bonding and Insurance Company**, do hereby certify that the attached Power of Attorney is in full force and effect and is irrevocable; and furthermore, that the Resolution of the Company as set forth in the Power of Attorney, is now in force. In testimony whereof, I have hereunto set my hand and the seal of the **RLI Insurance Company** and/or **Contractors Bonding and Insurance Company** this 29th day of April, 2022.

RLI Insurance Company
Contractors Bonding and Insurance Company

By: Jeffrey D Fick
Jeffrey D. Fick — Corporate Secretary

POLICE FIRING RANGE
CITY OF NIXA
NIXA, MISSOURI

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and City of Nixa Technical Specifications, apply to this Section. Where there is conflict between the City of Nixa Technical Specifications and these specifications, the City of Nixa Technical Specifications shall prevail.

1.2 SUMMARY

A. This Section includes the following:
   1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns and grasses, and exterior plants.
   2. Excavating and backfilling for buildings and structures (see Geotechnical Report for additional requirements).
   3. Drainage course for slabs-on-grade and low volume change layer (see Geotechnical Report for additional requirements)
   4. Subbase course for concrete pavements (see Geotechnical Report for additional requirements).
   5. Subbase course for asphalt paving (see Geotechnical Report for additional requirements).
   6. Subsurface drainage backfill for walls and trenches.
   7. Excavating and backfilling for utility trenches.
   8. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.

B. Related Sections include the following:
   1. Division 31 Section "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
   2. Division 32 Section "finish grading fertilizing and seeding" for finish grading, including preparing and placing topsoil and planting soil for lawns.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
   1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
   2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. (0.57 cu. m) or more in volume that exceed a standard penetration resistance of 100 blows/2 inches (97 blows/50 mm) when tested by an independent geotechnical testing agency, according to ASTM D 1586.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Product Data: For the following:
   1. Geotextile.
   2. Controlled low-strength material, including design mixture.

B. Samples: 12-by-12-inch (300-by-300-mm) Sample of filter and separation geotextile.

C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
   1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
   2. Laboratory compaction curve according to ASTM D 1557(modified procter maximum dry density) for each on-site and borrow soil material proposed for fill and backfill.

D. Seismic Survey Report: For record purposes; from seismic survey agency.

E. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

1.5 QUALITY ASSURANCE

A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.

B. Preexcavation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
   1. Notify Architect not less than five days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Architect's written permission.
   3. Contact utility-locator service for area where Project is located before excavating.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, CL, GP, ML, CL-ML, SW, SP, and, or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
   1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or washed crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

J. Sand: ASTM C 33; fine aggregate, natural, or washed manufactured sand.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 120 lbf (0.53 KN); ASTM D 4632.
3. Sewn Seam Strength: 142 lbf (630 N); ASTM D 4632.
4. Tear Strength: 50 lbf (0.22 KN); ASTM 4533.
5. Puncture Strength: 65 lbf (0.3KN); ASTM D 4833.
6. Apparent Opening Size: No. 70 (0.212-mm) sieve, maximum; ASTM D 4751.
7. Permittivity: 1.8 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 10 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 315 lbf (1.40 KN); ASTM D 4632.
3. Sewn Seam Strength: 222 lbf (990 N); ASTM D 4632.
4. Tear Strength: 120 lbf (0.53KN); ASTM D 4533.
5. Puncture Strength: 145 lbf (0.65KN); ASTM D 4833.
6. Apparent Opening Size: No. 60 (0.250-mm) sieve, maximum; ASTM D 4751.
7. Permittivity: 0.05 per second, minimum; ASTM D 4491.
8. UV Stability: 70 percent after 500 hours' exposure; ASTM D 4355.

2.3 CONTROLLED LOW-STRENGTH MATERIAL

A. Controlled Low-Strength Material: Low-density, self-compacting, flowable concrete material as follows:
1. Portland Cement: ASTM C 150, Type I or II or ASTMC595 Type IP.
2. Fly Ash: ASTM C 618, Class C or F.
3. Normal-Weight Aggregate: ASTM C 33 3/8-inch (10-mm) nominal maximum aggregate size.
4. Foaming Agent: ASTM C 869.
5. Water: ASTM C 94/C 94M.
6. Air-Entraining Admixture: ASTM C 260.

B. Produce low-density, controlled low-strength material with the following physical properties:
   1. As-Cast Unit Weight: 30 to 42 lb/cu. ft. (486 to 675 kg/cu. m) at point of placement, when tested according to ASTM C 138/C 138M.
   2. Compressive Strength: 140 psi (965 kPa), when tested according to ASTM C 495.

C. Produce conventional-weight, controlled low-strength material with 80-psi (550-kPa) 140-psi (965-kPa) compressive strength when tested according to ASTM C 495.

2.4 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:
   1. Red: Electric.
   2. Yellow: Gas, oil, steam, and dangerous materials.
   3. Orange: Telephone and other communications.
   4. Blue: Water systems.
   5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section "Site Clearing."

C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing," during earthwork operations.

D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

1. No blasting allowed.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
   a. 24 inches (600 mm) outside of concrete forms other than at footings.
   b. 12 inches (300 mm) outside of concrete forms at footings.
   c. 6 inches (150 mm) outside of minimum required dimensions of concrete cast against grade.
   d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
   e. 6 inches (150 mm) beneath bottom of concrete slabs on grade.
   f. 6 inches (150 mm) beneath pipe in trenches, and the greater of 24 inches (600 mm) wider than pipe or 42 inches (1065 mm) wide.

B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract time may be authorized for rock excavation.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
   a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
   a. 24 inches (600 mm) outside of concrete forms other than at footings.
   b. 12 inches (300 mm) outside of concrete forms at footings.
   c. 6 inches (150 mm) outside of minimum required dimensions of concrete cast against grade.
   d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
   e. 6 inches (150 mm) beneath bottom of concrete slabs on grade.
   f. 6 inches (150 mm) beneath pipe in trenches, and the greater of 24 inches (600 mm) wider than pipe or 42 inches (1065 mm) wide.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Pile Foundations: Stop excavations 6 to 12 inches (150 to 300 mm) above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch (25 mm). Do not disturb bottom of excavations intended as bearing surfaces.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.
   1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit, unless otherwise indicated.
   1. Clearance: 12 inches (300 mm) each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
   1. For pipes and conduit less than 6 inches (150 mm) in nominal diameter and flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
   2. For pipes and conduit 6 inches (150 mm) or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
   3. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
   1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.8 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the building slabs and pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).
2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Architect.
   1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for Record Documents.
   3. Testing and inspecting underground utilities.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Removing temporary shoring and bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03.

D. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the utility pipe or conduit.
   1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

E. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches (300 mm) over the utility pipe or conduit.

F. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

G. Place and compact final backfill of satisfactory soil to final subgrade elevation.

H. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

I. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.13 SOIL FILL

A. Disk, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:
   1. Under grass and planted areas, use satisfactory soil material.
   2. Under walks and pavements, use satisfactory soil material.
   3. Under steps and ramps, use engineered fill.
   4. Under building slabs, use engineered fill.
   5. Under footings and foundations, use engineered fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
   1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:
   1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95percent.
   2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 95 percent.
   3. Under lawn or unpaved areas, scarify and compact each layer of backfill or fill soil material at 90 percent. Do not compact top 12 inches.
   4. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
   1. Lawn or Unpaved Areas: Plus or minus 0.1 feet.
   2. Walks: Plus or minus 1 inch (25 mm)
   3. Pavements: Plus or minus 1/2 inch (13 mm).

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.17 SUBSURFACE DRAINAGE

A. Subdrainage Pipe: Specified in Division 33 Section "Subdrainage."

B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of subdrainage trench. Place a 6-inch (150-mm) course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches (300 mm) of filter(clean and washed) material, placed in compacted layers 6 inches (150 mm) thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).
   1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 with a minimum of two passes of a plate-type vibratory compactor.

C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches (300 mm) of final subgrade, in compacted layers 6 inches (150 mm) thick. Overlay drainage backfill with 1 layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches (150 mm).
   1. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 with a minimum of two passes of a plate-type vibratory compactor.
   2. Place and compact impervious fill over drainage backfill in 6-inch- (150-mm-) thick compacted layers to final subgrade.

3.18 SUBBASE AND BASE COURSES

A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase and base course under pavements and walks as follows:
   1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
   2. Place base course material over subbase course under hot-mix asphalt pavement.
   3. Shape subbase and base course to required crown elevations and cross-slope grades.
   4. Place subbase and base course 6 inches (150 mm) or less in compacted thickness in a single layer.
   5. Place subbase and base course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
   6. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

C. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches (300 mm) wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 90 percent of maximum dry unit weight according to ASTM D 1557.

3.19 DRAINAGE COURSE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
   1. Install subdrainage geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
   2. Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.
   3. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
   4. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.20 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
   1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than 3 tests.
   2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet (30 m) or less of wall length, but no fewer than 2 tests.
   3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet (46 m) or less of trench length, but no fewer than 2 tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

B. Disposal: Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.
   1. Remove waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.
   2. Do not burn waste on Site.

END OF SECTION 312000

SECTION 329200 – FINISH GRADING, FERTILIZING AND SEEDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Specification Sections apply to this Section.

B. Owner will provide landscaping.

1.2 SCOPE OF WORK

A. The work shall consist of furnishing all labor, equipment and materials necessary for the finish grading, preparation, fertilization, seeding, and mulching of the areas specified in the contract. All disturbed areas shall be hydroseeded, unless otherwise specified, and shall exclude surfaced areas and solid rock. Disturbed areas outside of authorized construction limits shall be hydroseeded or sodded at the Contractor's expense.

1.3 PROJECT CONDITIONS

A. Prior to the start of finish grading, the soil shall be "fine graded". The grade shall be smooth without high spots or low spots and shall be free of construction debris. The site shall be weed free and ready for finish grading and seed or sod bed preparation.

B. Finish grading shall be done in preparation for seeding. Any weed growth shall be removed prior to seeding.

PART 2 - MATERIALS

2.1 TOPSOIL

A. Where possible, reuse on-site topsoil removed by grading activities. Topsoil shall be "clean black dirt" free of any large roots, plants, sod, stones, clay lumps and other extraneous materials harmful to plant growth from topsoil before re-use.

2.2 FERTILIZERS

A. Fertilizers shall be uniform in composition, shall be delivered to the site fully labeled in conformance with applicable state fertilizer laws, and shall bear the analysis, trade names or trademark, and warranty of the producer.

B. Fertilizer shall be applied to supply a minimum of 1-3/4 pounds actual Nitrogen per 1,000 square feet, 1-3/4 pounds actual Phosphate per 1,000 square feet and 1-3/4 pounds of actual Potassium per 1,000 square feet. This is equivalent to 750 pounds of 10-10-10 fertilizer per acre. Any other analysis which gives equivalent amount of N/P/K may be used. Fertilizer shall be distributed evenly over the area to be seeded. Fertilizer shall be pelleted or granular form. 50% of the nitrogen shall be in slow release form.

2.3 GRASS SEED

A. Turf type: Seed shall be state certified seed of the latest season's crop. Seed mixtures and rates shall be by weight as follows:

Perennial Rye- 1 lbs per 1000 SQ. FT.
Kentucky 31 – 10 lbs per 1000 SQ. FT.

Seed shall provide 75% germination with maximum 2% weed seed. If an alternative mix is recommended

For project area, General Contractor shall submit alternate mix for review and approval.

B. Hydromulch of the above seed mix shall be the application method.

C. All seed to be furnished in sealed standard container. Seed which has become wet, moldy, or otherwise damaged in transit or storage will not be acceptable.

2.4 MULCH

A. Apply 2000 pound of cellulose paper mulch per acre according to requirement and specification of Second Nature Recycled Paper Fiber by Central Fiber Corporation.

2.5 SOIL FOR REPAIRS

A. Soil for filling areas to be repaired shall be free of large stones, clods, roots, stumps or other materials that would interfere with subsequent seeding, compacting or establishment.

PART 3 - EXECUTION

3.1 FINISH GRADING

A. Establish a finish graded soil surface ready to receive seed. The surface shall be free of large clods, rocks or construction debris. The soil surface shall be free of low spots.

B. Portions of the site not readily worked by machine shall be worked by hand.

C. Do not handle or grade soil when wet or frozen.

3.2 FERTILIZING: Apply fertilizer in compliance with manufacturer's instructions.

3.3 ACCEPTANCE: The above operations shall be completed and acceptable to the Engineer or Owner prior to seeding.

3.4 REPAIRING: Contractor shall be responsible for maintenance or repair of damaged finished graded areas until seeding operations begin.

3.5 GRASS SEED PREPARATION AND APPLICATION

A. Rough Grading - Grade subsoils to match the contour of the final plan, but several inches below final grade. This is to allow addition of topsoil or soil modifications. Any buried debris or surface debris is to be removed from the subsoil.

C. Surface and subsurface drainage - A minimum 1% grade is necessary for surface drainage. Pockets or depressional areas are to be avoided. Impermeable soils are to have subsurface drain tile installed, leading to a satisfactory outlet for rapid removal of excess water.

D. Subsoil preparation – None required.

E. Topsoil preparation - Topsoil is to be distributed over the area to a depth of at least 4 inches.

F. Removal of rocks and debris - surface debris as well as debris that has been buried is to be removed.

G. Application of fertilizer, if needed.

H. Grade the surface until smooth and even. Dips, sudden rises, sudden drops, pockets, and depressed areas

are to be eliminated.

I. Erosion Control Blankets are not required for Finish Grading. They are only required for temporary erosion control when necessary to comply with the Land Disturbance Permit.

J. Final soil preparation -Create a moist, firm, granular bed free of debris that would impede grass growth.

K. Seeding is not to be done when the soil is saturated or frozen.

L. The sowing shall be stopped when satisfactory results are not likely to be obtained due to extreme temperatures, high winds or other unfavorable conditions. It shall be resumed only when conditions are favorable again or when alternate or corrective measures and approved procedures have been adopted.

M. Once the soil is prepared as above, seed can be distributed.
   1. Due to climate constraints, seed should not be sown except during the following times; except with Owner/Architect approval:
      a. March 15 through May 31.
      b. September 1 through October 15.

N. All seed shall be certified as to trueness of type. All shall have labels showing:
   1. Percentages of pure seed.
   2. Other crop seed.
   3. Weed seed.
   4. Inert matter.

O. Mulch:
   1. Hydromulch application.

P. Water seed as necessary for significant growth start according to good landscape practice and seed supplier's recommendations.

3.2 ESTABLISHING TURF

A. The Contractor shall be responsible for the proper care of seeded areas until the new grass is 2-1/2" high and thick enough to receive its first mowing by the Owner.

B. The Contractor shall be responsible for keeping the seeded areas moist until it receives its first mowing.

D. Protect freshly seeded areas against traffic or other use as required until final acceptance.

3.3 REPAIRING

A. When the surface has become gullied or otherwise damaged, during the period of establishing turf, the affected areas shall be repaired to re-establish the grade and the condition of the soil, and shall be reseeded at the original seed rate.

END OF SECTION 329200

DIVISION 1
SECTION 1A – SUPPLEMENTARY CONDITIONS

1A-1 GENERAL DESCRIPTION OF WORK: The work to be performed under the provisions of these contract documents is as follows:

Police Firing Range in accordance with the plans and specifications.

1A-2 GENERAL CONDITIONS: The General Conditions are general in scope and may refer to conditions not encountered on the work covered by this contract. Any provision of the General Conditions which pertains to a nonexistent condition and is not applicable to the work to be performed hereunder, or which conflicts with any provision of the Technical Provisions, shall have no meaning in the contract and shall be disregarded.

1A-3 DESCRIPTION OF REQUIREMENTS: This section is a part of each section of the Specifications and defines certain terms used in the specifications, and explains the language, abbreviations thereof, format and certain conventions used in the Specifications and associated contract documents.

1A-4 DEFINITIONS: General Explanation: Much of the language of the Specifications can be recognized as specific definitions for nominal terms found of the drawings and in other contact documents. Certain terms used more generally throughout the contract documents are hereby defined as follows:

General Requirements: The terms "General Requirement(s)" and "Division 1 Section(s)" are alike in meaning and significance.

Indicated: The term "indicated" is a cross reference to details, notes or schedules on the drawings, other paragraphs or schedules in the specifications, and similar means of recording requirements in the contract documents. Where terms such as "shown", "notes", "scheduled", and "specified" are used in lieu of "indicated", it is for the purpose of helping the reader accomplish the cross reference, and no limitation of location is intended except as specifically noted.

Installer: The person or entity engaged by the Contractor or his subcontractor or sub-subcontractor for the performance of a particular unit of work at the project site, including installation, erection, application and similar required operations. It is a general requirement that installers be recognized experts in the work they are engaged to perform.

Directed, Requested, etc.: Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "approved", "required", "accepted", and "permitted" mean "directed by the Engineer", "requested by the Engineer", etc. However, no such implied meaning will be interpreted to extend the Engineer's responsibility into the Contractor's area of construction supervision.

DIVISION 1
SECTION 1A – SUPPLEMENTARY CONDITIONS

Approved: Where used in conjunction with the Engineer's response to submittals, requests, applications, inquiries, reports and claims by the Contractor, the meaning of the term "approved" will be held to the limitations of the Engineer's responsibilities and duties as specified in the General and Supplementary Conditions. In no case will "approved" by the Engineer be interpreted as an assurance to the Contractor that the requirements of the contract documents have been fulfilled.

Furnish: Except as otherwise defined in greater detail, the term "furnished" is used to mean "...supply and deliver to the project site, ready for unpacking, assembly and installation."

Provide: Except to the extent further defined, the term "provide" means to furnish and install, complete and ready for the intended use.

Guaranty and Warranty: Defined to be identical in meaning, and used interchangeable.

1A-5 CONTRACT DRAWINGS: The contract drawings or plans on which the contracts will be based consists of 12 sheets. In addition, each sheet bears the following general titles:

POLICE FIRING RANGE
FOR THE CITY OF NIXA, MISSOURI

The drawing referred to above is supplemented by additional shop and dimension drawings to be prepared by the Contractor as set forth in the specifications.

1A-6 SCOPE AND INTENT OF CONTRACT DOCUMENTS: The specifications and drawings are intended to supplement but not necessarily duplicate each other. Any work exhibited in the one and not in the other shall be executed as if it had been set forth in both, so that the work will be constructed according to the complete design as determined by the Engineer.

Should anything necessary for a clear understanding of the work be omitted from the specifications and drawings, or should the requirements appear to be in conflict, the Contractor shall secure written instructions from the Engineer before proceeding with the work affected thereby. It is understood and agreed that the work shall be performed according to the true intent of the contract documents.

1A-7 PERMITS AND REGULATIONS: The Contractor shall be responsible for all required permits, either local or state, required to perform the intended work under the contract.

1A-8 COORDINATION: The General Contractor will be responsible for coordinating all subcontractors. The Contractor shall contact the subcontractors well in advance and give them adequate notice to proceed on certain dates as set forth by him.

DIVISION 1
SECTION 1A – SUPPLEMENTARY CONDITIONS

1A-9 APPLICABLE CODES: The Contractor shall comply with the provisions of the "General Conditions" pertaining to Safety and Protection.

General Contractor will be responsible for safety during the construction of the project and see that all subcontractors and persons working for the General Contractor abide by the requirements as set forth by the Department of Labor and Occupational and Health Administration, Safety and Health Regulations for Construction dated December 15, 1972, Vol. 37, No. 243, Part II of the Federal Register and Vol. 37, No. 202, Part II of the Occupational and Safety Standards.

Contractor shall maintain a "Hard Hat" area for the project. The Department of Labor, Bureau of Labor Standards, Safety and Health Regulations for Construction shall be maintained for this project.

All subcontractors working under the General Contractor or under separate contracts will be responsible for the safety of all persons working on the project. This shall include but not be limited to providing temporary or completed structures by eliminating improper storage of materials, provided warning signs in areas where danger exists, and informing General Contractor of any areas that appear to be unsafe.

All references to codes, specifications and standards are intended to be the latest edition, amendment, and/or revision of such reference standard in effect on the date of these contract documents.

1A-10 FIELD OFFICE: The General Contractor will provide and maintain a field office on the site for himself and the Engineer's project representative unless other arrangements are made.

1A-11 TEMPORARY SCAFFOLDS, STAGING AND SAFETY DEVICES: Provide erect, maintain and remove when required all scaffolding staging, platforms, temporary runways, temporary flooring, guards, railings, stairs, etc., as required by local and state codes, or laws for the protection of the workmen and public. The construction, inspection and maintenance of the above items shall comply with all safety codes and regulations as applicable to the Project.

1A-12 TEMPORARY CLOSURES: The General Contractor shall provide temporary weather-tight closures for all exterior openings as soon as walls and roofs are completed. For protection of all work, doors shall be equipped with locks.

1A-13 LIQUIDATED DAMAGES: Should the Contractor fail to perform the work within the period of time stipulated in the Contract Agreement, the Contractor shall pay to the Owner, as liquidated damages and not as a penalty, $250.00 per calendar day of default unless extensions of time granted by the Owner specifically provide for the waiving of liquidated damages.

DIVISION 1
SECTION 1A – SUPPLEMENTARY CONDITIONS

A-14 LINES AND GRADES: All work shall be done to the lines, grades, and elevations shown on the drawings.

Control Points will be provided by Shaffer & Hines, Inc. (at no cost to the Contractor) for purposes of "boxing in the site" and this data will be given to the Contractor. Temporary Benchmark has been provided as shown on the plans. The Contractor is responsible for providing all other Construction Staking or obtaining a sub-contractor to provide these services.

The Contractor shall keep the Engineer informed, a reasonable time in advance, of the times and places at which he wishes to do work, so that horizontal and vertical control points may be established and any checking deemed necessary by the Engineer may be done with minimum inconvenience to the Engineer and minimum delay to the Contractor.

Any work done without being properly located may be ordered removed and replaced at the Contractor's expense.

1A-15 EASEMENTS AND RIGHT-OF-WAY: The easements and rights-of-way will be provided by the Owner. The Contractor shall confine his construction operations to the immediate vicinity of the location shown on the drawings, and shall use due care in placing construction tools, equipment, excavated materials, and materials and supplies, so as to cause the least possible damage to property and interference with traffic.

If it is necessary or desirable that the Contractor use land outside of the Owner's easement, the Contractor shall obtain consent from and shall execute a written agreement with, the owner and tenant of the land. The Contractor shall not enter for pipe delivery or occupy for any other purpose with men, tools, equipment, construction materials, or with material excavated from the pipe trench, any private property outside the designated construction easement boundaries without written permission from the owner and tenant.
The Contractor shall be solely responsible for obtaining and shall pay all costs in connection with any additional work area, storage sites, access to the site, or temporary right-of-way which may be required for proper completion of the work.

1A-16 FENCES: All existing fences affected by the work shall be maintained by the Contractor until completion of the work. Fences which interfere with construction operations shall not be relocated of dismantled until written permission is obtained from the owner of the fence, and the period the fence may be left relocated or dismantled has been agreed upon. Where fences must be maintained across the construction easement, adequate gates shall be installed. Gates shall be kept closed and locked at all times when not in use.

On completion of the work across any tract of land, the Contractor shall restore all fences to their original or to a better condition and to their original location.

1A-17 PROTECTION OF PUBLIC AND PRIVATE PROPERTY: The Contractor shall protect, shore, brace, support, and maintain all underground pipes, conduits, drains, and other underground construction uncovered or otherwise affected by the construction work performed by him. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, fences and other surface structures affected by construction operations, together with all sod and shrubs in yards and parking areas, shall be restored to their original condition, whether within or outside the easement. All replacements shall be made with new materials.

No trees shall be removed outside of the permanent easement, except where authorized by the Engineer. Trees left standing shall be adequately protected against damage by construction operations.

The Contractor shall be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges, and other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or men to or from the work or any part or site thereof, whether by him or his subcontractors. The Contractor shall make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage.

All fire hydrants and water control valves shall be kept free from obstruction and available for use at all times.

1A-18 MAINTENANCE OF TRAFFIC: The Contractor shall conduct his work so as to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, obstruct, or close roads, driveways, and walks, whether public or private, the Contractor shall, at his own expense, provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodations of public and private drives before interfering with them. Such maintenance of traffic will not be required when the Contractor has obtained permission from the owner and tenant of private property, or from the authority having jurisdiction over public property involved, to obstruct traffic at the designated point.

In making open cut street crossings, the Contractor shall not block more than one-half of the street at a time. Whenever possible the Contractor shall widen the shoulder on the opposite side to facilitate traffic flow. Temporary surfacing shall be provided as necessary on shoulders. The Contractor shall, at his own expense, provide and maintain necessary safety measures as described in 1A-18.02 Detours.

1A-18.01 Temporary Bridges: Substantial Bridges shall be constructed by, and at the expense of, the Contractor at all points where it is necessary to maintain traffic across pipeline construction. Bridges in public streets, roads, and highways shall be acceptable to the authority having jurisdiction thereover. Bridges erected in private roads and driveways shall be adequate

for the service to which they will be subjected. Bridges shall be provided with substantial guard rails and with suitably protected approaches. Foot bridges shall be not less than 4 feet wide, provided with handrails and uprights of dressed lumber. Bridges shall be maintained in place as long as the conditions of the work require their use for safety of the public, except that when necessary for the proper prosecution of the work in the immediate vicinity of a bridge, the bridge may be located or temporarily removed for such period as the Engineer may permit.

1A-18.02 Detours: Where required by the appropriate jurisdictional authority that traffic be maintained over any construction work in a public street, road or highway, and the traffic cannot be maintained on the alignment of the original roadbed or pavement, the Contractor shall, at his own expense, construct and maintain a detour around the construction work. Each detour shall include a bridge across the pipe trench and all necessary barricades, guard rails, approaches, lights, signals, signs, and other devices and precautions necessary for protection of the work and safety of the public.

1A-19 BARRICADES AND LIGHTS: All streets, roads, highways, and other public thoroughfares which are closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs. Barricades shall be located at the nearest intersecting public highway or street on each side of the block section.

All open trenches and other excavations shall be provided with suitable barriers, signs, and lights to the extent that adequate protection is provided to the public. Obstructions, such as material piles and equipment, shall be provided with similar warning signs and lights.
All barricades and obstructions shall be illuminated by means of warning lights from sunset to sunrise. Materials stored upon or alongside public streets and highways shall be so placed, and the work at all times shall be so conducted as to cause the minimum obstruction and inconvenience to the traveling public.

All barricades, signs, lights and other protective devices shall be installed and maintained in conformity with applicable statutory requirements and, where within railroad and highway rights-of-way, as required by the authority having jurisdiction thereover.

1A-20 REMOVAL OF TEMPORARY WORK AND STRUCTURES: Prior to completion of project, all temporary work and structures shall be completely removed from the project site.

1A-21 TEMPORARY STORAGE AND PROTECTION: Materials, products, and equipment shall be properly containerized, packaged, boxed and protected to prevent damage during transportation and handling.

Provide suitable temporary weather-tight storage facilities as may be required for materials that will be damaged by storage in the open.

Allocate the available storage areas and coordinate their use by the trades on the job. Maintain a current layout of all storage facilities.

Store and protect materials delivered at the site from damage. Do not use damaged materials on the work.

1A-22 CLEANING MATERIALS: Use only cleaning materials recommended by manufacturer of surface to be cleaned.

Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

1A-23 CLEANING DURING CONSTRUCTION: The job site shall be maintained in a neat and orderly condition, and kept free from accumulations of waste materials during the entire construction period. Remove flammable waste materials or trash from the work areas at the end of each working day.

Care shall be taken not to mark, soil, or otherwise deface finished surfaces. In the event finished surfaces become defaced, clean and restore materials.

Subcontractors are required to collect and remove from the job site their own liquid and other waste requiring special handling disposal. The contractor must keep all work areas, passageways and stairs in and around the project free from debris at all times.

At the completion of the work under this contract, all areas and premises where work has been performed (and where access areas have been used) shall be left in the clean condition specified, subject to the approval of the Engineer and the Owner.

1A-24 UNDERGROUND INSTALLATION: Existing underground installations such as water mains, gas mains, sewers, telephone lines, power lines, and buried structures in the vicinity of the work to be done hereunder are indicated on the drawings only to the extent such information has been made available to or discovered by the Engineer in preparing the drawings. There is no guarantee as to the accuracy or completeness of such information, and all responsibility for the accuracy and completeness thereof is expressly disclaimed. Generally, service connections are not indicated on the drawings.

The Contractor shall be solely responsible for locating all existing underground installations, including service connections, in advance of excavating or trenching, by contacting the owners thereof and prospecting. The Contractor shall use his own information and shall not rely upon any information shown on the drawings concerning existing underground installations.

Any delay, additional work, or extra cost to the Contractor caused by existing underground installations shall not constitute a claim for extra work, additional payment, or damages.

DIVISION 1
SECTION 1A – SUPPLEMENTARY CONDITIONS

1A-25 FIELD CHECK OF EXISTING STRUCTURES: The Contractor shall verify the dimensions and elevations of existing structures, pipelines, conduits, cables, equipment, or other existing items, both above and below ground, affected by or affecting the work under this contract, prior to the start of construction or ordering of materials and equipment affected thereby.

The Contractor's attention is directed to the Information to Bidders which requires that each bidder visit the site of the work to familiarize himself with the arrangements and conditions of existing construction that is to be connected to or that is to remain in place. Any delay or extra expense to the Contractor due to encountering construction, piping or equipment not shown or in locations different from those indicated on the drawings shall not constitute a claim for extra work, additional payment, or damages.

1A-26 SCHEDULE OF OPERATIONS: Before work is started, each Contractor shall prepare a detailed schedule of all construction operations that shall indicate the sequence of the work, the time of starting and completion of each part, and the installation dates for major items of equipment. The schedule shall be submitted to the Engineer for review.

At least every 7 days the schedule shall be revised as necessary to reflect changes in the progress of the work.

The Owner may require the Contractor to add to his plant equipment, or construction forces, as well as increase the working hours, if operations fall behind schedule at any time during the construction period.

1A-27 HISTORICAL/ARCHAEOLOGICAL: If during the course of construction evidence of deposits of historical or archaeological interest is found, the Contractor shall cease operations affecting the find and shall notify the Owner who shall notify the Office of Historical Preservation, Department of Natural Resources, P.O. Box 176, Jefferson City, Missouri 65101 and the Environmental Protection Agency, 901 N. 5th Street, Kansas City, Kansas 66101. No further disturbance of the deposit shall ensue until the Contractor has been notified by the Owner that he may proceed. The Owner will issue a notice to proceed only after the State Official has surveyed the find and made a determination to the Owner. Compensation to the Contractor, if any, for lost time or changes in construction to avoid the find, shall be determined in accordance with changed conditions or change order provisions of the specifications.

1A-28 HINDRANCES AND DELAYS: Each Contractor shall be responsible for all costs to the Owner resulting from hindrances and delays on the part of the Contractor. Such costs include salaries and overtime payments to the Owner's employees, travel and meals.

DIVISION 1
SECTION 1A – SUPPLEMENTARY CONDITIONS

1A-29 EXECUTION OF CONTRACT: Three (3) copies of the contract documents will be prepared by the Engineer. All copies will be submitted to the Contractor and the Contractor shall execute the Contract Agreement, insert executed copies of the required bonds and power of attorney, and submit all copies to the Owner. The date of contract on the contract and bond forms shall be left blank for filling in by the Owner. The certification date on the power of attorney shall be also left blank for filling in by the Owner.

The Owner will execute all copies, insert the date of contract on the bonds and power of attorney, and return all copies to the Engineer for review and distribution. Distribution of signed copies will be one copy each to the Owner, Contractor, Surety, and Engineer.

1A-30 CONTRACTOR'S RESPONSIBILITY FOR MATERIAL: The Contractor shall be responsible for the condition of all materials which he has furnished, and shall replace at his own expense all such material found to be defective or which has been damaged after delivery. This includes the replacement of material which is found to be defective at any time prior to expiration of the guarantee period.

1A-31 CONFLICT OF INTEREST: Unacceptable bidders. An ENGINEER or ARCHITECT (individual or firm including persons they employ) who has prepared plans and specifications will not be considered an acceptable bidder. Any firm or corporation in which such ENGINEER or ARCHITECT (including persons they employ) is an officer employee, or holds or controls a substantial interest will not be considered an acceptable bidder. Contracts or purchases by the CONTRACTOR shall not be awarded or made to a supplier or manufacturer if the ENGINEER or ARCHITECT (firm or individual) who prepared the plans and specifications has a corporate or financial affiliation with the supplier or manufacturer. Bids will not be awarded to firms or corporations which are owned or controlled wholly or in part by a member of the governing body of the OWNER or to an individual who is such a member.
The OWNER's officers, employees, or agents shall not engage in the award or the administration of the AGREEMENT if a conflict of interest, real or apparent, would be involved. Such a conflict would arise when: (a) the employee, officer or agent: (b) any member of their immediate family: (c) their partner of (d) an organization which employees, or is about to employ, any of the above financial or interest in the CONTRACTOR. The OWNER's officers, employees, or agents shall neither solicit nor accept gratuities, favors or monetary value from the CONTRACTOR or subcontractor.

1A-32 TAXES: "Missouri State Statutes 144.062, effective August 28, 1994, allows for a sales tax exemption to contractors constructing, repairing or remodeling facilities or purchasing personal property and materials to be incorporated into and consumed in the construction of projects for a tax exemption entity. The tax exempt entity shall furnish a signed exemption certification authorizing such purchases for the construction, repair or remodeling project to each contractor and/or subcontractor. For further information, please contact the Missouri

Department of Natural Resources or the Missouri Department of Revenue, P.O. Box 840, Jefferson City, Missouri 65105, Telephone (573) 751-2836.

1A-33 PUMPING AND DEWATERING OPERATIONS: Work to be performed may require draining, pumping and dewatering and certain cleaning operations necessary to complete the work as specified and as indicated on the drawings. It is the intent of these specifications that such draining, pumping, and dewatering and cleaning operations shall be the obligation of the Contractor.

1A-34 CONTRACTOR'S INSURANCE:

The Contractor shall procure and maintain insurance at its own cost and expense, throughout the duration of the Contract. This insurance shall remain in full force until the work is completed and accepted by the City of Nixa. The insurance shall be of such types and in such amounts as may be necessary to protect the Contractor/Bidder and the interest of the City of Nixa against all hazards or risks of loss as specified by the City.

INSURANCE REQUIREMENTS:

Such policies shall name the City of Nixa as an additional named insured with limits of liability not less than the sovereign immunity limits for Missouri public entities calculated by the Missouri Department of Insurance as of January 1 each calendar year and published annually in the Missouri Register pursuant to Section 537.610, RSMo.
(See, HTTP:\\www.insurance.mo.gov\industry\sovimmunity.htm).

The minimum coverage for the insurance referred to herein shall be as set out below:

a. Workers' Compensation....Statutory coverage per RSMo 287.010 et seq
Employer's Liability..... $1,000,000.00

b. Commercial General Liability Insurance, including coverage for Premises, Operations, Products and Completed Operations, Contractual Liability, Broad Form Property Damage, Independent Contractors, Explosion, Collapse, and Underground Property Damage and endorsed for blasting if blasting required. Such coverage shall apply to bodily injury and property damage on an "Occurrence Form Basis" with limits of at least Two Million Dollars and No Cents ($2,000,000.00) for all claims arising out of a single accident or occurrence and at least Three Hundred Thousand Dollars and No Cents ($300,000.00) with respect to injuries and/or death of any one person in a single occurrence and an amount not less than at least $1,000,000 for all claims to property arising out of a single occurrence and at least $100,000 to any one owner with respect to damages to property.

c. Automobile Liability Insurance covering bodily injury and property damage for owned, non-owned and hired vehicles, with limits of at least Two Million Dollars and No Cents ($2,000,000.00) for all claims arising out of a single accident or occurrence and at least Three Hundred Thousand Dollars and No Cents ($300,000.00) with respect to injuries and/or death of any one person in a single accident or occurrence.

d. Owner's and Contractor's Protective Liability Insurance to protect the City, its agents, servants and employees from claims which may arise from the performance of this Contract, with limits of at least Two Million Dollars and No Cents ($2,000,000.00) for all claims arising out of a single accident or occurrence and at least Three Hundred Thousand Dollars and No Cents ($300,000.00) with respect to injuries and/or death of any one person in a single accident or occurrence.

The Owner's and Contractor's Protective Liability Insurance must:

(1) Be a separate policy with the named insured being: The City of Nixa;

(2) Contain an endorsement that disclaims coverage for any claim barred by the doctrines of sovereign immunity or official immunity, except attorney's fees and other litigation costs incurred in defending a claim. Nothing contained in this policy (or this endorsement thereto) shall constitute any waiver of whatever kind of these defenses or sovereign immunity or official immunity for any monetary amount whatsoever.

e. Builders Risk Insurance for contracts involving unoccupied structures. The Contractor shall secure All Risk Builder's Risk Insurance. Unless specifically authorized by the City, the amount of such insurance shall not be less than the total contract price. The policy shall name as insured the Contractor and the City of Nixa.

f. 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. Contractor shall require any and all subcontractors with whom it enters into a contract to perform work on this project to protect the City of Nixa through insurance against applicable hazards or risks and shall, upon request of the City, provide evidence of such insurance.

CITY OF NIXA, MISSOURI

POLICE FIRING RANGE

NIXA, CHRISTIAN COUNTY, MISSOURI

8.5

LOCATION MAP

SECTION 24, TOWNSHIP 27 NORTH, RANGE 22 WEST
NTS

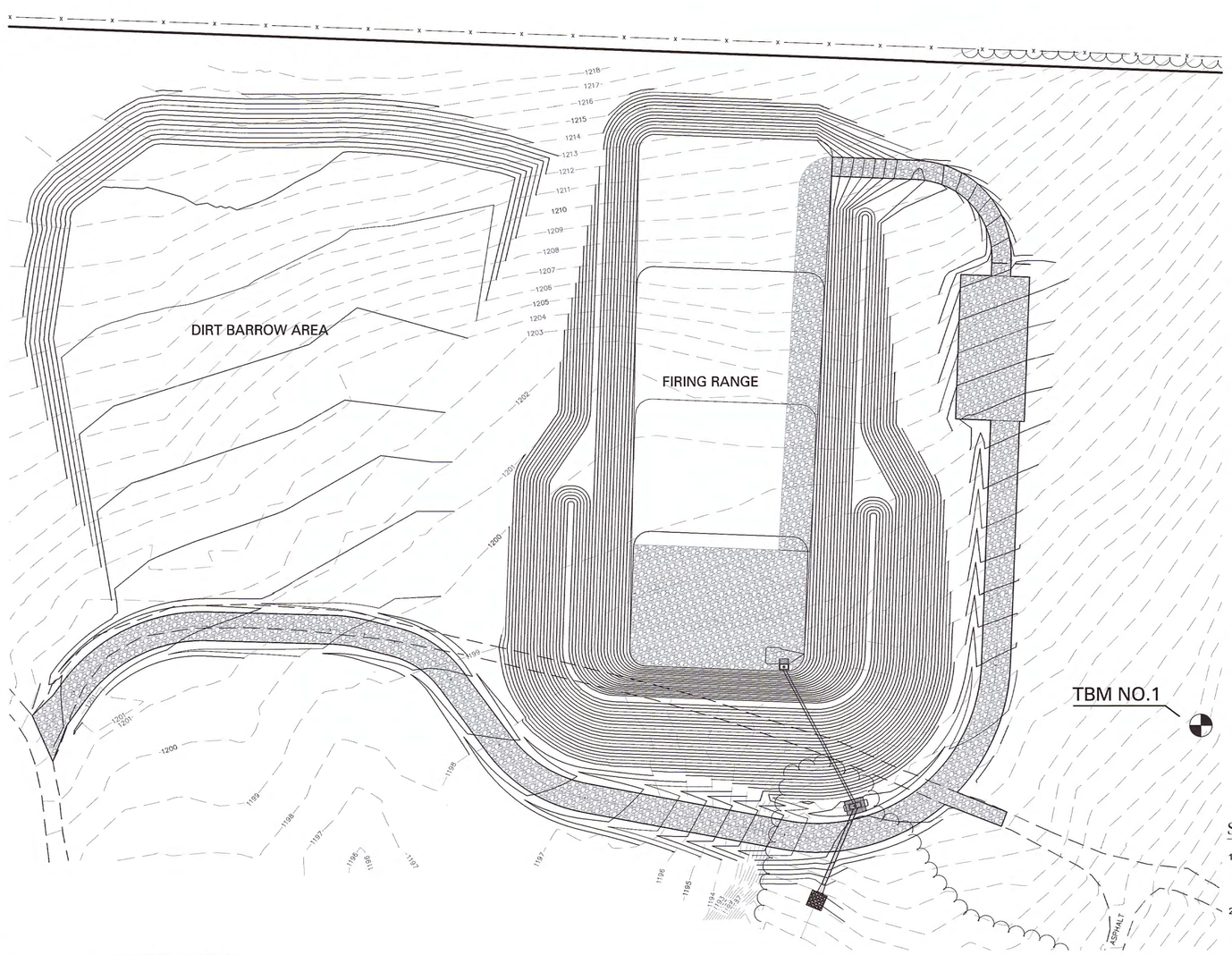
T.B.M. NO.1:

TBM NO. 1 - CONTROL POINT NO. 2, CP.58BASE. LOCATION IS SHOWN ON THIS SHEET.
ELEVATION:1183.57

MISSOURI ONE CALL SYSTEM, INC. 1-800-344-7483 STOP-CALL BEFORE YOU DIG

LEGEND

	EXISTING FIRE HYDRANT
W	GATE VALVE
	PROPOSED FIRE HYDRANT
S	SAN. SEWER MANHOLE
PP	POWER POLE
R/W	RIGHT-OF-WAY LINE
EOP	EDGE OF PAVEMENT
-W-	WATERLINE
-TEL-	TELEPHONE LINES
TEL RIS	TELEPHONE RISER
WM ⊠	WATER METER
MB □	MAIL BOX
-SS-	SAN. SEWER LINE



CAUTION

Existing underground installations such as water mains, gas mains, sewers, telephone lines, fiber optic lines, power lines and buried structures are indicated on the drawing only to the extent such information has been made available to or discovered by the surveyor in preparing this drawing. There is no guarantee as to the accuracy or completeness of such information.

HATCH LEGEND

GRAVEL ROAD/GRAVEL PARKING/GRAVEL PAD

SITE PLAN

NTS

SHEET INDEX

SHEET NO.	DESCRIPTION
1.	COVER SHEET
2.	SITE PLAN
3.	SITE GRADING PLAN
4.	STORM PLAN/PROFILE LINE A & DETAILS
5.	DIMENSION PLAN
6.	SEDIMENT AND EROSION CONTROL PLAN

GENERAL CONSTRUCTION NOTES

1. Materials, installation and testing shall conform to the City of Nixa's technical specifications and details. If there is a discrepancy between The City of Nixa standard details and the details indicated within these construction plans, The City of Nixa standard details shall govern.

2. Prior to beginning construction, the Contractor shall convene a preconstruction conference between the owner, Engineer and the City of Nixa.

3. It is the Contractor's responsibility to locate and move any affected utilities. The engineer or City of Nixa does not guarantee that all utilities are shown on these plans.

4. It shall be the sole responsibility of the Contractor to contact the utility suppliers and arrange for any necessary modifications required to facilitate construction activities.

5. It shall be the Contractor's responsibility to keep rock, mud, and other debris from access streets caused by construction equipment throughout the day and at the end of each work day.

6. Contractor is responsible for providing compaction tests for all fills required by the City of Nixa. Compaction of all fills shall be at least 95% standard proctor. The City of Nixa may core drill roads to ensure proper materials were used and the minimum depth of base rock were installed. This applies to all area's except the firing range berms.

7. Contractor shall be responsible for furnishing as-built plans for any deviations from this set of plan sheets.

8. Contractor shall field verify all elevations and slopes and shall confirm with Engineer and note any variation thereof prior to installment.

9. ¾" clean crushed stone backfill shall be provided over storm sewer line where line is located under roads or driveways.

10. Final clean-up requirements are the sole responsibility of the Contractor and shall be strictly enforced.

SAFETY NOTICE TO CONTRACTOR

1. IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THE CONTRACTOR WILL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT WILL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
2. THE DUTY OF THE ENGINEER OR OWNER TO CONDUCT CONSTRUCTION REVIEW OF THE CONTRACTOR'S PERFORMANCE IS NOT INTENDED TO INCLUDE REVIEW OF THE ADEQUACY OF THE CONTRACTOR'S SAFETY MEASURES IN, ON, OR NEAR THE CONSTRUCTION SITE.

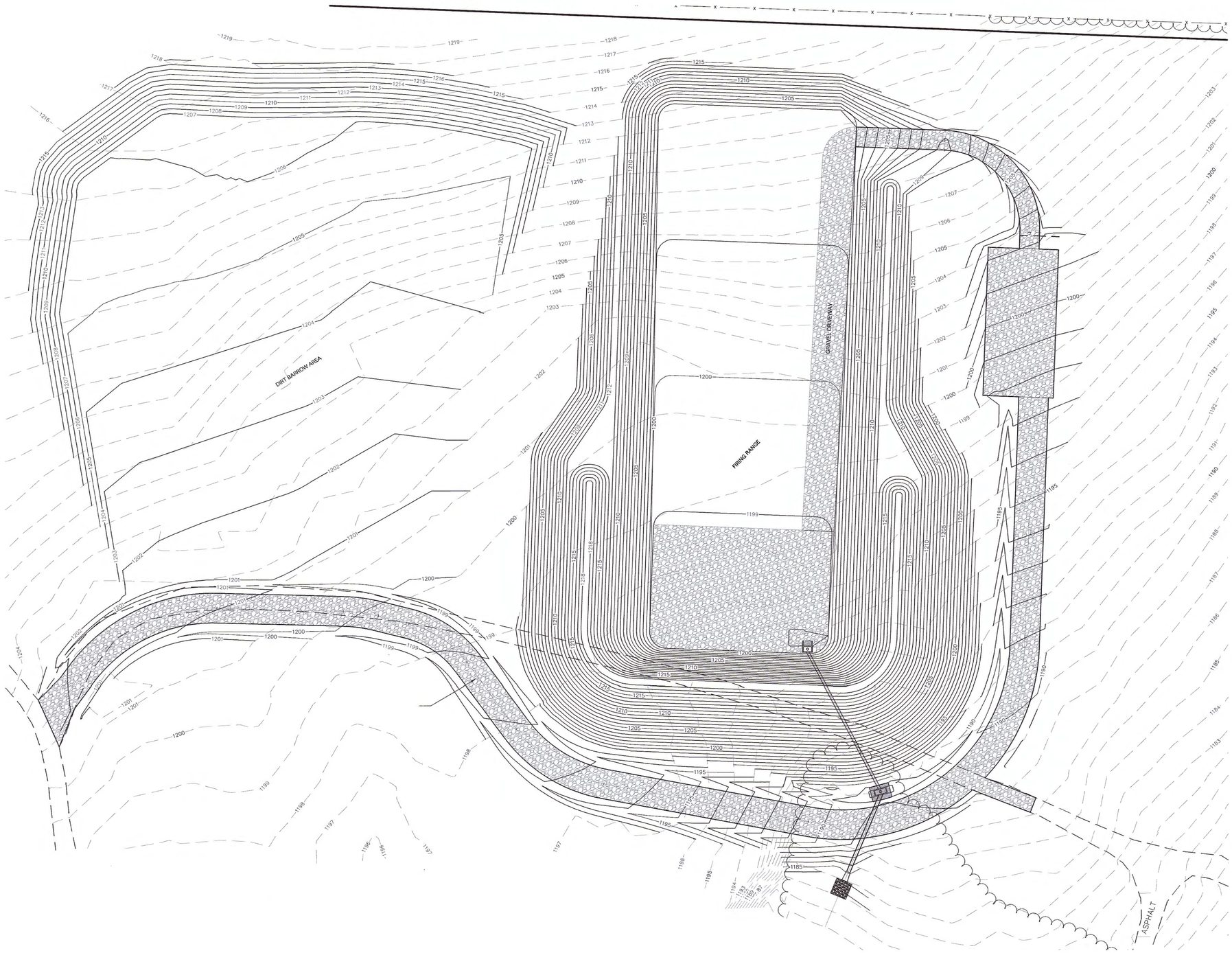
CITY OF NIXA, MISSOURI
POLICE FIRING RANGE
Nixa, Christian County, Missouri

SHAFFER & HINES, INC.
CERTIFICATE OF AUTHORITY
LICENSE NO. 001665

SHAFFER & HINES
CONSULTING ENGINEERS - REGISTERED LAND SURVEYORS
P.O. Box 493, Nixa, Missouri 65714
Tel: (417) 725-4663 - Fax: (417) 725-5230
Email: chines@shaffer-hines.com

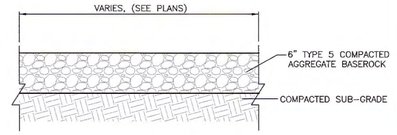
COVER SHEET

DESIGN BY	JCMH
DRAWN BY	GSM
CHK'D BY	JCMH
DATE	MARCH, 2022
SCALE	AS SHOWN
REVISIONS	
JOB NO.	202005
SHEET	1 OF 6



NORTH

MISSOURI ONE CALL SYSTEM, INC.
1-800-344-7483
STOP-CALL BEFORE YOU DIG!



TYP. SECTION – GRAVEL
ROAD/GRAVEL PARKING/GRAVEL PAD
NTS

SITE PLAN
SCALE: 1"=30'

CITY OF NIXA, MISSOURI
POLICE FIRING RANGE

Nixa, Christian County, Missouri

STATE OF MISSOURI
J. CLAYTON M. HINES
NUMBER E-29799
REGISTERED PROFESSIONAL ENGINEER
J. CLAYTON M. HINES E-29799

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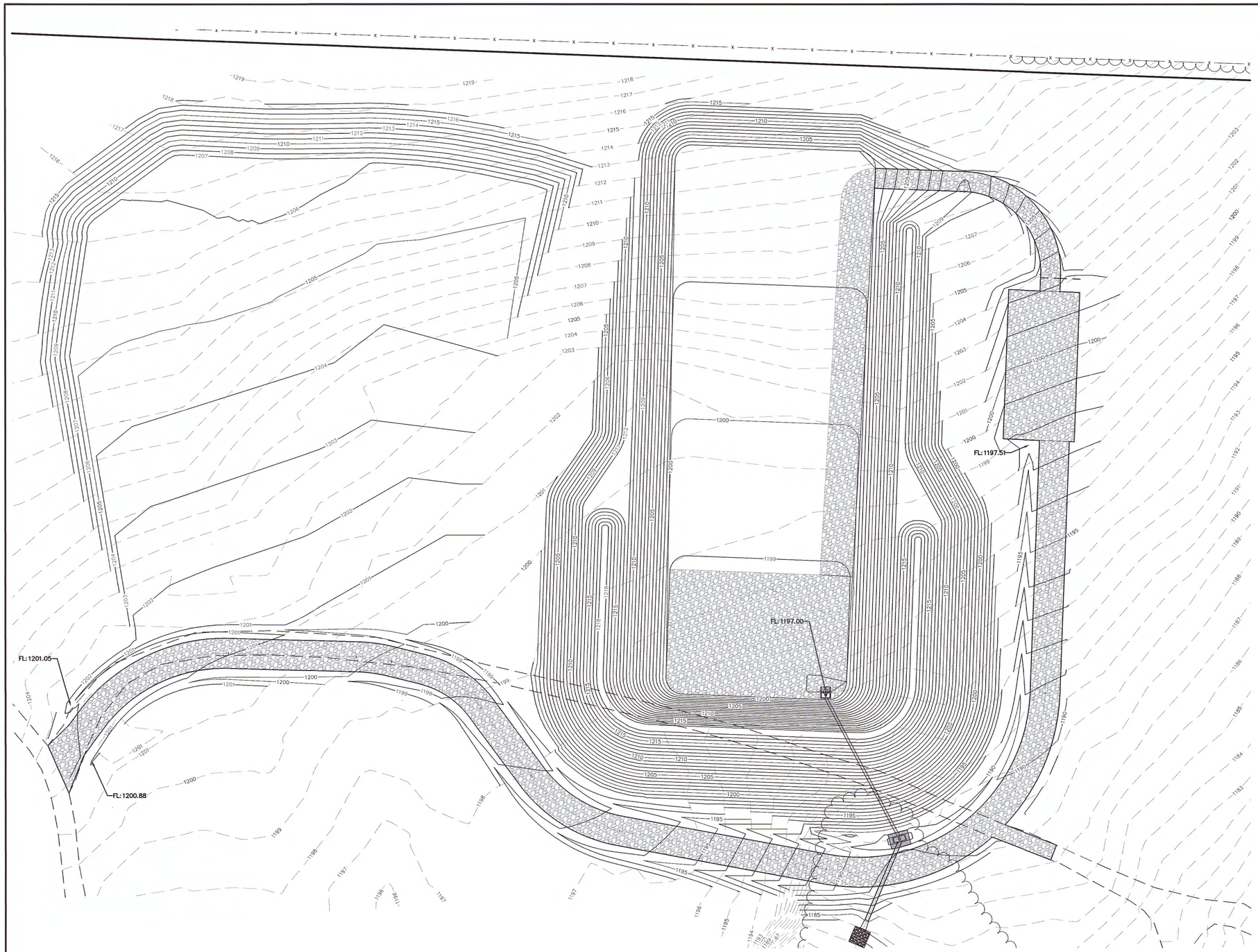
SITE PLAN

DESIGN BY	JCMH
DRAWN BY	GSM
CHK'D BY	JCMH
DATE	MARCH, 2022
SCALE	AS SHOWN

REVISIONS

JOB NO. 202005

SHEET 2 OF 6



SITE GRADING PLAN

SCALE: 1"=30'

NORTH

MISSOURI ONE CALL SYSTEM, INC. 1-800-344-7483 STOP-CALL BEFORE YOU DIG

GENERAL NOTES:

1. "SCREENED" (LIGHT) DELINEATION SHOWN ON THIS SHEET DENOTES EXISTING FACILITIES, UTILITIES, AND/OR ITEMS. "SCREENED" INFORMATION WAS TAKEN FROM FIELD SURVEY AND IS FOR REFERENCE ONLY AND SHALL BE FIELD VERIFIED BY CONTRACTOR. "BOLD" (DARK) DELINEATION IS NEW WORK TO BE CONSTRUCTED UNDER THIS PROJECT.

2. CONTRACTOR SHALL MAKE THE NECESSARY PROVISIONS TO PROTECT ALL EXISTING UTILITIES DURING CONSTRUCTION OPERATIONS.

SITE GRADING NOTES:

1. ROADS/DRIVEWAYS/PARKING: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ADEQUACY OF THE SUBGRADE SOILS. UNSUITABLE SOIL SHALL BE REMOVED AND REPLACED WITH QUALITY MATERIAL. COMPACTION SHALL BE TESTED BY A QUALIFIED GEOTECHNICAL EVALUATION LABORATORY OR FIRM TO ENSURE STABILITY.

2. ROADS/DRIVEWAYS/PARKING: 95% STANDARD PROCTOR COMPACTION SHALL BE MET OR EXCEEDED. COMPACTION TESTING SHALL BE PERFORMED AT REGULAR INTERVALS AND AT CONTRACTOR'S EXPENSE BY A QUALIFIED GEOTECHNICAL EVALUATION LABORATORY OR FIRM.

3. CONTRACTOR SHALL PROVIDE PROPER DRAINAGE OF THE STREET PRIOR TO PAVING (SUBGRADE). OBTAIN APPROVAL BY THE ENGINEER OR OTHER APPLICABLE AUTHORITY.

4. CONTRACTOR SHALL FIELD VERIFY ALL GRADES AND ELEVATIONS. THE MINIMUM ALLOWABLE GRADE IS 0.50%. MAXIMUM GRADES ARE AS LISTED IN THE CITY OF NIXA'S TECHNICAL SPECIFICATIONS.

5. ADEQUATE COVER SHALL BE MAINTAINED OVER ALL PIPES AND UTILITIES AS RECOMMENDED BY EACH MANUFACTURER.

6. ANY GRADING ADJACENT TO THE STREET SHALL BE ADJUSTED TO PROVIDE POSITIVE DRAINAGE OF THE STORMWATER.

7. EXISTING UTILITIES MAY NOT BE SHOWN OR MAY BE IN LOCATIONS OF CONFLICT WITH OTHER UTILITIES, CONTRACTOR SHALL VERIFY LOCATION PRIOR TO CONSTRUCTION AND REFER TO THE UTILITY PLANS.

8. CONTRACTOR SHALL PROVIDE ¾" CLEAN CRUSHED GRAVEL, PER CITY OF NIXA SPECIFICATIONS, OVER ALL PIPES AND CULVERTS TO THE SUBGRADE OF THE STREET IN LOCATIONS WHERE PIPES OR CULVERTS ARE LOCATED UNDER PROPOSED ROADS/DRIVEWAYS/PARKING LOTS.

9. A GRADING PLAN IS SHOWN FOR THE DIRT BARROW AREA. THIS AREA IS THE APPROXIMATE AREA REQUIRED TO GENERATE THE FILL MATERIAL NEEDED FOR THE FIRING RANGE. THE AMOUNT OF DIRT EXCAVATED FROM THIS AREA MAY BE MORE OR LESS THAN WHAT IS REQUIRED. IT IS INTENDED TO ONLY REMOVE THE REQUIRED AMOUNT FROM THE BARROW AREA IN THE GENERAL LOCATION SHOWN. THE BARROW AREA SLOPES SHALL BE MIN. 3:1 AND THE FLOOR SHALL BE 2% POSITIVE DRAINAGE. ROUND THE "CORNERS" AS NECESSARY TO PROVIDE SMOOTH TRANSITIONS FOR MAINTENANCE OF SLOPES.

10. THE FILL MATERIAL FOR THE FIRING RANGE IS UNCLASSIFIED MATERIAL . NO TREES, STUMPS, OR OTHER DECAY TYPE MATERIALS. ANY ROCKS OR CONCRETE SHALL BE BROKEN TO 2' DIA. OR SMALLER. THE FIRING RANGE "BERMS" MAY BE "MACHINE" ROLLED OR TRACKED IN FOR COMPACTION. COMPACTION TESTS ARE NOT REQUIRED FOR THE FIRING RANGE BERMS. INSPECTIONS WILL OCCUR TO ENSURE GENERAL COMPACTION OF THE BERMS ARE PROVIDED.

CITY OF NIXA, MISSOURI
POLICE FIRING RANGE

Nixa, Christian County, Missouri

STATE OF MISSOURI J. CLAYTON HINES NUMBER E-29799 REGISTERED PROFESSIONAL ENGINEER

J. CLAYTON H. HINES E-29799

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Email: chines@shaffer-hines.com

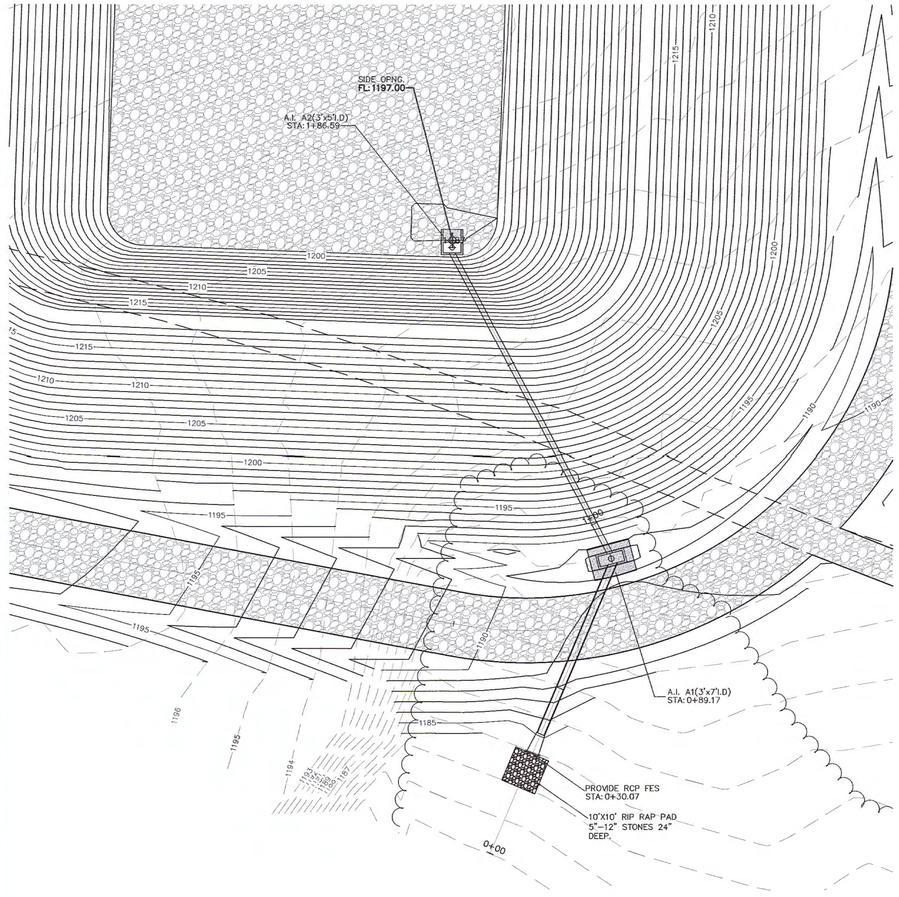
SITE GRADING PLAN

DESIGN BY	JCMH
DRAWN BY	GSM
CHK'D BY	JCMH
DATE	MARCH, 2022
SCALE	AS SHOWN

REVISIONS

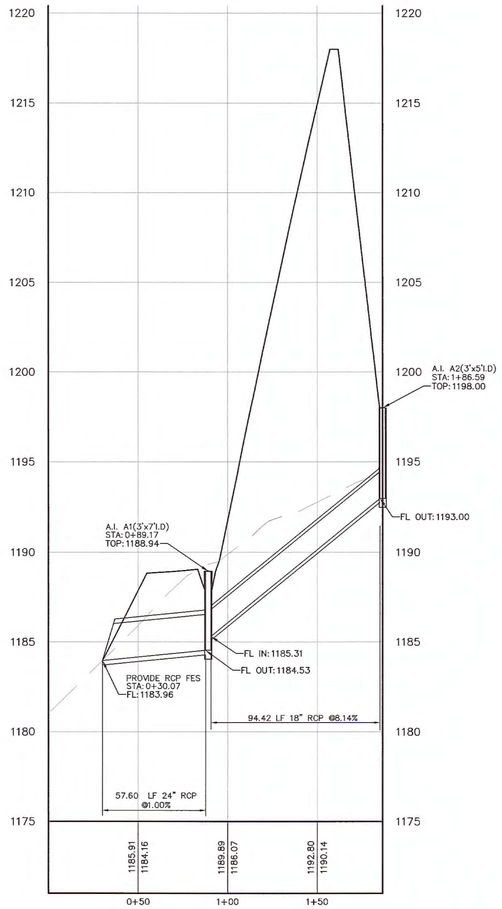
JOB NO. 202005

SHEET 3 OF 6



STORM LINE A - PLAN

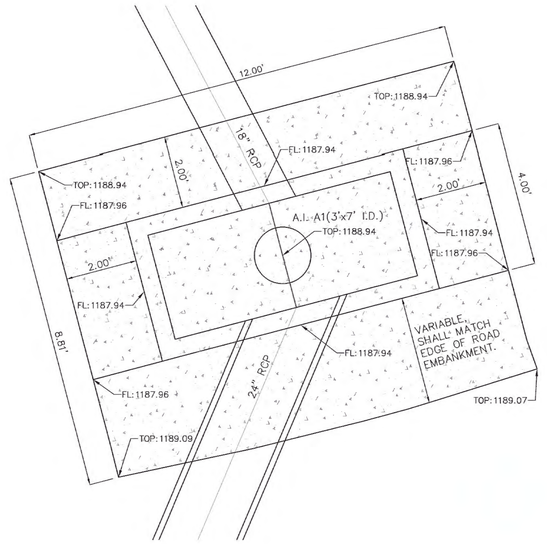
SCALE: 1"=20'



STORM LINE A - PROFILE

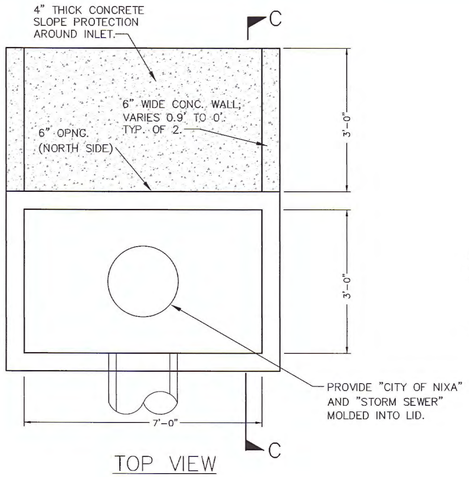
SCALE: HOR. 1"=40'
VERT. 1"=40'

= 4" THICK CONCRETE SLOPE PROTECTION AROUND INLET.

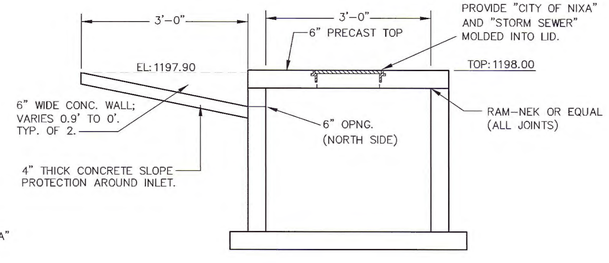


AREA INLET A1 - DETAIL

SCALE: 1"=2'



TOP VIEW



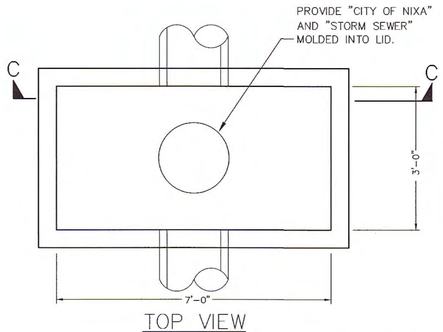
SEC. C–C

AREA INLET NOTES:

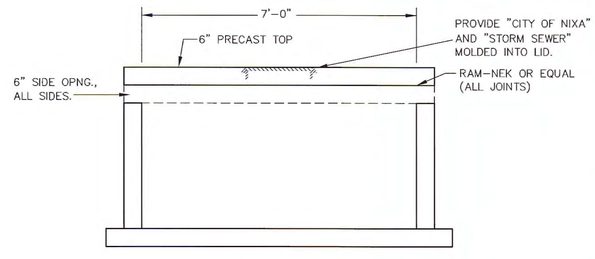
1. PIPES SHOWN HERE ARE FOR VISUAL PURPOSES ONLY, REFER TO THE STORMWATER PLAN AND PROFILE SHEETS FOR PIPE SIZES AND LOCATIONS.
2. BOTTOM SHALL BE CAST IN PLACE.
3. #4 BARS @ 10" EACH WAY IN THE SLAB.

PRE–CAST CONCRETE AREA INLET A2(3'x5'I.D.)

NOT TO SCALE



TOP VIEW



SEC. C–C

PRE–CAST CONCRETE AREA INLET A1(3'x7'I.D.)

NOT TO SCALE

AREA INLET NOTES:

1. PIPES SHOWN HERE ARE FOR VISUAL PURPOSES ONLY, REFER TO THE STORMWATER PLAN AND PROFILE SHEETS FOR PIPE SIZES AND LOCATIONS.
2. BOTTOM SHALL BE CAST IN PLACE.
3. #4 BARS @ 10" EACH WAY IN THE SLAB.

NORTH

MISSOURI ONE CALL SYSTEM, INC. 1-800-344-7483 STOP-CALL BEFORE YOU DIG!

CITY OF NIXA, MISSOURI
POLICE FIRING RANGE

NIXA
Nixa, Christian County, Missouri

STATE OF MISSOURI
J. CLAYTON M. HINES
NUMBER E-29799
REGISTERED PROFESSIONAL ENGINEER
J. CLAYTON M. HINES E-29799

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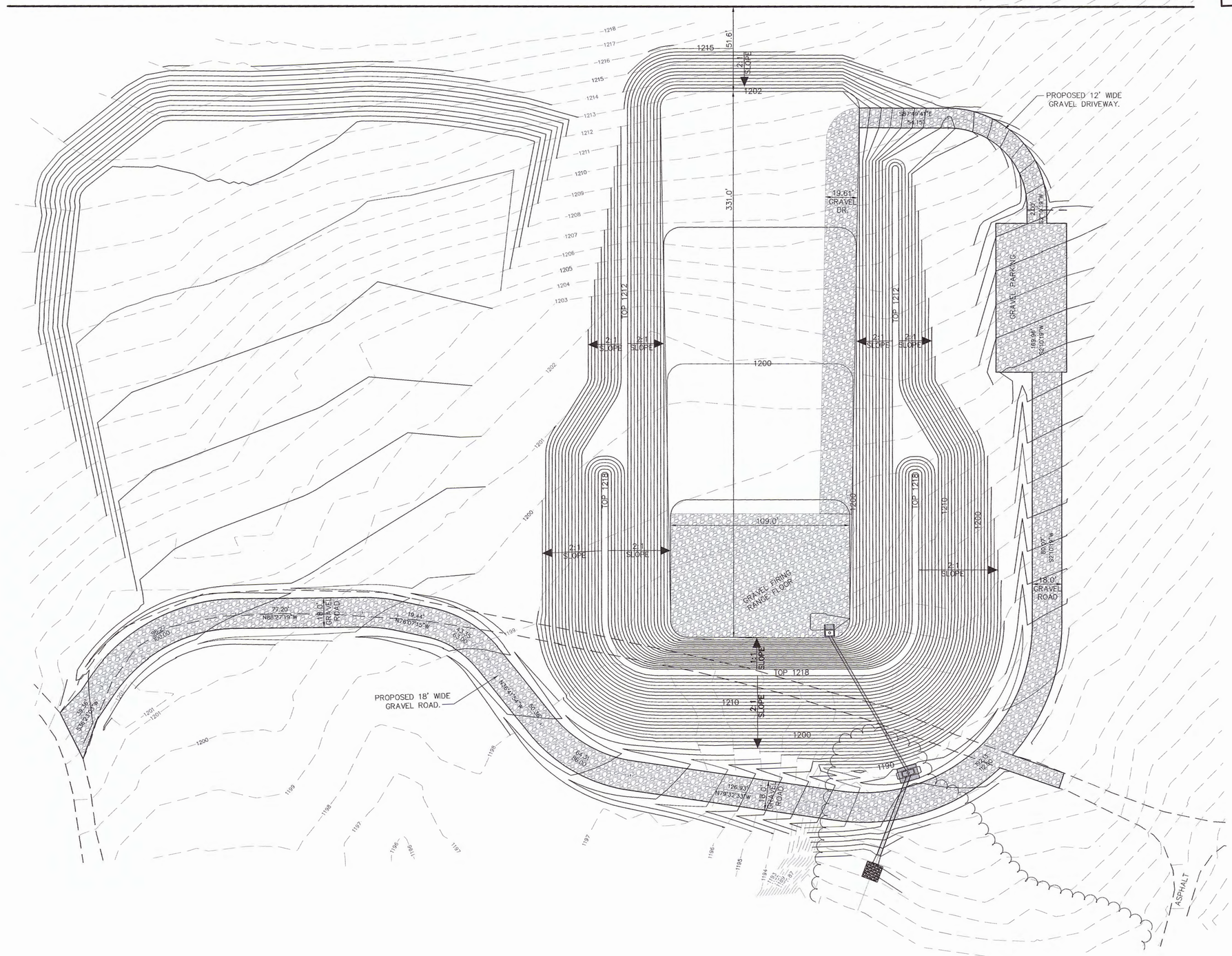
STORM PLAN/PROFILE LINE A

DESIGN BY	JCMH
DRAWN BY	GSM
CHK'D BY	JCMH
DATE	MARCH, 2022
SCALE	AS SHOWN
REVISIONS	
JOB NO.	202005
SHEET	4 OF 6



DIMENSION PLAN

SCALE: 1"=30'

NORTH

MISSOURI ONE CALL SYSTEM, INC. 1-800-344-7483 STOP - CALL BEFORE YOU DIG!

CITY OF NIXA, MISSOURI POLICE FIRING RANGE

Nixa, Christian County, Missouri

J. CLAYTON M. HINES E-29799 — STATE OF MISSOURI — REGISTERED PROFESSIONAL ENGINEER

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DIMENSION PLAN

DESIGN BY	JCMH
DRAWN BY	GSM
CHK'D BY	JCMH
DATE	MARCH, 2022
SCALE	AS SHOWN
REVISIONS	
JOB NO.	202005
SHEET	5 OF 6

SEDIMENT AND EROSION CONTROL PLAN

OWNER & DEVELOPER:
CITY OF NIXA
PO BOX 395
NIXA, MO. 65714
DANNY NEWELL (417)839-6887

MDNR LAND DISTURBANCE PERMIT NO. MORA20878

TOTAL DISTURBED AREA:
±5.2 ACRES

FACILITY CONTACT
DANNY NEWELL
(417)839-6887

NOTE: CONTRACTOR SHALL UPDATE SWPPP PREPARED WITH THE MSOP TO THIS SITE'S CONDITIONS.

CITY OF NIXA STORMWATER & SITE GRADING NOTES:

1. THE CONTRACTOR SHALL HAVE ONE (1) SIGNED COPY OF THE PLANS (APPROVED BY THE CITY OF NIXA) AND ONE (1) COPY OF THE APPROPRIATE CONSTRUCTION SPECIFICATIONS AT THE JOB SITE AT ALL TIMES.
2. CONSTRUCTION OF THE IMPROVEMENTS SHOWN OR IMPLIED BY THIS SET OF DRAWINGS SHALL NOT BE INITIATED OR ANY PART THEREOF UNDERTAKEN UNTIL THE CITY OF NIXA IS NOTIFIED OF SUCH INTENT, AND ALL REQUIRED AND PROPERLY EXECUTED BONDS AND PERMIT FEES ARE RECEIVED AND APPROVED BY THE CITY OF NIXA.
3. THE CITY OF NIXA CONSTRUCTION SPECIFICATIONS, LATEST EDITION, SHALL GOVERN CONSTRUCTION OF THIS PROJECT.
4. ALL EXISTING UTILITIES INDICATED ON THE DRAWINGS ARE ACCORDING TO THE BEST INFORMATION AVAILABLE TO THE ENGINEER; HOWEVER, ALL UTILITIES ACTUALLY EXISTING MAY NOT BE SHOWN. UTILITIES DAMAGED THROUGH NEGLIGENCE OF THE CONTRACTOR TO OBTAIN THE LOCATION OF SAME SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR AT HIS EXPENSE.
5. ALL BACKFILL SHALL BE COMPACTED.
6. ALL MATERIALS AND WORKMANSHIP ASSOCIATED WITH THIS PROJECT SHALL BE SUBJECT TO INSPECTION BY THE CITY OF NIXA. THE CITY OF NIXA RESERVES THE RIGHT TO ACCEPT OR REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DOES NOT CONFORM TO THE CITY OF NIXA CONSTRUCTION SPECIFICATIONS.
7. THE CONTRACTOR SHALL NOTIFY THE CITY OF NIXA PUBLIC WORK'S DEPARTMENT A MINIMUM OF TWENTY-FOUR (24) HOURS PRIOR TO THE BEGINNING OF CONSTRUCTION. IN ADDITION A MINIMUM OF TWENTY-FOUR (24) HOURS NOTICE SHALL BE PROVIDED FOR ANY REQUIRED INSPECTIONS.
8. RELOCATION OF ANY WATER LINE, SEWER LINE OR SERVICE LINE THEREOF REQUIRED FOR THE CONSTRUCTION OF THIS PROJECT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE AT HIS EXPENSE.

VEHICLE TRACKING PAD

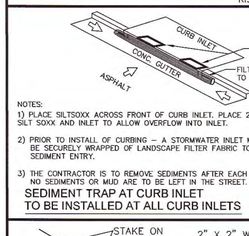
CONSTRUCTION SPECIFICATION:

CLEAR THE ENTRANCE AND EXIT AREA OF ALL VEGETATION, ROOTS, AND OTHER OBJECTIONABLE MATERIAL AND PROPERLY GRADE IT.

PLACE THE GRAVEL TO THE SPECIFIC GRADE AND DIMENSIONS SHOWN ON THE PLANS. FILTER FABRIC MAY BE APPLIED TO ROADBED FOR ADDITIONAL STABILITY IN ACCORDANCE WITH FABRIC MANUFACTURING SPECIFICATIONS.

PROVIDE DRAINAGE TO CARRY WATER TO AN APPROVAL SEDIMENT TRAP.

MAINTENANCE:
MAINTAIN THE GRAVEL PAD IN A CONDITION TO PREVENT MUD OR SEDIMENT FROM LEAVING THE CONSTRUCTION SITE. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH 2-INCH STONE. AFTER EACH RAINFALL, INSPECT ANY STRUCTURE USED TO TRAP SEDIMENT AND CLEAN IT OUT AS NECESSARY. IMMEDIATELY REMOVE ALL OBJECTIONABLE MATERIALS SPILLED, WASHED, OR TRACKED ON TO PUBLIC ROADWAYS.

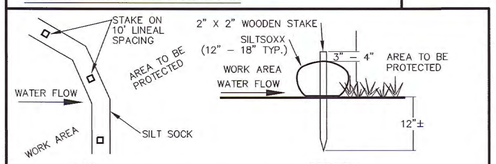


SILT FENCE

NOTES:
1. PLACE SILT FENCE AT DOWNSLOPE LIMIT OF AREA TO BE GRADED.
2. SILT FENCE SHOULD BE SECURELY FASTENED TO EACH STEEL SUPPORT POST OR TO WOVEN WIRE WHICH IS IN TURN ATTACHED TO THE STEEL FENCE POSTS.
3. INSPECTION SHALL BE FREQUENT AND REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY AS NEEDED.
4. SILT FENCE SHALL BE REMOVED WHEN IT HAS SERVED ITS USEFULNESS, SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.
5. SEDIMENT TRAPPED BY THIS PRACTICE SHALL BE DISPOSED OF IN AN APPROVED SITE IN A MANNER THAT WILL NOT CONTRIBUTE TO ADDITIONAL SILTATION.
6. ACCUMULATED SILT SHALL BE REMOVED WHEN IT REACHES A DEPTH OF 6 INCHES AND DISPOSED OF IN AN APPROVED SPOIL SITE OR AS IN NO. 5 ABOVE. AT EACH END OF SILT FENCE, TURN FENCE UPSLOPE AND EXTEND UNTIL GROUND SURFACE RISES 18"

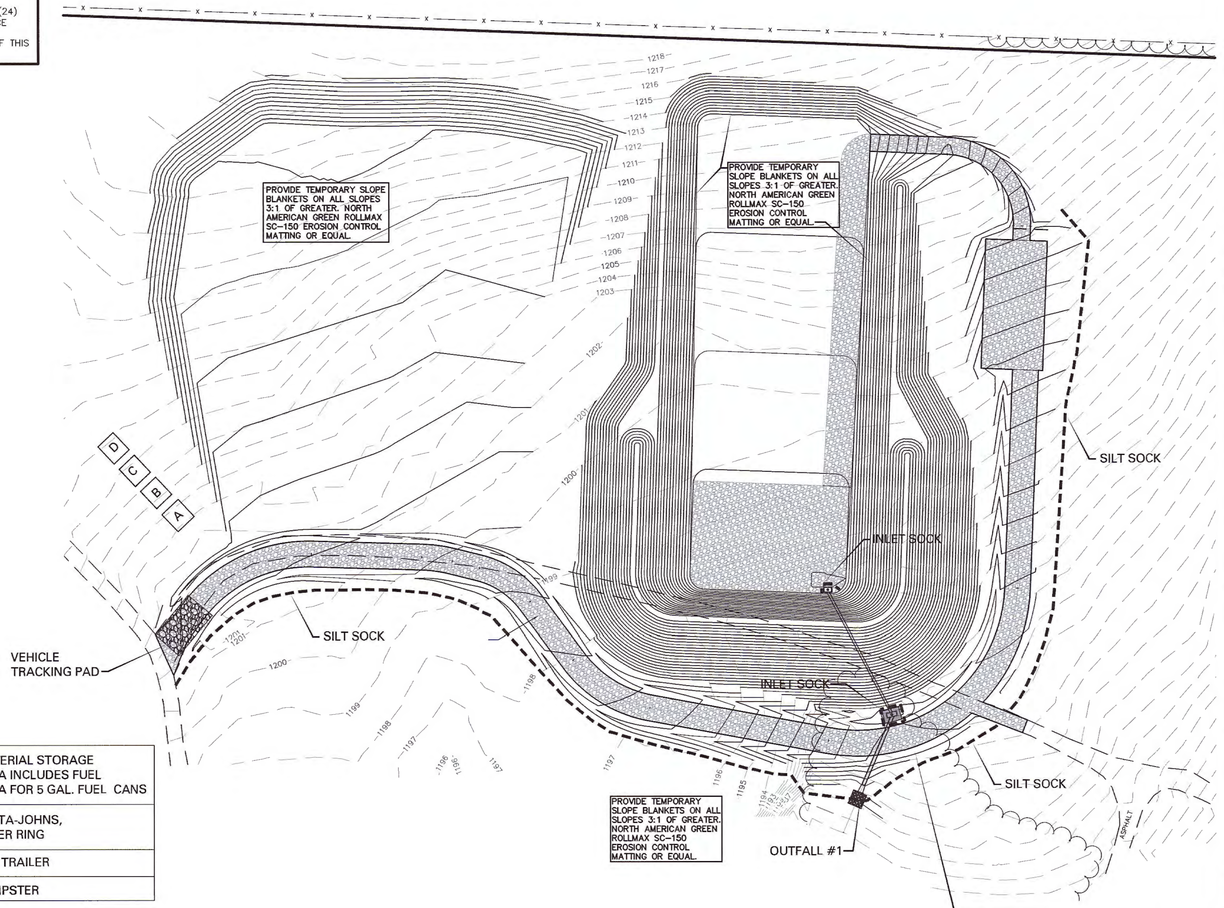
NOTES:
1) PLACE SILTSOXX ACROSS FRONT OF CURB INLET. PLACE 2-6"x12" CONC. BLOCKS BETWEEN SILT SOXX AND INLET TO ALLOW OVERFLOW INTO INLET.
2) PRIOR TO INSTALL OF CURBING – A STORMWATER INLET MAYBE BE SECURELY WRAPPED OF LANDSCAPE FILTER FABRIC TO PREVENT SEDIMENT ENTRY.
3) THE CONTRACTOR IS TO REMOVE SEDIMENTS AFTER EACH RAINFALL, NO SEDIMENTS OR MUD ARE TO BE LEFT IN THE STREET.

SEDIMENT TRAP AT CURB INLET
TO BE INSTALLED AT ALL CURB INLETS



NOTES:
1. SILT SOCK DEPICTED IS FOR MINIMUM SLOPES. GREATER SLOPES MAY REQUIRE LARGER SOCKS PER THE ENGINEER.
2. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

SILT SOCK DETAIL



A	MATERIAL STORAGE AREA INCLUDES FUEL AREA FOR 5 GAL. FUEL CANS
B	PORTA-JOHNS, FILTER RING
C	JOB TRAILER
D	DUMPSTER

PERMANENT SEEDING

GENERAL: *The work covered by this section consists of the furnishing of all labor, materials and equipment necessary for the complete seeding of newly graded areas and areas disturbed by the contractor during construction. Unless otherwise shown on the drawings, all disturbed pasture, grassed areas, and lawns (exclusive of woods and idle fields suitable for cultivation) shall be reseeded with normal plant seed mixtures as specified below.*

DESCRIPTIVE SUBMITTALS: Descriptive submittals shall be made for all seeds and fertilizers intended for use on this project.

MATERIALS:

Fertilizer: Fertilizer shall be a commercial carrier of available nutrients. It shall be of the UreaFormaldehyde type, uniform in composition, dry, free-flowing, and in condition for application with suitable applicating equipment.

APPLICATION RATE
Nitrogen (N) 90 lbs/acre
Phosphorous (P) 90 lbs/acre
Potash 90 lbs/acre
*Lime 1500 lbs/acre ENM**

** ENM – effective neutralizing material as per State evaluation of quarried rock.*

Seed shall be furnished in standard containers and labeled in accordance with the U.S. Department of Agriculture "Rules and Regulations Under the Federal Seed Act." Wet, moldy, or otherwise damaged seed will not be acceptable. The permanent seed mixture shall be as follows:

	Mixture	Purity	Germination
Tall Fescue	10%	95%	90%
Kentucky Blue Grass	1%	80%	65%
Creeping Red Fescue	5%	95%	90%
Wheat or Rye	46%	95%	85%
Annual Rye Grass	36%	98%	90%

The seed shall be free from Johnson grass, Canadian thistle, or field bind weed seed, and shall not contain more than 2 percent of other weed seeds. A certification of these mixtures shall be furnished to the Engineer prior to seeding.

Mulch: Materials for mulch shall consist of native hay, straw, or other approved locally available material. Mulch material which contains an excessive quantity of matured seed of noxious weeds or other species which would grow and be detrimental to overseeding or provide a menace to farm land will not be acceptable. Straw or other mulch material which is fresh or excessively brittle, or in such an advanced stage of decomposition as to smother or retard the growth of grass or the seeded cover crop will not be acceptable. Mulch rate shall be 4,500 lbs. per acre.

GRADING & SEEDING: Unless otherwise specified, all disturbed areas shall be graded with at least 4" of topsoil. Before final raking, areas to be seeded shall be fertilized with the specified mixture by spreading evenly using a mechanical spreader of the rotary type. The area shall then be raked to a smooth even surface, the soil loosened to a depth of at least 1" and seeded. The seed shall be evenly distributed over the area at a rate of 3 pounds per 1,000 square feet using a mechanical seeder. The seeded area shall be maintained as necessary until the project is completed.
Allowable seeding dates are as follows:

Perennial Grasses: March 1 to May 15 or August 15 to October 15
Temporary Cover: May 15 to August 15
Overseeding: October15 to March 1

SEDIMENT AND EROSION CONTROL PLAN

CONSTRUCTION SEQUENCE:

1. INSTALL VEHICLE TRACKING PAD
2. INSTALL SILT FENCE AS SHOWN.
3. INSTALL STORM SEWER.
4. CONSTRUCT ROAD FILL TO CREATE TEMPORARY SEDIMENT BASIN.
5. STRIP ALL TOPSOIL FROM PROPOSED GRADING AREAS AND STOCKPILE. STOCKPILE SLOPES SHALL NOT BE STEEPER THAN 3:1 A SILT FENCE SHALL BE INSTALLED AROUND THE STOCKPILE TO PREVENT LOSS OF TOPSOIL.
6. GRADE THE ENTIRE SITE AS SHOWN ON THE GRADING PLAN.
7. IF GRADING STOPS FOR A PERIOD OF 14 DAYS OR MORE, SEED AND STRAW AREAS AFFECTED WITH RAPIDLY GROWING PLANTS.
8. AFTER GRADING IS COMPLETE, PLACE TOPSOIL AT A MINIMUM DEPTH OF 4" IN ALL AREAS EXCEPT IMPERVIOUS AREAS. HYDRO-SEED ALL AREAS.

NORTH

MISSOURI ONE CALL SYSTEM, INC. 1-800-344-7483 STOP-CALL BEFORE YOU DIG!

SILT FENCE

Construction Specifications:

Materials:

Use a synthetic fabric which contains ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F; has an equivalent opening size of a U.S. standard sieve of 70; and the tensile strength at 20 percent elongation is 30 lb/lineal inches.

Posts shall be either 4-inch diameter wood or 1.33 pounds per linear foot steel with a minimum length of five feet. Steel posts shall have projections for fastening wire to them.

If wire fence reinforcement is used, it shall be 36 inches high, 14-gauge, and a maximum mesh spacing of 6 inches.

Construction of Barrier for Low Flows not Exceeding 1 cfs:

The height of a filter barrier shall be a minimum of 15 inches and shall not exceed 18 inches.

The stakes shall be spaced a maximum of three feet apart at the barrier location and driven securely into the ground (minimum of eight inches).

A trench shall be excavated approximately four inches wide and four inches deep along the line of stakes and upslope from the barrier.

The filter material shall be stapled to the wooden stakes using at least 4-inch long staples, and eight inches of the fabric shall be extended into the trench. Filter material shall not be stapled to existing trees.

The trench shall be backfilled and the soil compacted over the filter material.

If a filter barrier is to be constructed across a ditch line or swale, the barrier shall be of sufficient length to eliminate end flow, and the plan configuration shall resemble an arc or horseshoe with the ends oriented upslope.

Filter barriers shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.

Construction of Silt Fence When Only Sheet and Overland Flows are Expected

The height of a silt fence shall not exceed 36 inches (higher fences may impound volumes of water sufficient to cause failure of the structure).

The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are necessary, filter cloth shall be spliced together only at a support post, with a minimum 6-inch overlap, and securely sealed.

Posts shall be spaced a maximum of 10 feet apart at the barrier location and driven securely into the ground (Minimum of 18 inches) when used with the wire support fence, otherwise, post spacing shall not exceed three feet.

A trench shall be excavated approximately four inches wide and four inches deep along the line of posts and upslope from the barrier.

When a wire mesh support is used, the fence shall be fastened securely to the upslope side of the posts using heavy duty wire staples at least one inch long, tie wires or hog rings. The wire shall extend into the trench a minimum of two inches and shall not extend more than 36 inches above the original ground surface.

The filter fabric shall be stapled or wired to the fence, and eight inches of the fabric shall be extended into the trench. The fabric shall not extend more than 36 inches above the original ground surface.

The trench shall be backfilled and the soil compacted over the filter fabric.

Silt fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.

Maintenance:

Inspect sediment fences at least once a week and after each rainfall. Make any required repairs immediately.

Should the fabric of a sediment fence collapse, tear, decompose, or became ineffective, replace it promptly.

Remove sediment deposits as necessary after each storm to provide adequate storage volume for the next rain and to reduce pressure on the fence. Take care to avoid undermining the fence during cleanout.

Remove all fencing materials and unstable sediment deposits and bring the area to grade and stabilize it after the contributing drainage area has been properly stabilized.

TEMPORARY SEEDING

Specifications:

Complete grading before preparing seedbeds and install all necessary erosion control practices, such as dikes, waterways, and basins. Minimize steep slopes because they make seedbed preparation difficult and increase the erosion hazard. If soils become compacted during grading, loosen them to a depth of 6-8 inches using a ripper, harrow, or chisel plow.

Seedbed Preparation:

Good seedbed preparation is essential to successful plant establishment. A good seedbed is well pulverized, loose, and uniform. Where hydroseeding methods are used, the surface may be left with a more irregular surface of large clods and stones.

Liming – Apply lime according to soil test recommendations. If the pH (acidity) of the soil is not known, an application of ground agricultural limestone at the rate of two tons/acre is usually sufficient. Apply limestone uniformly and incorporate into the top 4-6 inches of soil. Soils with a pH of six or higher need not be limited.

Fertilizer – Base application rates on soil tests. When these are not possible, apply a 10-10-10 grade fertilizer at 700-1,000 lb/acre. Both fertilizer and lime should be incorporated into the top 4-6 inches of soil.

Surface roughening – If recent tillage operations have resulted in a loose surface, additional roughening may not be required except to break up large clods. If rainfall causes the surface to become sealed or crusted, loosen it just prior to seeding by discing, raking, harrowing, or other suitable methods. Groove or furrow slopes steeper than 3:1 on the contour before seeding.

Plant Selection:

Annual rye grass, wheat or oats should be used for temporary seeding.

Seeding:

Evenly apply seed using a cyclone seeder (broadcast), drill cultipacker seeder, or hydroseeder. Annual rye grass should be applied at a rate of 120 lbs/acre. Broadcast seeding and hydroseeding are appropriate for steep slopes where equipment cannot be driven. Hand broadcasting is not recommended because of the difficulty in achieving a uniform distribution.

Small grains should be planted no more than one inch deep, and grasses and legumes no more than ¼ inch. Broadcast seed must be covered by raking or chain dragging, and then lightly firmed with a roller or cultipacker. Hydroseeded mixtures should include a wood fiber (cellulose) mulch.

Mulching:

The use of an appropriate mulch will help ensure establishment under normal conditions and is essential to seeding success under harsh site conditions. Harsh site conditions include:

a) Seeding in fall or winter cover (wood fiber mulches are not considered adequate for this use),

b) Slopes steeper than 3:1,

c) Excessively hot or dry weather,

d) Adverse soils (shallow, rocky, or high in clay or sand, and

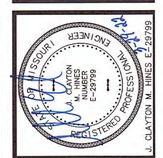
e) Areas receiving concentrated.

If the area to be mulches is subject to concentrated waterflow, as in channels, anchor mulch with netting.

Maintenance:

Refertilize areas if growth is not adequate. Reseed, refertilize, and mulch immediately following erosion or other damage.

CITY OF NIXA, MISSOURI
POLICE FIRING RANGE
Nixa, Christian County, Missouri



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CERTIFICATE OF AUTHORITY
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SHAFFER & HINES
CONSULTING ENGINEERS - REGISTERED LAND SURVEYORS
P.O. Box 493, Nixa, Missouri, 65714
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SEDIMENT AND EROSION CONTROL PLAN

DESIGN BY	JCMH
DRAWN BY	GSM
CHK'D BY	JCMH
DATE	MARCH, 2022
SCALE	AS SHOWN

REVISIONS

JOB NO. 202005

SHEET 6 OF 6

Stormwater Pollution Prevention Plan (SWPPP)

For Construction Activities At:

Police Firing Range
972 S. Old Riverdale Road
Nixa, Missouri, 65714
(417) 725-2510

SWPPP Prepared For:

City of Nixa
P.O. Box 395
Nixa, Missouri 65714
(417) 725-2510
jcampbell@nixa.com

SWPPP Prepared By:

Shaffer & Hines, Inc.
Clayton M. Hines, P.E.
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(417) 725-4663
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SWPPP Preparation Date:

03/29/2022

Estimated Project Dates:

Project Start Date: 05/02/2022

Project Completion Date: 12/31/2022

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SECTION 1: CONTACT INFORMATION/RESPONSIBLE PARTIES

1.1 Operator(s) / Subcontractor(s)

Operator(s):

To Be Determined

Subcontractor(s):

TO BE FILLED IN BY GENERAL CONTRACTOR
Insert Company or Organization Name
Insert Name
Insert Address
Insert City, State, Zip Code
Insert Telephone Number
Insert Fax/Email
Insert area of control (if more than one operator at site)

Emergency 24-Hour Contact:

To Be Determined

1.2 Stormwater Team

Stormwater Team		
Name and/or position, and contact	Responsibilities	I Have Read the CGP and Understand the Applicable Requirements
To Be Determined	Inspection/Modification/I Installing, maintaining Stormwater controls, site Inspections, corrective Actions.	☒ Yes Date: Click here to enter a date.

SECTION 2: SITE EVALUATION, ASSESSMENT, AND PLANNING

2.1 Project/Site Information

Project Name and Address

Project/Site Name: Police Firing Range
Project Street/Location: 972 S. Old Riverdale Road
City: Nixa
State: Missouri
ZIP Code: 65714
County or Similar Subdivision: Christian County

Business days and hours for the project: Monday – Friday, 8:00 a.m. – 5:00 p.m. (or as required)

Project Latitude/Longitude

Latitude: 37.01.29° N (decimal degrees)

Longitude: 93.17.14 ° W (decimal degrees)

Latitude/longitude data source:

☐ Map ☒ GPS ☐ Other (please specify): _____

Horizontal Reference Datum:

☐ NAD 27 ☒ NAD 83 ☐ WGS 84

2.3 Nature of the Construction Activities

General Description of Project

Construction activities will consist of excavation, site grading, construction of a Firing Range, storm sewers, and crushed stone roadway for the City of Nixa. The Contractor shall insert the Sediment and Erosion Control Plan for the project into Appendix A.

Size of Construction Site

Size of Property	Approx. 52.09 Acres
Total Area Expected to be Disturbed by Construction Activities	Approx. 5.2 Acres
Maximum Area Expected to be Disturbed at Any One Time	Approx. 5.2 Acres

Type of Construction Site *(check all that apply)*:

☐ Single-Family Residential ☐ Multi-Family Residential ☐ Commercial ☐ Industrial
☐ Institutional ☐ Highway or Road ☐ Utility ☒ Other Firing Range

Will there be demolition of any structure built or renovated before January 1, 1980?	☐ Yes	☒ No	
If yes, do any of the structures being demolished have at least 10,000 square feet of floor space?	☐ Yes	☐ No	☒ N/A
Was the pre-development land use used for agriculture (see Appendix A for definition of "agricultural land")?	☐ Yes	☒ No	

Pollutant-Generating Activities

Pollutant-Generating Activity (e.g., paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering operations)	**Pollutants or Pollutant Constituents** (e.g., sediment, fertilizers, pesticides, paints, caulks, sealants, fluorescent light ballasts, contaminated substrates, solvents, fuels)
Excavation, filling, and grading Operations	Sediment

2.4 Sequence and Estimated Dates of Construction Activities

Construction activities will consist of site grading, construction of waterlines, sanitary sewers, storm sewers, and roadways for a residential, multi family and commercial subdivision.	
Estimated Start Date of Construction Activities for this Phase	Date Provided By General Contractor
Estimated End Date of Construction Activities for this Phase	Date Provided By General Contractor
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	Date Provided By General Contractor
Estimated Date(s) when Stormwater Controls will be Removed	Date Provided By General Contractor

2.5 Authorized Non-Stormwater Discharges

No authorized non-stormwater discharges are anticipated on this project.

2.6 Site Maps

See appendix A for site maps.

SECTION 3: DOCUMENTATION OF COMPLIANCE WITH OTHER FEDERAL REQUIREMENTS

3.1 Endangered Species Protection

As per the U.S. Fish and Wildlife Service there are no critical habitats at this location.

3.2 Historic Preservation

Construction will take place on a previously disturbed property w/ development surrounding it.

SECTION 4: EROSION AND SEDIMENT CONTROLS

4.2 Perimeter Controls

General

- Prior to any earth disturbance perimeter sediment control shall be installed. The locations of required perimeter sediment control devices shall be as indicated on the sediment and erosion control plan located in Appendix A.

Specific Perimeter Controls

SILT SOCK/DITCH CHECK/VEGETATIVE STRIP SEDIMENT AND PERIMETER CONTROL DEVICE	
Description: Perimeter sediment control consisting of silt sock as required shall be installed and maintained prior to and after commencement of construction. The contractor shall be responsible for verifying that all perimeter sediment control is in place and operational.	
Installation	Date of Installation to be provided by General Contractor
Maintenance Requirements	All perimeter sediment control shall be inspected at a minimum once per week and after each rainfall and any required repairs shall be made immediately. Should the sediment control collapse, tear, decompose or become ineffective it shall be replaced promptly. Sediment deposits shall be removed as necessary after each storm to provide adequate storage volume for the next rain and to reduce pressure on the perimeter sediment control. As a minimum, sediment shall be removed before it has accumulated to one-half of the above-ground height of the perimeter sediment control.
Design Specifications	Design specifications can be found in Appendix N.

4.3 Sediment Track-Out

General

- Prior to any earth disturbance, sediment track-out control shall be installed. The location of required track-out control device shall be as indicated on the Sediment and Erosion Control plan located in Appendix A.

Specific Track-Out Controls

LIMESTONE TRACK-OUT PAD	
Description: Sediment track-out control shall consist of constructing a rock paved entrance/exit area to the project site having dimensions of 25'W x 50'L x 12"D.	
Installation	Date of Installation to be provided by General Contractor
Maintenance Requirements	Where sediment has been tracked-out from the site onto the surface of county roads, off-site streets, other paved areas, and sidewalks, the contractor shall remove the deposited sediment by the end of the same work day in which the track-out occurs or by the end of the next work day if track-out occurs on a non-work day. The contractor must remove the track-out by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. The contractor is prohibited from hosing or sweeping tracked-out sediment into any stormwater conveyance (unless it is connected to a sediment basin, sediment trap, or similarly effective control), storm drain inlet, or surface water.

Design Specifications	Temporary vehicle tracking pads shall be constructed of crushed limestone meeting the following specifications. Temporary vehicle tracking pads shall be a minimum of 25 feet wide and 50 feet long. Minimum thickness of crushed limestone surface shall be 2" to 4" diameter rock (rocks 6" and larger shall be avoided because they can become lodged between dual tires on trucks) is to be used, with a minimum thickness of 12 inches. Additional 2 inch lifts of crushed limestone shall be added if the surface of the initial drive deteriorates or becomes too muddy to be effective.

4.4 Stockpiled Sediment or Soil

General

- Any excess soil from the site shall be stockpiled in areas which are supplemented by additional erosion and sediment controls.

Specific Stockpile Controls

SILT SOCK STOCKPILE CONTROL	
Description: All topsoil stripped from the site shall be stockpiled on-site. Silt fencing consisting of silt sock sediment & perimeter control devices or an approved equal shall be installed to prevent loss of topsoil.	
Installation	Date of Installation to be provided by General Contractor
Maintenance Requirements	Contractor shall not hose down or sweep soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance (unless connected to a sediment basin, sediment trap, or similarly effective control), storm drain inlet, or surface water.)
Design Specifications	Stockpile Slopes Shall Not Be Steeper Than 3:1.

4.5 Minimize Dust

General

- Dust control shall be accomplished by the application of water as required.

Specific Dust Controls

DUST CONTROL BY APPLICATION OF WATER	
Description: If required, the contractor shall be required to use water trucks to minimize dust leaving the site when conditions warrant.	
Installation	Date to be provided by General Contractor
Maintenance Requirements	Dust control shall be performed as required.

Design Specifications	Contractor shall spread adequate water to slightly moisten the soil but shall avoid over application such that run-off of the water occurs.

4.6 Minimize Steep Slope Disturbances

General

If applicable, on all slopes exceeding 15 percent the contractor shall provide erosion control blankets or an approved equal.

4.7 Topsoil

General

- All topsoil stripped from the project site shall be stockpiled on-site and shall be reused upon completion of construction or removed from the site in an approved manner.

TOPSOIL CONTROL BY STOCKPILING	
Description: Contractor shall strip all topsoil from proposed grading areas and stockpile on-site.	
Installation	Date of stockpiling activities to be provided by General Contractor.
Maintenance Requirements	After final grading of topsoil contractor shall seed and straw all areas.
Design Specifications	Topsoil stockpile slopes shall not exceed 3:1 and a silt fence shall be installed around the stockpile to prevent loss of topsoil. After grading is complete, place topsoil at minimum depth of 4 inches in all areas except impervious areas; seed and straw all areas.

4.8 Soil Compaction

General

Topsoil which has been stockpiled on-site will be reused upon completion of subgrade compaction as required.

4.9 Storm Drain Inlets

General

- Storm drain inlets will be installed as a part of this project as required.

4.10 Stormwater Conveyance Channels

General

- Stormwater conveyance channels will be installed as a part of this project as required.

4.11 Sediment Basins

General

Proposed detention basins to be located in the southwest portion, the southeast portion, the northwest portion and the northeast portion of the development will provide adequate detention/sediment control for all construction activities.

4.12 Chemical Treatment

No treatment chemicals will be used at the proposed site.

4.13 Dewatering Practices

General

- No dewatering practices will be utilized at the proposed site.

4.14 Other Stormwater Controls

General

- No other stormwater controls will be utilized at the proposed site.

4.15 Site Stabilization

Total Amount of Land Disturbance Occurring at Any One Time

Total land disturbance at any one time associated with this project is approximately 40 +/- acres.

INSERT NAME OF SITE STABILIZATION PRACTICE	
☒ *Vegetative* ☐ *Non-Vegetative* ☐ *Temporary* ☒ *Permanent*	
Description: Permanent soil stabilization measures will consist of seeding, fertilizing and mulching to reestablish a vegetative cover. Upon completion of construction contractor shall permanently stabilize adjacent areas that have been disturbed by seeding, fertilizing and mulching. Contractor shall provide established uniform vegetation evenly distributed without large bare areas which provides 70 percent or more of the density of coverage that was provided by vegetation prior to commencing earth-disturbing activities.	
Installation	Date of installation to be provided by General Contractor
Completion	Date of completion to be provided by General Contractor
Maintenance Requirements	Contractor shall reseed, refertilize and mulch immediately following erosion or other damage or if vegetative growth is not adequate.
Design Specifications	Contractor shall refer to the Sediment and Erosion Control Plan and Appendix N for design specifications related to permanent seeding.

SECTION 5: POLLUTION PREVENTION STANDARDS

5.1 Potential Sources of Pollution

Construction Site Pollutants

Pollutant-Generating Activity	Pollutants or Pollutant Constituents (that could be discharged if exposed to stormwater)	Location on Site (or reference SWPPP site map where this is shown)
Fueling/Maint. Of Equipment	Petroleum	See Appendix A
Solid Waste/Trash Storage	N/A	See Appendix A

5.2 Spill Prevention and Response

General

Contractor shall protect against spills and/or be prepared to address spills by locating potential spill activities away from storm water conveyance ditches.

5.3 Fueling and Maintenance of Equipment or Vehicles

General

During fueling operations contractor shall ensure that silt sock and perimeter sediment control is installed and/or maintained properly to intercept any runoff which may occur. In addition, in designated fueling areas contractor shall clean up any spills immediately using dry clean-up methods where possible and dispose of used materials properly. Do not clean surfaces or spills by hosing the area down. Contractor shall eliminate the source of the spill to prevent a discharge or a continuation of an ongoing discharge.

Specific Pollution Prevention Practices

FILTER SOCK FOR FUELING SPILL CONTROL	
Description: During fueling operations contractor shall ensure that silt sock as perimeter sediment control is installed and maintained properly to intercept any runoff which may occur.	
Installation	Date of installation to be provided by General Contractor
Maintenance Requirements	Contractor shall perform weekly inspection of silt sock perimeter sediment control and after major rainfall events.
Design Specifications	Design specifications for the perimeter control are located in Appendix N.

5.4 Washing of Equipment and Vehicles

General

No equipment or vehicle washing is anticipated on the project.

5.5 Storage, Handling, and Disposal of Building Products, Materials, and Wastes

5.5.1 Building Products

General

Contractor shall store building materials, scrap construction materials, pipe, plastics, Styrofoam, concrete and other trash or building materials in a designated area on the project site in accordance with the Soil and Erosion Control Plan located in Appendix A.

Specific Pollution Prevention Practices

POLLUTION CONTROL OF BUILDING PRODUCTS	
Description: Contractor shall ensure that all building product waste is disposed of in designated waste containers or in a designated area. Any building product waste container which overflows shall be cleaned up immediately.	
Installation	Date of installation to be provided by General Contractor
Maintenance Requirements	Contractor shall perform daily inspection of building product waste control.
Design Specifications	Contractor shall refer to the Sediment and Erosion Control Plan located in Appendix A and Appendix N for design specifications related to accommodation of building product waste.

5.5.2 Pesticides, Herbicides, Insecticides, Fertilizers, and Landscape Materials

General

- No pesticides, herbicides, insecticides, fertilizer or landscape materials are anticipated on this project.

5.5.3 Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals

General

Contractor shall store all fuel, oil, hydraulic fluids and other petroleum based products in a designated area as indicated on the Sediment and Erosion Control Plan located in appendix A.

Specific Pollution Prevention Practices

PERIMETER CONTROL OF PETROLEUM/CHEMICALS	
Description: Contractor shall store fuel, oil, hydraulic fluids and other petroleum based products in water-tight containers and provide plastic sheeting to prevent these containers from coming into contact with rainwater. Spills shall be cleaned up immediately using dry clean-up methods and methods employed to eliminate the source of the spill.	
Installation	Date of installation to be provided by General Contractor
Maintenance Requirements	Contractor shall perform daily inspection of designated petroleum based products storage and maintain as necessary to eliminate the possibility of a spill.
Design Specifications	Contractor shall refer to the Sediment and Erosion Control Plan located in Appendix A and Appendix N for design specifications related to perimeter control of petroleum/chemicals.

5.5.4 Hazardous or Toxic Waste

General

- No hazardous or toxic waste products are proposed for this project.

5.5.5 Construction and Domestic Waste

General

Contractor shall store packaging materials, scrap construction materials, pipe, plastics, Styrofoam, concrete and other trash or building materials in a designated area on the project site.

Specific Pollution Prevention Practices

POLLUTION CONTROL OF CONSTRUCTION AND DOMESTIC WASTE	
Description: Contractor shall ensure that all solid waste is disposed of in designated waste containers or in a designated area. Any waste container which overflows shall be cleaned up immediately.	
Installation	Date of installation to be provided by General Contractor
Maintenance Requirements	Contractor shall perform daily inspection of solid waste control.
Design Specifications	Contractor shall refer to the Sediment and Erosion Control Plan located in Appendix A and Appendix N for design specifications related to accommodation of construction and domestic waste.

5.5.6 Sanitary Waste

General

The Contractor will be required to provide portable toilets to accommodate sanitary wastes generated on the site. Portable toilets shall be placed in a designated area and positioned such that they are secure and will not be tipped or knocked over.

Specific Pollution Prevention Practices

POLLUTION CONTROL OF PORTABLE WASTE FACILITIES	
Description: Contractor shall ensure that all waste is disposed of in accordance with the portable sanitary waste facility manufacturers. Any sanitary waste which overflows shall be cleaned up immediately.	
Installation	Date of installation to be provided by General Contractor
Maintenance Requirements	Contractor shall perform daily inspection of portable sanitary waste facilities.
Design Specifications	Contractor shall refer to the Sediment and Erosion Control Plan located in Appendix A and Appendix N for design specifications related to accommodation of sanitary waste facilities.

5.6 Washing of Applicators and Containers used for Paint, Concrete or Other Materials

General

If applicable, contractor shall limit washing of concrete trucks, etc. to the designated area(s) indicated on the Phase specific Sediment and Erosion Control Plan located in appendix A.

Specific Pollution Prevention Practices

POLLUTION PREVENTION AT EQUIPMENT WASHING STATION	
Description: Silt fencing consisting of silt sock sediment & perimeter control devices or an approved equal shall be installed at designated concrete truck washout stations to prevent the wash water from leaving the site.	
Installation	Date of installation to be provided by General Contractor
Maintenance Requirements	Contractor shall perform daily inspection of equipment washing station when applicable.
Design Specifications	Contractor shall refer to the Sediment and Erosion Control Plan located in Appendix A and Appendix N for design specifications related to accommodation of equipment washing waste.

5.7 Fertilizers

General

Upon completion of construction it is anticipated that the contractor will seed and straw disturbed adjacent areas. It is not anticipated that there will be the need to store fertilizers in a designated area on the project site.

5.8 Other Pollution Prevention Practices

General

- There are no other pollution prevention practices.

SECTION 6: INSPECTION, MAINTENANCE, AND CORRECTIVE ACTION

6.1 Inspection Personnel and Procedures

Personnel Responsible for Inspections

Contractor To Be Determined

Inspection Schedule

Standard Frequency:
☒ Every 7 days ☒ Every 14 days and within 24 hours of a 0.25" rain or the occurrence of runoff from snowmelt sufficient to cause a discharge
Reduced Frequency (if applicable)
For stabilized areas ☒ Twice during first month, no more than 14 calendar days apart; then once per month after first month;

Inspection Forms

See Appendix D

6.2 Corrective Action

Personnel Responsible for Corrective Actions

Contractor to be determined

Corrective Action Forms

See Appendix E

6.3 Delegation of Authority

Duly Authorized Representative(s) or Position(s):

To Be Determined

SECTION 7: TRAINING

Table 7-1: Documentation for Completion of Training

Name	Describe Training	Date Training Completed

SECTION 8: CERTIFICATION AND NOTIFICATION

Instructions (CGP Appendix I, Part I.11.b):

- The following certification statement must be signed and dated by a person who meets the requirements of Appendix I, Part I.11.b.
- This certification must be re-signed in the event of a SWPPP Modification.

Owner's Certification: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____ Title: _____

Signature: _____ Date: _____

Contractor: I understand that it is my responsibility to remain in compliance with the Missouri Land Disturbance Permit and modify the SWPPP as required during my contractual period on the project.

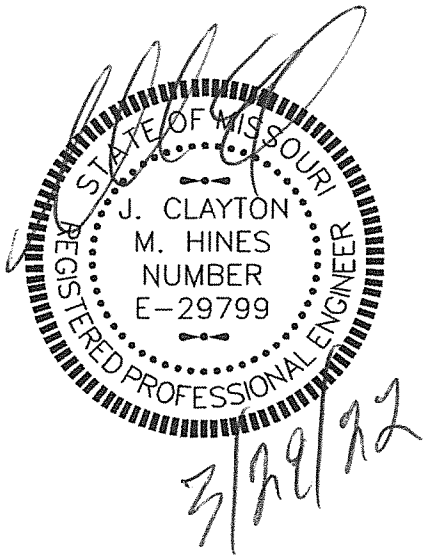
Name: _____ Title: _____

Signature: _____ Date: _____

Consulting Engineer: As the preparer of this SWPPP it is to be understood that the SWPPP is generic in nature and shall be updated, modified and/or revised by the Contractor or Owner as required to remain in compliance with the Missouri Department of Natural Resources Land Disturbance Permit.

Name: Clayton M. Hines Title: P.E.

Signature: Date: 3/29/22



SWPPP APPENDICES

Attach the following documentation to the SWPPP:

Appendix A – Site Maps

Appendix B – Copy of 2022 CGP (On file at office of the Engineer)

Appendix C – NOI and EPA Authorization Email / City Land Disturbance Permit (if applicable)

Appendix D – Inspection Form

Appendix E – Corrective Action Form

Appendix F – SWPPP Amendment Log

Appendix G – Subcontractor Certifications/Agreements

Appendix H – Grading and Stabilization Activities Log

Appendix I – Training Log

Appendix J – Delegation of Authority

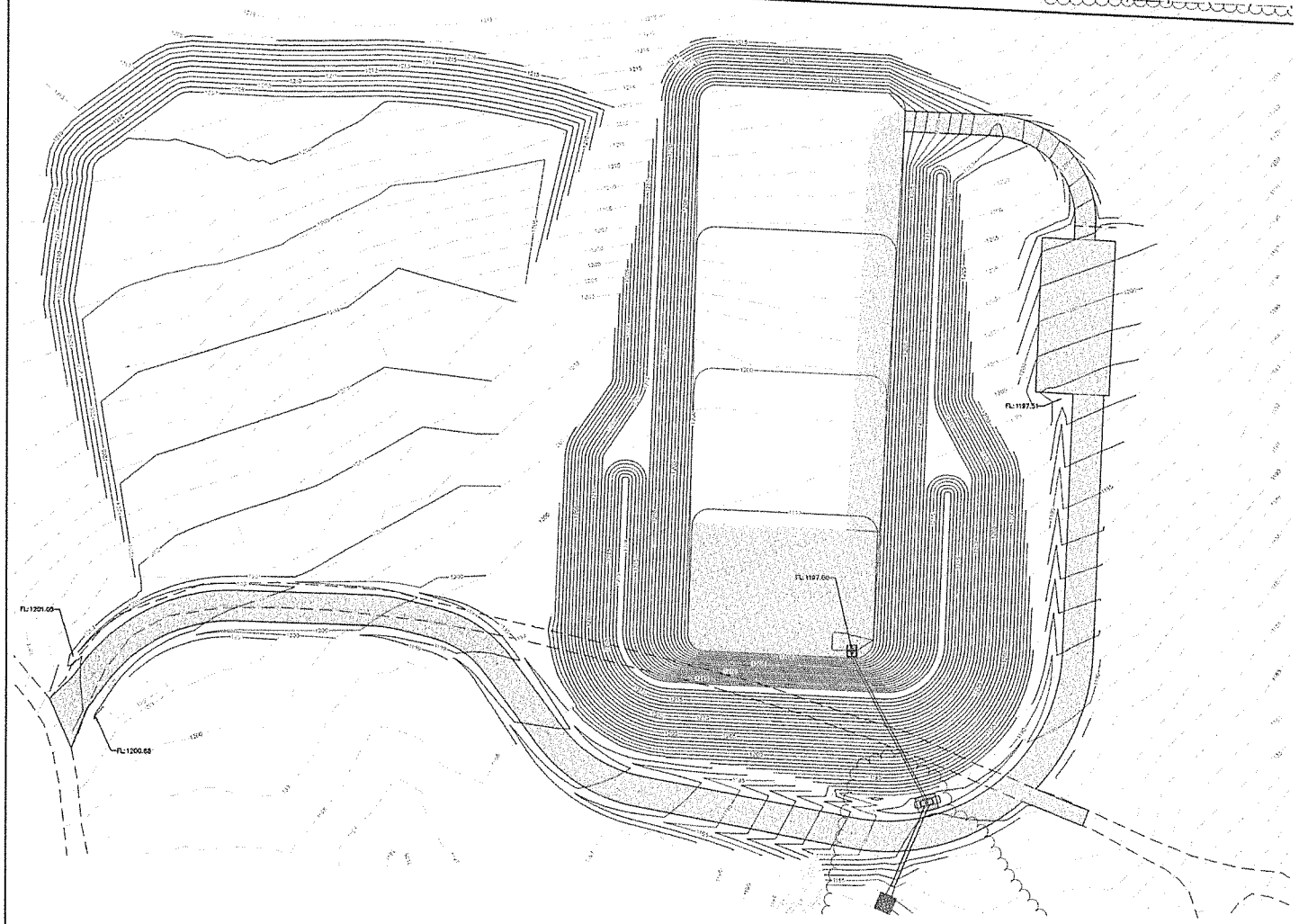
Appendix K – Endangered Species Documentation

Appendix L – Historic Preservation Documentation

Appendix M – Rainfall Gauge Reporting

Appendix N – Best Management Practices

Appendix A – Site Maps



SITE GRADING PLAN
SCALE: 1"=30'

NORTH

GENERAL NOTES:

1. "SCREENED" (LIGHT) DELINEATION SHOWN ON THIS SHEET DENOTES EXISTING FACILITIES, UTILITIES, AND/OR ITEMS. "SCREENED" INFORMATION WAS TAKEN FROM FIELD SURVEY AND IS FOR REFERENCE ONLY AND SHALL BE FIELD VERIFIED BY CONTRACTOR. "BOLD" (DARK) DELINEATION IS NEW WORK TO BE CONSTRUCTED UNDER THIS PROJECT.

2. CONTRACTOR SHALL MAKE THE NECESSARY PROVISIONS TO PROTECT ALL EXISTING UTILITIES DURING CONSTRUCTION OPERATIONS.

SITE GRADING NOTES:

1. ROADS/DRIVEWAYS/PARKING: IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE ADEQUACY OF THE SUBGRADE SOILS. UNSUITABLE SOIL SHALL BE REMOVED AND REPLACED WITH QUALITY MATERIAL. COMPACTION SHALL BE TESTED BY A QUALIFIED GEOTECHNICAL EVALUATION LABORATORY OR FIRM TO ENSURE STABILITY.

2. ROADS/DRIVEWAYS/PARKING: 95% STANDARD PROCTOR COMPACTION SHALL BE MET OR EXCEEDED. COMPACTION TESTING SHALL BE PERFORMED AT REGULAR INTERVALS AND AT CONTRACTOR'S EXPENSE BY A QUALIFIED GEOTECHNICAL EVALUATION LABORATORY OR FIRM.

3. CONTRACTOR SHALL PROVIDE PROPER DRAINAGE OF THE STREET PRIOR TO PAVING (SUBGRADE). OBTAIN APPROVAL BY THE ENGINEER OR OTHER APPLICABLE AUTHORITY.

4. CONTRACTOR SHALL FIELD VERIFY ALL GRADES AND ELEVATIONS. THE MINIMUM ALLOWABLE GRADE IS 0.50% MAXIMUM GRADES ARE AS LISTED IN THE CITY OF NIXA'S TECHNICAL SPECIFICATIONS.

5. ADEQUATE COVER SHALL BE MAINTAINED OVER ALL PIPES AND UTILITIES AS RECOMMENDED BY EACH MANUFACTURER.

6. ANY GRADING ADJACENT TO THE STREET SHALL BE ADJUSTED TO PROVIDE POSITIVE DRAINAGE OF THE STORMWATER.

7. EXISTING UTILITIES MAY NOT BE SHOWN OR MAY BE IN LOCATIONS OF CONFLICT WITH OTHER UTILITIES. CONTRACTOR SHALL VERIFY LOCATION PRIOR TO CONSTRUCTION AND REFER TO THE UTILITY PLANS.

8. CONTRACTOR SHALL PROVIDE 3" CLEAN CRUSHED GRAVEL, PER CITY OF NIXA SPECIFICATIONS, OVER ALL PIPES AND CULVERTS TO THE SUBGRADE OF THE STREET IN LOCATIONS WHERE PIPES OR CULVERTS ARE LOCATED UNDER PROPOSED ROADS/DRIVEWAYS/PARKING LOTS.

9. A GRADING PLAN IS SHOWN FOR THE DIRT BARROW AREA. THIS AREA IS THE APPROXIMATE AREA REQUIRED TO GENERATE THE FILL MATERIAL NEEDED FOR THE FIRING RANGE. THE AMOUNT OF DIRT EXCAVATED FROM THIS AREA MAY BE MORE OR LESS THAN WHAT IS REQUIRED. IT IS INTENDED TO ONLY REMOVE THE REQUIRED AMOUNT FROM THE BARROW AREA IN THE GENERAL LOCATION SHOWN. THE BARROW AREA SLOPES SHALL BE MIN. 3:1 AND THE FLOOR SHALL BE 2% POSITIVE DRAINAGE. ROUND THE "CORNERS" AS NECESSARY TO PROVIDE SMOOTH TRANSITIONS FOR MAINTENANCE OF SLOPES.

10. THE FILL MATERIAL FOR THE FIRING RANGE IS UNCLASSIFIED MATERIAL. NO TREES, STUMPS, OR OTHER DECAY TYPE MATERIALS. ANY ROCKS OR CONCRETE SHALL BE BROKEN TO 2' DIA. OR SMALLER. THE FIRING RANGE "BERMS" MAY BE "MACHINE" ROLLED OR TRACKED IN FOR COMPACTION. COMPACTION TESTS ARE NOT REQUIRED FOR THE FIRING RANGE BERMS. INSPECTIONS WILL OCCUR TO ENSURE GENERAL COMPACTION OF THE BERMS ARE PROVIDED.

Not to Scale
See Construction Plans

CITY OF NIXA, MISSOURI
POLICE FIRING RANGE

Nixa, Christian County, Missouri

SHAFFER & HINES, INC.
CERTIFICATE OF AUTHORITY
LICENSE NO. 001165

SHAFFER & HINES
CONSULTING ENGINEERS - REGISTERED LAND SURVEYORS
P.O. Box 193, Nixa, Missouri 65714
Tel: (417) 725-4563 | Fax: (417) 725-5230
Email: cbass@shafferhines.com

SITE GRADING PLAN

DESIGN BY: JCM/
DRAWN BY: GSM
CHKD BY: JCM/
DATE: MARCH, 2022
SCALE: AS SHOWN
REVISIONS:

JOB NO. 202005

SHEET 3 OF 6

Appendix B – Copy of 2022 CGP

On File at the Office of the Consulting Civil Engineer

Appendix C – Copy of NOI and EPA Authorization email

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Dru Buntin, Director

Police Firing Range
MORA20878, Christian County
City of Nixa
P.O. Box 395
Nixa, MO 65714

Pursuant to the Federal Water Pollution Control Act, under the authority granted to the State of Missouri and in compliance with the Missouri Clean Water Law, the Missouri Department of Natural Resources (Department) has issued, and we are enclosing your Missouri State Operating Permit which authorizes land disturbance activities for Police Firing Range.

This General Permit is both your federal discharge permit and your new state operating permit and replaces all previous state operating permits and letters of approval for the discharges described within. In all future correspondence regarding this permit, please refer to your general permit number as shown on page one of your permit.

Please note that prior to the beginning of land disturbance activities other permits may also be required. Especially note the requirements for a Department 401 Water Quality Certification and the U.S. Army Corps of Engineers 404 permit. A 401 Certification is needed when placing material, or fill, into the jurisdictional waters of the Unites States. Examples are culverts under road crossings, riprap along stream banks and storm water outfall pipes. The term jurisdictional waters refers to large lakes, rivers, streams and wetlands, including those that don't always contain water.

This permit may include requirements with which you may not be familiar. If you would like the Missouri Department of Natural Resources (Department) to conduct a Compliance Assistance Visit to discuss the permit, an appointment can be set up by contacting your local Department Regional Office or the Water Pollution Program at 573-751-1300.

The permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP). Refer to your permit for more information on this SWPPP.

The requirements found in this permit do not supersede nor relieve liability for compliance with other federal, state, county, or local statutes, regulations, or ordinances. Also, any exemptions found in this permit do not imply an exemption from other permits from the Department. It is your responsibility to ensure that any and all necessary permits for this facility have been obtained.

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to Sections 644.051.6 and 621.250, RSMo. To appeal, you must file a petition with the AHC within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is

received by the AHC. Contact information for the AHC is as follows: Administrative Hearing Commission, United States Post Office Bldg., Third Floor, 131 West High Street, Jefferson City, MO 65101, and PO Box 1557, Jefferson City, MO 65102. phone: 573 751 2422, fax: 573 751 5018, website: www.oa.mo.gov/ahc.

If you have any questions concerning this permit, please do not hesitate to contact us by mail at Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, MO 65102-0176, or by phone at 573-522-4502. Thank you.

Sincerely,

Water Protection Program

Chris Wieberg
Director

CW

Police Firing Range
MORA20878

ePermitting Certification and Signature Document

Missouri State Operating General Permit number MORA20878 was issued on 03-29-2022 based on information entered into the Missouri Department of Natural Resources' electronic Permitting (ePermitting) system. Missouri Regulation 10 CSR 20-6.010(2)(B) requires that all applications for construction and operating permits be signed.

Police Firing Range, Christian County
972 S. Old Riverdale Road
NIXA, MO 65714
Total Permitted Area: 8.47 Acres
Total Number of Permitted Features: 1

Based upon the selection you made on the 'New Permit' screen; it was indicated that a single polygon was drawn indicating the entire disturbance area.

Is any part of the area that is being disturbed in a jurisdictional water of the United States? If yes, you must also receive a Clean Water Act, Section 404 Permit for this site from the United States Army Corp of Engineers.
No

I understand there may be an established Local Authority Erosion Control Plan in the city or the unincorporated area of the county where land disturbance activities covered under this general permit will occur. (Note - you may want to contact your local authority to determine if there are any requirements).
Agreed

A Stormwater Pollution Prevention Plan (SWPPP) must be developed for this site. This plan must be developed in accordance with requirements and guidelines specified within the general permit for storm water discharges from land disturbance activities. The application will be considered incomplete if the SWPPP has not been developed.
Agreed

The above certifications were made electronically in the ePermitting system by:
Name: Clayton Hines
Date: 03/29/2022

I certify that I am familiar with the information contained in the application, that to the best of my knowledge and belief such information is true, complete and accurate, and being granted this permit, I agree to abide by the Missouri Clean Water Law and all rules, regulations, orders and decisions, and terms of this permit, subject to any legitimate appeal available to an applicant under the Missouri Clean Water Commission.
Agreed

Clayton Hines
Signature

03-29-2022
Date

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.:	MORA20878
Owner Address:	City of Nixa P.O. Box 395 Nixa, MO 65714
Continuing Authority:	City of Nixa P.O. Box 395 Nixa, MO 65714
Facility Name: Facility Address:	Police Firing Range 972 S. Old Riverdale Road NIXA, MO 65714
Legal Description: UTM Coordinates: Receiving Stream: First Classified Stream - ID#: USGS# and Sub Watershed#:	Sec. 24, T 27N, R 22W, Christian County 474304.165 / 4097580.825 (U) 100K Extent-Remaining Streams (C) 3960.00 11010002 - 0208

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 - 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 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.

03-29-2022
Issue date

02/07/2027
Expiration date

Chris Wieberg

Chris Wieberg, Director, Water Protection Program

I. APPLICABILITY

A. Permit Coverage and Authorized Discharges

1. This Missouri State Operating Permit (permit) authorizes the discharge of stormwater and certain non-stormwater discharges from land disturbance sites that disturb one or more acres, or disturb less than one acre when part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project. A permit must be issued before any disturbance of root zone of the existing vegetation or other land disturbance activities may begin.

2. If an individual or developer proposes to improve a lot for development or sale that is less than an acre and part of a common plan of development or sale, a permit is required. If an individual proposes to develop a lot to reside on themselves, the development is not considered part of the larger common plan of development or sale and does not require a permit unless the lot is an acre or more [10 CSR 20-6.200 (1)(B)6.]. See table below.

Permit Requirements for a Common Promotional Plan

	Land Disturbance Permit Required?	
	Less than one acre (< 1 acre)	One acre or more (≥ 1 acre)
Land disturbance by a developer (or a contractor working on their behalf), regardless of type of development (initial, commercial, residential)	Yes, if part of a larger common plan of development or sale with cumulative disturbance of one or more acres including individual residential lots in order to improve the lot for sale	Yes
Land disturbance by an individual to reside on themselves (or a contractor working on their behalf)	No	Yes

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)].

A Missouri State Operating Permit (MORA, MOR100, or site specific) that specifically identifies the project must be issued before any site vegetation is removed (disturbance of the root zone) or the site disturbed [10 CSR 20-6.200 (1)(A)].

Any persons who operate, use, or maintain a land disturbance activity (owner/operator) which is subject to permitting requirements for stormwater discharges from land disturbance activities, who disturbs land prior to permit issuance from the Department is in violation of both State [10 CSR 20-6.200 (1)(A)] and Federal regulations.

The owner/operator and continuing authority of this permit are responsible for compliance with this permit [10 CSR 20-6.200 (3)(B)].

The primary operator(s) of a land disturbance site is any party associated with the project who either: 1) has operational control over construction plans, including the ability to make modifications to those plans; or 2) has day-to-day operational control of those activities at a project that are necessary to ensure compliance with the permit conditions. This may be the General Contractor, Project Manager, or similar role.

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

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

4. This permit authorizes non-stormwater discharges from the following activities provided that these discharges are treated by appropriate Best Management Practices (BMPs) where applicable and addressed in the permittee's specific SWPPP required by this general permit:
   (a) Discharges from emergency fire-fighting activities;
   (b) De-chlorinated fire hydrant flushing;
   (c) Uncontaminated water line flushing;
   (d) Uncontaminated condensate from air conditioning or compressor condensate;
   (e) Landscape watering;
   (f) Uncontaminated, non-turbid discharges of ground water or spring water;
   (g) Foundation or footing drains where flows are not contaminated with process materials;
   (h) Water used to control dust; and
   (i) Pavement wash waters, provided spills or leaks of toxic or hazardous substances have not occurred (unless all spill material has been removed) and where soaps, solvents, and detergents are not used. Directing pavement wash waters directly into any water of the state, storm inlet, or stormwater conveyance, unless the conveyance is connected to an effective control, is prohibited.

5. 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, shall notify the Department's Water Protection Program for approval before applying for coverage under this permit. The Department reserves the right to revoke or deny coverage under this general permit; a site-specific permit may be required to cover such activities.

B. Permit Restrictions

1. Any non-stormwater discharges other than those explicitly authorized in Part I APPLICABILTY, Condition A.3 are prohibited under this permit.

2. This permit does not authorize the discharge of process wastewaters, treated or otherwise, including water used to wash machinery, equipment, buildings, or wastewater from washout of concrete.

3. For sites operating within the watershed of any Outstanding National Resource Water (which includes the Ozark National Riverways and the National Wild and Scenic Rivers System), sites that discharge to an Outstanding State Resource Water, or facilities located within the watershed of an impaired water as designated in the 305(b) report, including the 303(d) list, with an impairment for sediment:
   (a) This permit authorizes stormwater discharge so long as no degradation of water quality occurs due to discharges from the permitted facility per 10 CSR 20-7.031(3)(C) and as long as the facility is 1,000 or more feet away from the Outstanding National or State Resource Water or a water of the state with an impairment for sediment.
   (b) A site with a discharge found to be causing degradation or contributing to an impairment by discharging a pollutant of concern, during an inspection or through complaint investigations, may be required to become a no discharge facility or obtain a site-specific permit with more stringent monitoring and SWPPP requirements.
   (c) For sites within 1,000 feet of Outstanding National or State Resource Water or a water of the state with an impairment for sediment, the site shall operate as a no-discharge facility as defined in 10 CSR 20-6.015(1)(B)7, and discharges from dewatering of sedimentation basins is prohibited.

4. This general permit does not authorize the placement of fill materials in flood plains, placement of fill into any floodway, the obstruction of stream flow, or changing the channel of a defined drainage course. This general permit addresses only the quality of the stormwater runoff and the minimization of off-site migration of sediments and other water contaminants.

5. This permit does not allow stream channel or wetland alterations unless approved by Section 404 of the federal Clean Water Act (CWA) permitting authorities. Land disturbance activities may not begin in waters of the United States until any required Section 404 permit and Section 401 certification have been obtained.

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

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

8. The Department may require any facility or site authorized by a general permit to apply for a site-specific permit [10 CSR 20-6.010(13)(C)]. Cases where a site-specific permit may be required include, but are not limited to, the following:
   (a) The discharge(s) is a significant contributor of a pollutant(s) which impairs the designated uses or general criteria of the receiving stream;
   (b) The discharger is not in compliance with the conditions of the general permit;
   (c) A Total Maximum Daily Load (TMDL) containing requirements applicable to the discharge(s) is approved; or
   (d) Materials or contaminants exist at the site, or are brought to the site to use as fill or borrow, which may necessitate special controls or permit limits not otherwise considered under this general permit, such as contaminated soils from federal clean-up sites. This general permit may be authorized when additional contaminant controls are proposed by the applicant and the proposal is accepted by the Department in written correspondence.

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

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

11. In the event that a State of Emergency is declared, either by the State or Federal government, and as a result an emergency-related project requires land disturbance activity that requires a permit, the owner/operator of the project may begin work prior to permit issuance so long as they implement sediment and erosion controls in compliance with the master general permit conditions contained herein. The owner/operator is not exempt from permitting and shall apply for the land disturbance permit as soon as practicable but no later than seven calendar days after starting work. The Department may determine that other emergencies, considered on a case-by-case basis, are applicable. Contact the Department to determine if non-state of emergencies are applicable.

II. EXEMPTIONS FROM PERMIT REQUIREMENTS

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

2. Land disturbance activities that disturb less than one (1) acre of total land area which are not part of a common plan of sale where water quality standards are not exceeded are exempt from Department stormwater permit requirements. Land disturbance activity on an individual residential building lot is not considered as part of the overall subdivision unless the activity is by the developer to improve the lot for sale.

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

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

III. REQUIREMENTS

1. The permittee shall post a public notification sign at the main entrance to the site with the specific MORA permit number. The public notification sign must be visible from the public road that provides access to the site's main entrance. An alternate location is acceptable provided the public can see it and it is noted in the SWPPP. The public notification sign must remain posted at the site until the permit has been terminated. The sign is provided at the end of this permit.

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

3. Ensure the design, installation, and maintenance of effective erosion and sediment controls to minimize the discharge of pollutants. At a minimum, such controls must be designed, installed, and maintained to:
   (a) Control stormwater volume, velocity, and peak flow rates within the site to minimize soil erosion;
   (b) Control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion and scour;
   (c) Minimize the amount of exposed soil during construction activity;
   (d) Minimize the disturbance of steep slopes;
   (e) Minimize sediment discharges from the site. Address factors such as:
      1) the amount, frequency, intensity, and duration of precipitation;
      2) the nature of resulting stormwater runoff;
      3) expected flow from impervious surfaces, slopes, and drainage features; and
      4) soil characteristics, including the range of soil particle size expected to be present on the site;
   (f) Provide and maintain natural buffers around surface waters as detailed in Part V. BMP REQUIREMENTS Condition 7, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration and filtering, unless infeasible;
   (g) Minimize soil compaction and preserve topsoil where practicable; and
   (h) Capture or treat a 2-year, 24-hour storm event.

4. 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 https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html.
   (a) As an alternative to utilizing NOAA Atlas 14 for site specific data to determine the 2-year, 24-hour storm event the conservative default value can be used based on the map provided by the Department in the Factsheet portion of this permit. The permittee may choose which source to use for the site specific data.

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

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

7. Temporary BMPs may be added and removed as necessary with updates to the SWPPP as specified in the requirements below.

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

9. Minimize sediment trackout from the site and sediment transport onto roadways.
   (a) Restrict vehicle traffic to designated exit points.
   (b) Use appropriate stabilization techniques or BMPs at all points that exit onto paved roads or areas outside of the site.
   (c) Use additional controls to remove sediment from vehicle and equipment tires prior to exit from facility where necessary.
   (d) Any sediment or debris that is tracked out past the exit pad or is deposited on a roadway after a precipitation event shall be removed the shorter of either daily or before a rain event. Remove the track-out sediment by sweeping, shoveling, or vacuuming these surfaces, or by using other similarly effective means of sediment removal. Sediment or debris tracked out

on pavement or other impervious surfaces shall not be disposed of into any stormwater conveyance, storm drain inlet, or water of the state.

(e) Stormwater inlets susceptible to receiving sediment or other pollutants from the permitted land disturbance site shall have curb inlet protection. This may include inlets off the active area where track out from vehicles and equipment could impact the stormwater runoff to those inlets.

10. Concrete washout facilities shall be used to contain concrete waste from the activities onsite, unless the washout of trucks and equipment is managed properly at an offsite location.
The washout facility shall be managed to prevent solid and/or liquid waste from entering waters of the state by the following:
(a) Direct the wash water into leak-proof containers or pits designed so that no overflows can occur due to inadequate sizing or precipitation;
(b) Locate washout activities a minimum of 50 feet from waters of the state, stormwater inlets and/or stormwater conveyances;
(c) Washout facilities shall be cleaned, or new facilities must be constructed and ready for use, once the washout is 75% full;
(d) Designate the washout area(s) and conduct such activities only in these areas.
(e) Ensure contractors are aware of the location, such as by marking the area(s) on the map or signage visible to the truck and/or equipment operators.

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

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

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

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

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

17. The full implementation of this operating permit shall constitute compliance with all applicable federal and state statutes and regulations in accordance with RSMo 644.051.16 and the CWA §402(k); however, this permit may be reopened and modified or alternatively revoked and reissued to comply with any applicable effluent standard or limitation issued or approved under Clean Water Act §§ 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) if the effluent standard or limitation so issued or approved contains different conditions or is otherwise more stringent than any effluent limitation in the permit or controls any pollutant not limited

in the permit. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, termination, notice of planned changes, or anticipated non-compliance does not stay any permit condition.

IV. STORMWATER POLLUTION PREVENTION PLAN (SWPPP) MANAGEMENT REQUIREMENTS

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

   The purpose of the SWPPP is to ensure the design, implementation, management, and maintenance of BMPs in order to prevent sediment and other pollutants in stormwater discharges associated with the land disturbance activities [40 CFR 122.44 (k)(4)] from entering waters of the state above established general and narrative criteria; compliance with Missouri Water Quality Standards; and compliance with the terms and conditions of this general permit.
   (a) **The SWPPP must be developed and implemented prior to conducting any land disturbance activities and must be specific to the land disturbance activities at the site.**
   (b) The permittee shall fully implement the provisions of the SWPPP required under this permit as a condition of this general permit throughout the term of the land disturbance project. Failure to develop, implement, and maintain a SWPPP may lead to immediate enforcement action.
   (c) The SWPPP is a living document and shall be updated any time site conditions warrant adjustments to the project or BMPs.
   (d) Either an electronic copy or a paper copy of the SWPPP, and any required reports, must be accessible to anyone on-site at all times when land disturbance operations are in process or other operational activities that may affect the maintenance or integrity of the BMP structures and made available as specified under Part VIII. STANDARD PERMIT CONDITIONS, Condition 1 of this permit. The SWPPP shall be readily available upon request and should not be sent to the Department unless specifically requested

2. A SWPPP must be developed, implemented, and maintained at the site or electronically accessible by on-site personnel. Failure to implement and maintain the BMPs chosen, which can be revised and updated, is a permit violation. The chosen BMPs will be the most reasonable and cost effective while also ensuring the highest quality water discharged attainable for the facility. Facilities with established SWPPPs and BMPs shall evaluate BMPs on a regular basis and change the BMPs as needed if there are BMP deficiencies.

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

4. The SWPPP briefly must describe the nature of the land disturbance activity, including:
   (a) The function of the project (e.g., low density residential, shopping mall, highway, etc.);
   (b) The intended sequence and timing of activities that disturb the soils at the site;
   (c) Estimates of the total area expected to be disturbed by excavation, grading, or other land disturbance support activities including off-site borrow and fill areas;
   (d) If within the boundaries of a regulated Municipal Separate Storm Sewer System (MS4s), list the name of the regulated MS4.

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

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

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

   Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites, (Document number EPA 833-R-06-004) published by the United States Environmental Protection Agency (USEPA) in May 2007. This manual as well as other

information, including examples of construction SWPPPs, is available at the USEPA internet site at https://www.epa.gov/sites/production/files/2015-10/documents/sw_swppp_guide.pdf; and https://www.epa.gov/npdes/developing-stormwater-pollution-prevention-plan-swppp.

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

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

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

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

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

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

10. Site Inspections: The environmental lead, or a designated inspector, shall conduct regularly scheduled inspections. These inspections shall be conducted by a qualified person, one who is responsible for environmental matters at the site, or a person trained by and directly supervised by the person responsible for environmental matters at the site. Site inspections shall include, at a minimum, the following:
   (a) For disturbed areas that have not achieved final stabilization, all installed BMPs and other pollution control measures shall be inspected to ensure they are properly installed, appear to be operational, and are working as intended to minimize the discharge of pollutants.
   (b) For areas on site that have achieved either temporary or final stabilization, while at the same time active construction continues on other areas, ensure that all stabilization measures are properly installed, appear to be operational, and are

working as intended to minimize the discharge of pollutants.

(c) Inspect all material, waste, borrow, and equipment storage, and maintenance areas that are covered by this permit. Inspect for conditions that could lead to spills, leaks, or other accumulations of pollutants on the site.

(d) Inspect all areas where stormwater typically flows within the site, including drainage ways designed to divert, convey, and/or treat stormwater.

(e) All stormwater outfalls shall be inspected for evidence of erosion, sediment deposition, or impacts to the receiving stream. If a discharge is occurring during an inspection, the inspector must observe and document the visual quality of the discharge, and take note of the characteristics of the stormwater discharge, including turbidity, color; odor; floating, settled, or suspended solids; foam; oil sheen; and other indicators of stormwater pollutants.

(f) When practicable the receiving stream shall also be inspected for a minimum of 50 feet downstream of the outfall.

(g) The perimeter of the site shall be inspected for evidence of BMP failure to ensure concentrated flow does not develop a new outfall.

(h) The SWPPP must explain how the environmental lead will be notified when stormwater runoff occurs.

11. Inspection Frequency: All BMPs must be inspected in accordance to one of the schedules listed below. The inspection frequency shall be documented in the SWPPP, and any changes to the frequency of inspections, including switching between the options listed below, must be documented on the inspection form:

(a) At least once every seven (7) calendar days and within 48 hours after any storm event equal to or greater than a 2-year, 24-hour storm has ceased during a normal work day or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday; or

(b) Once every 14 calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches of precipitation or greater, or the occurrence of runoff from snowmelt. To determine if a storm event of 0.25 inches or greater has occurred on the site, the permittee shall either keep a properly maintained rain gauge on site, or obtain the storm event information from a weather station near the site location.

1) Inspections are only required during the project's normal working hours.
2) An inspection must be conducted within 24 hours of a storm event which has produced 0.25 inches. The inspection shall be conducted within 24 hours of the event end, or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.
3) If it is elected to inspect every 14 calendar days and there is a storm event at the site that continues for multiple days, and each day of the storm produces 0.25 inches or more of rain, the permittee shall conduct an inspection within 24 hours of the end of the storm or within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.

(c) For any portion of the site that discharges within the watershed of an Outstanding National or State Resource Water or a water impaired for sediment, inspections shall be inspected once every seven (7) calendar days and within 24 hours of the occurrence of a storm event of 0.25 inches or greater, or when the occurrence of runoff flow from frozen or snowmelt is sufficient to cause a discharge.

(d) Areas on-site that have achieved stabilization, while at the same time active construction continues on other areas, may reduce inspection frequency to monthly, for those stabilized areas, if the following conditions exist:

1) For areas where disturbed portions have undergone temporary stabilization, inspections shall occur at least once a month while stabilized and when re-disturbed shall follow either frequency outlined in (a),(b), or (c) above.
2) Areas on-site that have achieved final stabilization must be inspected at least once per month until the permit is terminated.

(e) If construction activities are suspended due to frozen conditions, the permittee may temporarily reduce site inspections to monthly until thawing conditions begin to occur if all of the following are met:

1) Land disturbances have been suspended; and
2) All disturbed areas of the site have been stabilized in accordance with Part V. BMP REQUIREMENTS, Condition 13.
3) The change shall be noted in the SWPPP.

(f) Any basin dewatering shall be inspected daily when discharge is occurring. The discharge shall be observed and dewatering activities shall be ceased immediately if the receiving stream is being impacted. These inspections shall be noted on a log or on the inspection report.

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

12. Site Inspection Reports: A log of each inspection and/or copy of the inspection report shall be kept readily accessible and must be made available upon request by the Department. Electronic logs are acceptable as long as reports can be provided within 24 hours. If inspection reports are kept off-site, the SWPPP must indicate where they are stored. The inspection report shall be signed by the environmental lead or designated inspector (electronically or otherwise).

(a) The inspection report is to include the following minimum information:

1) Inspector's name and title.
2) Date and time of inspection.
3) Observations relative to the effectiveness of the BMPs and stabilization measures. The following must be documented:
   a. Whether BMPs are installed, operational, and working as intended;
   b. Whether any new or modified stormwater controls are needed;
   c. Facilities examined for conditions that could lead to spill or leak;
   d. Outfalls examined for visual signs of erosion or sedimentation at outfalls. Excessive erosion or sedimentation may be due to BMP failure or insufficiency. Response to observations should be addressed in the inspection report.
4) Corrective actions taken or necessary to correct the observed problem.
5) Listing of areas where land disturbance operations have permanently or temporarily stopped.

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

V. BMP REQUIREMENTS

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

2. Existing vegetation and trees shall be preserved where practicable. The permittee is encouraged to preserve topsoil where practicable. Trees designated for preservation should have a protective barrier outside of the dripline, or the area directly located under the outer reaches of the tree's branches.

3. The permittee shall select appropriate BMPs for use at the site and list them in the SWPPP. When selecting effective BMPs, the permittee shall consider stormwater volume and velocity and shall incorporate more than one BMP and sequential treatment devices where the use of a single BMP is ineffective to prevent or minimize sediment or other pollutants from leaving the site. Permittee should consider a schedule for performing erosion control measures when selecting BMPs.

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

5. Structural BMP Installation: The permittee shall ensure all BMPs are properly installed and operational at the locations and relative times specified in the SWPPP.
   (a) Perimeter control BMPs for runoff from disturbed areas shall be installed or existing vegetative areas marked for preservation before general site clearing is started. Note this requirement does not apply to earth disturbances related to initial site clearing and establishing entry, exit, or access of the site, which may require that stormwater controls be installed immediately after the earth disturbance.
   (b) For phased projects, BMPs shall be properly installed as necessary prior to construction activities.
   (c) Stormwater discharges which leave the site from disturbed areas shall pass through an appropriate impediment to sediment movement such as a sedimentation basin, sediment traps (including vegetative buffers), or silt fences prior to leaving the land disturbance site.
   (d) A drainage course change shall be clearly marked on a site map and described in the SWPPP.
   (e) If vegetative stabilization measures are being implemented, stabilization efforts are considered "installed" when all activities

necessary to seed or plant the area are completed. Vegetative stabilization is not considered "operational" until the vegetation is established.

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

7. For surface waters of the state, defined in Section 644.016.1(27) RSMo, located on or adjacent to the site, the permittee must maintain a riparian buffer or structural equivalent in accordance with at least one of the following options. The selection and location must be described in the SWPPP.
   (a) Provide and maintain a 50-foot undisturbed natural buffer; or
   (b) Provide and maintain an undisturbed natural buffer that is less than 50 feet and is supplemented by erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer; or
   (c) If infeasible to provide and maintain an undisturbed natural buffer of any size, implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer.
   (d) The permittee is not required to comply with (a), (b), or (c) above if one or more of the following exceptions apply and documentation is provided in the SWPPP:
      1) If there is no discharge of stormwater to waters of the state through the area between the disturbed portions of the site and waters of the state located within 50 feet of the site. This includes situations where the permittee has implemented permanent control measures that will prevent such discharges, such as a berm or other barrier.
      2) Where no natural buffer exists due to preexisting development disturbances that occurred prior to the initiation of planning for the current development of the site.
         a. Where some natural buffer exists but portions of the area within 50 feet of the waters of the state are occupied by preexisting development disturbances the permittee is required to comply with (a), (b), or (c) above.
      3) For linear projects where site constraints make it infeasible to implement a buffer or equivalent provided the permittee limit disturbances within 50 feet of any waters of the state and/or the permittee provides supplemental erosion and sediment controls to treat stormwater discharges from earth disturbances within 50 feet of the water of the state. The permittee must also document in the SWPPP the rationale for why it is infeasible for the permittee to implement (a), (b), or (c) and describe any buffer width retained and supplemental BMPs installed.
   (e) Where the permittee is retaining a buffer of any size, the buffer should be measured perpendicularly from any of the following points, whichever is further landward from the water:
      1) The ordinary high water mark of the water body, defined as the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris; or
      2) The edge of the stream or river bank, bluff, or cliff, whichever is applicable.

8. Slopes for disturbed areas must be identified in the SWPPP. A site map or maps defining the sloped areas for all phases of the project must be included in the SWPPP. The disturbance of steep slopes shall be minimized.

9. Manage stockpiles or land clearing debris piles composed, in whole or in part, of sediment and/or soil.
   (a) Locate the piles outside of any natural buffers zones, established under the condition above, and away from any stormwater conveyances, drain inlets, and areas where stormwater flow is concentrated;
   (b) Install a sediment barrier along all downgradient perimeter areas;
   (c) Prevent stormwater flows from causing erosion of stockpiles, for example, by diverting flows around them.
   (d) For piles that will be unused for 14 or more days, provide cover with appropriate temporary stabilization in accordance with Part V. BMP REQUIREMENTS, Condition 13.
   (e) Rinsing, sweeping, or otherwise placing any soil, sediment, debris, or stockpiled product which has accumulated on pavement or other impervious surfaces into any stormwater conveyance, storm drain inlet, or water of the state is prohibited.

10. The site shall include BMPs for pollution prevention measures and shall be noted in the SWPPP. At minimum such measures must be designed, installed, implemented, and maintained to:
   (a) Minimize the discharge of pollutants from equipment and vehicle rinsing; no detergents, additives, or soaps of any kind shall be used. Rinse waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
   (b) Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to precipitation and to stormwater;
   (c) Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures, including, but not limited to, the installation of containment berms and use of drip pans at petroleum product and liquid storage tanks and containers; and
   (d) Prevent discharges from causing or contributing to an exceedance of water quality standards including general criteria.

11. Sedimentation Basins: The SWPPP shall include a sedimentation basin for each drainage area with ten or more acres disturbed at one time.
    (a) The sedimentation basin shall be sized, at a minimum, to treat a local 2-year, 24-hour storm.
    (b) Sediment basins shall not be constructed in any waters of the state or natural buffer zones.
    (c) Discharges from dewatering activities shall be managed by appropriate controls. The SWPPP shall include a description of any anticipated dewatering methods and specific BMPs designed to treat dewatering water.
        1) Appropriate controls include, but are not limited to, sediment socks, dewatering tanks, tube settlers, weir tanks, filtration systems (e.g. bag or sand filters), and passive treatment systems that are designed to remove or retain sediment.
        2) Erosion controls and velocity dissipation devices (e.g. check dams, riprap, and vegetated buffers) to prevent erosion at inlets, outlets, and discharge points shall be utilized.
        3) Water with an oil sheen shall not be discharged and shall be marked in SWPPP.
        4) Visible floating solids and foam shall not be discharged.
    (d) Until final stabilization has been achieved, sediment basins and impoundments shall utilize outlet structures or floating skimmers that withdraw water from the surface when discharging.
        1) Under frozen conditions, it may be considered infeasible to withdraw water from the surface and an exception can be made for that specific period as long as discharges that may contain sediment and other pollutants are managed by appropriate controls. If determined infeasible due to frozen conditions, documentation must be provided in the SWPPP to support the determination, including the specific conditions or time period when this exception applies.
    (e) Accumulated sediment shall not exceed 25% of total volume or as prescribed in the design, whichever is less. Note in the SWPPP the locations for disposal of the material removed from sediment basins.
    (f) Prevent discharges to the receiving stream causing visual turbidity. For the purposes of this permit, visual turbidity refers to a sediment plume or other cloudiness in the water caused by sediment that can be identified by an observer.
    (g) The SWPPP shall require the basin be maintained until final stabilization of the disturbed area served by the basin.

    Where use of a sediment basin is infeasible, the SWPPP shall evaluate and specify other similarly effective BMPs to be employed to control erosion and sediment. These similarly effective BMPs shall be selected from appropriate BMP guidance documents authorized by this permit. The BMPs must provide equivalent water quality protection to achieve compliance with this permit. The SWPPP shall require both temporary and permanent sedimentation basins to have a stabilized spillway to minimize the potential for erosion of the spillway or basin embankment.

12. Soil disturbing activities on site that have ceased either temporarily or permanently shall initiate stabilization immediately in accordance with the options below. For soil disturbing activities that have been temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days:
    (a) The permittee shall construct BMPs to establish interim stabilization; and
    (b) Stabilization must be initiated immediately and completed within 14 calendar days.
    (c) For soil disturbing activities that have been permanently ceased on any portion of the site, final stabilization of disturbed areas must be initiated immediately and completed within 14 calendar days.
        1) Extension to the 14-day completion period for temporary and final stabilization may be made due to weather and equipment malfunctions. In these circumstances, the justification for the extension to the 14 day shall be documented in the SWPPP. The discontinuation or continuation of the extension may be determined by review of the Department staff when on site.
    (d) Until stabilization is complete, interim sediment control shall consist of well-established and maintained BMPs that are reasonably certain to protect waters of the state from sediment pollution over an extended period of time. This may require adding more BMPs to an area than is normally used during daily operations. The types of BMPs used must be suited to the area disturbed, taking into account the number of acres exposed and the steepness of the slopes. If the slope of the area is greater than 3:1 (three feet horizontal to one foot vertical) 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. The following activities would constitute the immediate initiation of stabilization:
        1) Prepping the soil for vegetative or non-vegetative stabilization as long as seeding, planting, and/or installation of non-vegetative stabilization products takes place as soon as practicable;
        2) Applying mulch or other non-vegetative product to the exposed areas;
        3) Seeding or planting the exposed areas;
        4) Finalizing arrangements to have stabilization product fully installed in compliance with the deadlines for completing stabilization.
    (e) If vegetative stabilization measures are being implemented, stabilization is considered "installed" when all activities necessary to seed or plant the area are completed. Installed does not mean established.
    (f) If non-vegetative stabilization measures are being implemented, stabilization is considered "installed" when all such measures are implemented or applied.
        1) Non-vegetative stabilization shall prevent erosion and shall be chosen for site conditions, such as slope and flow of

stormwater.

(g) Final stabilization is not considered achieved until vegetation has grown and established to meet the requirements below.

13. Prior to removal of BMPs, ceasing site inspections, and requesting termination of the permit, final stabilization must be achieved. Final stabilization shall be achieved as soon as possible once land disturbance activities have ceased. Document in the SWPPP the type of stabilization and the date final stabilization is achieved.
    (a) The project is considered to have achieved final stabilization when perennial vegetation (excluding volunteer vegetation), pavement, buildings, or structures using permanent materials (i.e. riprap, gravel, etc.) cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetation must be at least 70% coverage of 100% of the vegetated areas on site. Vegetation must be evenly distributed.
    (b) Disturbed areas on agricultural land are considered to have achieved final stabilization when they are restored to their preconstruction agricultural use. If former agricultural land is changing to non-agricultural use, this is no longer considered agricultural land and shall follow condition (a).
    (c) If the intended function of a specific area of the site necessitates that it remain disturbed, final stabilization is considered achieved if all of the following are met:
        1) Only the minimum area needed remains disturbed (i.e. dirt access roads, motocross tracks, utility pole pads, areas being used for storage of vehicles, equipment, materials). Other areas must meet the criteria above.
        2) Permanent structural BMPs (rock checks, berms, grading, etc.) or non-vegetative stabilization measures are implemented and designed to prevent sediment and other pollutants from entering waters of the state.
        3) Inspection requirements in Part IV. SWPPP MANAGEMENT REQUIREMENT, Condition 11 are met and documented in the SWPPP.
    (d) Winter weather and frozen conditions do not excuse any of the above final stabilization requirements. If vegetation is required for stabilization the permittee must maintain BMPs throughout winter weather and frozen conditions until thawing and vegetation meets final stabilization criteria above. Document stabilization attempts during frozen conditions in the SWPPP. Consider future freezing when removing vegetation and plan with temporary stabilization techniques before the ground becomes frozen.

VI. PERMIT TERMINATION

1. Until the permittee terminates coverage under this permit, the permittee must comply with all conditions in the permit, including continuation of site inspections and public notification signage posted. To terminate permit coverage, the permittee must submit to the appropriate Regional Office a complete and accurate Request for Termination of Operating Permit which certifies that the site meets the following requirements:
    (a) For any areas that (1) were disturbed during construction, (2) are not covered over by permanent structures, and (3) over which the permittee had control during the construction activities, the requirements for final vegetative or non-vegetative stabilization in Part V BMP REQUIREMENTS, Condition 13;
    (b) The permittee has removed and properly disposed of all construction materials, waste, and waste handling devices and has removed all equipment and vehicles that were used during construction, unless intended for long-term use following termination of permit coverage;
    (c) The permittee has removed all temporary BMPs that were installed and maintained during construction, except those that are intended for long-term use following termination of permit coverage or those that are biodegradable; and
    (d) The permittee has removed all potential pollutants and pollutant-generating activities associated with construction, unless needed for long-term use following termination of permit coverage.

    The Department may request photographs that clearly document compliance with termination requirements.

2. The permit may be terminated if;
    (a) There has been a transfer of control of all areas of the site for which the current permittee is responsible under this permit to another operator, and that operator has obtained coverage under this permit; or
    (b) Coverage under an individual or alternative general NPDES permit, with land disturbance conditions, has been obtained.

VII. SAMPLING REQUIREMENTS

The permittee is not required to sample stormwater under this permit. The Department may require sampling and reporting as a result of illegal discharges, compliance issues related to water quality concerns or BMP effectiveness, or evidence of off-site impacts from activities at the site. If such an action is needed, the Department will specify in writing the sampling requirements, including such information as location and extent. If the permittee refuses to perform sampling when required, the Department may terminate the general permit and require the facility to obtain a site-specific permit with sampling requirements.

VIII. STANDARD PERMIT CONDITIONS

1. Records: The permittee shall retain copies of this general permit, the SWPPP and all amendments for the site named in the State Operating Permit, results of any monitoring and analysis, and all site inspection records required by this general permit.
   (a) The records shall be accessible during normal business hours and retained for a period of at least three (3) years from the date of termination.
   (b) The permittee shall provide a copy (electronic or otherwise) of the SWPPP to the Department, USEPA, or any local agency or government representative if they request a copy in the performance of their official duties within 24 hours of the request (or next working day), unless given more time by the representative.
   (c) The permittee shall provide a copy of the SWPPP to those who are responsible for installation, operation, or maintenance of any BMP. The permittee, their representative, and/or the contractor(s) responsible for installation, operation and maintenance of the BMPs shall have a current copy of the SWPPP with them when on the project site.

2. Land Ownership and Change of Ownership: Federal and Missouri stormwater regulations [10 CSR 20-6.200(1) (B)] require a stormwater permit and erosion control measures for all land disturbances of one or more acres. These regulations also require a permit for land disturbance sites less than one acre if the lot is part of a larger common plan of development or sale.
   (a) 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.
   (b) Property of any size which is part of a larger common plan of development where the property has achieved final stabilization and the original permit terminated will require application of a new land disturbance permit for any future land disturbance activity unless the activity is by an individual residential building lot owner on a site less than one acre.
   (c) If a portion of a larger common plan of development is sold to an individual for the purpose of building his or her own private residence, a permit is required if the disturbed portion of the land sold is equal to or greater than one acre. No permit is required, however, for less than one acre of land disturbed on the portion sold.

3. Permit Transfer: This permit may not be transferred to a new owner in any fashion except by submitting an Application for Transfer of Operating Permit signed by the seller and buyer of the site along with the appropriate modification fee. In some cases, revocation and reissuance may be necessary. Facilities that undergo transfers of ownership without notice to the Department are considered to be operating without a permit.

4. Termination: This permit may be terminated when the project has achieved final stabilization, defined in Part VI. PERMIT TERMINATION.
   (a) In order to terminate the permit, the permittee shall notify the Department by submitting the form Request for Termination of Operating Permit Form MO 780-2814. The form should be submitted to the appropriate Regional Office or through an approved electronic system if it should become available.
   (b) The Cover Page (Certificate Page) of the Master General Permit for Land Disturbance specifies the "effective date" and the "expiration date" of the Master General Permit. The "issued date" along with the "expiration date" will appear on the State Operating Permit issued to the applicant. **This permit does not continue administratively beyond the expiration date.**

5. Duty to Reapply: If the project or development completion date will be after the expiration date of this general permit, then the permittee must reapply to the Department for a new permit. This permit may be applied for and issued electronically in accordance with Section 644.051.10, RSMo.
   (a) Due to the nature of the electronic permitting system, a period of time may be granted at the discretion of the Department in order to apply for a new permit after the new version is effective. Applicants must maintain appropriate best management practices and inspections during the discretionary period.

6. Duty to Comply: The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Missouri Clean Water Law and Federal Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

7. Modification, Revocation, and Reopening:
   (a) If at any time the Department determines that the quality of waters of the state may be better protected by reopening this permit, or revoking this permit and requiring the owner/operator of the permitted site to apply for a site-specific permit, the Department may revoke a general permit and require any person to obtain such an operating permit as authorized by 10 CSR20-6.010(13) and 10 CSR 20-6.200(1)(B).

(b) If this permit is reopened, modified, or revoked pursuant to this Section, the permittee retains all rights under Chapter 536 and 644 Revised Statutes of Missouri upon the Department's reissuance of the permit as well as all other forms of administrative, judicial, and equitable relief available under law.

8. Other Information: Where the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.

9. Duty to Provide Information: The permittee shall furnish to the Department, within 24 hours unless explicitly granted more time in writing, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Department upon request, copies of records required to be kept by this permit.

10. Inspection and Entry: The permittee shall allow the Department, or an authorized representative (including an authorized contractor acting as a representative of the Department), upon presentation of credentials and other documents as may be required by law, to:
    (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of the permit;
    (b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
    (c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
    (d) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Federal Clean Water Act or Missouri Clean Water Law, any substances or parameters at any location.

11. Signatory Requirement:
    (a) All permit applications, reports required by the permit, or information requested by the Department shall be signed and certified. (See 40 CFR 122.22 and 10 CSR 20-6.010)
    (b) The Federal Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit (including monitoring reports or reports of compliance or non-compliance) shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six (6) months per violation, or by both.
    (c) The Missouri Clean Water Law provides that any person who knowingly makes any false statement, representation or certification in any application, record, report, plan, or other document filed or required to be maintained pursuant to sections 644.006 to 644.141 shall, upon conviction, be punished by a fine of not more than ten thousand dollars, or by imprisonment for not more than six months, or by both.

12. Property Rights: This permit does not convey any property rights of any sort or any exclusive privilege.

13. Notice of Right to Appeal: If you were adversely affected by this decision, you may be entitled to pursue an appeal before the administrative hearing commission (AHC) pursuant to Sections 621.250 and 644.051.6 RSMo. To appeal, you must file a petition with the AHC within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Any appeal should be directed to:

Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: https://ahc.mo.gov

MISSOURI DEPARTMENT OF NATURAL RESOURCES
FACT SHEET FOR MASTER GENERAL PERMIT
MO-RAXXXXX

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 CFR 124.8, and 10 CSR 20-6.020(1)(A)2, a Fact Sheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the permit. A Fact Sheet is not an enforceable part of an MSOP.

DEFINITIONS FOR THE PURPOSES OF THIS PERMIT:

Common Promotional Plan: A plan undertaken by one (1) or more persons to offer lots for sale or lease; where land is offered for sale by a person or group of persons acting in concert, and the land is contiguous or is known, designated, or advertised as a common unit or by a common name or similar names, the land is presumed, without regard to the number of lots covered by each individual offering, as being offered for sale or lease as part of a common promotional plan.

Dewatering: The act of draining rainwater and/or groundwater from basins, building foundations, vaults, and trenches.

Effective Operating Condition: For the purposes of this permit, a stormwater control is kept in effective operating condition if it has been implemented and maintained in such a manner that it is working as designed to minimize pollutant discharges.

Emergency-Related Project: A project initiated in response to a public emergency (e.g. earthquakes, extreme flooding conditions, tornado, disruptions in essential public services, pandemic) for which the related work requires immediate authorization to avoid imminent endangerment to human health/safety or the environment or to reestablish essential public services.

Exposed Soils: For the purposes of this permit, soils that as a result of earth-disturbing activities are left open to the elements.

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

Impervious Surface: For the purpose of this permit, any land surface with a low or no capacity for soil infiltration including, but not limited to, pavement, sidewalks, parking areas and driveways, packed gravel or soil, or rooftops.

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

Install or Installation: When used in connection with stormwater controls, to connect or set in position stormwater controls to make them operational.

Land Disturbance Site or Site: The land or water area where land disturbance activities will occur and where stormwater controls will be installed and maintained. The land disturbance site includes construction support activities, which may be located at a different part of the property from where the primary land disturbance activity will take place or on a different piece of property altogether. Off-site borrow areas directly and exclusively related to the land disturbance activity are part of the site and must be permitted.

Larger Common Plan of Development or Sale: A continuous area where multiple separate and distinct construction activities are occurring under one plan, including any offsite borrow areas that are directly and exclusively related to the land disturbance activity. Off-site borrow areas utilized for multiple different land disturbance projects are considered their own entity and are not part of the larger common plan of development or sale. See definition of Common Promotional Plan to understand what a 'common plan' is.

Minimize: To reduce and/or eliminate to the extent achievable using stormwater controls that are technologically available and economically practicable and achievable in light of best industry practices.

Non-structural BMP: Institutional, educational, or pollution prevention practices designed to limit the amount of stormwater runoff or

pollutants that are generated in the landscape. Examples of non-structural BMPs include picking up trash and debris, sweeping up nearby sidewalks and streets, maintaining equipment, and training site staff on stormwater control practices.
Operational: for the purposes of this permit, stormwater controls are made "operational" when they have been installed and implemented, are functioning as designed, and are properly maintained.

Ordinary High Water Mark: The line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris.

Outfall: For the purposes of this permit, outfalls are locations where stormwater exits the site property, including pipes, ditches, swales, channels, or other conduits that transport stormwater discharges associated with the construction activity.

Peripheral: For the purposes of this permit, peripheral should be defined as the outermost boundary of the area that will be disturbed.

Permanently: For the purposes of this permit, permanently is defined as any activity that has been ceased without any intentions of future disturbance.

Pollution Prevention Controls (or Measures): Stormwater controls designed to reduce or eliminate the addition of pollutants to construction site discharges through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions.

Qualified Person (inspections): A person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention who possesses the appropriate skills and training to assess conditions at the construction site that could impact stormwater quality and the appropriate skills and training to assess the effectiveness of any stormwater controls selected and installed to meet the requirements of this permit.

Stormwater Control (also referred to as sediment/erosion controls): refers to any temporary or permanent BMP or other method used to prevent or reduce the discharge of pollutants to waters of the state.

Structural BMP: Physical sediment/erosion controls working individually or as a group (treatment train) appropriate to the source, location, and area climate for the pollutant to be controlled. Examples of structural BMPs include silt fences, sedimentation ponds, erosion control blankets, and seeding.

Temporary Stabilization: A condition where exposed soils or disturbed areas are provided temporary vegetation and/or non-vegetative protective cover to prevent erosion and sediment loss. Temporary stabilization may include temporary seeding, geotextiles, mulches, and other techniques to reduce or eliminate erosion until either final stabilization can be achieved or until further construction activities take place to re-disturb this area.

Treatment Train: A multi-BMP approach to managing the stormwater volume and velocity and often includes erosion prevention and sediment control practices often applied when the use of a single BMP is inadequate in preventing the erosion and transport of sediment. A good option to utilize as a corrective action.

Volunteer Vegetation: A volunteer plant is a plant that grows on its own, rather than being deliberately planted for stabilization purposes. Volunteers often grow from seeds that float in on the wind, are dropped by birds, or are inadvertently mixed into soils. Commonly, volunteer vegetation is referred to as 'weeds'. This does not meet the requirements for final stabilization.

Waters of the State: Section 644.016.1(27) RSMo. defines waters of the state as, "All waters within the jurisdiction of this state, including all rivers, streams, lakes and other bodies of surface and subsurface water lying within or forming a part of the boundaries of the state which are not entirely confined and located completely upon lands owned, leased or otherwise controlled by a single person or by two or more persons jointly or as tenants in common."

EXAMPLES OF TYPES; BUT NOT LIMITED TO'S:

Building materials and building products typically present at constructions sites: Asphalt sealants, copper flashing, roofing materials, adhesives, concrete admixtures, and gravel and mulch stockpiles

Construction and domestic (solid) waste: Packaging materials, scrap construction materials, masonry products, timber, pipe and electrical cuttings, plastics, Styrofoam, concrete, demolition debris, and other trash or building materials.

Hazardous or toxic waste that may be present at construction sites: Caulks, sealants, fluorescent light ballasts (mercury), solvents, petroleum-based products, wood preservatives, additives, curing compounds, and acids.

Pollutant-generating activities: Paving operations; concrete, paint, and stucco washout and waste disposal; solid waste storage and disposal; and dewatering activities.

Types of pollutants typically found at constructions sites: Sediment; nutrients; heavy metals; pesticides and herbicides; oil and grease; bacteria and viruses; trash, debris, and solids; treatment polymers; and any other toxic chemicals.

BMPs for Erosion Control: Temporary/permanent seeding, hydroseeding, mulch and hydromulch, erosion control blankets, dust control, sodding, slope protection, and preservation of existing vegetation.

BMPs for Sediment Control: Fabric drop inlet protection, excavated drop inlet protection, block and gravel inlet protection, domed inlet protection, inlet bag or insert, silt fence, temporary diversion, right-of-way/diversion bar, temporary slope drain, subsurface drain, rock outlets, berms, filter socks, transition mats, temporary sediment trap, energy dissipaters, rock check dam, ditch checks, wattles, straw bale barrier, vegetative buffer strip, sediment basin, particle curtains, frog logs, and dispersion fields.

ePermitting for Land Disturbance

In order to apply for the states MO-RA land disturbance permit you will need to utilize the Department's online ePermitting system. In order to access this, you will need to register an account with the Missouri Gateway for Environmental Management (MoGEM). The following user guides will assist you with this process.

MoGEM Website:https://dnr.mo.gov/data-e-services/missouri-gateway-environmental-management-mogem
ePermitting Website: https://dnr.mo.gov/data-e-services/water/electronic-permitting-epermitting
How to Register: https://dnr.mo.gov/document-search/registering-new-user-account-within-missouri-gateway-environmental-management-mogem-portal
ePermitting User Guides: (found on ePermitting website)

- How to Add a Facility: https://dnr.mo.gov/document-search/epermitting-chapter-2-home-facility-search-associate-new-facility
- How to Apply for a Permit: https://dnr.mo.gov/document-search/epermitting-chapter-3-create-new-permit.

Part I – Basic Permit Information

Facility Type:	Industrial Stormwater; Land Disturbance
Facility SIC Code(s):	1629
Facility Description:	Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading, filling, and other activities that result in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution to waters of the state).

This permit establishes a SWPPP requirement for pollutants of concern from all facilities covered under this permit. 10 CSR 20-6.200(7) specifies "general permits shall contain BMP requirements and/or monitoring and reporting requirements to keep the stormwater from becoming contaminated".

Land disturbance activities include clearing, grubbing, excavating, grading, filling and other activities that result in the destruction of the root zone and/or other activities that are reasonably certain to cause pollution to waters of the state.

A Missouri State Operating Permit for land disturbance permit is required for construction disturbance activities of one or more acres, or for construction activities that disturb less than one acre when they are part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project per 10CSR 20-6.200(1)(D)28.

The primary requirement of a land disturbance permit is the development of a SWPPP which incorporates site-specific BMPs to minimize soil exposure, soil erosion, and the discharge of pollutants. The SWPPP ensures the design, implementation, management and maintenance of BMPs in order to prevent sediment and other pollutants from leaving the site.

When it precipitates, stormwater washes over the loose soil on a construction site and various other materials and products being stored outside. As stormwater flows over the site, it can pick up pollutants like sediment, debris, and chemicals from the loose soil and transport them to nearby storm sewer systems or directly into rivers, lakes, or coastal waters. The Missouri Department of Natural Resources is responsible for ensuring that construction site operators have the proper stormwater controls in place so that construction can proceed in a way that protects your community's clean water and the surrounding environment. One way the department helps protect water quality is by issuing land disturbance permits.

Local conditions are not considered when developing conditions for a general permit. A facility may apply for a site-specific permit if they desire a review of site-specific conditions.

CHANGES TO THE RENEWAL OF THIS PERMIT INCLUDE:
While drafting this permit for renewal, the Department hosted three public meetings held on January 27, February 17, and March 9, 2021, which allowed stakeholders to voice concerns about conditions within the permit and submit comments during the period of initial stakeholder involvement. These concerns were taken into consideration when drafting the permit. In addition to these meetings, the Department also held an informal review period for stakeholders to review the draft prior to the 30 day public comment period.

- Updated language throughout the permit to current permit language used by the Department and EPA.
- Added language for emergency related projects.
- Clarified conditions which were ambiguous.
- Reorganized sections/conditions for logical progression.
- Authorized permit transfers and some modifications.
- Sections added for termination procedures, discharges to special streams, and procedures for concrete washout.

PART II – RECEIVING STREAM INFORMATION

APPLICABLE DESIGNATIONS OF WATERS OF THE STATE:
Per Missouri Effluent Regulations (10 CSR 20-7.015), the waters of the state are divided into seven (7) categories. This permit applies to facilities discharging to the following water body categories:

- ✓ Missouri or Mississippi River [10 CSR 20-7.015(2)]
- ✓ Lakes or Reservoirs [10 CSR 20-7.015(3)]
- ✓ Losing Streams [10 CSR 20-7.015(4)]
- ✓ Metropolitan No-Discharge Streams [10 CSR 20-7.015(5)]
- ✓ Special Streams [10 CSR 20-7.015(6)]
- ✓ Subsurface Waters [10 CSR 20-7.015(7)]
- ✓ All Other Waters [10 CSR 20-7.015(8)]

Missouri Water Quality Standards (10 CSR 20-7.031) defines the Clean Water Commission water quality objectives in terms of "water uses to be maintained and the criteria to protect those uses." The receiving stream and/or 1st classified receiving stream's designated water uses shall be maintained in accordance with 10 CSR 20-7.031(24). A general permit does not take into consideration site-specific conditions.

MIXING CONSIDERATIONS:
This permit applies to receiving streams of varying low flow conditions. Therefore, the effluent limitations must be based on the smallest low flow streams considered, which includes waters without designated uses. As such, no mixing is allowed [10 CSR 20-7.031(5)(A)4.B.(I)(a)]. No Zone of Initial Dilution is allowed. [10 CSR 20-7.031(5)(A)4.B.(I)(b)].

RECEIVING STREAM MONITORING REQUIREMENTS:
There are no receiving water monitoring requirements recommended at this time.

PART III – RATIONALE AND DERIVATION OF EFFLUENT LIMITATIONS & PERMIT CONDITIONS

305(B) REPORT, 303(D) LIST, & TOTAL MAXIMUM DAILY LOAD (TMDL):
Section 305(b) of the Federal CWA requires each state identify waters not meeting Water Quality Standards and for which adequate water pollution controls have not been required. Water Quality Standards protect such beneficial uses of water as whole body contact, maintaining fish and other aquatic life, and providing drinking water for people, livestock, and wildlife. The 303(d) report, which includes the 303(d) list, helps state and federal agencies keep track of waters which are impaired but not addressed by normal water pollution control programs.

A TMDL is a calculation of the maximum amount of a given pollutant a body of water can absorb before its water quality is affected. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan will be developed which shall include the TMDL calculation. For facilities with an existing general permit before a TMDL is written on their receiving stream, the Department will evaluate the permit and may require any facility authorized by this general permit to apply for and obtain a site-specific operating permit.

ANTI-BACKSLIDING:

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

✓ Not Applicable: All effluent limitations in this permit are at least as protective as those previously established.

ANTIDEGRADATION:

Antidegradation policies ensure protection of water quality for a particular water body on a pollutant by pollutant basis to ensure Water Quality Standards are maintained to support beneficial uses such as fish and wildlife propagation and recreation on and in the water. This also includes special protection of waters designated as an Outstanding National Resource Water or Outstanding State Resource Water [10 CSR 20-7.031(3)(C)]. Antidegradation policies are adopted to minimize adverse effects on water.

The Department has determined the best avenue forward for implementing the Antidegradation requirements into general stormwater permits is by requiring the appropriate development and maintenance of a SWPPP. The SWPPP must identify all reasonable and effective BMPs, taking into account environmental impacts and costs. This analysis must document why no discharge or no exposure options are not feasible at the facility. This selection and documentation of appropriate control measures will then serve as the analysis of alternatives and fulfill the requirements of the Antidegradation Rule and Implementation Procedure 10 CSR 20-7.031(3) and 10 CSR 20-7.015(9)(A)5.

Any facility seeking coverage under this permit which undergoes expansion or discharges a new pollutant of concern must update their SWPPP and select reasonable and cost effective new BMPs. New facilities seeking coverage under this permit are required to develop a SWPPP including this analysis and documentation of appropriate BMPs. Renewal of coverage for a facility requires a review of the SWPPP to ensure the selected BMPs continue to be appropriate.

✓ Applicable; the facility must review and maintain stormwater BMPs as appropriate.

BENCHMARKS:

When a permitted feature or outfall consists of only stormwater, a benchmark may be implemented at the discretion of the permit writer. Benchmarks require the facility to monitor and, if necessary, replace and update stormwater control measures. Benchmark concentrations are not effluent limitations. A benchmark exceedance, therefore, is not a permit violation; however, failure to take corrective action is a violation of the permit. Benchmark monitoring data is used to determine the overall effectiveness of control measures and to assist the permittee in knowing when additional corrective actions may be necessary to comply with the limitations of the permit.

✓ Not applicable; this facility has stormwater-only outfalls and does not contain numeric benchmarks.

BEST MANAGEMENT PRACTICES:

Minimum site-wide BMPs are established in this permit to ensure all permittees are managing their sites equally to protect waters of the state from certain activities which could cause negative effects in receiving water bodies. If the minimum BMPs are not followed, the facility may violate general criteria [10 CSR 20-7.031(4)]. Statutes are applicable to all permitted facilities in the state; therefore, pollutants cannot be released unless in accordance with RSMo 644.011 and 644.016 (17).

During a short time period, construction sites can contribute more sediment to streams than can be deposited naturally during several decades. The resulting siltation and contribution of other pollutants from construction sites can cause physical, chemical, and biological harm to Missouri's waters. Land disturbance activities, such as clearing and grading the land surface, increases the potential for sediment discharges.

The previous version of this permit contained the majority of the BMPs required in this permit and were found to protect water quality. Additional BMPs were added to improve protections with language taken from the EPA's Construction General Permit.

Language was added for track out to clarify and to combine with the roadway conditions in the previous permit. Preventing sediment from entering roadway inlets will protect water quality. Requirements were added for concrete wash out management. This is a common activity on construction sites which had not been address in the previous permit. Containment of the wash out water will protect waters of the state. This language was adopted from the EPAs Construction General Permit.

This renewal requires certain operators be listed in the SWPPP, this was added to ensure all responsible parties are known to the staff on site in the event there is an environmental issue that needs attention.

Inspection conditions were added to clarify what parts of the site to inspect. By inspecting areas prone to pollution, such as material storage, or location where pollutants are like to leave the site, such as the outfall, there is increased protections to water quality by stopping pollutants before leaving the site, or correcting an issue quickly.

Inspection frequencies were reduced for areas where stabilization has been achieved. It was the permit writer's judgement that stabilized areas do not require inspections at the same frequency as active areas of a site as the stabilization is a BMP to reduce sediment loss. Additional inspections are required for sediment basin dewatering activities during times of dewatering. These activities

open the possibility for high volumes of sediment to be discharged into the receiving waters. By inspecting the discharge, the waters shall be better protected. Language was added to add the temporary reduction of inspections for areas that have frozen ground.

Condition was added for stockpile management to add clarity for operators on site. Migration of soil or product from mis-managed piles can enter waters of the state and cause water quality violations. Conditions were added to sediment basin dewater to increase the protection of receiving waters by increasing controls to retain sediment and keep it out of the discharged water.

Language was added to include National and State Resource Waters with added protections. Language for this was taken from the template for Missouri General Permits. These requirements also include waters with impairments for sediment, the pollutant of concern under this permit. Extra protections in these special stream requirements were added to clarify the discharges must be stormwater only.

Language was added to include the encouragement of preserving vegetation, trees, and soil. Clearing reduces the natural uptake of water and nutrients by vegetation and excessive grading can smooth the ground surface, increasing amount and velocity of runoff. Vegetation inhibits erosion as the roots hold the topsoil in place, while leaves protect the surface against rain. Once the vegetative cover is gone, erosion is accelerated. The longer the exposed area is subject to erosive forces, the more severe the effect. Clarification was added to define voluntary vegetation and to explain that these shallow rooted short-lived vegetation is not allowed as permanent stabilization.

CHANGES IN DISCHARGES OF TOXIC POLLUTANT:
This special condition reiterates the federal rules found in 40 CFR 122.44(f) and 122.42(a)(1). In these rules, the facility is required to report changes in amounts of toxic substances discharged. Toxic substances are defined in 40 CFR 122.2 as "...any pollutant listed as toxic under section 307(a)(1) or, in the case of "sludge use or disposal practices," any pollutant identified in regulations implementing section 405(d) of the CWA." Section 307 of the clean water act then refers to those parameters found in 40 CFR 401.15. The permittee should also consider any other toxic pollutant in the discharge as reportable under this condition.

DOMESTIC WASTEWATER, SLUDGE, AND BIOSOLIDS:
Domestic wastewater is defined as wastewater (i.e., human sewage) originating primarily from the sanitary conveyances of bathrooms and kitchens. Domestic wastewater excludes stormwater, animal waste, process waste, and other similar waste.

✓ Not applicable; this permit does not authorize discharge of domestic waste, sludge, or biosolids. This includes discharges to onsite lagoons. If a facility has an onsite lagoon, they may need to obtain a separate general or site specific permit to cover discharges or land application from this structure.

Sewage sludge is solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works; including but not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works. Biosolids are solid materials resulting from domestic wastewater treatment meeting federal and state criteria for productive use (i.e. fertilizer) and after having pathogens removed.

✓ Not applicable; this permit does not authorize discharge or land application of biosolids or sludge. A separate permit must be obtained for these activities, either general or site specific.

EFFLUENT LIMITATION GUIDELINE:
Effluent Limitation Guidelines, or ELGs, are found at 40 CFR 400-499. These are limitations established by the EPA based on the SIC code and the type of work a facility is conducting. Most ELGs are for process wastewater and some address stormwater. All are technology based limitations which must be met by the applicable facility at all times.

✓ The industries covered under this permit have an associated Effluent Limit Guideline (ELG) which is applicable to the stormwater discharges in this permit and is applied under 40 CFR 125.3(a).

ELECTRONIC DISCHARGE MONITORING REPORT (EDMR) SUBMISSION SYSTEM:
The U.S. Environmental Protection Agency (EPA) promulgated a final rule on October 22, 2015, to modernize Clean Water Act reporting for municipalities, industries, and other facilities by converting to an electronic data reporting system. The final rule requires regulated entities and state and federal regulators to use information technology to electronically report data required by the National Pollutant Discharge Elimination System (NPDES) permit program instead of filing paper reports. To comply with the federal rule, the Department is requiring all permittees to begin submitting discharge monitoring data and reports online.

✓ Not applicable; this permit has no limits to report.

GENERAL CRITERIA CONSIDERATIONS:
In accordance with 40 CFR 122.44(d)(1), effluent limitations shall be placed into permits for pollutants determined to cause, have reasonable potential to cause, or to contribute to, an excursion above any water quality standard, including narrative water quality criteria. In order to comply with this regulation, the permit writer has completed a reasonable potential determination on whether

discharges have reasonable potential to cause or contribute to an excursion of the general criteria listed in 10 CSR 20-7.031(4). In instances where reasonable potential exists, the permit includes limitations within the permit to address the reasonable potential. In discharges where reasonable potential does not exist, the permit may include monitoring to later determine the discharge's potential to impact the narrative criteria. Additionally, RSMo 644.076.1, as well as Standard Permit Conditions Part VIII of this permit state it shall be unlawful for any person to cause or allow any discharge of water contaminants from any water contaminant or point source located in Missouri in violation of sections 644.006 to 644.141 of the Missouri Clean Water Law or any standard, rule, or regulation promulgated by the commission.

LAND APPLICATION:
Land application, or surficial dispersion of wastewater and/or sludge, is performed by facilities to maintain a basin as no-discharge. Requirements for these types of operations are found in 10 CSR 20-6.015; authority to regulate these activities is from RSMo 644.026.
✓ Not applicable; this permit does not authorize operation of a surficial land application system to disperse wastewater or sludge.

LAND DISTURBANCE:
Land disturbance, sometimes called construction activities, are actions which cause disturbance of the root layer or soil; these include clearing, grading, and excavating of the land. 40 CFR 122.26(b)(14) and 10 CSR 20-6.200(3) requires permit coverage for these activities. Coverage is not required for facilities when only providing maintenance of original line and grade, hydraulic capacity, or to continue the original purpose of the facility.
✓ Applicable; this permit provides coverage for land disturbance activities. These activities have SWPPP requirements and may be combined with the standard site SWPPP. Land disturbance BMPs should be designed to control the expected peak discharges. The University of Missouri has design storm events for the 25 year 24 hour storm; these can be found at: http://ag3.agebb.missouri.edu/design_storm/comparison_reports/20191117_25yr_24hr_comparison_table.htm; to calculate peak discharges, the website https://www.lmnoeng.com/Hydrology/rational.php has the rational equation to calculate expected discharge volume from the peak storm events.

NUTRIENT MONITORING:
Nutrient monitoring is required for facilities characteristically or expected to discharge nutrients (nitrogenous compounds and/or phosphorus) when the design flow is equal to or greater than 0.1 MGD per 10 CSR 20-7.015(9)(D)8.
✓ This is a stormwater only permit; therefore, it is not subject to provisions found in 10 CSR 20-7.015 per 10 CSR 20-7.015(1)(C).

OIL/WATER SEPARATORS:
Oil water separator (OWS) tank systems are frequently found at industrial sites where process water and stormwater may contain oils and greases, oily wastewaters, or other immiscible liquids requiring separation. Food industry discharges typically require pretreatment prior to discharge to municipally owned treatment works. Per 10 CSR 26-2.010(2)(B), all oil water separator tanks must be operated according to manufacturer's specifications and authorized in NPDES permits per 10 CSR 26-2.010(2) or may be regulated as a petroleum tank.
✓ Not applicable; this permit does not authorize the operation of OWS. The facility must obtain a separate permit to cover operation of and discharge from these devices.

OPERATOR CERTIFICATION REQUIREMENTS:
As per 10 CSR 20-6.010(8) Terms and Conditions of a Permit, permittees shall operate and maintain facilities to comply with the Missouri Clean Water Law and applicable permit conditions and regulations. Operators or supervisors of operations at regulated wastewater treatment facilities shall be certified in accordance with [10 CSR 20-9.020(2)] and any other applicable state law or regulation.
✓ Not applicable; the facilities covered under this permit are not required to have a certified operator.

PERMIT SHIELD:
The permit shield provision of the Clean Water Act (Section 402(k)) and Missouri Clean Water Law (644.051.16 RSMo) provides that when a permit holder is in compliance with its NPDES permit or MSOP, they are effectively in compliance with certain sections of the Clean Water Act and equivalent sections of the Missouri Clean Water Law. In general, the permit shield is a legal defense against certain enforcement actions but is only available when the facility is in compliance with its permit and satisfies other specific conditions, including having completely disclosed all discharges and all facility processes and activities to the Department at time of application. It is the facility's responsibility to ensure that all potential pollutants, waste streams, discharges, and activities, as well as wastewater land application, storage, and treatment areas, are all fully disclosed to the Department at the time of application or during the draft permit review process. Subsequent requests for authorization to discharge additional pollutants or expanded or newly disclosed flows, or for authorization for previously unpermitted and undisclosed activities or discharges, will likely require permit modification or may require the facility be covered under a site specific permit.

PRETREATMENT PROGRAM:
This permit does not regulate pretreatment requirements for facilities discharging to an accepting permitted wastewater treatment facility. If applicable, the receiving entity (the publicly owned treatment works - POTW) must ensure compliance with any effluent

limitation guidelines for pretreatment listed in 40 CFR Subchapter N per 10 CSR 20-6.100. Pretreatment regulations per RSMo 644.016 are limitations on the introduction of pollutants or water contaminants into publicly owned treatment works or facilities.

✓ Not Applicable; the facilities covered under this permit are not required to meet pretreatment requirements under an ELG.

PUBLIC NOTICE OF COVERAGE FOR AN INDIVIDUAL FACILITY:

Public Notice of reissuance of coverage is not required unless the facility is a specific type of facility as defined in 10 CSR 20-6.200(1). The need for an individual public notification process shall be determined and identified in the permit [10 CSR 20-6.020(1)(C)5.].

✓ Not applicable; public notice is not required for coverage under this permit to individual facilities. The MGP is public noticed in lieu of individual permit PN requirements.

REASONABLE POTENTIAL ANALYSIS (RPA):

Federal regulation 40 CFR Part 122.44(d)(1)(i) requires effluent limitations for all pollutants which are or may be discharged at a level which will cause or have the reasonable potential to cause or contribute to an in-stream excursion above narrative or numeric water quality standard. In accordance with 40 CFR Part 122.44(d)(iii) if the permit writer determines any given pollutant has the reasonable potential to cause or contribute to an in-stream excursion above the water quality standard, the permit must contain effluent limits for the pollutant.

✓ The permit writer reviewed industry materials, available past inspections, and other documents and research to evaluate general and narrative water quality reasonable potential for this permit. Permit writers also use the Department's permit writer's manual, the EPA's permit writer's manual (https://www.epa.gov/npdes/npdes-permit-writers-manual), program policies, and best professional judgment. For each parameter in each permit, the permit writer carefully considers all applicable information regarding technology based effluent limitations, effluent limitation guidelines, and water quality standards. Best professional judgment is based on the experience of the permit writer, cohorts in the Department and resources at the EPA, research, and maintaining continuity of permits if necessary. For stormwater permits, the permit writer is required per 10 CSR 6.200(6)(B)2 to consider: A. application and other information supplied by the permittee; B. effluent guidelines; C. best professional judgment of the permit writer; D. water quality; and E. BMPs.

SCHEDULE OF COMPLIANCE (SOC):

Per § 644.051, RSMo, a permit may be issued with a Schedule of Compliance (SOC) to provide time for a facility to come into compliance with new state or federal effluent regulations, water quality standards, or other requirements. Such a schedule is not allowed if the facility is already in compliance with the new requirement or if prohibited by other statute or regulation. An SOC includes an enforceable sequence of interim requirements (e.g. actions, operations, or milestone events) leading to compliance with the Missouri Clean Water Law, its implementing regulations, and/or the terms and conditions of an operating permit. *See also* Section 502(17) of the Clean Water Act, and 40 CFR 122.2. For new effluent limitations, the permit may include interim monitoring for the specific parameter to demonstrate the facility is not already in compliance with the new requirement. Per 40 CFR 122.47(a)(1) and 10 CSR 20-7.031(11), compliance must occur as soon as possible. If the permit provides a schedule for meeting new water quality based effluent limits, an SOC must include an enforceable, final effluent limitation in the permit even if the SOC extends beyond the life of the permit.

✓ Not Applicable: This permit does not contain a SOC.

SETBACKS:

Setbacks, sometimes called separation distances, are common elements of permits and are established to provide a margin of safety in order to protect the receiving water and other features from accidents, spills, unusual events, etc. Specific separation distances are included in 10 CSR 20-8 for minimum design standards of wastewater structures. While wastewater is considered separately from stormwater under this permit, the guides and Chapter 8 distances may remain relevant to requirements under this permit if deemed appropriate by the permittee.

✓ Discharge to the watersheds of a Metropolitan No-Discharge Stream (10 CSR 20-7.031 Table F) is authorized by this permit if the discharges are in compliance with 10 CSR 20-7.015(5) and 10 CSR 20-7.031(7). Discharges to these watersheds are authorized for uncontaminated stormwater discharges only.

✓ This permit authorizes stormwater discharges which are located in a way to allow water to be released into sinkholes, caves, fissures, or other openings in the ground which could drain into aquifers (except losing streams) per 10 CSR 20-7.015(7). It is the best professional judgment of the permit writer to allow discharges to losing streams as the effluent is stormwater only.

✓ This permit authorizes stormwater discharge in the watersheds of Outstanding state Resource Waters (OSRW); Outstanding National Resources Waters (ONRW), which includes the Ozark National Riverways and the National Wild and Scenic Rivers System; and impaired waters as designated in the 305(b) report, including the 303(d), list so long as no degradation of water quality occurs in the OSRW and ONRW due to discharges from the permitted facility per 10 CSR 20-7.015(6)(B) and 10 CSR 20-7.031(3)(C).

Additionally, if the facility is found to be causing degradation or contributing to an impairment by discharging a pollutant of concern during an inspection or through complaint investigations, they will be required to become a no discharge facility or obtain a site specific permit with more stringent monitoring and SWPPP requirements. Missouri's impaired waters can be found at https://dnr.mo.gov/water/what-were-doing/water-planning/quality-standards-impaired-waters-total-maximum-daily-

loads/impaired-waters. Sites within 1000 feet of a OSRW, ONRW, or water impaired for sediment must operate as a no-discharge facility. These additional protections are borrowed from the USEPA 2021 draft Construction General Permit.

SLUDGE – DOMESTIC BIOSOLIDS:
Biosolids are solid materials resulting from domestic wastewater treatment meeting federal and state criteria for beneficial use (i.e. fertilizer). Sewage sludge is solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works; including, but not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in a treatment works.
✓ This permit does not authorize discharge or land application of biosolids. Sludge/biosolids is not generated by this industry.

SLUDGE – INDUSTRIAL:
Industrial sludge is solid, semi-solid, or liquid residue generated during the treatment of industrial process wastewater in a treatment works; including, but not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment process; scum and solids filtered from water supplies and backwashed; and a material derived from industrial sludge.
✓ Not applicable; sludge is not generated by this industry.

SPILL REPORTING:
Any emergency involving a hazardous substance must be reported to the Department's 24 hour Environmental Emergency Response hotline at (573) 634-2436 at the earliest practicable moment after discovery. The Department may require the submittal of a written report detailing measures taken to clean up a spill. These reporting requirements apply when the spill results in chemicals or materials leaving the permitted property or reaching waters of the state. This requirement is in addition to the noncompliance reporting requirement found in Standard Conditions Part I. https://dnr.mo.gov/waste-recycling/investigations-cleanups/environmental-emergency-response.

Underground and above ground storage devices for petroleum products, vegetable oils, and animal fats may be subject to control under federal Spill Prevention, Control, and Countermeasure Regulation and are expected to be managed under those provisions, if applicable. Substances regulated by federal law under the Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) which are transported, stored, or used for maintenance, cleaning or repair shall be managed according to the provisions of RCRA and CERCLA.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP):
In accordance with 40 CFR 122.44(k), BMPs must be used to control or abate the discharge of pollutants when: 1) Authorized under section 304(e) of the Clean Water Act (CWA) for the control of toxic pollutants and hazardous substances from ancillary industrial activities; 2) Authorized under section 402(p) of the CWA for the control of stormwater discharges; 3) Numeric effluent limitations are infeasible; or 4) the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA. In accordance with the EPA's *Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites,* (Document number EPA 833-R-06-004) published by the EPA in 2007 https://www.epa.gov/sites/production/files/2015-10/documents/sw_swppp_guide.pdf, BMPs are measures or practices used to reduce the amount of pollution entering waters of the state from a permitted facility. BMPs may take the form of a process, activity, or physical structure. Additionally, in accordance with the Stormwater Management, a SWPPP is a series of steps and activities to 1) identify sources of pollution or contamination, and 2) select and carry out actions which prevent or control the pollution of storm water discharges. Additional information can be found in *Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-006; September 1992).

A SWPPP must be prepared if the SIC code for the facility is found in 40 CFR 122.26(b)(14) and/or 10 CSR 20-6.200(2). A SWPPP may be required of other facilities where stormwater has been identified as necessitating better management. The purpose of a SWPPP is to comply with all applicable stormwater regulations by creating an adaptive management plan to control and mitigate stream pollution from stormwater runoff. Developing a SWPPP provides opportunities to employ appropriate BMPs to minimize the risk of pollutants being discharged during storm events. The following paragraph outlines the general steps the permittee should take to determine which BMPs will work to achieve the benchmark values or limits in the permit. This section is not intended to be all encompassing or restrict the use of any physical BMP or operational and maintenance procedure assisting in pollution control. Additional steps or revisions to the SWPPP may be required to meet the requirements of the permit.

Areas which should be included in the SWPPP are identified in 40 CFR 122.26(b)(14). Once the potential sources of stormwater pollution have been identified, a plan should be formulated to best control the amount of pollutant being released and discharged by each activity or source. This should include, but is not limited to, minimizing exposure to stormwater, good housekeeping measures, proper facility and equipment maintenance, spill prevention and response, vehicle traffic control, and proper materials handling. Once a plan has been developed, the facility will employ the control measures determined to be adequate to prevent pollution from entering waters of the state. The facility will conduct inspections of the BMPs to ensure they are working properly and re-evaluate any BMP

not achieving compliance with permitting requirements. For example if the BMP being employed is deficient in controlling stormwater pollution, corrective action should be taken to repair, improve, or replace the failing BMP. If failures do occur, continue this trial and error process until appropriate BMPs have been established.

The EPA has developed factsheets on the pollutants of concern for specific industries along with the BMPs to control and minimize stormwater (https://www.epa.gov/npdes/stormwater-discharges-industrial-activities). Along with EPA's factsheets, the International Stormwater BMP database (https://bmpdatabase.org/) may provide guidance on BMPs appropriate for specific industries.

For new, altered, or expanded stormwater discharges, the SWPPP shall identify reasonable and effective BMPs while accounting for environmental impacts of varying control methods. The antidegradation analysis must document why no discharge or no exposure options are not feasible. The selection and documentation of appropriate control measures shall serve as an alternative analysis of technology and fulfill the requirements of antidegradation [10 CSR 20-7.031(3)].

Alternative analysis evaluation of the BMPs is a structured evaluation of BMPs which are reasonable and cost effective. The alternative analysis evaluation should include practices designed to be: 1) non-degrading; 2) less degrading; or 3) degrading water quality. The glossary of the *Antidegradation Implementation Procedure* defines these three terms. The chosen BMP will be the most reasonable and effective management strategy while ensuring the highest statutory and regulatory requirements are achieved and the highest quality water attainable for the facility is discharged. The alternative analysis evaluation must demonstrate why "no discharge" or "no exposure" is not a feasible alternative at the facility. This structured analysis of BMPs serves as the antidegradation review, fulfilling the requirements of 10 CSR 20-7.031(3) Water Quality Standards and *Antidegradation Implementation Procedure*, Section II.B.

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

UNDERGROUND INJECTION CONTROL (UIC):

The UIC program for all classes of wells in the State of Missouri is administered by the Missouri Department of Natural Resources and approved by EPA pursuant to section 1422 and 1425 of the Safe Drinking Water Act (SDWA) and 40 CFR 147 Subpart AA. Injection wells are classified based on the liquids which are being injected. Class I wells are hazardous waste wells which are banned by RSMo 577.155; Class II wells are established for oil and natural gas production; Class III wells are used to inject fluids to extract minerals; Class IV wells are also banned by Missouri in RSMo 577.155; Class V wells are shallow injection wells; some examples are heat pump wells and groundwater remediation wells. Domestic wastewater being disposed of sub-surface is also considered a Class V well. In accordance with 40 CFR 144.82, construction, operation, maintenance, conversion, plugging, or closure of injection wells shall not cause movement of fluids containing any contaminant into Underground Sources of Drinking Water (USDW) if the presence of any contaminant may cause a violation of drinking water standards or groundwater standards under 10 CSR 20-7.031 or other health-based standards or may otherwise adversely affect human health. If the Department finds the injection activity may endanger USDWs, the Department may require closure of the injection wells or other actions listed in 40 CFR 144.12(c), (d), or (e). In accordance with 40 CFR 144.26, the permittee shall submit a Class V Well Inventory Form for each active or new underground injection well drilled, or when the status of a well changes, to the Missouri Department of Natural Resources, Geological Survey Program, P.O. Box 250, Rolla, Missouri 65402. Single family residential septic systems and non-residential septic systems used solely for sanitary waste and having the capacity to serve fewer than 20 persons a day are excluded from the UIC requirements (40 CFR 144.81(9)).

✓ Not applicable; this permit does not authorize subsurface wastewater systems or other underground injection. These activities must be assessed under an application for a site specific permit. Certain discharges of stormwater into sinkholes may qualify as UIC. It is important the permittee evaluate all stormwater basins, even those holding water; as sinkholes have varying seepage rates. This permit does not allow stormwater discharges into sinkholes. The facility must ensure sinkholes are avoided in the construction process. The State's online mapping resource https://modnr.maps.arcgis.com/apps/webappviewer/index.html?id=87ebef4af15d438ca658ce0b2bbc862e has a sinkhole layer.

VARIANCE:

Per the Missouri Clean Water Law Section 644.061.4, variances shall be granted for such period of time and under such terms and conditions as shall be specified by the commission in its order. The variance may be extended by affirmative action of the commission. In no event shall the variance be granted for a period of time greater than is reasonably necessary for complying with the Missouri Clean Water Law Section 644.006 to 644.141 or any standard, rule, or regulation promulgated pursuant to Missouri Clean Water Law Section 644.006 to 644.141.

✓ Not Applicable: This permit is not drafted under premises of a petition for variance.

WASTELOAD ALLOCATIONS (WLA) FOR LIMITATIONS:

Per 10 CSR 20-2.010(78), the amount of pollutant each discharger is allowed by the Department to release into a given stream after the Department has determined total amount of pollutant which may be discharged into the stream without endangering its water quality. Water quality based maximum daily and average monthly effluent limitations were calculated using methods and procedures

outlined in USEPA's Technical Support Document For Water Quality-based Toxics Control (TSD) (EPA/505/2-90-001).
✓ Not applicable; water quality limitations were not applied in this permit.

WATER QUALITY STANDARDS:
Per 10 CSR 20-7.031(4), General Criteria shall be applicable to all waters of the state at all times, including mixing zones. Additionally, 40 CFR 122.44(d)(1) directs the Department to include in each NPDES permit conditions to achieve water quality established under Section 303 of the CWA, including state narrative criteria for water quality.

WHOLE EFFLUENT TOXICITY (WET) TEST:
Per 10 CSR 20-7.031(1)(FF), a toxicity test conducted under specified laboratory conditions on specific indicator organism; and per 40 CFR 122.2, the aggregate toxic effect of an effluent measured directly by a toxicity test. A WET test is a quantifiable method of determining if a discharge from a facility may be causing toxicity to aquatic life by itself, in combination with, or through synergistic responses when mixed with receiving water.
✓ Not applicable: At this time, permittees are not required to conduct a WET test. This permit is for stormwater only.

PART IV – EFFLUENT LIMITATIONS DETERMINATION

EPA Construction General Permit (CGP)
The CGP was used to research and support best professional judgment decisions made in establishing technology-based conditions for this general permit which are consistent with national standards. The permit writer determined the standards established by the CGP are achievable and consistent with federal regulations. Additionally, the conditions reflecting the best practicable technology currently available are utilized to implement the ELG.

In this general permit, technology-based effluent conditions are established through the SWPPP and BMP requirements. Effective BMPs should be designed on a site-specific basis. The implementation of inspections provides a tool for each facility to evaluate the effectiveness of BMPs to ensure protection of water quality. Any flow through an outfall is considered a discharge. Future permit action due to permit modification may contain new operating permit terms and conditions which supersede the terms and conditions, including effluent limitations, of this operating permit.

PART V–REPORTING REQUIREMENTS

SAMPLING:
The permittee is not required to sample stormwater under this permit. The Department may require sampling and reporting as a result of illegal discharges, compliance issues related to water quality concerns or BMP effectiveness, or evidence of off-site impacts from activities at the facility. If such an action is needed, the Department will specify in writing the sampling requirements, including such information as location and extent. If the permittee refuses to perform sampling when required, the Department may terminate the general permit and require the facility to obtain a site-specific permit with sampling requirements.

REPORTING:
There are no reporting requirements for MO-RAxxxxx land disturbance permits. Land disturbance information is best reviewed on an as requested basis and this permit established documents requirements that allow the Department to request and receive needed documentation prior to, during, or after site inspections.

PART VI – RAINFALL VALUES FOR MISSOURI & SURFACE WATER BUFFER ZONES

Knowledge of the 2-year, 24-hour storm event is used in this permit for two main reasons:

1) The design, installation, and maintenance of effective erosion and sediment controls to minimize the discharge of pollutants. These erosion and sediment controls must be designed to capture or treat a 2-year, 24-hour storm event. This includes BMPs and, depending on the acreage of the drainage area, sediment basins.

2) If the seven-day inspection frequency is utilized, an inspection must occur within 48 hours after any storm event equal to or greater than a 2-year, 24 hour storm has ceased.

A 2-year, 24-hour storm event may be determined in two different ways. For site-specific 2-year, 24-hour storm event information utilize the National Oceanic and Atmospheric Administration's National Weather Service Atlas 14 (NOAA Atlas 14) which is located at https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html. This is the most accurate and preferred method for determining the 2-

year, 24-hour storm event. In general, this will be the least stringent method. For more information visit; https://www.weather.gov/media/owp/oh/hdsc/docs/Atlas14_Volume8.pdf.

As an alternative to NOAA Atlas 14, a default value may be utilized. The map below provided by the Department represent the most conservative, protective values for default values applicable to Missouri. In general, this will be the most stringent method. This map is based on Technical Paper No. 40 (TP-40). TP-40 provides a map of the continental U.S. for the 2-year, 24-hour storm event. See map below for default values.

Map 1: Default Values for 2-Year, 24-Hour Storm Event for Design of Sediment and Erosion Controls

Legend: Northern Counties (blue): 3.5 inches
Southern Counties (grey): 4 inches

Surface Water Buffer Zones: In order to design controls that match the sediment removal efficiency of a 50-foot buffer, you first need to know what this efficiency is for your site. The sediment removal efficiencies of natural buffers vary according to a number of site-specific factors, including precipitation, soil type, land cover, slope length, width, steepness, and the types of erosion and sediment controls used to reduce the discharge of sediment prior to the buffer. For additional information; https://www.epa.gov/sites/default/files/2017-02/documents/2017_cgp_final_appendix_g_-_buffer_reqs_508.pdf

PART VII – ADMINISTRATIVE REQUIREMENTS

On the basis of preliminary staff review and applicable standards and regulations, the Department, as administrative agent for the Missouri Clean Water Commission, proposes to issue a permit(s) subject to certain effluent limitations, schedules, and special conditions contained herein and within the permit. The proposed determinations are tentative pending public comment.

PUBLIC MEETING:
The Department hosted three public meetings for this permit. The meetings were held on January 27, February 17, and March 9, 2021.

PUBLIC NOTICE:
The Department shall give public notice when a draft permit has been prepared and its issuance is pending. Additionally, public notice will be issued if a public hearing is to be held because of a significant degree of interest or because of water quality concerns related to a draft permit. No public notice is required when a request for a permit modification or termination is denied; however, the requester and facility must be notified of the denial in writing.

The Department must give public notice of a pending permit or of a new or reissued Missouri State Operating Permit. The public comment period is a length of time not less than thirty (30) days following the date of the public notice, during which interested persons may submit written comments about the proposed permit.

For persons wanting to submit comments regarding this proposed permit, please refer to the Public Notice page located at the front of this draft permit. The Public Notice page gives direction on how and where to submit appropriate comments.

✓ The Public Notice period for this permit was held from November 5, 2021 and ends December 6, 2021. Two letters were received during the 30 day Public Notice period. The summarized comments from the letter and the Department's responses to the comments are below and are in reference to the Public Noticed version of this permit. The comments and responses to the Public Notice of this permit do not warrant the modification of the terms and conditions of this permit.

Letter 1:
Comment #1: Numbering on Page 3 - **there are two #2's**
Response: Thank you, this was corrected.
Comment #2: 2. … If an individual proposes to develop a lot to reside on **(themself)**,
Response: This word has been added to add clarity.
Comment #3: Table on Page 3, I. Applicability Section A, #2. The second row, second column is confusing. This second part seems to imply that lots less than 1 acre but not part of a common plan would need a permit if the lot is to be sold. This seems contrary to the one or more acres required for a permit.
Response: The second part was reworded in effort to clarify. The "or if" was changed to "including" to clarify both situations are part of the common plan and would require a permit.
Comment #4: The first part of this section before the semicolon seems incomplete:
Response: The redundant wording was removed to clarify this condition.
Comment #5: There is no #3.
Response: Thank you, this was corrected.
Comment #6: Number 4. Could the impaired water also be on the 303(d) list? Impaired waters are only on the 305(b) list after they have a TMDL written. What about the streams on the 303(d) list that are waiting for a TMDL?
Response: The 303(d) list is a less-encompassing component of the all-encompassing 305(b) Report. The permit has been edited to state "designated in the 305(b) Report, including the 303(d) list," to emphasizing the 303(d) list.
Comment #7: 10. Change the word States to state
Response: This was corrected.
Comment #8: There are 2 (b)s under #1. 1(c). Part VII. should be Part VIII STANDARD PERMIT CONDITIONS
6. Replace the period with a colon after BMPs. "The permittee shall select, install, use, operate and maintain appropriate BMPs for the permitted site. The following manuals are acceptable resources for the selection of appropriate BMPs:"
Response: These corrections were made.
Comment #9: 11(b) 2 and 3. These are missing periods after the word "holiday"
Response: These corrections were made.
Comment #10: V. BMP Requirements (2) Can you define "dripline"
Response: A longer explanation of "dripline" was added to that condition for clarity.
Comment #11: 11.(c)(2) Is this missing a word after "from". In the phrase "discharge points from" ? Perhaps just remove the word "from". The phrase would read "inlets, outlets, and discharge points shall be utilized."
Response: This correction has been made.
Comment #12: Also, the addition of language related to BMPs discussed on page 5 and 6 of the fact sheet are positive additions to the permit and should help guide protection of waters of the state from sediment.
On the top of page 6 of the fact sheet, it appears there is a typo: " Migration of soil or product from mis-managed **plies"**
Response: This correction has been made.

Letter 2:
Comment #1: Define Outfalls.
Response: Outfalls are points with discharges of stormwater from areas associated with the industrial activity for which the facility is permitted; in this case construction. Discerning if certain drains which leave the site would be considered an outfall or not would be specific to each site, in addition to the specific phase of construction. Outfalls on construction sites are often not stationary. An outfall does not need to be a pipe, it can be a ditch, channel, or other conduit that discharges stormwater off the property, and there is no size constraint to outfalls. A definition has been added to the fact sheet to add clarification.
Comment #2: I. Applicability: A. Permit Coverage and Authorized Discharges – Permit numbering is off.
Response: Thank you, this has been corrected.
Comment #3: **I. Applicability: B. Permit Restrictions** – Permit numbering is off.
Response: Thank you, this has been corrected.
Comment #4: 4(c) Discharges from dewatering of sedimentation basins is prohibited. Does this mean direct dumping of dewatering material? Are dewatering controls such as sediment bags, infiltration trenches, or buffer strips allowed?
Response: The definition of no-discharge facility found in 10 CSR 20-6.015 includes the condition "To hold or irrigate, or otherwise dispose without discharge to surface or subsurface waters of the state, all process wastes and associated storm water flows except for discharges that are caused by catastrophic and chronic storm events;". Dewatering controls are allowed so long as they are operated so that the dewatered material and water is not discharged to waters of the state.
Comment #5: 4(c) references 10 CSR 20-6.15(1)B(7). Should this be 10 CSR 20-6.015(1)B(7)?
Response: This has been corrected, thank you.
Comment #6: Could the department please clarify what is meant by a "catastrophic event" referenced in this regulation? The

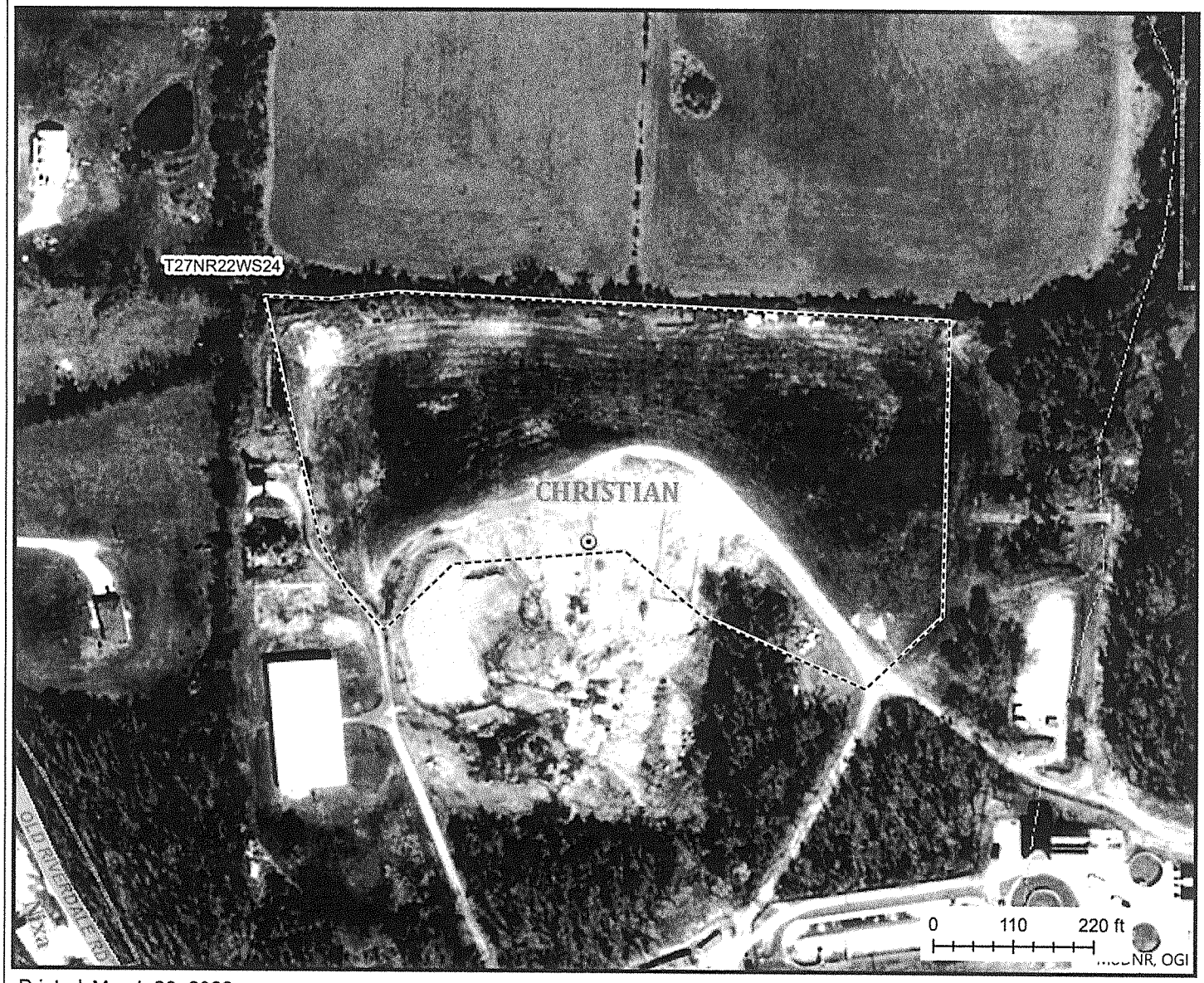
permit design standards are for the 2-year, 24-hour storm.
Response: Catastrophic storm is defined in 10 CSR 20-6.015(1)(B)2 as "A precipitation event of twenty-four (24)-hour duration or less that exceeds the twenty-five (25)-year, twenty-four (24)-hour storm event." A chronic storm event is defined in 10 CSR 20-6.015(1)(B)3 as "A precipitation event with a duration of more than twenty-four (24) hours that exceeds the one-in-ten (1 in 10)-year return frequency."
This information is found on the National Oceanic and Atmospheric Administration's National Weather Service Atlas 14. A link can be found in the permit part **III. REQUIREMENTS** 4.
Comment #7: IV. SWPPP Management Requirements 1. Multilevel numbering is off.
Response: This has been corrected, thank you.
Comment #8: **VIII. Standard Permit Conditions 2. Land Ownership and Change of Ownership** 2(c) – Please clarify if an individual needs a land disturbance permit for their personal residence if the portion of land sold is equal to or greater than one acre, as it states in the proposed permit, or only if they will be disturbing one acre or greater.
Response: The word 'disturbed' has been included in this portion to add clarity.

DATE OF FACT SHEET: 10/13/2021

COMPLETED BY:

SARAH WRIGHT
ENVIRONMENTAL SPECIALIST
MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
OPERATING PERMITS SECTION - STORMWATER AND CERTIFICATION UNIT
(573) 526-1139
Sarah.wright@dnr.mo.gov, dnr.generalpermits@dnr.mo.gov

DNR_Landscape



Legend

- Land Disturbance Point
- Land Disturbance Area
- 12 Digit Watershed Boundaries
- Impaired Streams - 303(d)
- Impaired Lakes - 303(d)
- Stream Classifications and Use Designations
- Lake Classifications and Use Designations
- Public Land Survey System
- Interstates and U.S. highways
- State numbered routes
- State letttered routes
- ramps
- Major roads
- Minor roads
- Railroads
- County Boundaries
- Lake or Pond
- Lake or Pond / Intermittent
- Lake or Pond / Perennial
- Reservoir
- Swamp or Marsh
- Other; Artificial Path
- Canal or Ditch
- Stream or River
- Stream or River / Intermittent
- Stream or River / Perennial
- Municipalities Boundary
- Municipalities Fill

N

Printed: March 29, 2022

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

STORMWATER DISCHARGES FROM THIS LAND DISTURBANCE SITE ARE AUTHORIZED BY THE MISSOURI STATE OPERATING PERMIT NUMBER:

MORA20878

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
Division of Environmental Quality Regional Offices

Kansas City Area

Kansas City Regional Office
500 NE Colbern Rd.
Lee's Summit, MO 64086-4710
816-251-0700 FAX: 816-622-7044

St. Louis Area

St. Louis Regional Office
7545 S. Lindbergh, Ste 210
St. Louis, MO 63125
314-416-2960 FAX: 314-416-2970

Northeast Area

Northeast Regional Office
1709 Prospect Drive
Macon, MO 63552-2602
660-385-8000 FAX: 660-385-8090

Southwest Area

Southwest Regional Office
2040 W. Woodland
Springfield, MO 65807-5912
417-891-4300 FAX: 417-891-4399

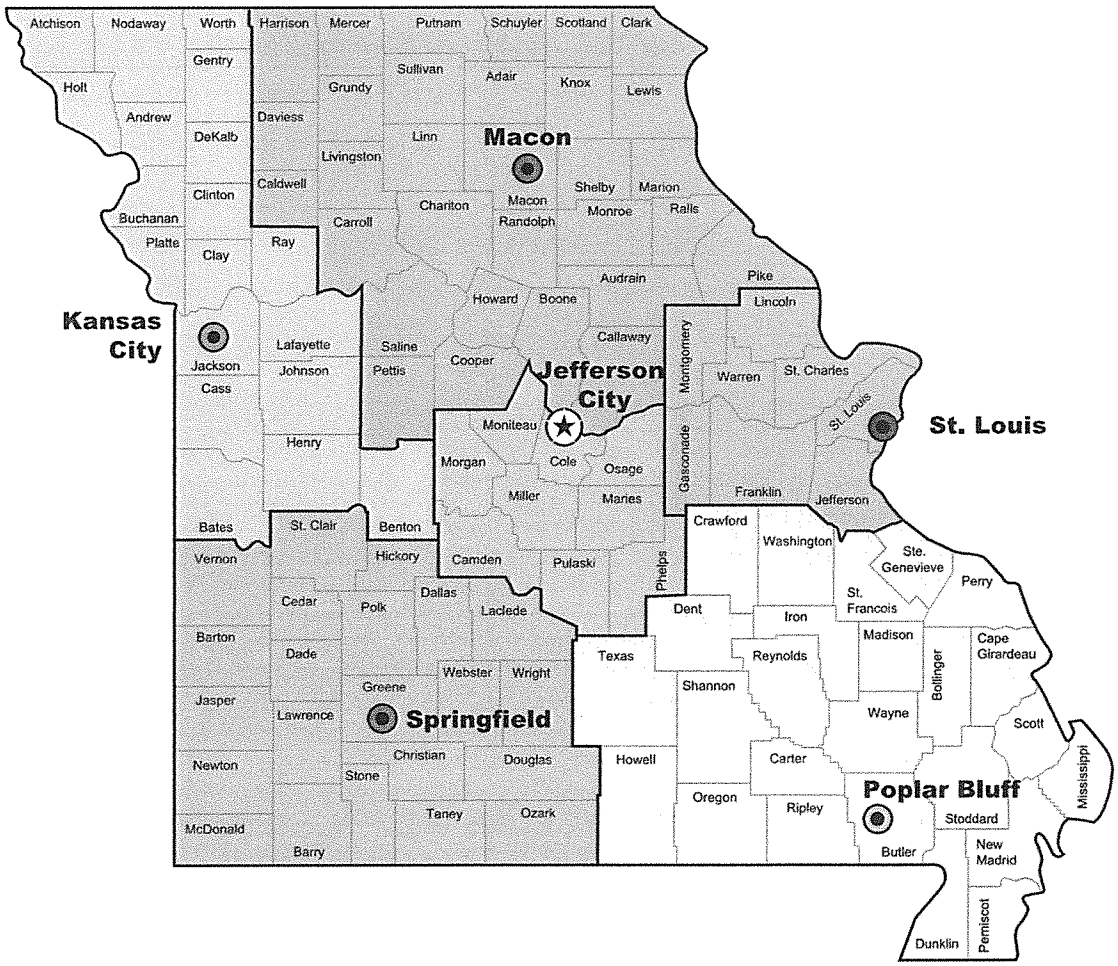
Southeast Area

Southeast Regional Office
2155 North Westwood Blvd.
Poplar Bluff, MO 63901
573-840-9750 FAX: 573-840-9754

Central Area

Department Central Offices
P.O. Box 176
Jefferson City, MO 65102-0176
573-751-3443

Central Field Operations
P.O. Box 176
Jefferson City, MO 65102-0176
573-522-3322 FAX: 573-522-3522



6/25/19

For more information on the departmei
visit dnr.mo.gov or call 800-361-4827

Appendix D – Copy of Inspection Form

City of Nixa Construction Site BMP Inspection Form

Project Name:	Current phase being inspected:
Project Location:	Weather: ☐ Clear ☐ Cloudy ☐ Rain ☐ Snow
General Contractor:	Inspection start/end Times:
Date of Inspection:	Date of last rainfall event:
Inspector's name (print):	Duration of last rainfall event:
Signature:	Approximate Rainfall Amount (in):
Title:	Type of Inspection:
Qualifications:	☐ Weekly (once every 7 days)
Telephone No.:	☐ Post Storm (within 24 hours of rainfall event that causes runoff)

	Areas of Inspection	Over All Condition			Requires Attention		
		Yes	No	n/a	Yes	No	n/a
1	All slopes and disturbed areas not actively being worked are properly stabilized.						
2	All natural resource areas (streams & wetlands, etc.) are protected by the proper BMP.						
3	All perimeter controls and sediment barriers are properly installed and maintained.						
4	All discharge points and receiving waters are free of sediment.						
5	All slopes are free of significant erosion?						
6	Construction entrance is stabilized and in an effective working condition.						
	Mud or rock being tracked out onto City streets is being regularly addressed.						
7	All trash from site is being collected daily and placed in covered trash dumpster.						
8	All operational storm drain inlets are properly protected.						
9	All washout facilities (paint, stucco, concrete, etc.) are clearly marked and properly maintained.						
10	All vehicle & equipment fueling, cleaning and maintenance areas are free of spills, leaks or any other environmentally detrimental material.						
11	All materials that are potential stormwater contaminants are stored inside or under cover.						
12	All non-stormwater discharges (wash water, de-watering, etc.) are being properly controlled.						

Describe corrective actions needed/taken: (attach additional sheet if needed)

Describe SWPPP revisions needed/completed: (attach additional sheet if needed)

A copy of this completed inspection form is to be mailed, e-mailed or handed to the City of Nixa Public Works Inspector at least once every seven days.

Appendix E – Copy of Corrective Action Form

Section A – Initial Report (CGP Part 5.4.1)

(Complete this section within 24 hours of identifying the condition that triggered corrective action)

Name of Project		**NPDES ID No.**		**Today's Date**	
Date Problem First Discovered		**Time Problem First Discovered**			
Name and Contact Information of Individual Completing this Form					

What site conditions triggered the requirement to conduct corrective action *(check the box that applies)*:

- ☐ A stormwater control needs repair or replacement (beyond routine maintenance required under Part 2.1.4)
- ☐ A stormwater control necessary to comply with the requirements of this permit was never installed, or was installed incorrectly
- ☐ A discharge is causing an exceedance of applicable water quality standards
- ☐ A Part 1.3 prohibited discharge has occurred
- ☐ EPA requires corrective action as a result of permit violations found during an EPA inspection carried out under Part 4.8

Provide a description of the problem:

Deadline for completing corrective action *(check the box that applies)*:

- ☐ Immediately take all reasonable steps to address the condition, including cleaning up any contaminated surfaces so the material will not discharge in subsequent storm events
- ☐ Complete by close of the next business day when problem does not require a new or replacement control or significant repair
- ☐ No later than 7 calendar days from the time of discovery for problems that require a new or replacement control or significant repair
- ☐ Infeasible to complete the installation or repair within 7 calendar days. Explain why it is infeasible and document schedule for installing control:

Enter date of corrective action completion: _____

Section B – Corrective Action Completion (CGP Part 5.4.2)

(Complete this section no later than 24 hours after completing the corrective action)

Section B.1 – Why the Problem Occurred

Cause(s) of Problem (Add an additional sheet if necessary)	**How You Determined the Cause and the Date You Determined the Cause**
1.	**1.**
2.	**2.**

Section B.2 – Stormwater Control Modifications Implemented to Correct the Problem

List of Stormwater Control Modification(s) Needed to Correct Problem (Add an additional sheet if necessary)	**Date of Completion**	**SWPPP Update Necessary?**	**Notes**
1.		☐Yes ☐No If yes, provide date SWPPP modified:	
2.		☐Yes ☐No If yes, provide date SWPPP modified:	

Section C –Signature and Certification (CGP Part 5.4.3)

Section C.1 – Contractor or Subcontractor Signature and Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Contractor or Subcontractor: _____

Date:

Printed Name and Affiliation: _____

Section C.2 – Operator Signature and Certification

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature of Operator or "Duly Authorized Representative": _____

Date:

Printed Name and Affiliation: _____

Appendix F – SWPPP Amendment Log

Instructions (see CGP Part 7.4):

- Create a log here of changes and updates to the SWPPP. You may use the table below to track these modifications.
- SWPPP modifications are required pursuant to CGP Part 7.4.1 in the following circumstances:
  - ✓ Whenever new operators become active in construction activities on your site, or you make changes to your construction plans, stormwater controls, or other activities at your site that are no longer accurately reflected in your SWPPP;
  - ✓ To reflect areas on your site map where operational control has been transferred (and the date of transfer) since initiating permit coverage;
  - ✓ If inspections or investigations determine that SWPPP modifications are necessary for compliance with this permit;
  - ✓ Where EPA determines it is necessary to install and/or implement additional controls at your site in order to meet requirements of the permit; and
- To reflect any revisions to applicable federal, state, tribal, or local requirements that affect the stormwater control measures implemented at the site.
- If applicable, if a change in chemical treatment systems or chemically-enhanced stormwater control is made, including use of a different treatment chemical, different dosage rate, or different area of application.

No.	Description of the Amendment	Date of Amendment	Amendment Prepared by [Name(s) and Title]

Appendix G – Subcontractor Certifications/Agreements

SUBCONTRACTOR CERTIFICATION
STORMWATER POLLUTION PREVENTION PLAN

Project Number: _____

Project Title: _____

Operator(s): _____

As a subcontractor, you are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that you perform on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the office trailer.

Each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement:

I certify under the penalty of law that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the practices described in the SWPPP.

This certification is hereby signed in reference to the above named project:

Company: _____

Address: _____

Telephone Number: _____

Type of construction service to be provided: _____

_____

_____

Signature: _____

Title: _____

Date: _____

Appendix H – Grading and Stabilization Activities Log

Date Grading Activity Initiated	**Description of Grading Activity**	**Description of Stabilization Measure and Location**	**Date Grading Activity Ceased** (Indicate Temporary or Permanent)	**Date When Stabilization Measures Initiated**
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	
			☐ Temporary ☐ Permanent	

Appendix I – SWPPP Training Log

Stormwater Pollution Prevention Training Log

Project Name:

Project Location:

Instructor's Name(s):

Instructor's Title(s):

Course Location: _____ Date: _____

Course Length (hours): _____

Stormwater Training Topic: *(check as appropriate)*

- ☐ **Sediment and Erosion Controls**
- ☐ **Stabilization Controls**
- ☐ **Pollution Prevention Measures**
- ☐ **Emergency Procedures**
- ☐ **Inspections/Corrective Actions**

Specific Training Objective:_____

_____

Attendee Roster: *(attach additional pages as necessary)*

No.	Name of Attendee	Company
1		
2		
3		
4		
5		
6		
7		
8		

Appendix J – Delegation of Authority Form

Delegation of Authority

I, _____ (name), hereby designate the person or specifically described position below to be a duly authorized representative for the purpose of overseeing compliance with environmental requirements, including the Construction General Permit (CGP), at the _____ construction site. The designee is authorized to sign any reports, stormwater pollution prevention plans and all other documents required by the permit.

_____ (name of person or position)
_____ (company)
_____ (address)
_____ (city, state, zip)
_____ (phone)

By signing this authorization, I confirm that I meet the requirements to make such a designation as set forth in Appendix I of EPA's CGP, and that the designee above meets the definition of a "duly authorized representative" as set forth in Appendix I.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: _____

Company: _____

Title: _____

Signature: _____

Date: _____

Appendix K – Endangered Species Documentation

Appendix L – Historic Properties Documentation

Appendix M – Rainfall Gauge Recording

Use the table below to record the rainfall gauge readings at the beginning and end of each work day. An example table follows.

Month/Year			Month/Year			Month/Year		
Day	Start time	End time	Day	Start time	End time	Day	Start time	End time
1			1			1		
2			2			2		
3			3			3		
4			4			4		
5			5			5		
6			6			6		
7			7			7		
8			8			8		
9			9			9		
10			10			10		
11			11			11		
12			12			12		
13			13			13		
14			14			14		
15			15			15		
16			16			16		
17			17			17		
18			18			18		
19			19			19		
20			20			20		
21			21			21		
22			22			22		
23			23			23		
24			24			24		
25			25			25		
26			26			26		
27			27			27		
28			28			28		
29			29			29		
30			30			30		
31			31			31		

Example Rainfall Gauge Recording

April 2017			May 2017			June 2017		
Day	7:00 am	4:400 pm	Day	7:00 am	4:00 pm	Day	7:00 am	4:00 pm
1	--	--	1	0.2	0	1	0	0.4
2	--	--	2	0	0	2	0	0
3	0	0	3	0.1	0.3	3	--	--
4	0	0.3	4	0	0	4	--	--
5	0	0	5	0	0	5	0	0

In this example (for only partial months), 0.25-inch rainfall inspections would have been conducted on April 4 and June 1.

Appendix N – Best Management Practices

filtrexx®
SUSTAINABLE TECHNOLOGIES

SECTION 1: CONSTRUCTION

Filtrexx® Sediment/Perimeter Control (SiltSoxx™)

PURPOSE & DESCRIPTION

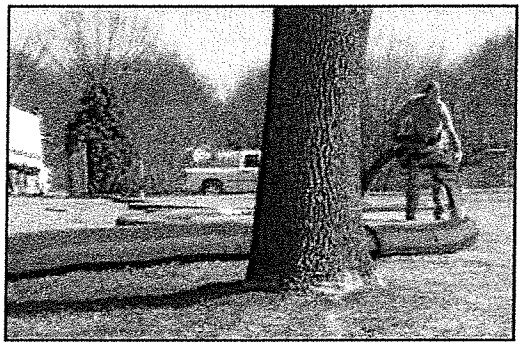
Filtrexx® SiltSoxx™ is a three-dimensional tubular sediment control and stormwater runoff filtration device typically used for **Sediment/Perimeter Control** of sediment and soluble pollutants (such as phosphorus and petroleum hydrocarbons), on and around construction activities. Perimeter control traps sediment and soluble pollutants by *filtering* runoff water as it passes through the matrix of the Soxx™ *and* by allowing water to temporarily pond behind the Soxx, allowing *deposition* of suspended solids. Perimeter control is also used to reduce runoff flow velocities on sloped surfaces.

APPLICATION

Perimeter control is to be installed down slope of any disturbed area requiring erosion and sediment control and filtration of soluble pollutants from runoff. Perimeter control is effective when installed perpendicular to sheet or low concentrated flow, and in areas that silt fence is normally considered appropriate. Acceptable applications include:

- Site perimeters
- Above and below disturbed areas subject to sheet runoff, interrill and rill erosion
- Above and below exposed and erodable slopes
- Along the toe of stream and channel banks
- Around area drains or inlets located in a 'sump'
- On compacted soils where trenching of silt fence is difficult or impossible
- Around sensitive trees where trenching of silt fence is not beneficial for tree survival or may unnecessarily disturb established vegetation
- On frozen ground where trenching of silt fence is impossible
- On paved surfaces where trenching of silt fence is impossible

Perimeter control can be applied to areas of high sheet runoff and erosion, on slopes up to a 1:1 grade (should be used in conjunction with slope stabilization/erosion control technology on slopes



Installation Method – Perimeter Control

> 4:1), around inlets, and in other disturbed areas of construction sites requiring sediment control. Perimeter control may also be used in sensitive environmental areas, where migration of wildlife may be impeded by the use of fences or trenching may damage roots.

It is possible to drive over perimeter control during construction (although not recommended), however, these areas should be immediately repaired by manually moving perimeter control back into place, if disturbed. Continued heavy construction traffic may destroy the fabric mesh, reduce the dimensions, and reduce the effectiveness of the perimeter control.

ADVANTAGES AND DISADVANTAGES

Advantages

- Tubular filtration matrix allows for better trapping and removal of sediment and soluble pollutants in stormwater runoff compared to planar constructed sediment control devices (i.e., silt fence).
- Greater surface area contact with soil than typical sediment control devices reduces potential for runoff to create rills under the device leading to unfiltered sediment.
- No trenching is required; therefore soil is not disturbed upon installation or removal.
- Perimeter control can be installed year-round in

difficult soil conditions such as frozen or wet ground, and dense and compacted soils, as long as stakes can be driven.

- Perimeter control is easily implemented as a treatment in a greater treatment train approach to erosion and sediment control.
- Organic matter and humus colloids in FilterMedia™ (filler material in perimeter control) have the ability to bind and adsorb phosphorus, metals, and hydrocarbons that may be in stormwater runoff.
- Microorganisms in FilterMedia have the ability to degrade organic pollutants and cycle captured nutrients in stormwater runoff.
- Soxx (the mesh netting containment system) allows perimeter control to be placed in areas of high sheet flow and low concentrated flow.
- Perimeter control can be direct seeded at time of application to provide greater stability and filtration capability once vegetation is established.
- FilterMedia is organic and can be left on site after permanent stabilization is complete, to be used in landscape design and/or seeded and planted with permanent vegetation.
- FilterMedia improves existing soil structure if spread out and used as a soil amendment after construction activity is complete.
- Biodegradable or photodegradable perimeter control can be left on site after construction activity eliminating the need for removal and labor and disposal costs.
- Perimeter control can be used on slopes to slow down runoff velocity, disperse concentrated runoff, and reduce effective slope lengths, reducing the erosive potential of stormwater runoff.
- Perimeter control is less likely to obstruct wildlife movement and migration than planar/silt fence sediment control practices.
- Perimeter control is available in 5 in. (125mm), 8 in.(200mm), 12 in. (300mm), 18 in. (450mm), 24 in. (600mm), and 32 in (800mm) diameters for customized applications and challenging situations.
- Perimeter control is available in up to 200 ft (61m) continuous lengths to prevent weak sections and creation of concentrated flow situations typical to low points in runs of other sediment control devices. End points are sleeved together to form continuous runs of unlimited lengths without low or break points.
- Perimeter control may assist in qualification for LEED® Green Building Rating and Certification credits under LEED Building Design & Construction (BD+C), New Construction v4. Awarded credits may be possible from the categories of Sustainable Sites, Water Efficiency, Materials & Resources, and Innovation. *Note: LEED is an independent program offered through the U.S. Green Building Council. LEED credits are determined on a per project basis by an independent auditing committee. Filtrexx neither guarantees nor assures LEED credits from the use of its products. LEED is a trademark of the U.S. Green Building Council.*

ADVANTAGES			
	LOW	MED	HIGH
Installation Difficulty	✓		
Durability			✓
Sediment Control			✓
Soluble Pollutant Control		✓	
Runoff Flow Control		✓	
Life Cycle Cost	✓		

Disadvantages

- If filler material of perimeter control is not Filtrexx® Certified℠ FilterMedia™, performance may be diminished.
- If not installed correctly, maintained or used for a purpose or intention that does not meet specifications performance may be diminished.
- If land surface is extremely bumpy, rocky, or changes elevation abruptly ground surface contact to perimeter control may be diminished thereby adversely effecting performance.

MATERIAL SPECIFICATIONS

Perimeter control use only photodegradable or biodegradable Soxx netting materials available from Filtrexx International and are the only mesh materials accepted in creating perimeter control for any purpose. For Soxx tubular mesh material specifications see Table 1.1.

FILTERMEDIA™ CHARACTERISTICS

Specifications for perimeter control use only Filtrexx Certified FilterMedia which is a coarse composted material that is specifically designed for removal of solids and soluble pollutants from stormwater runoff. FilterMedia can be altered or customized to target specific pollutants in runoff as approved by the Engineer or Filtrexx International. All Filtrexx Certified FilterMedia has been third party tested and certified to meet minimum performance criteria defined by Filtrexx International. Performance parameters include; hydraulic flow through rate, total solids removal efficiency, total suspended solids removal efficiency, turbidity reduction, nutrient removal efficiency, metals removal efficiency, and motor oil removal efficiency. For information on the physical and chemical properties of Filtrexx Certified FilterMedia refer to the Filtrexx Design Manual, section 5.1. Look for the Filtrexx Certified FilterMedia Seal from our international network of Filtrexx Certified Installers and Manufacturers.

PERFORMANCE

Performance testing and research on perimeter control has been extensive. Results from testing and research programs conducted on perimeter control include: hydraulic flow through rate, ponding rate and calculation (behind perimeter control), sediment storage capacity (inside + behind tool), total solids removal efficiency, suspended solids removal efficiency (with and w/out biopolymer and polymer flocculants), turbidity reduction (with and w/out biopolymer and polymer flocculants), nitrate-N removal efficiency, total P removal efficiency, soluble reactive P removal efficiency (with and w/out Nutrient Agent), petroleum hydrocarbon (motor oil) removal efficiency, and heavy metals (Cu, Fe, Mn, Zn) removal efficiency. For a summary of performance testing, research results, and design specifications see Table 1.1 and Table 1.2. For copies of full reports visit www.filtrexx.com.

Successful bidders will furnish adequate research support showing their manufactured product meets or exceeds performance and design criteria outlined in this standard specification. Research or performance testing will be accepted if it meets the following criteria: conducted by a neutral third party, utilizes standard test methods reported by ASTM or referenced in a peer reviewed scientific journal, product and control treatments are tested in triplicate, performance results are reported for product and control (control should be a bare soil under the same set of environmental and experimental conditions), results are peer reviewed, results indicate a minimum 60% TSS removal efficiency and a minimum hydraulic flow through rate of 5 gpm/ft^2. Bidders shall attach a copy of the research report indicating test methodologies utilized and results.
Note: the Contractor is responsible for establishing a working erosion and sediment control system and may, with approval of the Engineer, work outside the minimum construction requirements as needed. Where the perimeter control deteriorates or fails, it shall be repaired or replaced with an effective alternative.

DESIGN CRITERIA

The sediment and pollutant removal process characteristic to perimeter control combines both filtering and deposition from settling solids. This is different than methods that rely on ponding for deposition of solids for perimeter control (i.e., silt fence). Ponding occurs when water flowing to the perimeter control accumulates faster than the hydraulic flow through rate of the perimeter control. Typically, hydraulic flow-through rates for perimeter control are 50% greater than geotextile filter fabric (silt fence). *Greater hydraulic flow-through rates reduce ponding, therefore reducing the need for taller sediment control structural design height.* Additionally, perimeter control does not blind as easily with small soil/sediment colloids, such as clay soils, as do planar geotextile sediment control barriers (such as silt fence). However, installation and maintenance is especially important for proper function and performance. For engineering design details see Figure 1.1. For a summary of specifications for product/practice use, performance and design see Table 1.1 and Table 1.2.

Filtering Water

For most standard perimeter control applications, a 12 in (300mm) diameter perimeter control can replace a 24 to 36 in (600 to 900mm) silt fence. See Table 1.3 and 1.4 and Figure 1.2 for standard design specifications for maximum allowable slope lengths. Note: In some low flow conditions, an 8 in (200mm) perimeter control may replace a 24 in (600mm) silt fence. Design consideration should be given to the duration of the project, total area of disturbance, rainfall/runoff potential, soil erosion potential, and sediment loading.

Runoff Flow:
Sheet runoff flow and ponding depth should not exceed the height of the perimeter control. If overflow of the device is a possibility, larger diameter perimeter control should be constructed, other sediment control devices may be used, or management practices to reduce runoff should be installed. Alternatively, a second perimeter control may be constructed or used in combination with compost erosion control blankets or rolled erosion control blankets to slow runoff and reduce erosion. The Filtrexx Design Tool can assist in planning and designing what diameter perimeter control should be used, correct spacing requirements, and what rainfall and site conditions can lead to runoff breaching of the perimeter control. For instructions and a copy of

Figure 1.3 Filtrexx® Sediment Control Design Tool for Sediment Control Applications.

Step 1: Choose units. ft or m		ft				
Step 2: Choose input: Tr or I		Tr				
total rainfall	inches	1.5	storm duration	hours: 24		
Step 3: Choose input: A or W		W				
width of area	ft	400.00	length of slope	ft: 250	43560	
Step 4: Input slope	%	10			452.588	
Step 5: Input reduction runoff percent	%	10				
		sediment control (8,12,16)	silt fence (24, 30)			
Step 6: Input effective length of filter	ft	400	400			
Step 7: Input diameter/height of filter	inches	12	36			

Step 8: Find time to overflow filter and total flow/ft the filter can handle

Step 9: On figure find for given flow expected time to overflow filter

Part A. Evaluation of q_l

I inches/hr	A acres	s percent	Q gpm	L_{ss} ft	q_l gpm/ft
0.063	2.2957	10	58.15	400	0.145

Part B. Predicted time and total flow to top filter.

	q_o gpm/hr	D inches	Effective D inches	Time Overflow hr	Total Flow gal/f	Filter OKAY time > tr
Sediment control (Coarse Material)	0.145	12	9.6	99.1	865	OKAY
Silt Fence	0.145	36	30.6	97.5	851	OKAY

Use on Ecologically Sensitive Sites

the Filtrexx Design Tool, refer to the Filtrexx Design Manual, Section 5.4 and 5.4a.

Level Contour:
Perimeter control should be placed on level contours to assist in dissipating low concentrated flow into sheet flow and reducing runoff flow velocity. Do not construct perimeter control to concentrate runoff or channel water. Sheet flow of water should be perpendicular to the perimeter control at impact and relatively un-concentrated. Placing perimeter control on undisturbed soil will reduce the potential for undermining.

Runoff and Sediment Accumulation:
Where possible, perimeter control should be placed at a 5 ft (1.5m) or greater distance away from the toe of the slope to allow for proper runoff accumulation for sediment deposition and to allow for maximum sediment storage capacity behind the device. If a 5 ft (1.5m) distance is not available, due to construction restrictions, a second perimeter control may be installed to increase ponding and sediment accumulation capacity. Steeper slopes allow less sediment storage behind the perimeter control device and may require larger perimeter control or shorter slope lengths.

End Around Flow:
In order to prevent water flowing around the ends of perimeter control, the ends of the perimeter control must be constructed pointing upslope so the ends are at a higher elevation. A minimum of 10 linear ft (3m) per end each placed at a 30 degree angle is recommended.

Vegetated Perimeter Control:
For permanent areas perimeter control can be direct-seeded to allow vegetation established directly in the device, and may be expanded to 5 ft (1.5m) upslope and downslope from the device, for added performance. Vegetation on and around the perimeter control will assist in slowing runoff velocity for increased deposition and filtration of pollutants. The option of adding vegetation will be at the discretion of the Engineer. No additional soil amendments or fertilizer are required for vegetation establishment in the perimeter control.

Slope Spacing & Drainage Area:
Maximum drainage area to, and slope spacing between perimeter control is dependent on: rainfall intensity and duration used for specific design/ plan, slope steepness, and width of area draining to the perimeter control. Refer to the Filtrexx Design Tool developed by The Ohio State University to accurately design a plan based on your site and climate conditions. See *Design Capacity Prediction Tool for SiltSoxx™ and Silt Fence* and *Flow-Through Rates and Evaluation of Solids Separation of Compost FilterMedia™ vs. Silt Fence in Sediment Control Applications* (http://www.filtrexx.com/research-library/) for more information on the Design Tool or the research project and results used to create the tool. Figure 1.3 provides an example of the user interface for the Design Tool. A specification for maximum slope lengths, based on a 1 in (25 mm)/24 hr rainfall event is provided in Table 1.3 and Figure 1.2; and for a 2 in (50 mm)/24 hr rainfall event is provided in Table 1.4.

INSTALLATION

1. Perimeter control used for control of sediment and soluble pollutants in storm runoff shall meet Filtrexx Soxx Material Specifications and use Filtrexx Certified FilterMedia.
2. Contractor is required to be Filtrexx Certified or use pre-filled Filtrexx® SiltSoxx™ products manufactured by a Filtrexx Certified Manufacturer as determined by Filtrexx International (call Filtrexx at 440-926-2607 for a current list of installers). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application Look for the Filtrexx Certified Seal.
3. Perimeter control will be placed at locations indicated on plans and in a manner as directed by the Engineer or Manufacturer.
4. Perimeter control should be installed parallel to the base of the slope or other disturbed area.

In challenging conditions (i.e., 2:1 slopes), a second perimeter control shall be constructed at the top of the slope, or staking may be increased.

5. Effective Soxx height in the field should be as follows: 5" diameter Soxx = 4" high; 8" diameter Soxx = 6.5" high; 12" diameter Soxx = 9.5" high; 18" diameter Soxx = 14.5" high; 24" diameter Soxx = 19" high.
6. Stakes should be installed through the middle of the perimeter control on 10 ft (3m) centers, using 2 in (50mm) by 2 in (50mm) by 3 ft (1m) wooden stakes. In the event staking is not possible, i.e., when perimeter control is used on pavement, heavy concrete blocks shall be used behind the perimeter control to help stabilize during rainfall/runoff events.
7. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.
8. Loose compost may be backfilled along the upslope side of the perimeter control, filling the seam between the soil surface and the device, improving filtration and sediment retention.
9. If the perimeter control is to be left as a permanent filter or part of the natural landscape, it may be seeded at time of installation for establishment of permanent vegetation. The Engineer will specify seed requirements.
10. Perimeter control is not to be used in perennial, ephemeral, or intermittent streams.

See design drawing schematic for correct installation (Figure 1.1).

INSPECTION

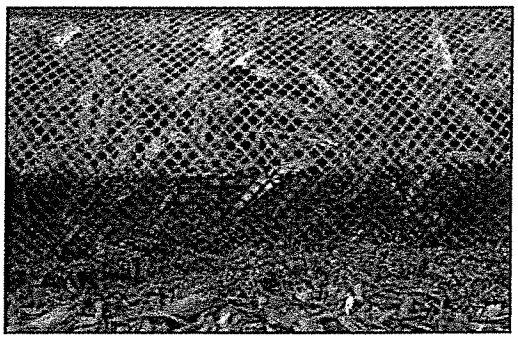
Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the regulating authority. Perimeter control should be regularly inspected to make sure they maintain their shape and are producing adequate hydraulic flow-through. If ponding becomes excessive, additional perimeter control may be required to reduce effective slope length or sediment removal may be necessary. Perimeter control shall be inspected until area above has been permanently stabilized and construction activity has ceased.

MAINTENANCE

1. The Contractor shall maintain the perimeter control in a functional condition at all times and it shall be routinely inspected.
2. If the perimeter control has been damaged, it shall be repaired, or replaced if beyond repair.
3. The Contractor shall remove sediment at the base of the upslope side of the perimeter control when accumulation has reached 1/2 of the effective height of the Soxx, or as directed by the Engineer. Alternatively, a new perimeter control can be placed on top of and slightly behind the original one creating more sediment storage capacity without soil disturbance.
4. Perimeter control shall be maintained until disturbed area above the device has been permanently stabilized and construction activity has ceased.
5. The FilterMedia will be dispersed on site once disturbed area has been permanently stabilized, construction activity has ceased, or as determined by the Engineer.
6. For long-term sediment and pollution control applications, perimeter control can be seeded at the time of installation to create a vegetative filtering system for prolonged and increased filtration of sediment and soluble pollutants (contained vegetative filter strip). The appropriate seed mix shall be determined by the Engineer.

DISPOSAL/RECYCLING

FilterMedia is a composted organic product recycled and manufactured from locally generated organic, natural, and biologically based materials. Once all soil has been stabilized and construction activity has been completed, the FilterMedia may be dispersed with a loader, rake, bulldozer or similar device and may be incorporated into the soil as an amendment or left on the soil surface to aid in permanent seeding or landscaping. Leaving the FilterMedia on site reduces removal and disposal costs compared to other sediment control devices. The mesh netting material will be extracted from the FilterMedia and disposed of properly by the Contractor. The photodegradable



Close Up of Sediment Control

mesh netting material (Soxx) will degrade in 2 to 5 years if left on site. Biodegradable mesh netting material is available and does not need to be extracted and disposed of, as it will completely decompose in approximately 6 to 12 months. Using biodegradable perimeter control completely eliminates the need and cost of removal and disposal.

METHOD OF MEASUREMENT

Bid items shall show measurement as 5 (125), 8 (200), 12 (300), 18 (450), 24 (600), 32 (800) inch (mm) diameter Filtrexx® Sediment/Perimeter Control or SiltSoxx™ per linear foot (or linear meter), installed.

Engineer shall notify Filtrexx of location, description, and details of project prior to the bidding process so that Filtrexx can provide design aid and technical support.

ADDITIONAL INFORMATION

For other references on this topic, including additional research reports and trade magazine and press coverage, visit the Filtrexx website at www.filtrexx.com

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Call for complete list of international installers.

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TABLES & FIGURES:

Table 1.1. Filtrexx® Soxx™ Material Specifications.

Material Type	Cotton BioSoxx™	5 mil High Density Polyethylene (HDPE)	5 mil High Density Polyethylene (HDPE)	Multi-Filament Polypropylene (MFPP, previously HDPP)	Multi-Filament Polypropylene SafteySoxx™	Multi-Filament Polypropylene DuraSoxx®	Multi-Filament Polypropylene DuraSoxx® (Heavy Duty)
Material Characteristic	Biodegradable	Oxo-degradable	Photodegradable	Photodegradable	Photodegradable	Photodegradable	Photodegradable
Design Diameters	8 in (200mm), 12 in (300mm)	8 in (200mm), 12 in (300mm), 18 in (400mm)	5 in (125mm), 8 in (200mm), 12 in (300mm), 18 in (400mm)	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)	8 in (200mm), 12 in (300mm), 18 in (400mm)	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)	5 in (125mm), 8 in (200mm), 12 in (300mm), 18 in (400mm)
Mesh Opening	1/8 in (3mm)	3/8 in (10mm)	3/8 in (10mm)	3/8 in (10mm)	1/8 in (3mm)	1/8 in (3mm)	1/8 in (3mm)
Tensile Strength	ND	26 psi (1.83 kg/cm²)	26 psi (1.83 kg/cm²)	44 psi (3.09 kg/cm²)	202 psi (14.2 kg/cm²)*	202 psi (14.2 kg/cm²)	242 psi (16.99 kg/cm²)
% Original Strength from Ultraviolet Exposure (ASTM G-155)	ND	ND	23% at 1000 hr	100% at 1000 hr	100% at 1000 hr	100% at 1000 hr	100% at 1000 hr
Functional Longevity/ Project Duration***	up to 12 months**	6 mo-3.5 yr	9 mo-4 yr	1-4 yr	2-5 yr	2-5 yr	2-5 yr

* Tested at Texas Transportation Institute/Texas A&M University (ASTM 5035-95).
** Data based on Caltrans research and specifications
*** Functional longevity ranges are estimates only. Site specific environmental conditions may result in shorter or longer time periods.

Table 1.2. Filtrexx® Sediment Control Performance and Design Specifications Summary.

Design Diameter / Design & Performance	5 in (125mm)	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Effective Height	4 in (100mm)	6.5 in (160mm)	9.5 in (240mm)	14.5 in (360mm)	19 in (480mm)	26 in (650mm)	The Ohio State University, Ohio Agricultural Research and Development Center	Transactions of the American Society of Agricultural & Biological Engineers, 2006
Effective Circumference	15 in (380mm)	25 in (630mm)	38 in (960mm)	57 in (1450mm)	75 in (1900mm)	100 in (2500mm)		
Density (when filled)	7.8 lbs (12 kg/m)	13 lbs/ft (20 kg/m)	32 lbs/ft (50 kg/m)	67 lbs/ft (100 kg/m)	133 lbs/ft (200 kg/m)	200 lbs/ft (300 kg/m)	Soil Control Lab, Inc	
Air Space	20%	20%	20%	20%	20%	20%	Soil Control Lab, Inc	
Maximum continuous length	unlimited	unlimited	unlimited	unlimited	unlimited	unlimited		
Staking Requirement	10 ft (3m)	10 ft (3m)	10 ft (3m)	10 ft (3m)	10 ft (3m)	10 ft (3m)		
Maintenance Requirement (sediment accumulation removal at X height)	2 in (50mm)	3.25 in (80mm)	4.75 in (120mm)	7.25 in (180mm)	9.5 in (240mm)	13 in (325mm)		

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Table 1.2. Filtrexx® Sediment Control Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	5 in (125mm)	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Initial Maintenance Requirement based on Rainfall-Runoff*	13 in (33 cm); 665 L/linear m	22 in (55 cm); 1109 L/linear m	32 in (80 cm); 1388 L/linear m	42 in (105 cm); 1825 L/linear m	64 in (160 cm); 2776 L/linear m	86 in (215 cm); 3885 L/linear m	The University of Georgia & Auburn University	
Functional Longevity**	2–5 yr	2–5 yr	2–5 yr	2–5 yr	2–5 yr	2–5 yr		
Maximum Slope Length (<2%)	360 ft (110m)	600 ft (183m)	750 ft (229m)	1000 ft (305m)	1300 ft (396m)	1650 ft (500m)	The Ohio State University, Ohio Agricultural Research and Development Center	Filtrexx® Design Tool™, Filtrexx® Library #301, Filtrexx® Tech Link #3304 & #3311
Hydraulic Flow Through Rate	4.5 gpm/ft (56 L/min/m)	7.5 gpm/ft (94 L/min/m)	11.3 gpm/ft (141 L/min/m)	15.0 gpm/ft (188 L/min/m)	22.5 gpm/ft (281 L/min/m)	30.0 gpm/ft (374 L/min/m)	The Ohio State University, Ohio Agricultural Research and Development Center; University of Guelph, School of Engineering/ Watershed Research Group	Filtrexx® Tech Link #3311 & #3313, #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006, Second Interagency Conference on Research in Watersheds, 2006
P Factor (RUSLE)	0.1-0.32	0.1-0.32	0.1-0.32	0.1-0.32	0.1-0.32	0.1-0.32	USDA ARS Environmental Quality Lab/ University of Georgia	American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Sediment Storage Capacity***	104 cu. in (1710cc)	174 cu. in (2850cc)	396 cu. in (6490cc)	857 cu. in (14040cc)	1631 cu. in (26840cc)	2647 cu. in (43377 cc)		Filtrexx® Tech Link #3314
Total Solids Removal	98%	98%	98%	98%	98%	98%	Soil Control Lab, Inc	International Erosion Control Association, 2006
Total Suspended Solids Removal	78%	78%	78%	78%	78%	78%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006

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Table 1.2. Filtrexx® Sediment Control Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	5 in (125mm)	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Turbidity Reduction	63%	63%	63%	63%	63%	63%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Clay (<0.002mm) Removal	65%	65%	65%	65%	65%	65%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Silt (0.002-0.05mm) Removal	64%	64%	64%	64%	64%	64%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
TSS Removal w/PAM	97%	97%	97%	97%	97%	97%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
TSS Removal w/ Flocculent	97%	97%	97%	97%	97%	97%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Turbidity Reduction w/PAM	98%	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Turbidity Reduction w/ Flocculent	94%	94%	94%	94%	94%	94%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006

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Table 1.2. Filtrexx® Sediment Control Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	5 in (125mm)	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Total Phosphorus Removal	34%	34%	34%	34%	34%	34%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Reactive Phosphorus Removal	38%	38%	38%	38%	38%	38%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Total Phosphorus Removal w/ Nutrient Agent	60%	60%	60%	60%	60%	60%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Reactive Phosphorus Removal w/ Nutrient Agent	99%	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Nitrate-N Removal	25%	25%	25%	25%	25%	25%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Ammonium-N Removal	15%	15%	15%	15%	15%	15%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Ammonium-N Removal w/ Nutrient Agent	33%	33%	33%	33%	33%	33%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Motor Oil Removal w/ Hydrocarbon Agent	99%	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	International Erosion Control Association, 2006
Diesel Fuel Removal w/ Hydrocarbon Agent	99%	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Gasoline Removal w/ Hydrocarbon Agent	54%	54%	54%	54%	54%	54%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link

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Table 1.2. Filtrexx® Sediment Control Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	5 in (125mm)	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Cadmium (Cd) Removal w/ Heavy Metal Agent	73%	73%	73%	73%	73%	73%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Chromium (Cr) Removal w/ Heavy Metal Agent	47%	47%	47%	47%	47%	47%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Copper (Cu) Removal w/ Heavy Metal Agent	70%	70%	70%	70%	70%	70%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Nickel (Ni) Removal w/ Heavy Metal Agent	69%	69%	69%	69%	69%	69%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Lead (Pb) Removal w/ Heavy Metal Agent	73%	73%	73%	73%	73%	73%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Zinc (Zn) Removal w/ Heavy Metal Agent	53%	53%	53%	53%	53%	53%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Iron (Fe) Removal	22%	22%	22%	22%	22%	22%	Soil Control Lab, Inc	
Manganese (Mn) Removal	8%	8%	8%	8%	8%	8%	Soil Control Lab, Inc	
Total coliform Removal	67%	67%	67%	67%	67%	67%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
E. coli Removal	67%	67%	67%	67%	67%	67%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Enterococcus Removal	47%	47%	47%	47%	47%	47%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
E. coli Removal w/ Bacteria Agent	98%	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Fecal coliform Removal w/ Bacteria Agent	98%	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Enterococcus Removal w/ Bacteria Agent	91%	91%	91%	91%	91%	91%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Other Recommended Uses	Slope Interruption	Inlet Protection, Ditch Protection, Slope Interruption	Inlet protection, Ditch Protection, Concrete Washout, Filtration System, Slope Interruption	Ditch Protection, Concrete Washout, Filtration System	Ditch Protection, Concrete Washout, Filtration System	Ditch Protection, Concrete Washout, Filtration System		

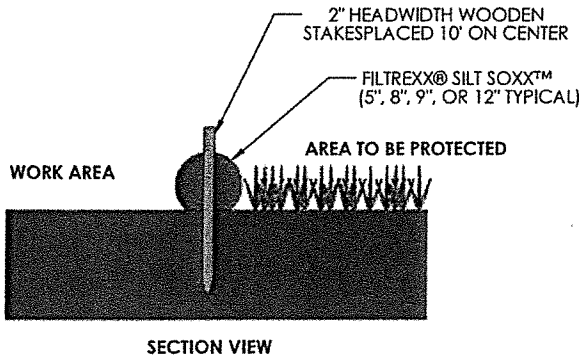
* Based on rainfall intensity of 12.5 cm (5 in)/hr applied to a bare clay loam soil at a 10% slope; runoff flow rate of 108 ml/sec/linear m (0.52 gpm/linear ft); and mean runoff volume of 230 L/m2 (6.3 g/ft2).

** Functional Longevity is dependent on UV exposure, freeze/thaw frequency, region of US/Canada, runoff-sediment frequency/duration/loading, and adherence to specified maintenance requirement.

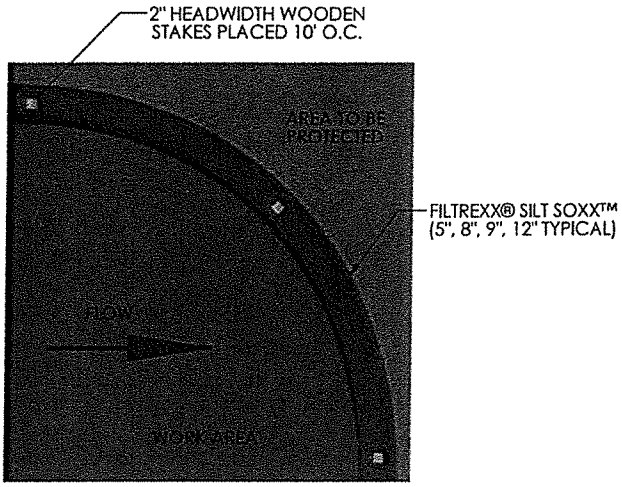
*** Sediment Storage Capacity = sediment accumulation behind (directly upslope) + within the device.

Figure 1.1. Engineering Design Drawing for Perimeter Control

FILTREXX® SILT SOXX™

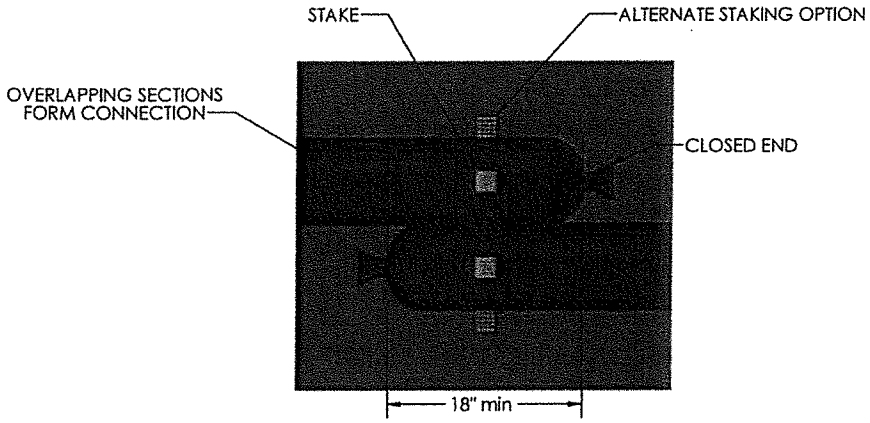


SECTION VIEW

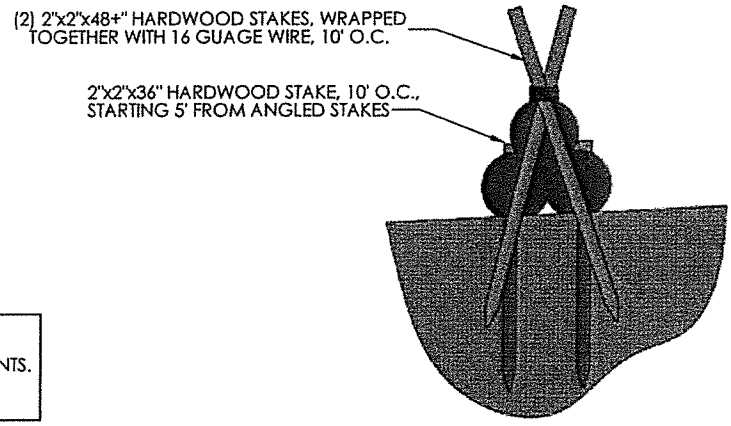


TOP VIEW

COMPOST SOCK CONNECTION/ATTACHMENT DETAIL



FILTREXX® PYRAMID STAKING DETAIL



NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. SILT SOXX™ FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

Figure 1.2. Maximum Slope Lengths of Filtrexx® Perimeter Control Based on a 1 in (25 mm)/24 hr Rainfall Event.

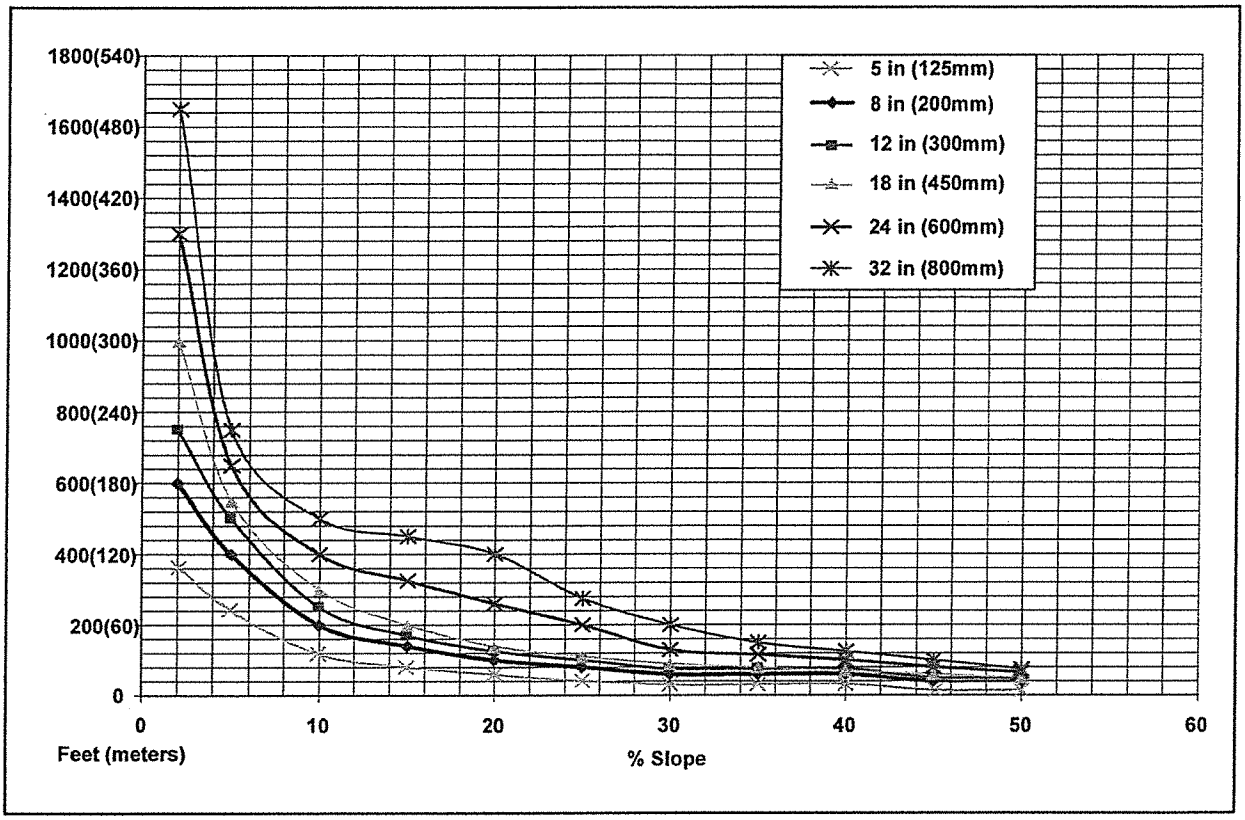


Table 1.3. Maximum Slope Lengths for Filtrexx® Perimeter Control Based on a 1 in (25 mm)/24 hr Rainfall Event.

Slope Percent	Maximum Slope Length Above Sediment Control in Feet (meters)*					
	5 in (125 mm) Sediment control	8 in (200 mm) Sediment control	12 in (300 mm) Sediment control	18 in (450 mm) Sediment control	24 in (600mm) Sediment control	32 in (800mm) Sediment control
	4 in (100 mm)**	6.5 in (160 mm)**	9.5 in (240 mm) **	14.5 in (360 mm) **	19 in (480 mm) **	26 in (650 mm) **
2 (or less)	360 (110)	600 (180)	750 (225)	1000 (300)	1300 (400)	1650 (500)
5	240 (73)	400 (120)	500 (150)	550 (165)	650 (200)	750 (225)
10	120 (37)	200 (60)	250 (75)	300 (90)	400 (120)	500 (150)
15	85 (26)	140 (40)	170 (50)	200 (60)	325 (100)	450 (140)
20	60 (18)	100 (30)	125 (38)	140 (42)	260 (80)	400 (120)
25	48 (15)	80 (24)	100 (30)	110 (33)	200 (60)	275 (85)
30	36 (11)	60 (18)	75 (23)	90 (27)	130 (40)	200 (60)
35	36 (11)	60 (18)	75 (23)	80 (24)	115 (35)	150 (45)
40	36 (11)	60 (18)	75 (23)	80 (24)	100 (30)	125 (38)
45	24 (7)	40 (12)	50 (15)	60 (18)	80 (24)	100 (30)
50	24 (7)	40 (12)	50 (15)	55 (17)	65 (20)	75 (23)

* Based on a failure point of 36 in (0.9 m) super silt fence (wire reinforced) at 1000 ft (303 m) of slope, watershed width equivalent to receiving length of sediment control device, 1 in/ 24 hr (25 mm/24 hr) rain event.

** Effective height of Sediment control after installation and with constant head from runoff as determined by Ohio State University.

Table. 1.4. Maximum Slope Lengths for Filtrexx® Perimeter Control Based on a 2 in (50 mm)/24 hr Rainfall Event.

Slope Percent	Maximum Slope Length Above Sediment Control in Feet (meters)*					
	5 in (125 mm) Sediment control	8 in (200 mm) Sediment control	12 in (300 mm) Sediment control	18 in (450 mm) Sediment control	24 in (600mm) Sediment control	32 in (800mm) Sediment control
	4 in (100 mm)**	6.5 in (160 mm) **	9.5 in (240 mm) **	14.5 in (360 mm) **	19 in (480 mm) **	26 in (650 mm) **
2 (or less)	180 (55)	300 (90)	375 (110)	500 (150)	650 (200)	850 (260)
5	120 (37)	200 (60)	250 (75)	275 (85)	325 (100)	400 (120)
10	60 (18)	100 (30)	125 (35)	150 (45)	200 (60)	275 (85)
15	42 (13)	70 (20)	85 (25)	100 (30)	160 (50)	225 (70)
20	30 (9)	50 (15)	65 (20)	70 (20)	130 (40)	180 (55)
25	24 (7)	40 (12)	50 (15)	55 (16)	100 (30)	150 (45)
30	18 (6)	30 (9)	40 (12)	45 (13)	65 (20)	100 (30)
35	18 (6)	30 (9)	40 (12)	45 (13)	55 (18)	75 (23)
40	18 (6)	30 (9)	40 (12)	45 (13)	50 (15)	60 (38)
45	12 (4)	20 (6)	25 (8)	30 (9)	40 (12)	50 (15)
50	12 (4)	20 (6)	25 (8)	30 (9)	35 (10)	40 (12)

* Based on a failure point of 36 in (0.9 m) super silt fence (wire reinforced) at 1000 ft (303 m) of slope, watershed width equivalent to receiving length of sediment control device, 2 in/ 24 hr (50 mm/24 hr) rain event.

** Effective height of Sediment control after installation and with constant head from runoff as determined by Ohio State University.

filtrexx®
SUSTAINABLE TECHNOLOGIES

SECTION 1: CONSTRUCTION

Filtrexx® Inlet Protection (SiltSoxx™)

PURPOSE & DESCRIPTION

Filtrexx® SiltSoxx™ is a three-dimensional tubular sediment control and stormwater runoff filtration device typically used for storm drain **Inlet Protection** of sediment and soluble pollutants (such as phosphorus and petroleum hydrocarbons) on and around construction activities. Inlet Protection traps sediment and soluble pollutants by *filtering* runoff water as it passes through the matrix of the Soxx™ *and* by allowing water to temporarily pond behind the Soxx, allowing *deposition* of suspended solids.

APPLICATION

Inlet protection has three distinct applications:

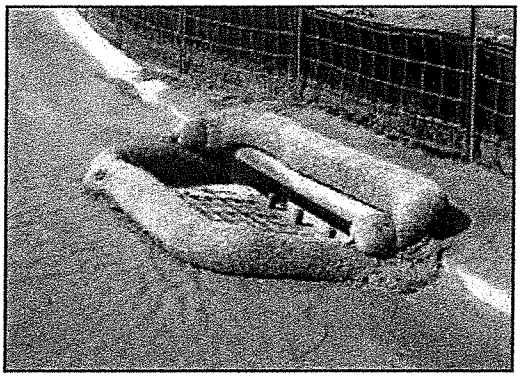
- around *drain inlets,*
- in front of *curb inlets,*
- as *curb sediment containment* systems

These applications are described in detail below and shown graphically in Figure 2.1 and 2.2.

Drain inlets are located in areas that receive runoff from surrounding lands, often exposed and disturbed soils, and are located at a low point, or in a sump. Inlet protection used around drain inlets (or *rain* inlet protection) should completely enclose the circumference of the drain and where possible should not be placed on a grade or slope. Inlet protection used around drain inlets should never be the only form of site sediment control and should be accompanied by erosion control/slope stabilization practices, such as compost erosion control blankets or rolled erosion control blankets. Inlet protection should never be placed where they divert runoff flow from the drain inlet, or on top of the inlet, which can cause flooding. Under high runoff and sediment loading conditions placement of 1-2 in (25-50 mm) diameter rock (AASHTO #2) may be placed around the outer circumference of the inlet protection up to ½ the height of the inlet protection. This will help slow runoff velocity as it contacts the inlet protection and will reduce sediment build-up and clogging of the inlet protection.

Curb inlets are generally located on paved surfaces and are designed to rapidly drain storm runoff from roadways to prevent flooding that poses a hazard to vehicular traffic. Inlet protection devices should be placed in a manner which intercepts runoff prior to entering the inlet, but does not block or divert runoff from the inlet. To prevent diversion of runoff, inlet protection used around curbs (or *curb* inlet protection) should be used in low points, or sumps, and minor slopes or grades. Inlet protection should never be placed in or on the curb inlet drain, or placed in a manner that obstructs vehicular traffic. Inlet protection height should be at least 1 in (25 mm) lower than top of curb inlet to allow for overflow into the drain and not over the curb. Maximum sediment removal efficiency occurs when minor ponding exists behind inlet protection but should never lead to flooding.

Curb sediment containment systems are used to reduce the sediment and pollutant load flowing to a curb inlet. They are generally placed on paved surfaces perpendicular to runoff flow and should be lower than the height of the curb. Curb sediment containment systems should never cause flooding or placed where they are a hazard to vehicular traffic. Inlet protection used for curb sediment containment (or *curb sediment containment* inlet protection) can be



Curb Inlet Protection – Fine Silts Filtration

placed on a grade but should never be placed directly upslope from curb inlet where it may inadvertently divert runoff from entering curb inlet.

ADVANTAGES AND DISADVANTAGES

Advantages

- Tubular filtration matrix allows for better trapping and removal of sediment and soluble pollutants in stormwater runoff compared to planar constructed sediment control devices, such as silt fences.
- Inlet protection can be installed on soil or paved surface conditions.
- Greater surface area contact with soil or pavement than typical sediment control devices, reducing potential for runoff to undercut the device leading to unfiltered sediment.
- No trenching is required; therefore soil is not disturbed upon installation.
- Drain inlet protection can be installed year-round in difficult soil conditions such as frozen or wet ground, and dense and compacted soils, as long as stakes can be driven.
- Inlet protection is easily implemented as a treatment in a greater treatment train approach to erosion and sediment control.
- Organic matter and humus colloids in FilterMedia have the ability to bind and adsorb phosphorus, metals, and hydrocarbons that may be in stormwater runoff.
- Microorganisms in compost FilterMedia have the ability to degrade organic pollutants and cycle captured nutrients in stormwater runoff.
- Soxx (mesh netting containment system) allows inlet protection to be placed in areas of high sheet flow and low concentrated flow.

ADVANTAGES			
	LOW	MED	HIGH
Installation Difficulty	✓		
Sediment Control			✓
Soluble Pollutant Control		✓	
Runoff Flow Control		✓	
Life Cycle Cost	✓		

- Drain inlet protection can be direct seeded at time of application to provide greater stability and filtration capability once vegetation is established, if used on soil surface.
- FilterMedia is organic and can be left on site soil after permanent stabilization is complete, to be used in landscape design and/or seeded and planted with permanent vegetation.
- FilterMedia improves existing soil structure if spread out and used as a soil amendment after construction activity is complete.
- Biodegradable drain inlet protection can be left on site after construction activity eliminating the need for removal and labor and disposal costs.
- Inlet protection is available in 8 in (200mm), 12 in (300mm), 18 in (450mm), 24 in (600mm), and 32 in (800mm) diameters.
- Inlet protection may assist in qualification for LEED® Green Building Rating and Certification credits under LEED Building Design & Construction (BD+C), New Construction v4. Awarded credits may be possible from the categories of Sustainable Sites, Water Efficiency, Materials & Resources, and Innovation. *Note: LEED is an independent program offered through the U.S. Green Building Council. LEED credits are determined on a per project basis by an independent auditing committee. Filtrexx neither guarantees nor assures LEED credits from the use of its products. LEED is a trademark of the U.S. Green Building Council.*

Disadvantages

- If filler material of inlet protection is not Filtrexx® Certified℠ FilterMedia™, hydraulic flow rate and and/or sediment and pollutant removal performance may be diminished.
- If not installed correctly, maintained or used for a purpose or intention that does not meet specifications, performance may be diminished.
- If land surface is extremely bumpy or rocky ground surface contact to drain inlet protection may be diminished thereby adversely effecting performance.
- If inlet protection is installed on a grade or slope, runoff may be diverted from drain or inlet, causing flooding downstream.
- If runoff breaches inlet protection sediment retention will be minimal.
- Incorrect installation or application may cause flooding or pose a hazard to vehicular traffic.
- Inlet protection should never be the only form of

site sediment control.
- Inlet protection should only be used in small drainage areas.

MATERIAL SPECIFICATIONS

Inlet protection use only high wear heavy duty netting materials available from Filtrexx International and are the only mesh materials accepted in creating inlet protection for any application. For Soxx™ Material Specifications see Table 2.1.

FILTERMEDIA™ CHARACTERISTICS

Inlet protection use only Filtrexx Certified FilterMedia which is a coarse composted material that is specifically designed for removal of solids and soluble pollutants from stormwater runoff. *FilterMedia can be altered or customized to target specific pollutants in runoff as approved by the Engineer or Filtrexx International.* All Filtrexx Certified FilterMedia has been third party tested and certified to meet minimum performance criteria defined by Filtrexx International. Performance parameters include hydraulic flow through rate, total solids removal efficiency, total suspended solids removal efficiency, turbidity reduction, nutrient removal efficiency, metals removal efficiency, and motor oil removal efficiency. For information on the physical and chemical properties of Certified FilterMedia refer to the Filtrexx Design Manual, Section 5.1. Look for the Filtrexx Certified FilterMedia Seal from our international network of Filtrexx Certified Installers and Manufacturers.

PERFORMANCE

Performance testing and research on sediment control has been extensive. For a summary of performance testing, research results, and design specifications see Table 2.2. For copies of publications, full reports, or Tech Link summaries contact Filtrexx International.

Successful bidders will furnish adequate research support showing their manufactured product meets or exceeds performance and design criteria outlined in this standard specification. Research or performance testing will be accepted if it meets the following criteria: conducted by a neutral third party, utilizes standard test methods reported by ASTM or referenced in a peer reviewed scientific journal, product and control treatments are tested in triplicate, performance results are reported for product and control (control should be a bare soil under the same set of environmental and experimental conditions), results are peer reviewed, results indicate a minimum 60% TSS removal efficiency and a minimum hydraulic flow through rate of 5 gpm/ft^2. Bidders shall attach a copy of the research report indicating test methodologies utilized and results.

Note: the Contractor is responsible for establishing a working erosion and sediment control system and may, with approval of the Engineer, work outside the minimum construction requirements as needed. Where the inlet protection deteriorates or fails, it shall be repaired or replaced with an effective alternative.

DESIGN CRITERIA

Inlet protection is used for curb inlet protection and curb sediment containment on paved surfaces by providing a physical barrier that reduces the rate at which sediment-laden runoff water can enter a storm drain. Inlet protection is also used around storm runoff drain inlets on soil surfaces where construction activities are ongoing and soil stabilization and erosion control measures are also employed. Inlet protection allows construction to continue while protecting storm systems from sediment overload. Inlets are normally protected until final vegetation and stabilization is complete, thereby reducing the amount of sediment reaching the storm inlets.

For most standard curb inlet protection applications, an 8 in (200mm) diameter inlet protection is recommended; for drainage inlets receiving runoff where soils are not stabilized a 12 in (300mm) or 18 in (450mm) drain inlet protection may be specified.

For engineering design details of inlet protection see Figure 2.1 and 2.2. For a summary of specifications for product/practice use, performance and design see

Drain Inlet Protection

Table 2.1 and Table 2.2.

Planning:

Inlet protection should not be considered the only form of site sediment control and should be used within an overall integrated Erosion and Sediment Control or StormWater Pollution Prevention Plan. The blocking of storm drains by the use of inlet protection should be considered in the overall site planning, especially where ponding water will create disturbances.

Preconstruction meetings should be conducted to educate construction site personnel about the E&SC devices used and acceptable traffic patterns that avoid running over inlet protection with heavy equipment.

It is possible to drive over inlet protection during construction (not recommended); however, these areas should be immediately repaired by manually moving inlet protection back into place, if disturbed. Continued heavy construction traffic may destroy the material fabric, reduce the dimensions, and reduce the effectiveness of the inlet protection.

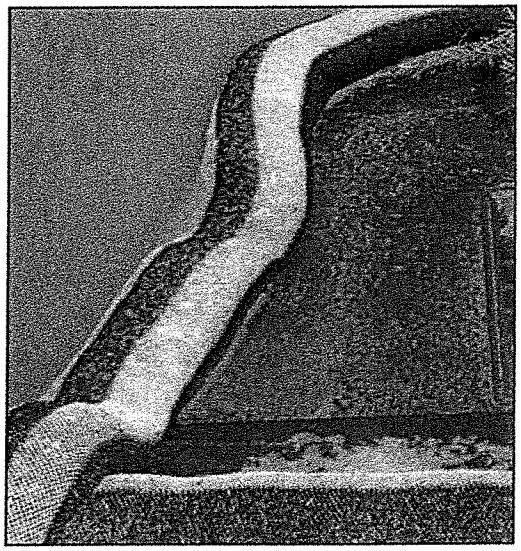
Device Function:

The sediment and pollutant removal process characteristic to inlet protection combines both filtering and deposition of solids. This is different than methods that rely solely on ponding for deposition of solids for sediment control. Ponding occurs when water flowing to the inlet protection accumulates faster than the hydraulic flow through rate of the inlet protection. Typically, hydraulic flow-through rates for inlet protection are **50% greater** than geotextile filter fabric (silt fence). *Greater hydraulic flow-through rates reduce ponding, therefore reducing the need for taller sediment control structural design height.* However, installation and maintenance is especially important for proper function and performance.

Pollutant Removal:

Unlike most inlet protection devices, inlet protection has been shown to remove pollutants other than total and suspended solids from stormwater. Inlet protection has the ability to remove soluble pollutants, such as phosphorus and petroleum hydrocarbons (e.g. motor oil) from entering storm drains. Additional Filtrexx products can be added to the inlet protection to increase removal efficiency of target pollutants such as turbidity, TSS, and soluble phosphorus.

It should be noted that sediment removal efficiency can be near 100% unless runoff breaches the inlet protection, at which point the effectiveness may be greatly diminished.



Before and After Filtration

Runoff Flow:

Sheet and/or concentrated runoff flow should not exceed the hydraulic flow-through capacity, and ponding depth should not exceed the height, of the inlet protection. If overflow of the device is a possibility, larger diameter inlet protection should be specified, other sediment control devices may be used, or management practices to reduce runoff should be implemented. For curb inlets, inlet protection should not exceed the height of the intake opening. For curb sediment containment, inlet protection should not exceed the height of the curb.

Level Contour:

Place inlet protection on level contours to prevent diversion of runoff from storm inlets. Sheet flow of water should be perpendicular to the inlet protection at impact. If inlet protection is to be placed on a grade, care should be taken not to divert runoff from storm inlet.

Runoff and Sediment Accumulation:

Where possible, inlet protection used for drain inlets should be placed at a 5 ft (1.5m) or greater distance away from the toe of the slope to allow for proper runoff accumulation for sediment deposition and to allow for maximum sediment storage capacity behind the device. If a 5 ft (1.5m) distance is not available, due to construction restrictions, a second inlet protection may be installed to increase ponding and sediment accumulation capacity.

Vegetated Filter:
For permanent drain inlet applications inlet protection can be direct-seeded to allow vegetation establishment directly in the device. Vegetation on and around the inlet protection will assist in slowing runoff velocity which can increase deposition and filtration of pollutants. The option of adding vegetation will be at the discretion of the Engineer. No additional soil amendments or fertilizer are required for vegetation establishment in the drain inlet protection. The appropriate seed mix shall be determined by the Engineer. This option is not normally available when using the tool on paved areas.

Drainage Area and Spacing:
Maximum drainage area contributing runoff to drain inlet protection should be no more than 3 acres (1.2 ha). Drainage areas greater than 3 acres (1.2 ha) should implement sediment traps, sediment basins, or runoff reduction practices (KY TC, 2006).

Spacing between inlet protection used for sediment containment along curbs is dependent on the grade of the roadway and can have an effect on the total sediment load reaching the curb inlet.

INSTALLATION

1. Inlet protection used to reduce sediment and soluble pollutants entering storm drains shall meet Filtrexx Soxx Material specifications and use Filtrexx Certified FilterMedia.
2. Contractor is required to be a Filtrexx Certified Installer as determined by Filtrexx International. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application (Call Filtrexx at 440-926-2607 for a current list of installers). Look for the Filtrexx Certified Installer Seal.
3. Inlet protection shall be placed at locations indicated on plans as directed by the Engineer. Inlet protection should be installed in a pattern that allows complete protection of the inlet area.
4. Installation of curb inlet protection will ensure a minimal overlap of at least 1 ft (300mm) on either side of the opening being protected. Inlet protection will be anchored to the soil behind the curb using staples, stakes or other devices capable of holding the inlet protection in place.
5. Standard inlet protection for curb inlet protection and curb sediment containment will use 8 in (200mm) diameter inlet protection, and drain inlets on soil will use 12 in (300mm) or 18 in (450mm) diameter inlet protection. In severe flow situations, larger inlet protection may be specified by the Engineer. During curb installation, inlet protection shall be compacted to be slightly shorter than curb height.
6. If inlet protection becomes clogged with debris and sediment, they shall be maintained so as to assure proper drainage and water flow into the storm drain. In severe storm events, overflow of the inlet protection may be acceptable in order to keep the area from flooding.
7. Curb and drain inlet protection shall be positioned so as to provide a permeable physical barrier to the drain itself, allowing sediment to collect on the outside of the inlet protection.
8. For drains and inlets that have only curb cuts, without street grates, a spacer is required in order to keep the inlet protection away from the drain opening. This spacer should be a hog wire screen bent to overlap the grate opening and keep the sock from falling into the opening. Use at least one spacer for every 4 ft (1.2m) of curb drain opening. The wire grid also prevents other floatable waste from passing over the inlet protection.
9. Stakes shall be installed through the middle of the drain inlet protection on 5 ft (1.5m) centers, using 2 in (50mm) by 2 in (50mm) by 3 ft (1m) wooden stakes.
10. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.

INSPECTION

Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the

Table 2.3 Spacing for Curb Sediment Containment Systems.

Grade (%)	Spacing (ft)	Spacing (mm)
0.5	100	30
1.0	50	15
2.0	25	8
3.0	16	5
4.0	13	4
5.0	10	3

Source: Fifield, 2001.

regulating authority. Inlet protection should be regularly inspected to make sure they maintain their shape and are producing adequate hydraulic flow-through. If ponding becomes excessive, additional inlet protection may be required or sediment removal may be necessary. Inlet protection shall be inspected until contributing drainage area has been permanently stabilized and construction activity has ceased.

MAINTENANCE

1. The Contractor shall maintain the inlet protection in a functional condition at all times and it shall be routinely inspected.
2. If the inlet protection has been damaged, it shall be repaired, or replaced if beyond repair.
3. The Contractor shall remove sediment at the base of the upslope side of the inlet protection when accumulation has reached 1/2 of the effective height of the inlet protection, or as directed by the Engineer. Alternatively, for drain inlet protection, a new Soxx may be placed on top of the original increasing the sediment storage capacity without soil distbance.
4. Inlet protection shall be maintained until disturbed area above or around the device has been permanently stabilized and construction activity has ceased.
5. Regular maintenance includes lifting the inlet protection and cleaning around and under them as sediment collects.
6. The FilterMedia will be removed from paved areas or dispersed on site soil or behind curb once disturbed area has been permanently stabilized, construction activity has ceased, or as determined by the Engineer.
7. Permanent vegetated filter strips will be left intact.

DISPOSAL/RECYCLING

FilterMedia is an organic, composted product manufactured from locally generated organic, natural, and biologically based materials. Once all soil has been stabilized and construction activity has been completed, the FilterMedia may be dispersed with a loader, rake, bulldozer or similar device and may be incorporated into the soil as an amendment or left on the soil surface to aid in permanent seeding or landscaping. Leaving the FilterMedia on site reduces removal and disposal costs compared to other sediment control devices. The mesh netting material will be extracted from the FilterMedia and disposed of properly by the Contractor. Consequently, the mesh netting material is photodegradable and will decompose in 2 to 5 years if left on site. Biodegradable mesh netting material is available and does not need to be extracted and disposed of, as it will completely decompose in approximately 6 months. Using biodegradable inlet protection completely eliminates the need and cost of removal and disposal.

METHOD OF MEASUREMENT

Bid items shall show measurement as 'X in (X mm) Filtrexx® Inlet Protection/SiltSoxx™/InletSoxx™ per linear ft (linear meter) installed, per inlet, or as specified by the Engineer. Engineer shall notify Filtrexx of location, description, and details of project prior to the bidding process so that Filtrexx can provide design aid and technical support.

ADDITIONAL INFORMATION

For other references on this topic, including additional research reports and trade magazine and press coverage, visit the Filtrexx website at www.filtrexx.com

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877-542-7699 | 234-466-0810 (fax)
www.filtrexx.com | info@filtrexx.com

Call for complete list of international installers.

REFERENCES CITED & ADDITIONAL RESOURCES

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TABLES & FIGURES:

Table 2.1. Filtrexx® Soxx™ Material Specifications.

Material Type	Cotton BioSoxx™	5 mil High Density Polyethylene (HDPE)	5 mil High Density Polyethylene (HDPE)	Multi-Filament Polypropylene (MFPP, previously HDPP)	Multi-Filament Polypropylene SafteySoxx™	Multi-Filament Polypropylene DuraSoxx®	Multi-Filament Polypropylene DuraSoxx® (Heavy Duty)
Material Characteristic	Biodegradable	Oxo-degradable	Photodegradable	Photodegradable	Photodegradable	Photodegradable	Photodegradable
Design Diameters	8 in (200mm), 12 in (300mm)	8 in (200mm), 12 in (300mm), 18 in (400mm)	5 in (125mm), 8 in (200mm), 12 in (300mm), 18 in (400mm)	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)	8 in (200mm), 12 in (300mm), 18 in (400mm)	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)	5 in (125mm), 8 in (200mm), 12 in (300mm), 18 in (400mm)
Mesh Opening	1/8 in (3mm)	3/8 in (10mm)	3/8 in (10mm)	3/8 in (10mm)	1/8 in (3mm)	1/8 in (3mm)	1/8 in (3mm)
Tensile Strength	ND	26 psi (1.83 kg/cm²)	26 psi (1.83 kg/cm²)	44 psi (3.09 kg/cm²)	202 psi (14.2 kg/cm²)*	202 psi (14.2 kg/cm²)	242 psi (16.99 kg/cm²)
% Original Strength from Ultraviolet Exposure (ASTM G-155)	ND	ND	23% at 1000 hr	100% at 1000 hr	100% at 1000 hr	100% at 1000 hr	100% at 1000 hr
Functional Longevity/ Project Duration***	up to 12 months**	6 mo-3.5 yr	9 mo-4 yr	1-4 yr	2-5 yr	2-5 yr	2-5 yr

*Tested at Texas Transportation Institute/Texas A&M University (ASTM 5035-95).
** Data based on Caltrans research and specifications
*** Functional longevity ranges are estimates only. Site specific environmental conditions may result in shorter or longer time periods.

Table 2.2. Filtrexx® Inlet Protection Performance and Design Specifications Summary.

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Effective Height	6.5 in (160mm)	9.5 in (240mm)	14.5 in (360mm)	19 in (480mm)	26 in (650mm)	The Ohio State University, Ohio Agricultural Research and Development Center	Transactions of the American Society of Agricultural & Biological Engineers, 2006
Effective Circumference	25 in (630mm)	38 in (960mm)	57 in (1450mm)	75 in (1900mm)	100 in (2500mm)		
Density (when filled)	13 lbs/ft (20 kg/m)	32 lbs/ft (50 kg/m)	67 lbs/ft (100 kg/m)	133 lbs/ft (200 kg/m)	200 lbs/ft (300 kg/m)	Soil Control Lab, Inc	
Air Space	20%	20%	20%	20%	20%	Soil Control Lab, Inc	
Maximum continuous length	unlimited	unlimited	unlimited	unlimited	unlimited		
Staking Requirement	10 ft (3m)	10 ft (3m)	10 ft (3m)	10 ft (3m)	10 ft (3m)		
Maintenance Requirement (sediment accumulation removal at X height)	3.25 in (80mm)	4.75 in (120mm)	7.25 in (180mm)	9.5 in (240mm)	13 in (325mm)		

(continued on next page)

Table 2.2. Filtrexx® Inlet Protection Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Initial Maintenance Requirement based on Rainfall-Runoff*	22 in (55 cm); 1109 L/linear m	32 in (80 cm); 1388 L/linear m	42 in (105 cm); 1825 L/linear m	64 in (160 cm); 2776 L/linear m	86 in (215 cm); 3885 L/linear m	The University of Georgia & Auburn University	
Functional Longevity**	2–5 yr	2–5 yr	2–5 yr	2–5 yr	2–5 yr		
Maximum Slope Length (<2%)	600 ft (183m)	750 ft (229m)	1000 ft (305m)	1300 ft (396m)	1650 ft (500m)	The Ohio State University, Ohio Agricultural Research and Development Center	Filtrexx® Design Tool™, Filtrexx® Library #301, Filtrexx® Tech Link #3304 & #3311
Hydraulic Flow Through Rate	7.5 gpm/ft (94 L/min/m)	11.3 gpm/ft (141 L/min/m)	15.0 gpm/ft (188 L/min/m)	22.5 gpm/ft (281 L/min/m)	30.0 gpm/ft (374 L/min/m)	The Ohio State University, Ohio Agricultural Research and Development Center; University of Guelph, School of Engineering/ Watershed Research Group	Filtrexx® Tech Link #3311 & #3313, #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006, Second Interagency Conference on Research in Watersheds, 2006
P Factor (RUSLE)	0.1-0.32	0.1-0.32	0.1-0.32	0.1-0.32	0.1-0.32	USDA ARS Environmental Quality Lab/ University of Georgia	American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Sediment Storage Capacity***	174 cu. in (2850cc)	396 cu. in (6490cc)	857 cu. in (14040cc)	1631 cu. in (26840cc)	2647 cu. in (43377 cc)		Filtrexx® Tech Link #3314
Total Solids Removal	98%	98%	98%	98%	98%	Soil Control Lab, Inc	International Erosion Control Association, 2006
Total Suspended Solids Removal	78%	78%	78%	78%	78%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006

Table 2.2. Filtrexx® Inlet Protectio Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Turbidity Reduction	63%	63%	63%	63%	63%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Clay (<0.002mm) Removal	65%	65%	65%	65%	65%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Silt (0.002-0.05mm) Removal	64%	64%	64%	64%	64%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
TSS Removal w/PAM	97%	97%	97%	97%	97%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
TSS Removal w/ Flocculent	97%	97%	97%	97%	97%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Turbidity Reduction w/PAM	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Turbidity Reduction w/ Flocculent	94%	94%	94%	94%	94%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006

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Table 2.2. Filtrexx® Inlet Protection Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Total Phosphorus Removal	34%	34%	34%	34%	34%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Reactive Phosphorus Removal	38%	38%	38%	38%	38%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Total Phosphorus Removal w/ Nutrient Agent	60%	60%	60%	60%	60%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Reactive Phosphorus Removal w/ Nutrient Agent	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Nitrate-N Removal	25%	25%	25%	25%	25%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Ammonium-N Removal	15%	15%	15%	15%	15%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Ammonium-N Removal w/ Nutrient Agent	33%	33%	33%	33%	33%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Motor Oil Removal w/ Hydrocarbon Agent	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	International Erosion Control Association, 2006
Diesel Fuel Removal w/ Hydrocarbon Agent	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Gasoline Removal w/ Hydrocarbon Agent	54%	54%	54%	54%	54%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link

Table 2.2. Filtrexx® Inlet Protection Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Cadmium (Cd) Removal w/ Heavy Metal Agent	73%	73%	73%	73%	73%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Chromium (Cr) Removal w/ Heavy Metal Agent	47%	47%	47%	47%	47%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Copper (Cu) Removal w/ Heavy Metal Agent	70%	70%	70%	70%	70%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Nickel (Ni) Removal w/ Heavy Metal Agent	69%	69%	69%	69%	69%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Lead (Pb) Removal w/ Heavy Metal Agent	73%	73%	73%	73%	73%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Zinc (Zn) Removal w/ Heavy Metal Agent	53%	53%	53%	53%	53%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Iron (Fe) Removal	22%	22%	22%	22%	22%	Soil Control Lab, Inc	
Manganese (Mn) Removal	8%	8%	8%	8%	8%	Soil Control Lab, Inc	
Total coliform Removal	67%	67%	67%	67%	67%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
E. coli Removal	67%	67%	67%	67%	67%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Enterococcus Removal	47%	47%	47%	47%	47%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
E. coli Removal w/ Bacteria Agent	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Fecal coliform Removal w/ Bacteria Agent	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Enterococcus Removal w/ Bacteria Agent	91%	91%	91%	91%	91%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Other Recommended Uses	Inlet Protection, Check Dams, Slope Interruption	Inlet protection, Check Dams, Concrete Washout, Filtration System, Slope Interruption	Check Dams, Concrete Washout, Filtration System	Check Dams, Concrete Washout, Filtration System	Check Dams, Concrete Washout, Filtration System		

* Based on rainfall intensity of 12.5 cm (5 in)/hr applied to a bare clay loam soil at a 10% slope; runoff flow rate of 108 ml/sec/linear m (0.52 gpm/linear ft); and mean runoff volume of 230 L/m2 (6.3 g/ft2).

** Functional Longevity is dependent on UV exposure, freeze/thaw frequency, region of US/Canada, runoff-sediment frequency/duration/loading, and adherence to specified maintenance requirement.

*** Sediment Storage Capacity = sediment accumulation behind (directly upslope) + within the device.

Figure 2.1. Engineering Design Drawing for Curb and Drain Inlet Protection

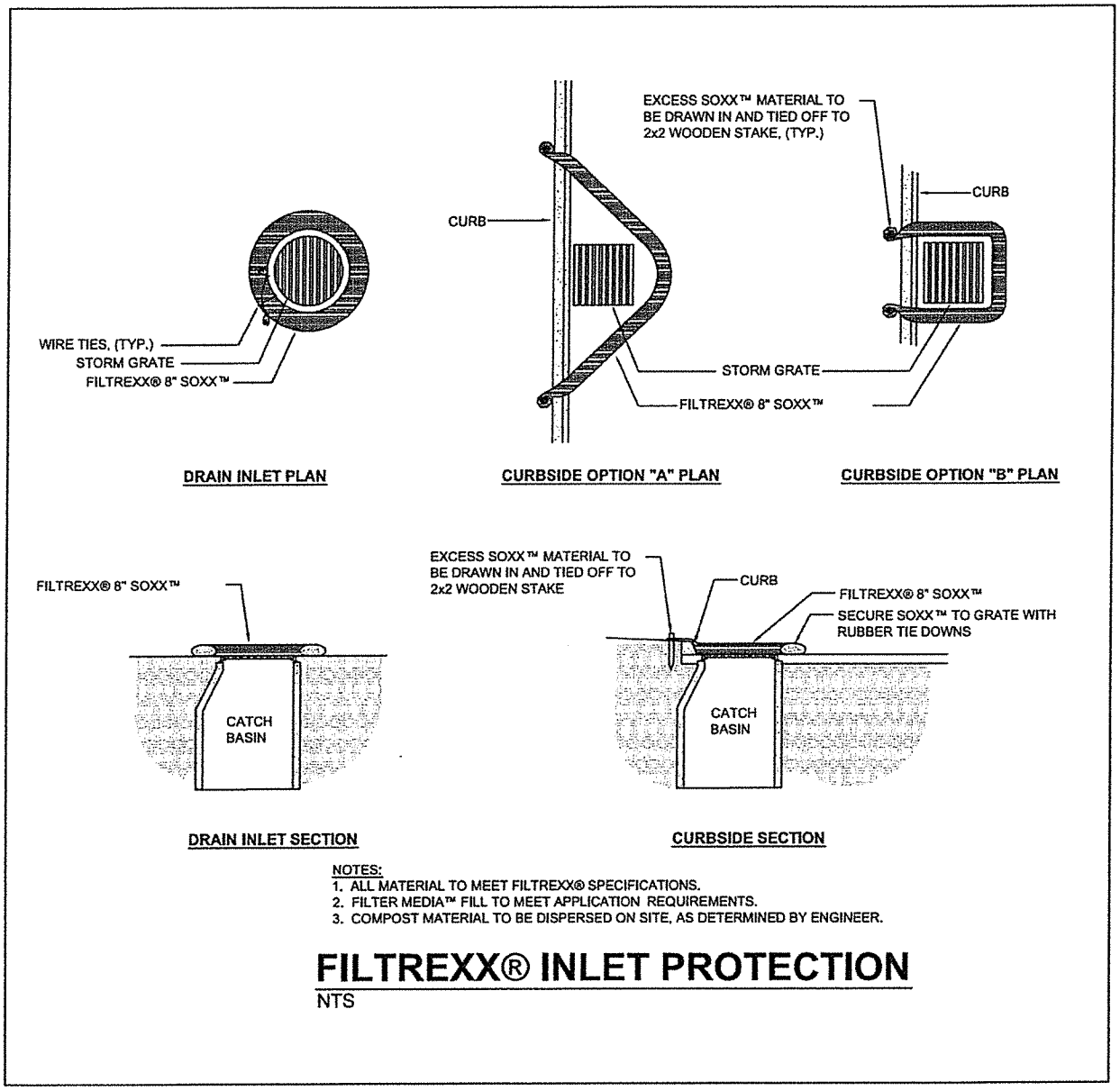
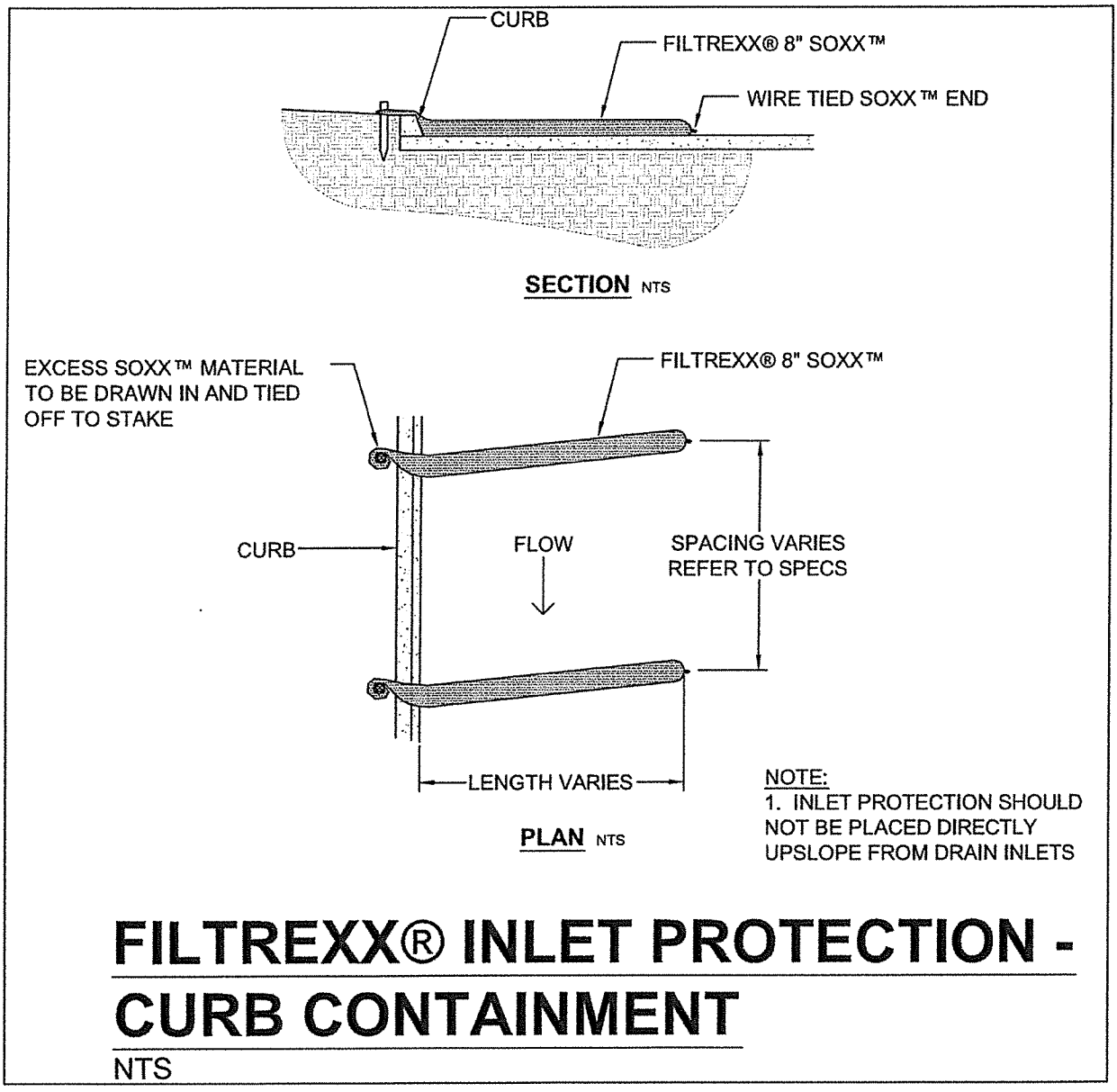
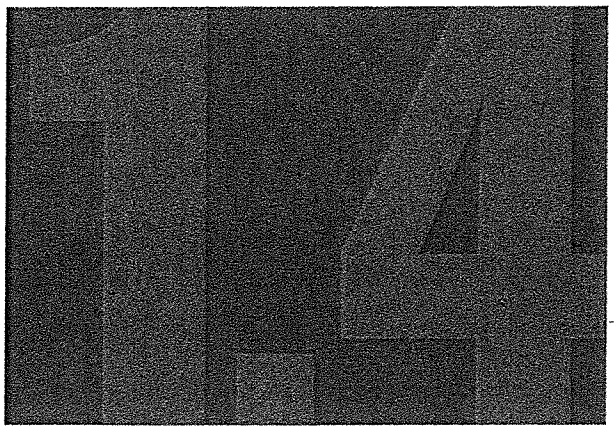


Figure 2.2. Engineering Design Drawing for Curb Sediment Containment Inlet Protection





filtrexx®
SUSTAINABLE TECHNOLOGIES

SECTION 1: CONSTRUCTION

Filtrexx® Concrete Washout (SiltSoxx™)

PURPOSE & DESCRIPTION

Filtrexx® SiltSoxx™ is a three-dimensional tubular **solids separation and water pollutant filtration** device used as a **Concrete Washout** for temporary, passive filtration of sediment-laden effluent and point sources of contaminated water. Concrete washouts can be used as a pretreatment filtration system to separate solids or reduce solids content of contaminated water. Concrete washouts are easy to customize for size, shape, quantity of contaminated effluent and target pollutant removal.

APPLICATION

Concrete washouts are used in temporary applications where unfiltered slurry or effluent may adversely affect surface water quality. Common applications for Concrete washouts include:

- Concrete wash-off and wash-out from equipment and trucks.
- Pumping of surface water to allow access to stream banks for stabilization projects.
- Sediment and storm water pond emergency overflow capture and filtration.
- Dredging slurry filtration.
- Animal manure and lagoon slurry filtration at concentrated animal feeding operation (CAFO) sites.
- Non-hazardous industrial effluent and slurry solids separation from point sources.

Customize Size and Configuration

Concrete washouts require adequate site drainage space to allow water to percolate through the concrete washout and drain away from the device, leaving the solid fraction or filtrate within the device. After the water has been separated, the solid portion can be removed with a loader and disposed or land applied, depending upon the constituents within the filtrate. On sites with highly permeable soils, high water tables, or if constituents in unfiltered water may contaminate soil or ground water, an impervious mat or membrane may be placed underneath the concrete washout to prevent soil infiltration and percolation of contaminated water. Passively dewatering solids-laden water prior to hauling and disposal can significantly reduce handling and disposal costs.

ADVANTAGES AND DISADVANTAGES

Advantages

- Tubular filtration matrix allows for better trapping and removal of solids and soluble pollutants in contaminated water compared to planar geotextile sediment control devices, such as silt fence.
- Concrete washouts can be customized to remove target pollutants from contaminated water, such as phosphorus, petroleum hydrocarbons, turbidity, suspended solids, and some heavy metals.
- Concrete washouts can be customized to handle a variety of water pollutant concentrations, pollutant loads, and water volumes.
- Concrete washouts are available in 8 in (200mm), 12 in (300mm), 18 in (450mm), 24 in (600mm), and 32 in (800mm) diameters for a variety of volumes, flow conditions, and/or customized applications.
- Concrete washouts can be stacked and constructed in a pyramid or equilateral triangle to increase design height and water containment capacity if space is limited.
- Greater surface area contact with soil, relative to planar geotextile devices, reduces potential for contaminated water to undercut the device leading to unfiltered water.
- No trenching is required; therefore soil and plant

roots are not disturbed upon installation.

- Concrete washouts can be installed year around in difficult soil conditions such as frozen or wet ground, and dense and compacted soils, as long as stakes can be driven.
- Concrete washouts can be easily installed on top of impervious mats or membranes, pavement, concrete, and compacted soils.
- Organic matter and humus colloids in FilterMedia™ have the ability to bind and adsorb phosphorus, metals, and hydrocarbons that may be present in contaminated water.
- Microorganisms in compost FilterMedia have the ability to degrade organic pollutants and cycle captured nutrients from contaminated water.
- Soxx™ (mesh netting containment system) allow concrete washouts to be used where water pressure may exist.
- Concrete washouts can be direct seeded at time of application to provide greater stability and pollutant filtration capability once vegetation has established.
- FilterMedia is organic and can be left on site soil after permanent stabilization is complete, used in landscape design, and/or seeded and planted with permanent vegetation.
- FilterMedia improves existing soil structure if spread out and used as a soil amendment after construction activity is complete.
- Concrete washouts may assist in qualification for LEED® Green Building Rating and Certification credits under LEED Building Design & Construction (BD+C), New Construction v4. Awarded credits may be possible from the categories of Sustainable Sites, Water Efficiency, Materials & Resources, and Innovation. *Note: LEED is an independent program offered through the U.S. Green Building Council. LEED credits are determined on a per project basis by an independent auditing committee. Filtrexx neither guarantees nor assures LEED credits from the use of its products. LEED is a trademark of the U.S. Green Building Council.*

ADVANTAGES			
	LOW	MED	HIGH
Installation Difficulty	✓		
Durability		✓	
Solids Filtration			✓
Soluble Pollutant Filtration		✓	
Target Pollutant Removal			✓
Life Cycle Cost	✓		

Disadvantages

- If filler material of concrete washouts is not Filtrexx® Certified℠ FilterMedia, hydraulic flow rate and/or sediment and pollutant removal per formance may be diminished.
- If not installed correctly, maintained or used for a purpose or intention that does not meet specifications, performance may be diminished.
- If land surface is extremely bumpy, rocky, or changes elevation abruptly, ground surface contact to concrete washouts may be diminished thereby adversely effecting performance.
- If concrete washouts are placed on a slope, volumetric fill capacity may be reduced.
- If contaminated water breaches or undercuts concrete washout pollutant removal will be greatly diminished.
- Concrete washouts should not be used to filter hazardous or toxic materials from water.

MATERIAL SPECIFICATIONS

Concrete washouts use only Soxx photodegradable or biodegradable netting materials available from Filtrexx International and are the only mesh materials accepted in creating concrete washouts for any application. For Soxx Material Specifications see Table 4.1.

FILTERMEDIA™ CHARACTERISTICS

Concrete washouts use only Filtrexx Certified FilterMedia which is a coarse composted material that is specifically designed for removal of solids and soluble pollutants from contaminated water. *FilterMedia can be altered or customized to target specific pollutants in effluent water as approved by the Engineer or Filtrexx International.* All Filtrexx Certified FilterMedia has been third party tested and certified to meet minimum performance criteria defined by Filtrexx International. Performance parameters include hydraulic flow through rate, total solids removal efficiency, total suspended solids removal efficiency, turbidity reduction, nutrient removal efficiency, metals removal efficiency, and motor oil removal efficiency. For information on

the physical and chemical properties of Filtrexx Certified FilterMedia refer to the Filtrexx Design Manual, section 5.1. Look for the Filtrexx Certified FilterMedia Seal from our international network of Filtrexx Certified Installers and Manufacturers.

PERFORMANCE

Performance testing and research on sediment control has been extensive. For a summary of performance testing, research results, and design specifications see Table 4.2. For copies of publications, full reports, or Tech Link summaries visit www.filtrexx.com

Successful bidders will furnish adequate research support showing their manufactured product meets or exceeds performance and design criteria outlined in this standard specification. Research or performance testing will be accepted if it meets the following criteria: conducted by a neutral third party, utilizes standard test methods reported by ASTM or referenced in a peer reviewed scientific journal, product and control treatments are tested in triplicate, performance results are reported for product and control (control should be a bare soil under the same set of environmental and experimental conditions), results are peer reviewed, results indicate a minimum 60% TSS removal efficiency and a minimum hydraulic flow through rate of 5 gpm/ft^2. Bidders shall attach a copy of the research report indicating test methodologies utilized and results.
Note: the Contractor is responsible for establishing a working erosion and sediment control system and may, with approval of the Engineer, work outside the minimum construction requirements as needed. Where concrete washouts deteriorates or fails, it shall be repaired or replaced with an effective alternative.

DESIGN CRITERIA

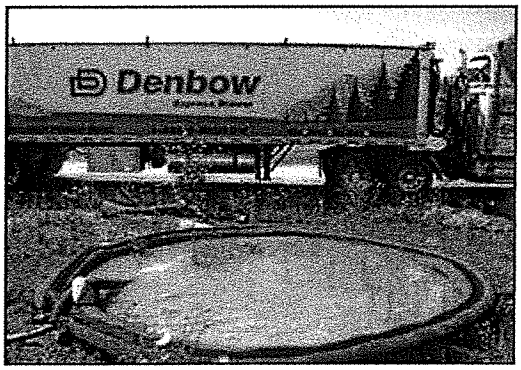
Concrete washouts are used for temporary filtration and solids separation of non-hazardous slurry and sediment-laden water, by passive means, commonly found on construction sites, dredging operations, and storm water pond overflows.

For engineering design details for concrete washouts see Figure 4.1 and Figure 4.2. For staking details see Figure 4.3. For examples of concrete washout applications see Figure 4.4. For a summary of specifications for product/practice use, performance and design see Table 4.1 and Table 4.2.

Planning:
Concrete washouts have a hydraulic flow through rate that will remain constant or progressively decrease depending on solids concentration of influent water and the progressive filling of pores within the FilterMedia. Concrete washouts are to be used for temporary or batch filtration purposes and are not intended for continuous flow or permanent filtration of contaminated effluent water. To allow for potential water volume increase from atmospheric precipitation, the influent volume should never exceed 50% of the containment capacity of the concrete washout. Concrete washouts should never be placed in directional storm water flows or where runoff conditions may compromise the structural base of the concrete washout.

Preconstruction meetings should be conducted to educate construction site personnel about the tools/ practices used and acceptable traffic patterns that avoid running over concrete washouts with heavy equipment.

Orientation:
Concrete washouts are generally designed as circular or rectangular enclosures, usually on flat surfaces. A horseshoe design may be used on sloped surfaces, where the horseshoe bend is placed at the low point on the slope, although storage volume may be reduced. Concrete washout square-shaped cells can be used as a multiphase treatment filtration system if multiple cells are placed in a linear pattern where cell walls abut one another, to allow contaminated water to passively move from one cell to the next by gravitational flow. A gradual step or terrace design on a slope can be used to assist in gravitational flow of water. For more information on this design see Filtrexx Design Manual, Section 2.5, Filtrexx Biofiltration Systems.



Use as Pump Out Filtration

Level Contour:
Place concrete washouts on level contours to assist in dissipating concentrated influent and prevent undercutting of device.

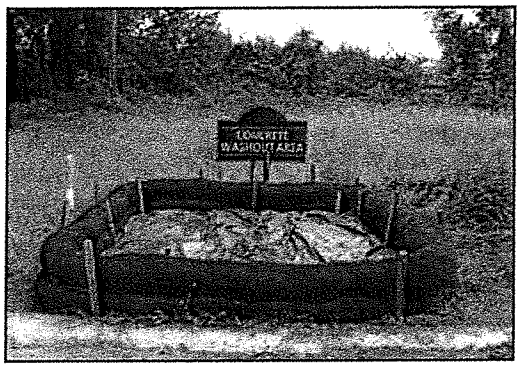
Staking:
Ends of the concrete washouts should be overlapped and staked (see Figure 4.1) and this seam should be on the highest point of the ring, if possible. In areas of poor ground contact, additional stakes should be added every 2-5 ft (0.6-1.5m). On pavement or concrete applications, concrete washouts should be depressed when installed in order to maximize ground contact.

Device Function:
Concrete washouts are a *porous physical barrier* that are specifically designed to contain contaminated water while slowly releasing filtered water as it percolates through the contained FilterMedia. Concrete washouts have the ability to remove solids and soluble pollutants from contaminated water. The pollutant removal process characteristic to concrete washouts combines both filtering and deposition of solids. This is different than methods that rely solely on containment for deposition of solids. Correct installation and maintenance is especially important for proper function and performance.

Pollutant Removal:
Concrete washouts are most effective at removing large solids but are also effective at removing small particulates that are often suspended in water. Concrete washouts have the ability to remove soluble pollutants, such as phosphorus and petroleum hydrocarbons (e.g. motor oil), from contaminated water. Pollutant removal efficiency often increases over time, as the filter becomes more restrictive due to the filling of pore spaces. Additional Filtrexx products can be added to the concrete washouts to increase removal efficiency of target pollutants such as turbidity, TSS, and soluble phosphorus. For specific products and their removal efficiency and performance see Table 4.2.

It should be noted that pollutant removal efficiency will be greatly diminished if contaminated water breaches or undercuts the concrete washout.

Influent and Solids Accumulation:
Contaminated water and solids accumulation inside Concrete washouts should be no higher than 50% of the height of the Concrete washouts. If additional



Concrete Washout Area

capacity is required solids should be removed, or additional Concrete washouts should be installed (as separate entities, surrounding the original, or to increase the height of the original).

Vegetated Concrete Washout:
For long term filtration applications concrete washouts can be direct-seeded at the time of installation to allow vegetation to establish directly in the filtration device. Vegetated concrete washouts will further assist in filtration of solid and soluble pollutants from contaminated water. The option of adding vegetation will be at the discretion of the Engineer. No additional soil amendments or fertilizer are required for vegetation establishment in the concrete washouts. The appropriate seed mix shall be determined by the Engineer.

Drainage Capacity and Spacing:
Concrete washouts should be designed to contain a maximum of 50% of their volume capacity. This will prevent breach of concrete washout in the event of a storm. Volume capacity should be designed based on the total or maximum volume of influent or contaminated water the concrete washout can contain. Capacity design should not be based on the solids or dewatered portion of the contaminated water. The following conversions are provided to help in the design of liquid volume transfer to the Concrete washout.

Concrete washouts placed on sloping land will have reduced storage capacity as contaminated water will concentrate on down slope side. Concrete washouts should be placed where there is sufficient drainage area for filtered effluent exiting the concrete washout. For increased filtration performance additional concrete washouts can be placed around

Table 4.3 Liquid Conversions
Concrete Washout/Concrete Washout

1 cubic yard	202 gal
1 cubic yard	46656 cubic in
1 cubic yard	27 cubic ft
1 cubic ft	7.5 gal
1 cubic ft	1728 cubic in
1 cubic ft	0.037 cubic yd
1 gallon	231 cubic in
1 gallon	0.13 cubic ft
1 gallon	0.005 cubic yd
1 cubic meter	1,000,000 cc
1 cc	0.000001 cubic m

Circular:
$V = R^2 * \pi * 0.5H$

Rectangular:
$V = L * W * 0.5H$

Where:
V = volume (cubic in. or cc)
L = inside length of ring (in or cm)
W = width of ring (in or cm)
H = inside height of ring (in or cm)
R = inside radius of ring (in or cm)
$\pi = 3.14$

the outer circumference of the original Concrete washout. Spacing between additional concrete washouts should be at least 1 ft (300mm).

Concrete washout Soxx may be stacked or constructed in a pyramid design to increase volume capacity within the concrete washout. See Figure 4.2 for design details.

INSTALLATION

1. Concrete washouts used for solids separation and filtration of soluble pollutants from contaminated water shall meet Filtrexx Soxx Material Specifications and use Filtrexx Certified FilterMedia.
2. Contractor is required to be Filtrexx Certified Installer as determined by Filtrexx International. Certification shall be considered current if appropriate identification is shown during time of bid or at time of application (call Filtrexx at 440-926-2607 for a current list of installers). Look for the Filtrexx Certified Installer Seal.
3. Concrete washouts shall be placed at locations indicated on plans as directed/specified by the Engineer. Concrete washouts should be installed in a manner that effectively filters solids and soluble pollutants from contaminated water.
4. Concrete washouts may be manufactured onsite at time of application or pre-manufactured and delivered to site for installation.
5. Installation of concrete washouts shall ensure that the containment area within the concrete washout is sufficient to handle the rate and volume of contaminated influent water.
6. Installation of concrete washouts shall ensure that the containment area within the concrete washout is sufficient to allow for receiving water to properly flow through the filter concrete washout filtration system.
7. Stakes shall be installed through the middle of the concrete washout on 5 ft (1.5m) centers, using 2 in (50mm) by 2 in (50mm) by 3 ft (1m) wooden stakes.
8. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.
9. Standard diameter size of concrete washouts for concrete washouts is 18 in (450mm). For applications where rate or volume of contaminated water addition is high the Engineer may specify 24 in (600mm) or 32 in (800m) diameter concrete washouts, a stack design, or an equilateral triangle or pyramid design.
10. If stack or pyramid design is specified, concrete washout Soxx should decrease in diameter with each layer of concrete washout Soxx.
11. Concrete washouts may be installed on top of impermeable mats or membranes to prevent percolation of contaminated water into soil. Local ordinances may require the use of additives to reduce ph contamination in runoff.
12. Concrete washouts shall not be placed near concentrated or high sheet flows of storm runoff which may compromise the structural base of the concrete washout.
13. Vegetated concrete washouts may be seeded at the time of manufacture and installation to create a contained 'green or living bio-filter'. These may be left intact once construction phase is complete. The appropriate seed mix, live stakes, and/or sprigs shall be specified by the Engineer.

14. Concrete washouts installed on paved surfaces should be stabilized along the outer circumference using concrete blocks for structural support.

INSPECTION

Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the regulating authority. Concrete washouts should be regularly inspected to make sure they maintain their shape and are producing adequate hydraulic flow-through and solids removal. If rainfall becomes excessive, additional concrete washouts may be required to contain the added water volume. Water height within the concrete washouts should remain 4 in below the lowest point of the rim to allow for storm water volume additions. If overflow, undercutting, or leaking between concrete washouts occurs, maintenance should be conducted immediately.

MAINTENANCE

1. The contractor shall maintain the concrete washouts in a functional condition at all times and it shall be routinely inspected.
2. If a concrete washout has been damaged, it shall be repaired, or replaced if beyond repair.
3. The contractor shall remove solids or filtrate from the inside of the concrete washout when solids accumulation has reached 1/2 of the effective height of the concrete washout, or as directed by the engineer. As an alternative, another concrete washout may be installed on top of, or in a pyramid design to increase the containment capacity of the concrete washout.
4. If concrete washouts become clogged with debris or solids, they shall be maintained so as to assure proper hydraulic flow through. Overflow or undercutting of contaminated water is not acceptable.
5. If minor undercutting occurs, the areas may be plugged with sand, soil or additional FilterMedia. If undercutting continues, a new concrete washout should be installed and leveling or minor grading of ground surface may be required to increase surface contact with concrete washout.
6. Concrete washouts shall be maintained until contaminated water has fully percolated through the device.
7. The FilterMedia and filtrate may be dispersed on site once solids separation is complete only if there are no concerns with soil and water contamination, or as determined by the engineer.

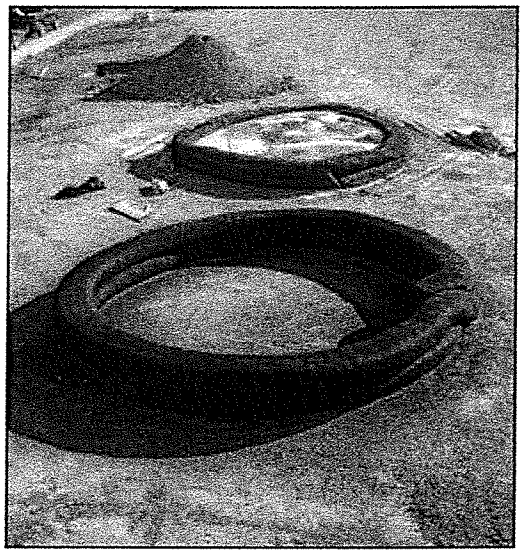
DISPOSAL/RECYCLING

FilterMedia is an organic, composted product manufactured from locally generated organic, natural, and biologically based materials. Once all soil has been stabilized and construction activity has been completed, the FilterMedia may be dispersed with a loader, rake, bulldozer or similar device and may be incorporated into the soil as an amendment or left on the soil surface to aid in permanent seeding or landscaping. Leaving the FilterMedia on site reduces removal and disposal costs. The mesh netting material will be extracted from the FilterMedia and disposed of properly by the contractor. Consequently, the mesh netting material is photodegradable and will decompose in 2 to 5 years if left on site. Biodegradable mesh netting material is available and does not need to be extracted and disposed of, as it will completely decompose in approximately 6 months. Using biodegradable concrete washouts completely eliminates the need and cost of removal and disposal.

The filtrate or solid material left after separation from water within the concrete washout shall be disposed of properly. If material is of landscape quality it may be dispersed and used on-site for landscaping, planting, seeding, or as a soil amendment. If filtrate is contaminated, it shall be disposed of in an environmentally acceptable manner compliant with all local, state and federal regulations.

METHOD OF MEASUREMENT

Bid items shall show measurement as a specified



Filtrexx Concrete Washout

diameter per linear ft (linear meter) of 'X inch (X mm) diameter Filtrexx® Concrete washouts/ SiltSoxx™', installed, as specified by the Engineer.

Engineer shall notify Filtrexx of location, description, and details of project prior to the bidding process so that Filtrexx can provide design aid and technical support.

ADDITIONAL INFORMATION

For other references on this topic, including additional research reports and trade magazine and press coverage, visit the Filtrexx website at www.filtrexx.com

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Call for complete list of international installers.

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TABLES & FIGURES:

Table 4.1. Filtrexx® Soxx™ Material Specifications.

Material Type	Cotton BioSoxx™	5 mil High Density Polyethylene (HDPE)	5 mil High Density Polyethylene (HDPE)	Multi-Filament Polypropylene (MFPP, previously HDPP)	Multi-Filament Polypropylene SafteySoxx™	Multi-Filament Polypropylene DuraSoxx®	Multi-Filament Polypropylene DuraSoxx® (Heavy Duty)
Material Characteristic	Biodegradable	Oxo-degradable	Photodegradable	Photodegradable	Photodegradable	Photodegradable	Photodegradable
Design Diameters	8 in (200mm), 12 in (300mm)	8 in (200mm), 12 in (300mm), 18 in (400mm)	5 in (125mm), 8 in (200mm), 12 in (300mm), 18 in (400mm)	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)	8 in (200mm), 12 in (300mm), 18 in (400mm)	8 in (200mm), 12 in (300mm), 18 in (400mm), 24 in (600mm), 32 in (800mm)	5 in (125mm), 8 in (200mm), 12 in (300mm), 18 in (400mm)
Mesh Opening	1/8 in (3mm)	3/8 in (10mm)	3/8 in (10mm)	3/8 in (10mm)	1/8 in (3mm)	1/8 in (3mm)	1/8 in (3mm)
Tensile Strength	ND	26 psi (1.83 kg/cm²)	26 psi (1.83 kg/cm²)	44 psi (3.09 kg/cm²)	202 psi (14.2 kg/cm²)*	202 psi (14.2 kg/cm²)	242 psi (16.99 kg/cm²)
% Original Strength from Ultraviolet Exposure (ASTM G-155)	ND	ND	23% at 1000 hr	100% at 1000 hr	100% at 1000 hr	100% at 1000 hr	100% at 1000 hr
Functional Longevity/ Project Duration***	up to 12 months**	6 mo-3.5 yr	9 mo-4 yr	1-4 yr	2-5 yr	2-5 yr	2-5 yr

* Tested at Texas Transportation Institute/Texas A&M University (ASTM 5035-95).
** Data based on Caltrans research and specifications
*** Functional longevity ranges are estimates only. Site specific environmental conditions may result in shorter or longer time periods.

Table 4.2. Filtrexx® Concrete Washout Performance and Design Specifications Summary.

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Effective Height	6.5 in (160mm)	9.5 in (240mm)	14.5 in (360mm)	19 in (480mm)	26 in (650mm)	The Ohio State University, Ohio Agricultural Research and Development Center	Transactions of the American Society of Agricultural & Biological Engineers, 2006
Effective Circumference	25 in (630mm)	38 in (960mm)	57 in (1450mm)	75 in (1900mm)	100 in (2500mm)		
Density (when filled)	13 lbs/ft (20 kg/m)	32 lbs/ft (50 kg/m)	67 lbs/ft (100 kg/m)	133 lbs/ft (200 kg/m)	200 lbs/ft (300 kg/m)	Soil Control Lab, Inc	
Air Space	20%	20%	20%	20%	20%	Soil Control Lab, Inc	
Maximum continuous length	unlimited	unlimited	unlimited	unlimited	unlimited		
Staking Requirement	10 ft (3m)	10 ft (3m)	10 ft (3m)	10 ft (3m)	10 ft (3m)		
Maintenance Requirement (sediment accumulation removal at X height)	3.25 in (80mm)	4.75 in (120mm)	7.25 in (180mm)	9.5 in (240mm)	13 in (325mm)		

(continued on next page)

Table 4.2. Filtrexx® Concrete Washout Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Initial Maintenance Requirement based on Rainfall-Runoff*	22 in (55 cm); 1109 L/linear m	32 in (80 cm); 1388 L/linear m	42 in (105 cm); 1825 L/linear m	64 in (160 cm); 2776 L/linear m	86 in (215 cm); 3885 L/linear m	The University of Georgia & Auburn University	
Functional Longevity**	2–5 yr	2–5 yr	2–5 yr	2–5 yr	2–5 yr		
Maximum Slope Length (<2%)	600 ft (183m)	750 ft (229m)	1000 ft (305m)	1300 ft (396m)	1650 ft (500m)	The Ohio State University, Ohio Agricultural Research and Development Center	Filtrexx® Design Tool™, Filtrexx® Library #301, Filtrexx® Tech Link #3304 & #3311
Hydraulic Flow Through Rate	7.5 gpm/ft (94 L/min/m)	11.3 gpm/ft (141 L/min/m)	15.0 gpm/ft (188 L/min/m)	22.5 gpm/ft (281 L/min/m)	30.0 gpm/ft (374 L/min/m)	The Ohio State University, Ohio Agricultural Research and Development Center; University of Guelph, School of Engineering/ Watershed Research Group	Filtrexx® Tech Link #3311 & #3313, #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006, Second Interagency Conference on Research in Watersheds, 2006
P Factor (RUSLE)	0.1-0.32	0.1-0.32	0.1-0.32	0.1-0.32	0.1-0.32	USDA ARS Environmental Quality Lab/ University of Georgia	American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Sediment Storage Capacity***	174 cu. in (2850cc)	396 cu. in (6490cc)	857 cu. in (14040cc)	1631 cu. in (26840cc)	2647 cu. in (43377 cc)		Filtrexx® Tech Link #3314
Total Solids Removal	98%	98%	98%	98%	98%	Soil Control Lab, Inc	International Erosion Control Association, 2006
Total Suspended Solids Removal	78%	78%	78%	78%	78%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006

Table 4.2. Filtrexx® Concrete Washout Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Turbidity Reduction	63%	63%	63%	63%	63%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Clay (<0.002mm) Removal	65%	65%	65%	65%	65%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Silt (0.002-0.05mm) Removal	64%	64%	64%	64%	64%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
TSS Removal w/PAM	97%	97%	97%	97%	97%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
TSS Removal w/ Flocculent	97%	97%	97%	97%	97%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Turbidity Reduction w/PAM	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Turbidity Reduction w/ Flocculent	94%	94%	94%	94%	94%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006

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Table 4.2. Filtrexx® Concrete Washout Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Total Phosphorus Removal	34%	34%	34%	34%	34%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Reactive Phosphorus Removal	38%	38%	38%	38%	38%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Total Phosphorus Removal w/ Nutrient Agent	60%	60%	60%	60%	60%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Reactive Phosphorus Removal w/ Nutrient Agent	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link #3308; American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Nitrate-N Removal	25%	25%	25%	25%	25%	USDA ARS Environmental Quality Lab	American Society of Agricultural & Biological Engineers Meeting Proceedings, 2006
Ammonium-N Removal	15%	15%	15%	15%	15%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Ammonium-N Removal w/ Nutrient Agent	33%	33%	33%	33%	33%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Motor Oil Removal w/ Hydrocarbon Agent	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	International Erosion Control Association, 2006
Diesel Fuel Removal w/ Hydrocarbon Agent	99%	99%	99%	99%	99%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Gasoline Removal w/ Hydrocarbon Agent	54%	54%	54%	54%	54%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link

Table 4.2. Filtrexx® Concrete Washout Performance and Design Specifications Summary. *(continued)*

Design Diameter / Design & Performance	8 in (200mm)	12 in (300mm)	18 in (450mm)	24 in (600mm)	32 in (800mm)	Testing Lab/ Reference	Publication(s)
Cadmium (Cd) Removal w/ Heavy Metal Agent	73%	73%	73%	73%	73%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Chromium (Cr) Removal w/ Heavy Metal Agent	47%	47%	47%	47%	47%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Copper (Cu) Removal w/ Heavy Metal Agent	70%	70%	70%	70%	70%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Nickel (Ni) Removal w/ Heavy Metal Agent	69%	69%	69%	69%	69%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Lead (Pb) Removal w/ Heavy Metal Agent	73%	73%	73%	73%	73%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Zinc (Zn) Removal w/ Heavy Metal Agent	53%	53%	53%	53%	53%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Iron (Fe) Removal	22%	22%	22%	22%	22%	Soil Control Lab, Inc	
Manganese (Mn) Removal	8%	8%	8%	8%	8%	Soil Control Lab, Inc	
Total coliform Removal	67%	67%	67%	67%	67%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
E. coli Removal	67%	67%	67%	67%	67%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Enterococcus Removal	47%	47%	47%	47%	47%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
E. coli Removal w/ Bacteria Agent	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Fecal coliform Removal w/ Bacteria Agent	98%	98%	98%	98%	98%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Enterococcus Removal w/ Bacteria Agent	91%	91%	91%	91%	91%	USDA ARS Environmental Quality Lab	Filtrexx® Tech Link
Other Recommended Uses	Inlet Protection, Check Dams, Slope Interruption	Inlet protection, Check Dams, Concrete Washout, Filtration System, Slope Interruption	Check Dams, Concrete Washout, Filtration System	Check Dams, Concrete Washout, Filtration System	Check Dams, Concrete Washout, Filtration System		

* Based on rainfall intensity of 12.5 cm (5 in)/hr applied to a bare clay loam soil at a 10% slope; runoff flow rate of 108 ml/sec/linear m (0.52 gpm/linear ft); and mean runoff volume of 230 L/m2 (6.3 g/ft2).

** Functional Longevity is dependent on UV exposure, freeze/thaw frequency, region of US/Canada, runoff-sediment frequency/duration/loading, and adherence to specified maintenance requirement.

*** Sediment Storage Capacity = sediment accumulation behind (directly upslope) + within the device.

Figure 4.1. Engineering Design Drawing for Concrete Washout

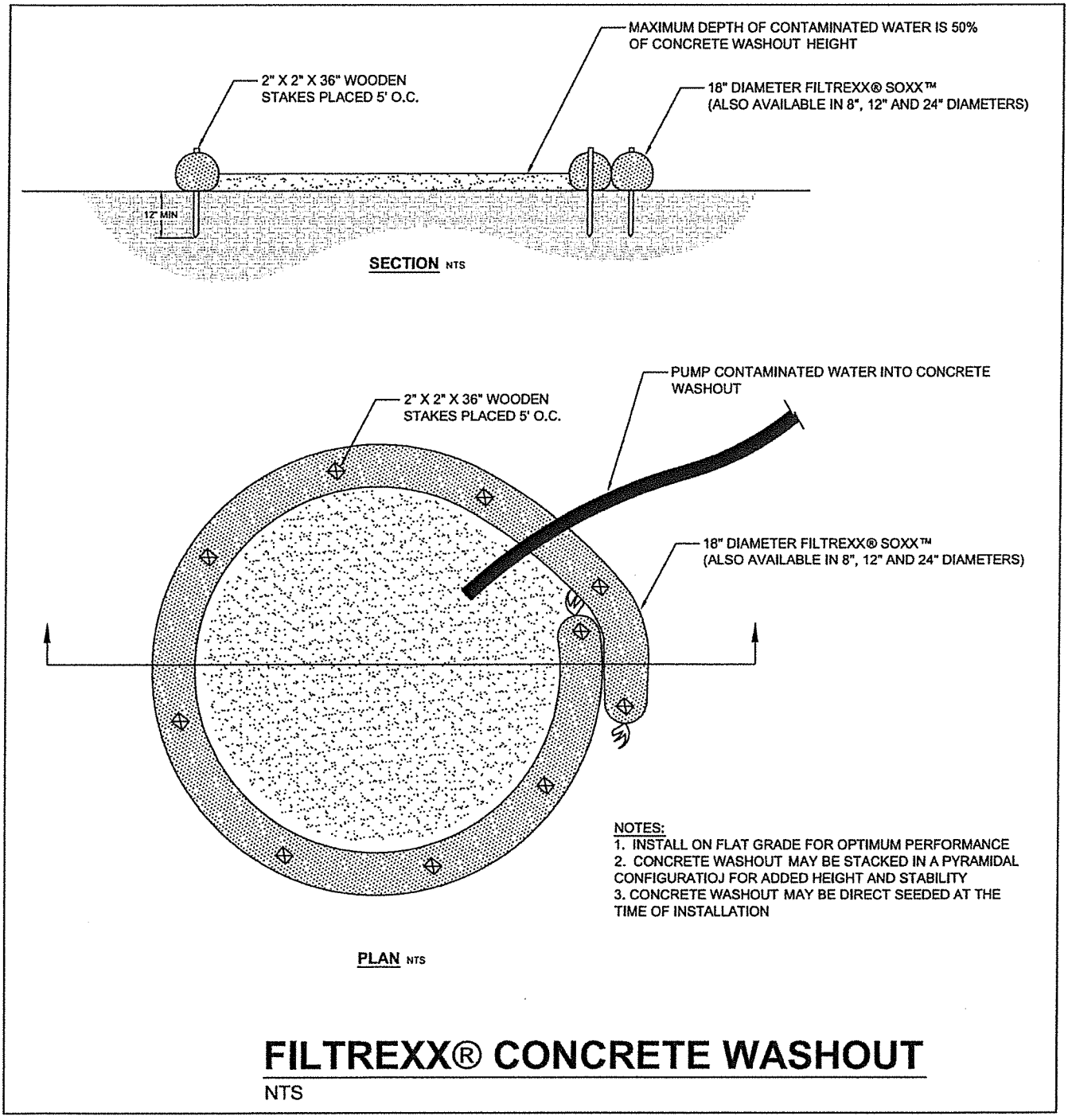


Figure 4.2. Engineering Design Drawing for Stacking Concrete Washout Soxx™ to Increase Design Height & Volume Capacity

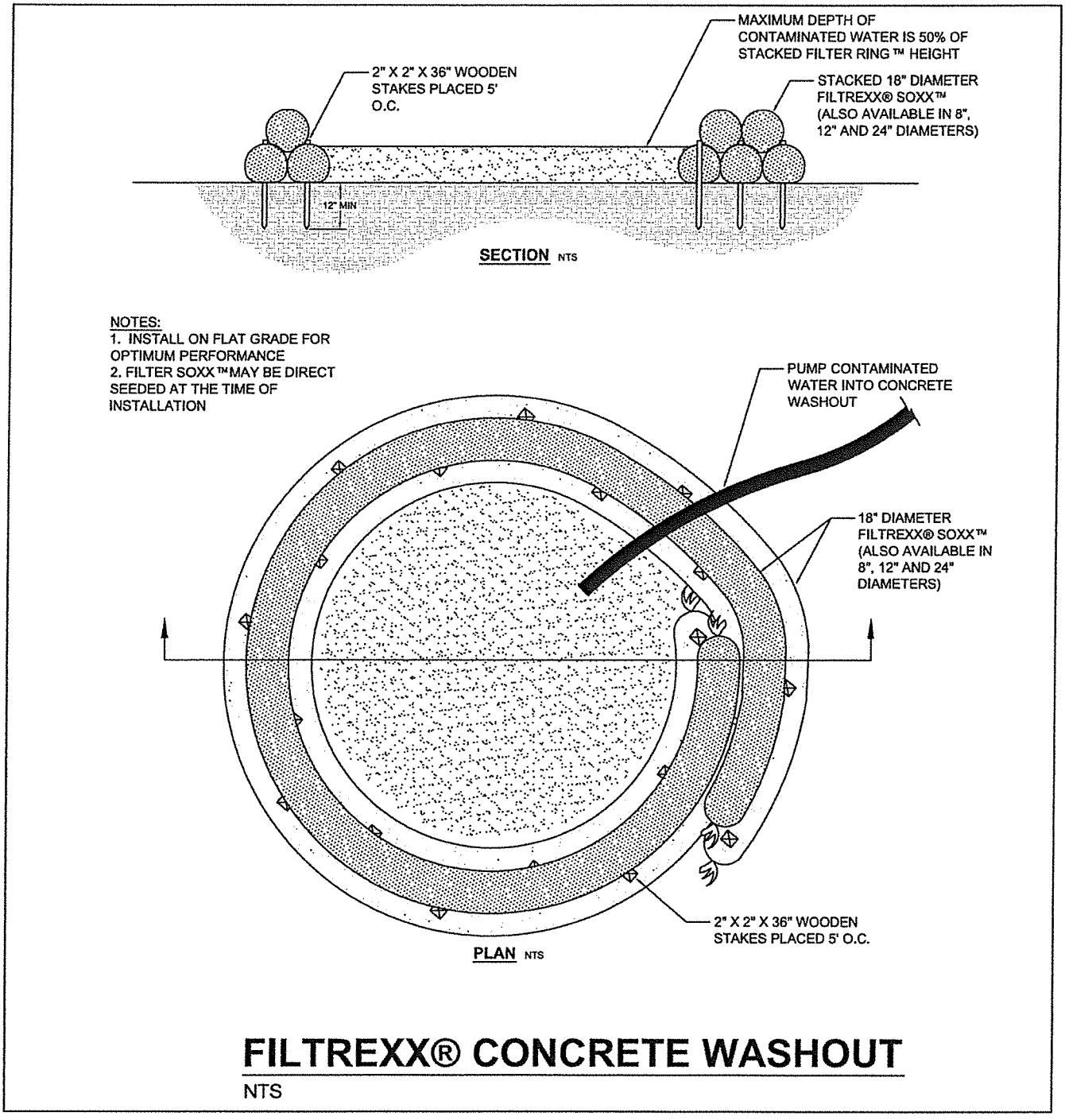
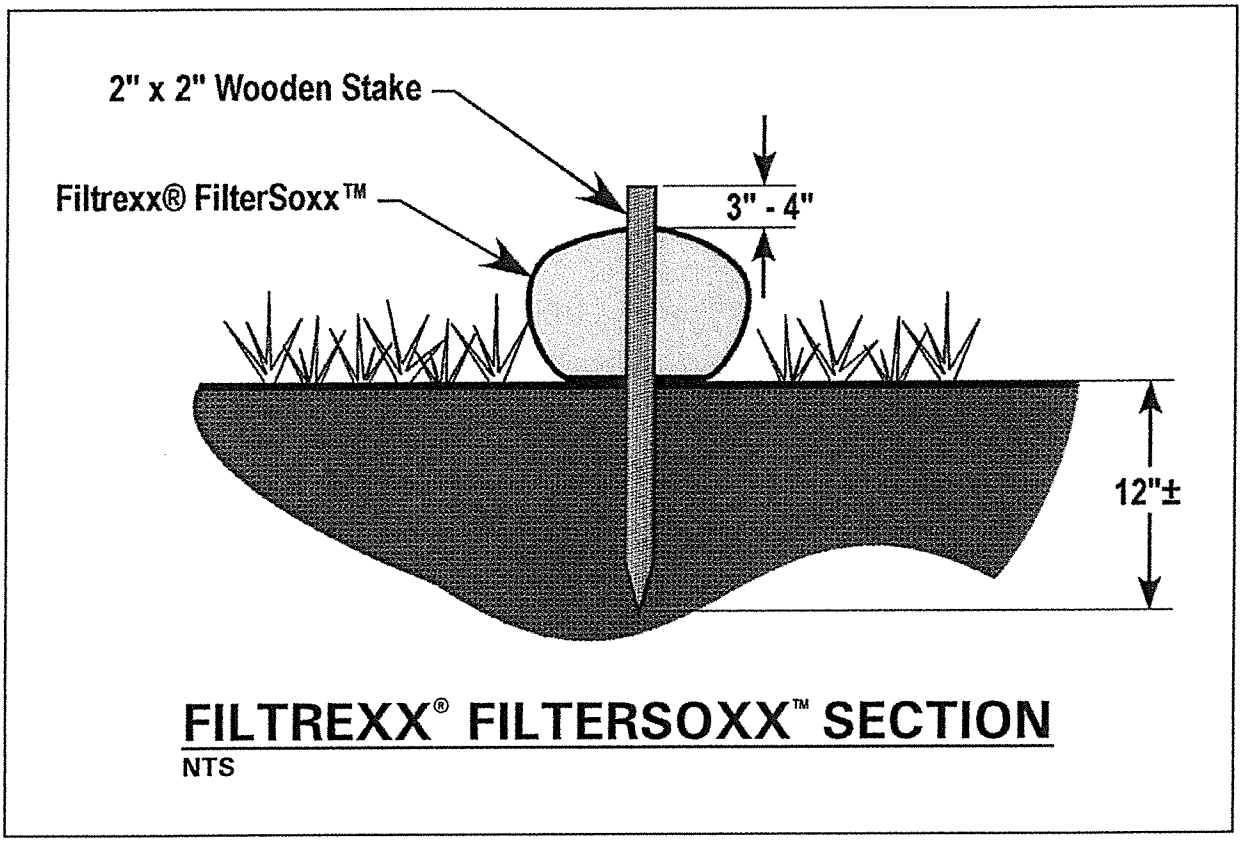


Figure 4.3. Engineering Design Drawing for Staking of Concrete Washout



filtrexx®
SUSTAINABLE TECHNOLOGIES

SECTION 1: CONSTRUCTION

Filtrexx® Compost Vegetated Cover/ Temporary Seeding (GrowingMedia™)

PURPOSE & DESCRIPTION

Filtrexx® Compost Vegetated Cover (CVC)/ Temporary Seeding is a **temporary vegetation and erosion control** practice used on hill slopes to stabilize disturbed soils on and around construction activities. CVC is generally used for rapid vegetation establishment on disturbed or erodable soils, and are not to be used as an erosion control blanket. CVC consists of a ½ in to ¾ in (12-20mm) deep layer of Filtrexx® GrowingMedia™ or 70 to 100 cubic yards/ acre (135-193 cubic m/ha) mixed with a specified seed mix and applied to hill slopes with pneumatic blower trucks or similar equipment.

APPLICATION

CVC is generally used for temporary vegetation for erosion control on disturbed, bare, or highly erodable soils during land disturbing and construction activities. Stabilization using temporary vegetation is generally required for (Fifield, 2001):

- disturbed soils that will undergo future disturbance,
- cut and fill slopes under construction,
- soil storage areas and stockpiles,
- permanent vegetation establishment that requires a nurse crop,
- stabilization of temporary runoff diversion devices, dikes, and sediment containment systems,
- curbside buffers on residential construction lots prior to vertical construction.

Permanent stabilization practices, such as erosion control blankets, anchoring and sod are not typically used for these applications; however, they may be used selectively with temporary vegetation practices. CVC is best utilized on bare soils in excavated or fill areas immediately after temporary or final grading is finished. It should be noted that CVC provides little erosion control until vegetation is established, this should be considered in the planning and design process. Slopes greater than 4:1 should be vertically tracked to aid in catching and stabilizing CVC application prior to germination. Slopes greater than 3:1 should apply a tackifier with the CVC to increase stability. Slopes greater than 2:1 should utilize erosion control blankets or turf reinforcement mats (KY TC, 2006). Other erosion control practices should be utilized if soil erosion control/ slope stabilization is required prior to vegetation establishment.

Compost Vegetated Cover is generally used for rapid vegetation establishment.

ADVANTAGES AND DISADVANTAGES

Advantages

- CVC can be used to temporarily stabilize and prevent erosion on soil storage and stockpiles, cut and fill slopes under construction, disturbed soils that will undergo disturbance in the near future, areas that require nurse crops for permanent vegetation, and areas requiring stabilization of runoff diversion devices, dikes and sediment containment systems.
- CVC is easily applied and can establish vegetation in difficult areas.
- CVC can easily be spot applied or used in combination with rolled erosion control blankets (RECBs) and turf reinforcement mats (TRMs).
- CVC can dissipate the energy of rainfall impact, thereby reducing splash erosion.
- CVC can absorb rainfall and runoff water, thereby increasing infiltration, increasing germination, and reducing runoff and sheet erosion.
- CVC can slow runoff velocity, thereby reducing the

erosive energy of runoff and the potential for soil erosion.
- Humus colloids and organic matter in temporary seeding provide physical structure for seed and establishing seedlings.
- Humus colloids and organic matter in temporary seeding provide increased water holding capacity and reduced water evaporation to aid in seed germination and the potential for reduced irrigation.
- CVC is a good option for arid and semiarid regions where germination, moisture management, and irrigation can be difficult.
- CVC provides organic nutrients that slow release for optimum efficiency to establishing vegetation.
- CVC provides organic nutrients that are less prone to runoff transport and pollution of surface waters relative to mineral nutrients supplied by fertilizers.
- CVC has the ability to bind and adsorb phosphorus, metals, and hydrocarbons that may be in stormwater runoff.
- Microorganisms in CVC have the ability to degrade organic pollutants and cycle captured nutrients in stormwater runoff.
- CVC is organic and can be left on site after permanent stabilization is complete, used in the landscape design, and/or seeded and planted with permanent vegetation.
- CVC can improve existing soil structure and stability as a soil amendment after construction activity is complete.
- CVC can increase soil organic matter which may reduce runoff and erosion, and increase plant sustainability through improved soil quality over the long term.
- CVC may assist in qualification for LEED® Green Building Rating and Certification credits under LEED Building Design & Construction (BD+C), New Construction v4. Awarded credits may be possible from the categories of Sustainable Sites, Water Efficiency, Materials & Resources, and Innovation. *Note: LEED is an independent program offered through the U.S. Green Building Council. LEED credits are determined on a per project basis by an independent auditing committee. Filtrexx neither guarantees nor assures LEED credits from the use of its products. LEED is a trademark of the U.S. Green Building Council.*

ADVANTAGES			
	LOW	MED	HIGH
Ease of Installation			✓
Erosion Control – Pre Vegetation	✓		
Erosion Control – w/Vegetation		✓	
Vegetation Establishment			✓
Runoff Control		✓	
Sediment Control	✓		

Disadvantages
- If CVC does not use Filtrexx® GrowingMedia™, performance may be diminished.
- If not installed correctly, maintained or used for a purpose or intention that does not meet specifications, performance may be diminished.
- CVC should not be the only form of site erosion and sediment control.
- CVC should never be used alone in areas of concentrated runoff flow.
- CVC should not be used alone on slopes greater than 4:1.
- CVC does not sufficiently cover soil surfaces prior to vegetation establishment, and therefore cannot be considered an erosion control blanket (which typically covers the soil completely prior to vegetation).
- CVC does not sufficiently cover soil surfaces prior to vegetation establishment, leaving the potential for high soil erosion rates prior to establishment.
- CVC may need to be reapplied if runoff occurs prior to vegetation establishment or where vegetation fails.
- CVC should not be used where rainfall, sheet runoff, or soil erosion rates may be high.

GROWINGMEDIA™ CHARACTERISTICS

Filtrexx® CVC uses only Filtrexx® GrowingMedia™ which is a composted material that is specifically designed for rapid establishment and sustainability of vegetation growth. GrowingMedia can be third party tested to meet minimum performance criteria defined by Filtrexx International. Performance parameters include: percent cover of vegetation, water holding capacity, pH, organic matter, soluble salts, moisture content, biological stability, maturity bioassay, percent inert material, bulk density and

particle size distribution. For information on the physical, chemical, and biological properties of GrowingMedia™ refer to Filtrexx Design Manual, section 5.2.

PERFORMANCE

Conservative assumptions can be made regarding CVC in light of performance associated with slope protection, mulches, hydroseeding, and general use compost. For performance on these practices see Filtrexx® Compost Erosion Control Blanket and supporting technical reports and research in the Appendices. Note, CVC is specifically intended for seeding and temporary vegetation establishment as an alternative to hydroseeding or dry seeding. Although CVC may provide some erosion control benefit prior to vegetation establishment, it is not the intended use, and designing based on these criteria is at the discretion of the Engineer. Filtrexx International is undergoing research to quantify the performance of CVC to aid design professionals in the future. For a summary of current design specifications and performance testing results see Table 7.1.
Note: the Contractor is responsible for establishing a working erosion and sediment control system and may, with approval of the Engineer, work outside the minimum construction requirements as needed. Where the CVC deteriorates or fails, it shall be repaired or replaced with an effective alternative.

DESIGN CRITERIA

CVC is a temporary vegetation practice used for soil erosion control of disturbed, bare, and erodable soils, on cut and fill slopes, storage and stockpiles, areas that will be re-disturbed, areas requiring a nurse crop for permanent vegetation, and stabilization of temporary runoff diversion devices, dikes, and sediment containment systems.

Planning Considerations:
CVC should be used as one treatment in a treatment train approach to site erosion and sediment control. In some cases, seeding of CVC may transfer to providing permanent vegetation after final grading – if the correct seed is selected at the time of application. Runoff control and runoff diversion practices may be designed to help prevent seed washing and erosion control prior to vegetation establishment and to protect seedlings prior to mature establishment. Preconstruction meetings should be conducted to educate construction site personnel about the devices/practices used and acceptable traffic patterns that avoid running over CVC with vehicles and heavy equipment. Vehicular traffic and heavy equipment will reduce the effectiveness of CVC and contribute to soil compaction, which may increase runoff and erosion and reduce vegetation establishment.

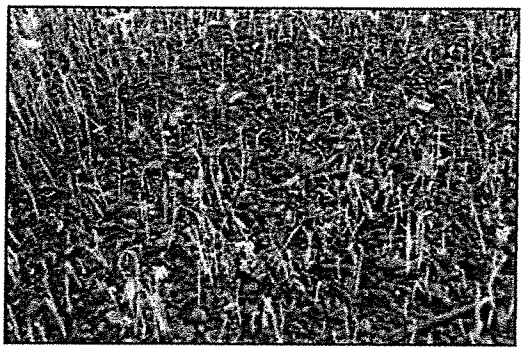
Successful planning for any vegetation establishment project should consider climate, prevailing weather, temperature, sun exposure, available moisture/irrigation requirements, topography, soil type, soil pH, soil amendments, nutrient requirements, drought tolerance, time/coordination with construction phases, site preparation/coordination with construction phases, protection from erosion and sedimentation, and seed mix/plant selection (Fifield, 2001).

Temporary vs. Permanent Vegetation:
Temporary vegetation is typically specified for the applications previously mentioned. Quick establishing annual grasses and legumes are normally specified for these applications.

Permanent vegetation is usually specified for slopes where erosion control blankets are required, drainage ditches and channels that require liners or turf reinforcement mats, and areas that have undergone final clearing and grading and require soil stabilization. Perennial grasses are typically specified and if possible native grasses should be utilized (Fifield, 2001).

Local Landscape Architects, NRCS, or cooperative extensions should be consulted and used as resources for temporary and/or permanent vegetation establishment. Many state erosion and sediment control manuals have specifications for seed selection and application rates.

Preparation and Application:
Where possible, slopes should be vertically tracked to increase soil roughness, which will increase the



Vegetation Establishing in Temporary Seeding

CVC contact with the soil, increase vegetation establishment success, and reduce runoff velocity which may wash seeds prior to and during germination and/or stress young plants during establishment. Care should be given not to compact clay soils with tracking equipment. CVC *is not an erosion control blanket* and therefore does not cover the soil surface until *after* vegetation has completely established. CVC shall be applied to 100% of the area where temporary vegetation is required and applied at a depth of ½ to ¾ in (12-20mm) or 70 to 100 cubic yards/ac (135-193 cubic m/ha).

Establishing & Sustaining Vegetation:
Although CVC increases water holding capacity and reduces evaporation, irrigation may be required to ensure successful establishment. Runoff diversion devices may be utilized to prevent storm runoff from washing seed prior to germination and establishment and reduce erosion prior to temporary stabilization.

CVC can supply humus, organic matter, beneficial microbes, and slow release organic nutrients that can contribute to better soil quality and plant health. In arid and semi-arid regions or hot and dry weather regular irrigation may be required.

Runoff Conditions:
CVC should not be used in areas where concentrated flow exists or where runoff velocities will damage or undermine vegetation. For most grasses a maximum velocity of 4 ft/sec (1.2 m/sec) or a maximum hydraulic shear stress of 2 lbs/ft^2 (10 kg/m^2) is recommended (Maryland Storm Water Design Manual, 2000).

High Wind Conditions:
In regions or seasons prone to high velocity wind conditions (such as arid regions, mountainous regions, and regions with distinct hurricane seasons) it is recommended that Filtrexx® LockDown™ Netting is installed on top of the CVC to prevent wind erosion and movement of the CVC. For more information on LockDown™ Netting refer to Filtrexx Design Manual Section 5.4.

Mulch Function:
Although CVC application depths do not fully cover the soil surface they do provide limited beneficial affects characteristic to mulching, including: reduced raindrop impact and splash erosion, reduced runoff energy and sheet erosion, buffered soil temperature for plants, decreased moisture evaporation, increased moisture holding capacity at the soil surface, reduced runoff volume and velocity, and increased infiltration.

Soil Amendment Function:
CVC also amends the soil which can provide the following functional benefits: increased soil structure, increased soil aggregates, increased soil aeration, increased infiltration and percolation, increased moisture holding capacity, increased activity of beneficial microbes, increased availability of nutrients, decreased runoff volume and velocity, decreased erosion, and increased plant health and sustainability.

Organic vs. Fertilizer Nutrients:
Although most specification and design manuals include fertilizer recommendations or requirements for vegetation, mineral nutrients from fertilizers may not be preferable where vegetation sustainability and water quality are a concern. CVC provides organic nutrients which are slow release, provides plant micronutrients, and is less likely to be transported in storm runoff to receiving waters – which can lead to pollution and eutrophication of waterways (Faucette et al, 2005). In site sensitive areas where nutrient runoff is a concern, CVC may release up to 1/10 of the nutrient load compared to conventional hydroseeding and hydromulching (Faucette et al, 2005).

Weed Establishment:
The effects of mulching are known to suppress weed establishment. In addition, invasive weed growth has been more closely associated with mineral fertilizer than organic fertility practices (Faucette et al, 2004).

INSTALLATION

1. CVC used for temporary vegetation establishment and erosion control shall meet Filtrexx® CVC

Specifications and use Filtrexx® GrowingMedia™.
2. Contractor is required to be a Filtrexx® Certified℠ Installer as determined by Filtrexx International (440-926-2607). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application. Look for the Filtrexx® Certified℠ Installer Seal.
3. CVC will be placed at locations indicated on plans as directed by the Engineer.
4. CVC shall be installed on and around unprotected and erodable soils for temporary vegetation and erosion control.
5. CVC shall be applied to 100% of the area where temporary vegetation is required.
6. CVC shall be applied at a depth of ½ to ¾ in (12-20mm) or 70 to 100 cubic yards/ac (135-293 cubic m/ha).
7. Seed shall be thoroughly mixed with the GrowingMedia™ prior to application or surface applied with GrowingMedia™ at time of application.
8. CVC shall not be installed in areas of concentrated runoff flow.
9. CVC installed on slopes: greater than 4:1 shall be vertically tracked; greater than 3:1 shall use tackifiers or slope stabilizers; greater than 2:1 shall use erosion control blankets or turf reinforcement mats.

INSPECTION

Routine inspection should be conducted within 24 hours of a runoff event or as designated by the regulating authority. If rilling occurs or vegetation does not establish, the area of application should be reapplied with CVC. If failure continues, the use of runoff diversion devices, compost erosion control blankets, rolled erosion control blankets, or soil stabilizers should be considered. CVC should be inspected until permanent vegetation or other erosion control practices are installed. Temporary vegetation practices should also be inspected for noxious or invasive weeds.

MAINTENANCE

1. The Contractor shall maintain the temporary seeding in a functional condition at all times and it shall be routinely inspected.
2. CVC shall be maintained until a minimum of 70% uniform cover of the applied area has been vegetated or as required by the jurisdictional agency.

3. CVC may need to be irrigated in hot and dry weather seasons, or arid and semi-arid climates to ensure vegetation establishment.
4. CVC shall be maintained until permanent vegetation is established or erosion control practices are installed.
5. Where CVC fails, rilling occurs, or vegetation does not establish the Contractor will repair or provide an approved and functioning alternative.
6. If CVC is damaged by stormwater runoff, runoff diversion devices installed above the CVC may be required.
7. Once vegetation is established, final seeding and/or permanent vegetation may not be required.
8. No additional fertilizer or lime is required for vegetation establishment and maintenance.
9. No disposal is required for this product/practice.

METHOD OF MEASUREMENT

Bid items shall show measurement as 'Filtrexx® Compost Vegetated Cover (CVC)/Temporary Seeding per square ft, per square yd, per square meter, per acre, or per hectare installed.

Engineer shall notify Filtrexx of location, description, and details of project prior to the bidding process so that Filtrexx can provide design aid and technical support.

ADDITIONAL INFORMATION

For other references on this topic, including additional research reports and trade magazine and press coverage, visit the Filtrexx website at www.filtrexx.com

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Call for complete list of international installers.

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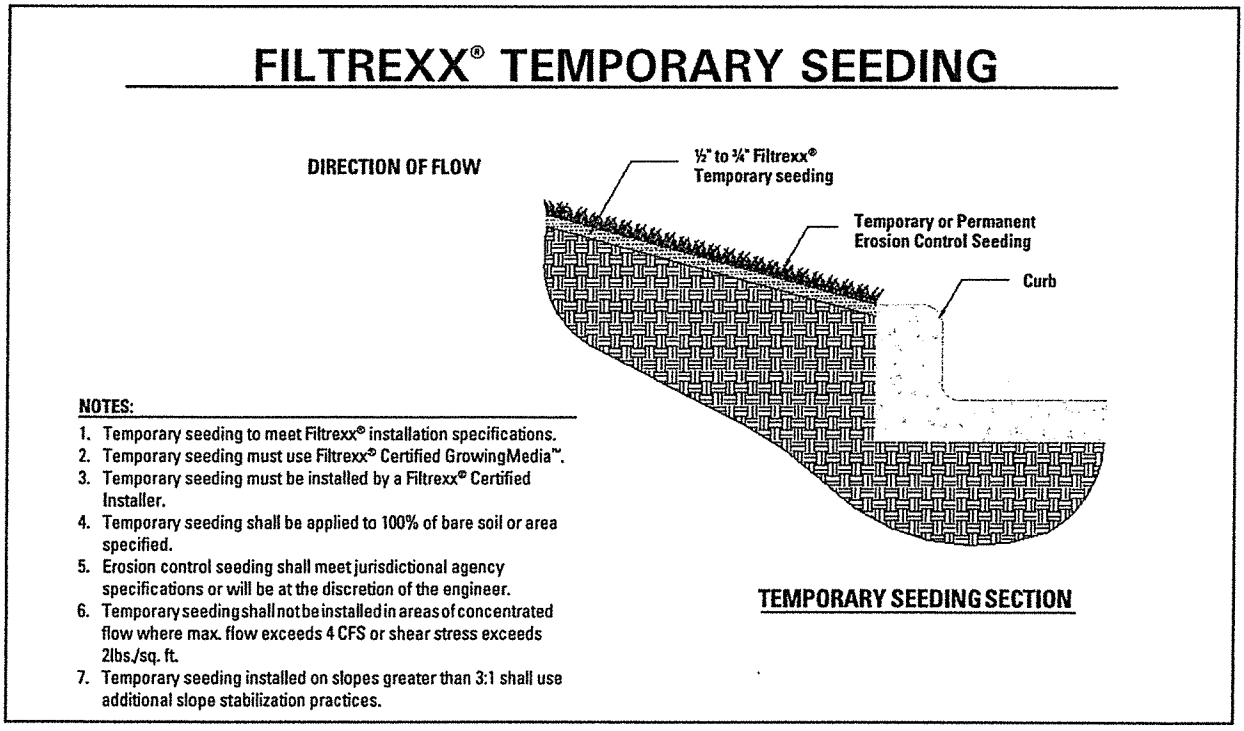
TABLES & FIGURES:

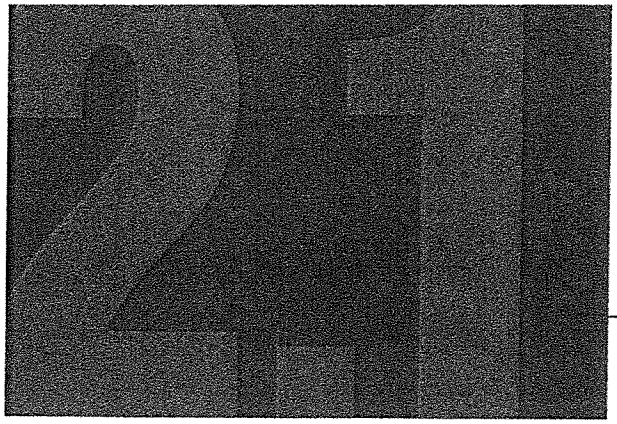
Table 7.1. Temporary Seeding Performance and Design Specifications Summary.

Rainfall Total/Intensity Design & Performance	4.4 in/1.85 in hr (112mm/47mm hr)	1.06 in/0.71 in hr (27mm/18mm hr)	0.38 in/1.54 in hr (10mm/39mm hr)
C Factor*	0.0032	0.0098	0.0138
Soil Loss Reduction	99%	99%	99%
Runoff Volume Reduction	0%	24%	92%
Soil Type	Silty sand	Silty sand	Silty sand
Slope	2:1	2:1	2:1
Test Plot Size	30 ft wide x 5 ft long (9m x 1.5m)	30 ft wide x 5 ft long (9m x 1.5m)	30 ft wide x 5 ft long (9m x 1.5m)
Depth of Temporary Seeding	¾ in (20 mm)	¾ in (20 mm)	¾ in (20 mm)
Seeding Rate	Determined by Engineer/Landscape Architect/State Design Manual	Determined by Engineer/Landscape Architect/State Design Manual	Determined by Engineer/Landscape Architect/State Design Manual
Vegetation Type	Determined by Engineer/Landscape Architect/State Design Manual	Determined by Engineer/Landscape Architect/State Design Manual	Determined by Engineer/Landscape Architect/State Design Manual
Reference	New England Transportation Consortium; Federal Highway Administration	New England Transportation Consortium; Federal Highway Administration	New England Transportation Consortium; Federal Highway Administration
Test/Research Facility	University of Connecticut Department of Civil & Environmental Engineering	University of Connecticut Department of Civil & Environmental Engineering	University of Connecticut Department of Civil & Environmental Engineering
Authors	Demars et al., 2000	Demars et al., 2000	Demars et al., 2000

* Cover-Management Factor: A C Factor of .02 indicates that erosion is reduced to 2% of what would occur under fallow conditions.

Figure 7.1. Engineering Design Drawing for Temporary Seeding





filtrexx®
SUSTAINABLE TECHNOLOGIES

SECTION 2: POST-CONSTRUCTION

Filtrexx® Compost Storm Water Blanket (CSWB) (GrowingMedia™)

PURPOSE & DESCRIPTION

Filtrexx® Compsot Storm Water Blanket (CSWB™) is a **storm water runoff reduction** and **permanent vegetation establishment** practice used on post-construction soil surfaces. CSWB are intended for application and use where:

- land disturbing activities have ceased,
- permanent vegetation is required,
- reduction of pollutant loading in storm runoff is required,
- runoff volume reduction from contributing watershed is necessary,
- reduction in the size of storm water collection or bio-retention ponds, and rain gardens is necessary.

CSWB are designed to act like a sponge for rain water and non-concentrated storm runoff. By holding large volumes of water at and across the land surface, CSWB increase the infiltration and evapotransporation of water from rainfall and storm runoff. These processes aid the cycling of water by recharging ground water and atmospheric water vapor. By increasing the land surface roughness, CSWB slow the rate of sheet runoff, allowing it to more readily infiltrate the soil surface. CSWB are also specifically designed to allow for permanent and sustained vegetation growth.

Site Application

APPLICATION

CSWB are surface applied at a depth of 2 in (50mm). CSWB are used where reduction of storm water runoff and/or permanent vegetation is required or will improve the design and function of the landscape. CSWB are generally applied after land disturbing activities have ceased and where sheet runoff may exist under storm conditions. CSWB should NOT be used in areas of concentrated storm water flow. CSWB should not be used on slopes greater than 2:1 without the use of additional stabilizers or support practices (See Section 1.8 of Filtrexx Design Manual). Filtrexx Slope Interruption (See Section 1.5 of Filtrexx Design Manual) may be seeded and used with CSWB to slow runoff velocity and the potential for soil erosion.

ADVANTAGES AND DISADVANTAGES

Advantages

- CSWB can be used for reduction of storm water runoff and permanent vegetation establishment.
- CSWB can be easily designed and incorporated as part of a treatment train approach in storm water management and pollution prevention.
- CSWB are easily applied and can establish vegetation in difficult areas.
- CSWB have a high water holding capacity, therefore can absorb high volumes of rainfall and storm water sheet flows.
- CSWB can absorb rainfall and runoff water, thereby increasing infiltration and reducing runoff, erosion, and transport of pollutants.
- Holding water at soil-vegetation complex can increase ground water recharge, evapotransporation, and plant available water.
- Reduction of storm runoff volume and transport of pollutants reduces pollutant loading to receiving surface waters and wetlands.
- CSWB can slow runoff velocity, thereby increasing infiltration and reducing the erosive energy of runoff and the potential for soil erosion and transport of pollutants.
- Humus colloids and organic matter in CSWBs provide good physical structure for seed and

establishing seedlings.
- Humus colloids and organic matter in storm water blankets provide increased water holding capacity to aid in seed germination and the potential for reduced irrigation.
- CSWB act like a mulch which has been shown to reduce invasive weed establishment and cover.
- CSWB are a good option for arid and semiarid regions where germination, moisture management, and irrigation can be difficult.
- CSWB provide organic nutrients that are slow release for optimum uptake efficiency to establishing vegetation.
- CSWB provide organic nutrients that are less prone to transport in storm runoff and pollution of receiving surface waters, relative to mineral nutrients supplied by fertilizers.
- CSWB provide organic nutrients which have been correlated to lower growth of invasive weeds, relative to mineral nutrient fertilizers.
- CSWB have the ability to bind and adsorb phosphorus, metals, and hydrocarbons that may be in storm water runoff, thereby reducing their ability to migrate to and pollute receiving surface waters.
- Microorganisms in CSWB have the ability to degrade organic pollutants and cycle captured nutrients in storm water runoff.
- CSWB are manufactured from bio-based organic materials that can be incorporated into a permanent landscape design.
- CSWB may improve existing soil structure, soil aggregation, water permeability, aeration, and biological diversity for post-construction soils, thereby increasing the likelihood that vegetation will be sustainable.
- CSWB may increase soil carbon and organic matter which can increase water holding capacity and infiltration, and reduce runoff and erosion, which can be beneficial to storm water reduction and water quality well into the future.
- CSWB may assist in qualification for LEED® Green Building Rating and Certification credits under LEED Building Design & Construction (BD+C), New Construction v4. Awarded credits may be possible from the categories of Sustainable Sites, Water Efficiency, Materials & Resources, and Innovation. *Note: LEED is an independent program offered through the U.S. Green Building Council. LEED credits are determined on a per project basis by an independent auditing committee. Filtrexx neither guarantees nor assures LEED credits from the use of its products. LEED is a trademark of the U.S. Green Building Council.*

ADVANTAGES			
	LOW	MED	HIGH
Installation Difficulty	✓		
Storm Water Volume Reduction			✓
Storm Water Runoff Rate Reduction		✓	
Pollutant Load Reduction			✓
Permanent Vegetation Establishment			✓
Soil Erosion Control			✓

Disadvantages
- If CSWB do not use Filtrexx® GrowingMedia™ or follow Filtrexx International specifications performance may be greatly diminished.
- If not installed correctly, maintained or used for a purpose or intention that does not meet specifications, performance may be diminished
- CSWB should never be used in areas of concentrated storm runoff flow, including channels and drainage ditches.
- CSWB should not be used without additional support practices on slopes greater than 2:1.
- CSWB may need to be reapplied if severe runoff occurs prior to vegetation establishment or where vegetation fails.

GROWINGMEDIA™ CHARACTERISTICS

Filtrexx® CSWB use only Filtrexx® GrowingMedia™ which is a composted material that is specifically designed to increase water holding capacity, reduce runoff volume, reduce pollutant loading to receiving waters, slow runoff velocity, increase infiltration, increase surface evapotransporation, and provide rapid establishment and permanent sustainability of vegetation. GrowingMedia can be third party tested to meet minimum performance criteria defined by Filtrexx International. Performance parameters include: percent cover of vegetation, water holding capacity, pH, organic matter, nutrient and metals content, soluble salts, moisture content,

biological stability, maturity bioassay, percent inert material, bulk density and particle size distribution. It should be noted that particle size distribution of GrowingMedia™ is one of the key components to the effective performance and design capacity of CSWB; therefore, Filtrexx International has conducted extensive research and development and review of state and federal specifications to create high performance and reliable CSWB. For information on the physical, chemical, and biological properties of Filtrexx® GrowingMedia™ refer to Specifications in Section 5.2

PERFORMANCE

QA/QC material testing of GrowingMedia to ensure that specifications are met, is conducted by the Soil Control Lab, Inc. Performance testing and research of CSWB has been extensive in the last 5 years and is currently on-going. Filtrexx International will continue to conduct and support testing and research programs to better inform and assist design professionals in storm water management and storm water pollution prevention plan development. As new information becomes available it will be incorporated into our specifications and performance and design criteria; meaning this manual is a dynamic one and shall continually be updated. Filtrexx International relies on completed and published research or test results from reputable laboratories to generate the performance and design information provided herein. Filtrexx International gives preference to research published in peer-reviewed scientific journals, and secondarily to third party research conducted by universities and federal agencies. For a summary of performance testing, research results, and design criteria considerations see Table 1.1. Supporting summaries of technical reports and research papers have been included in the Appendices. *Note: the Contractor is responsible for establishing a working storm water management system and may, with approval of the Engineer, work outside the minimum requirements as needed. Where the CSWB deteriorates or fails, it shall be repaired or replaced with an effective alternative.*

DESIGN CRITERIA

CSWB are a storm water runoff reduction and permanent vegetation establishment practice to be used on around post-construction soil surfaces.

Planning Considerations:

CSWB should be used as one treatment in a designed treatment train approach to site storm water management and pollution prevention. Runoff control and runoff diversion practices may be designed to help prevent seed washing and erosion prior to vegetation establishment and to protect seedlings prior to maturity. Pre-application meetings should be conducted to educate site personnel about the devices/practices used and acceptable traffic patterns that avoid running over CSWB with vehicles and heavy equipment. Vehicular traffic and heavy equipment may reduce the effectiveness of CSWB and contribute to soil compaction, which may increase runoff and erosion and reduce vegetation establishment.

Successful planning for any permanent vegetation establishment project should consider climate, prevailing weather, temperature, sun exposure, available moisture/irrigation requirements, topography, soil type, soil pH, soil amendments, nutrient requirements, drought tolerance, site preparation/coordination with construction phases, time to vegetation establishment/coordination with construction phases, protection from erosion and sedimentation, and seed mix/plant selection. Perennial grasses are typically specified and if possible native grasses should be utilized (Fifield, 2001).

Local Landscape Architects, NRCS, or university/ cooperative extension should be consulted and used as resources for seed and plant material selection in your region. Many state storm water design manuals have specifications for seed and plant selection and application rates.

Preparation and Application:

Where possible, slopes should be vertically tracked to increase soil roughness. This will increase the CSWB's contact with the soil, reduce runoff velocity, and increase vegetation establishment success. Reducing runoff velocity can reduce seed wash prior to and during germination and reduce stress on young plants during the establishment phase. CSWB

shall be applied to and cover 100% of the exposed soil area where storm runoff reduction or vegetation is required. CSWB shall be applied at a depth of 2 in (50mm) or a rate of 270 cubic yards/ac (513 cubic m/ha). Thicker CSWB may further reduce runoff volume during large storm events; however, this should be at the discretion of the Engineer. See Installation guidelines in the following section for further details on application specifications of CSWB. Field application depths up to 6 in (150mm), or a rate of 810 cubic yards/ac (249 cubic m/ha), have been used successfully to reduce stormwater volume and pollutant loads, however this has not been tested in a controlled environment. The Filtrexx® Rain Garden/Bioretention System (Section 2.7) Specification should be consulted for deeper media applications, where stormwater containment will be utilized, or where containment and infiltration is the primary objective.

Establishing & Sustaining Vegetation:
Although CSWB increase water holding capacity and may reduce evaporation, irrigation should be utilized to ensure successful vegetation establishment. Runoff diversion devices may be utilized to prevent storm runoff from washing seed prior to germination and establishment and reduce erosion prior to permanent stabilization.

CSWB can supply humus, organic matter, beneficial microbes, and slow release organic nutrients that can contribute to better soil quality and plant health. In arid and semi-arid regions, or hot and dry weather, regular irrigation may be required.

Runoff Conditions:
CSWB should not be used in areas where concentrated flow exists or where runoff velocities will damage or undermine vegetation. For most grasses a maximum velocity of 4 ft/sec (1.2 m/sec) or a maximum hydraulic shear stress of 2 lbs/ft^2 (10 kg/m^2) is recommended (Maryland Storm Water Design Manual, 2000).

High Wind Conditions:
In regions or seasons prone to high velocity wind conditions (such as arid regions, mountainous regions, and regions with distinct hurricane seasons) it is recommended that LockDown™ Netting is installed on top of the CSWB to prevent wind erosion and movement of the CSWB. For more information on LockDown™ Netting see Section 5.4.

Mulch Function:
CSWB cover 100% of the soil surface, and therefore provide the beneficial affects characteristic to mulches, including: reduced raindrop impact and splash erosion, reduced runoff energy and sheet erosion, buffered soil temperature for plants, decreased moisture evaporation, increased moisture holding capacity at the soil surface, reduced runoff volume and velocity, and increased infiltration. Decreasing runoff volume can decrease pollutant transport and loading to receiving waters. Increasing water holding capacity at the soil surface can increase infiltration, which can help to recharge ground water, and increase available water to plants.

Soil Amendment Function:
CSWB also amend the soil which can provide the following functional benefits: increased soil structure, increased soil aggregates, increased soil aeration, increased infiltration and percolation, increased moisture holding capacity, increased activity of beneficial microbes, increased availability of nutrients, increased cation exchange capacity, decreased runoff volume and velocity, decreased erosion, and increased plant health and long-term sustainability.

Organic vs. Fertilizer Nutrients:
Although most specification and design manuals include fertilizer recommendations or requirements for permanent vegetation establishment, mineral nutrients from fertilizers may not be preferable where vegetation sustainability and water quality are a concern. CSWB provide organic nutrients, which: are slow release, provide plant micronutrients, and are less likely to be transported in storm runoff to receiving waters – which can reduce pollution and eutrophication of waterways (Faucette et al, 2005).

Weed Establishment:
The effects of mulching are known to suppress weed establishment. In addition, invasive weed growth has been more closely associated with mineral fertilizers than organic fertility practices (Faucette et al, 2004).

Runoff Volume Reduction
CSWB are designed to absorb water. For every 1% of organic matter, the CSWB will hold approximately 5,500 gal (21 cubic m) of water per acre inch (103 cubic m) (Breedlove, 2006). CSWB are typically 25% organic matter by wet weight and 50% organic matter by dry weight. Alternatively, CSWB typically hold approximately 1.6 oz (45 g) of water per 3.6 oz (100 g) of CSWB (dry weight); 1 gal (0.004 cubic m) of water per 20 lbs (9 kg) of CSWB (dry wt) or per 30 lbs (14 kg) of CSWB (wet wt). This equates to approximately 40 gal (0.15 cubic m) of water per cubic yard (0.76 cubic m) of CSWB and 5,400 gal (722 cubic ft, 20 cubic m) of water per acre inch (0.01 ha meter, 103 cubic m) of CSWB, and 10,800 gal (1444 cubic ft, 41 cubic m) of water for a 2 in (50mm) CSWB; An acre inch (0.01 ha meter) of CSWB requires approximately 135 cubic yards (103 cubic meters) of material.

INSTALLATION

1. CSWB used for storm runoff reduction and permanent vegetation establishment shall meet Filtrexx® Compost Storm Water Blanket Specifications and use Filtrexx® GrowingMedia™.
2. Contractor is required to be a Filtrexx® Certified℠ Installer as determined by Filtrexx International (440-926-2607). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application. Look for the Filtrexx® Certified℠ Installer Seal.
3. CSWB will be placed at locations indicated on plans as directed by the Engineer.
4. Land or soil surface shall be roughened prior to application of CSWB.
5. CSWB shall be applied to 100% of the land surface area where storm water reduction and permanent vegetation is required. No native soil shall be visible in or through the CSWB.
6. CSWB shall be applied at a minimum depth of 2 in (50mm) or at a rate of 270 cubic yards/ac (513 cubic m/ha).
7. Seed shall be thoroughly mixed with the GrowingMedia™ prior to application or surface applied to GrowingMedia™ at time of application.
8. CSWB shall not be installed in areas of concentrated storm runoff flow, including channels and ditches.
9. CSWB shall be installed at least 10 ft (3m) over and beyond the shoulder of a slope and/or into existing vegetation to ensure runoff does not undercut the blanket.
10. CSWB installed on slopes: greater than or equal to 4:1 shall be tracked; greater than 2:1 shall be tracked and use other support practices (See Section 1.8 of Filtrexx Design Manual).

INSPECTION

Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the regulating authority. If rilling occurs or vegetation does not establish, the area of application should be reapplied with a CSWB. If failure continues, the use of runoff diversion devices, slope interruption devices, erosion control support practices, soil stabilizers, turf reinforcement mats, or hard armoring practices should be considered. CSWB should be inspected until permanent vegetation is established. Permanent vegetation practices should always be inspected for noxious or invasive weeds.

MAINTENANCE

1. The Contractor shall maintain the stormwater blanket in a functional condition and it shall be routinely inspected until vegetation is established.
2. CSWB shall be maintained until a minimum of 70% uniform cover of the applied area has been vegetated or as required by the juris-dictional agency.
3. CSWB may require regular irrigation during hot and dry weather, or arid and semi-arid climates to ensure permanent vegetation establishment.
4. Where a CSWB fails, rilling occurs, or vegetation does not establish the Contractor will repair or provide an approved and functioning alternative.
5. If gullies form in CSWB, the area shall be re-graded prior to reinstallation of CSWB or approved alternative.
6. If a CSWB is damaged by stormwater runoff, installation of slope interruption devices across the slope, or runoff diversion devices above the CSWB may be required.
7. No additional fertilizer or lime is required for vegetation establishment and maintenance.

METHOD OF MEASUREMENT

Bid items shall show measurement as 'Filtrexx® Compost Storm Water Blanekt (CSWB), per square ft, per square yd, per square meter, per hectare, or per acre installed.

Engineer shall notify Filtrexx of location, description, and details of project prior to the bidding process so that Filtrexx can provide design aid and technical support.

ADDITIONAL INFORMATION

For other references on this topic, including additional research reports and trade magazine and press coverage, visit the Filtrexx website at www.filtrexx.com

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61 N Clev-Mass Rd, Ste E, Akron, OH 44333
877-542-7699 | 234-466-0810 (fax)
www.filtrexx.com | info@filtrexx.com
Call for complete list of international installers.

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TABLES & FIGURES:

Table 1.1. Compost Storm Water Blanket Performance[1] and Design Specifications.

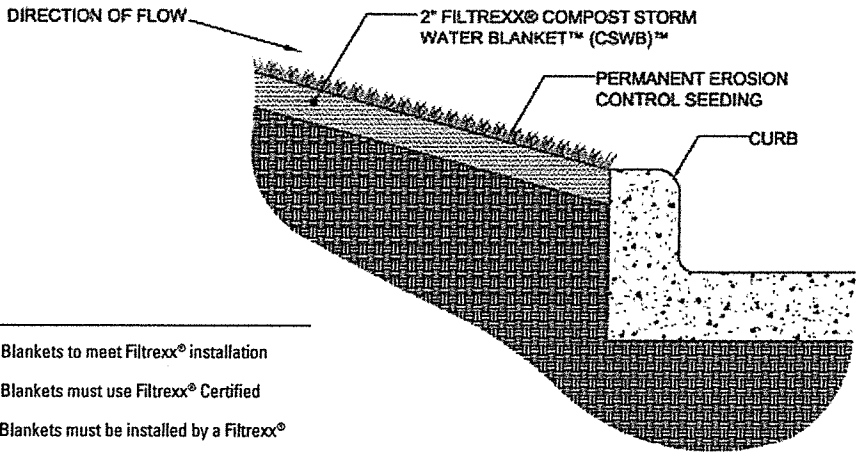
Rainfall Total/Duration Design & Performance	4.4 in(112mm) /2.4 hr	1.8 in(45mm) /35 min	3.2 in(80mm) /1 hr	4.0 in(100mm) /1 hr	8.0 in(200mm) /2 hr
Depth of Application	3.0 in (75mm)	2.0 in (50mm)	1.5 in (35mm)	1.5 in (35mm)	2.0 in (50mm)
Slope	2:1	3:1	10:1	10:1	3:1
Soil Texture	Silty sand	Clay	Sandy clay loam	Sandy clay loam	Loamy sand
Hydrologic Soil Class			B	B	
Runoff Volume Reduction (Vr)	76%[2]	35%	49%[3]	60%	90[4]
Peak Runoff Flow Rate Reduction (Q)	ND	ND	36%	34-51%	79%
Hydrologic Abstraction (Initial) Reduction (Ia)	ND	ND	68%	72%	94%[4]
Runoff Curve Number (CN)	ND	ND	49	42	ND
Runoff Coefficient (C)	ND	ND	0.28 - 0.32	0.21	ND
Unit Hydrograph vs. bare sandy clay loam				See Figure 1.2	
Water Holding Capacity[5]	2,166 ft3/ac (153 m3/ha)	1,444 ft3/ac (102 m3/ha)	1,083 ft3/ac (77 m3/ha)	1,083 ft3/ac (77 m3/ha)	1,444 ft3/ac (102 m3/ha)
Total N Load Reduction	ND	88%	58%[6]	92%[7]	99%
Nitrate-N Load Reduction	ND	45%	88%[6]	ND	ND
Total P Load Reduction	ND	87%	83%[6]	ND	99%
Bio-available P Load Reduction	ND	87%	83%[6]	97%[7]	99%
Soil Loss Reduction	98%	99.2%	99%	93.5%	96.1%[8]
Test/Research Facility	University of Connecticut	Texas A&M	University of Georgia	University of Georgia	Iowa State University
Reference/Publication	New England Transportation Consortium & Federal Highway Administration – NETCR 20	ASAE International Meeting	Journal of Soil and Water Conservation	USDA SBIR	Transactions of ASAE
Authors	Demars et al, 2000	Mukhtar et al, 2004	Faucette et al, 2005	Faucette et al 2006	Persyn et al 2004; Glanville et al 2004; Glanville et al 2001.

ND: no data reported
[1]Blankets in studies that met Filtrexx Specifications.
[2]Averaged over 10 runoff events.
[3]Cumulative over 3 runoff events.
[4]Calculated from mean rainfall intensity/duration and runoff rate values
[5]Based on database provided by independent lab, Soil Control Lab, Inc.
[6]Relative to vegetation establishment by hydroseed
[7]Relative to vegetation establishment that followed GDOT specifications.
[8]Determined from interrill erosion rate.

Figure 1.1. Engineer Design Details for Compost Storm Water Blanket.

FILTREXX® STORM WATER BLANKET

NTS

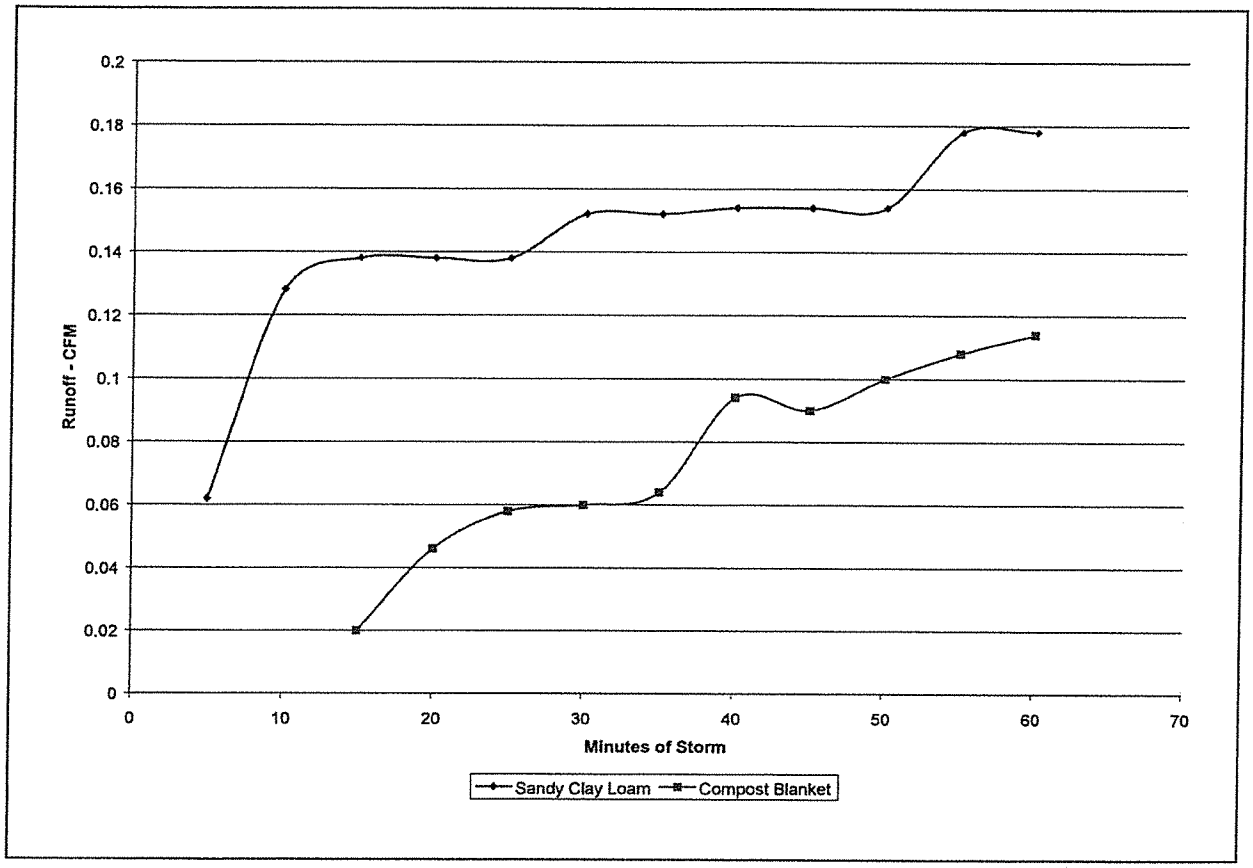


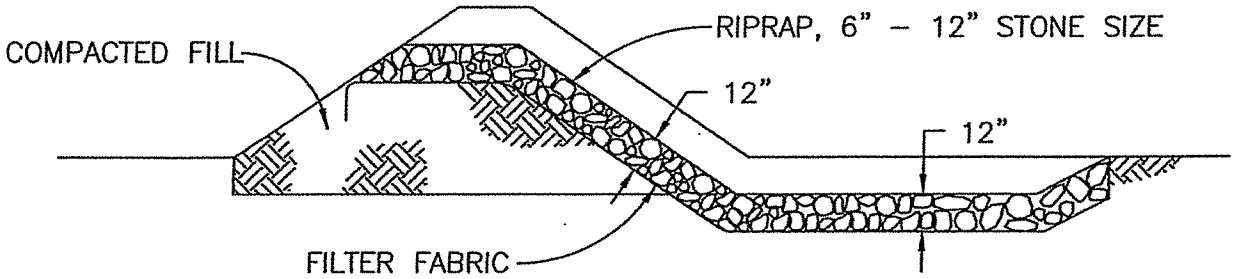
CSWB™ Section View

NOTES:

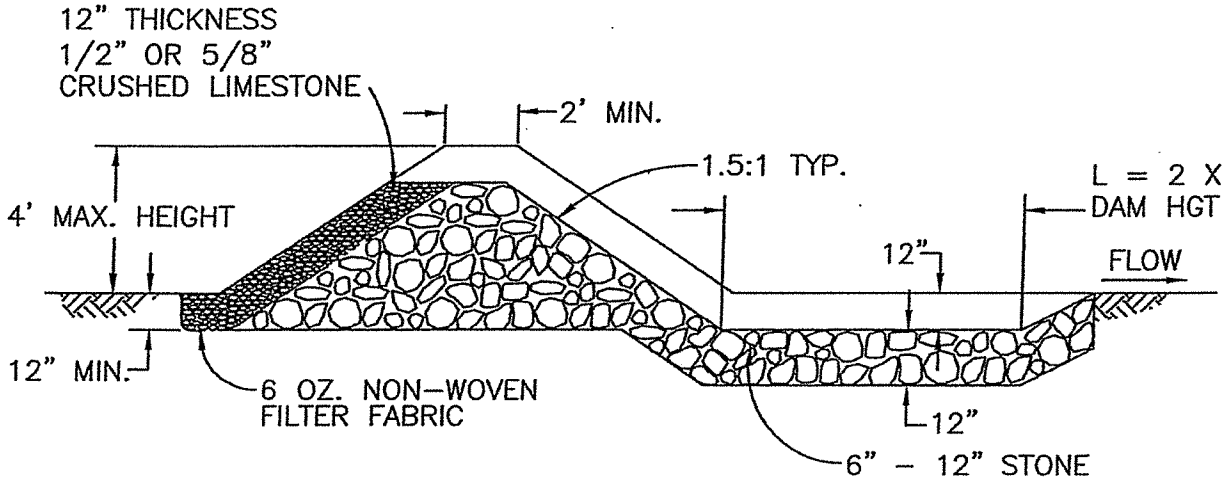
1. Compost Storm Water Blankets to meet Filtrexx® installation specifications.
2. Compost Storm Water Blankets must use Filtrexx® Certified GrowingMedia™.
3. Compost Storm Water Blankets must be installed by a Filtrexx® Certified℠ Installer.
4. Compost Storm Water Blankets shall be applied to 100% of bare soil or area specified where stormwater reduction and permanent vegetation is required.
5. Compost Storm Water Blankets shall be installed at least 10 feet over the slope shoulder or into existing vegetation.
6. Compost Storm Water Blankets will be placed at locations indicated on plans as directed by the Engineer.
7. Land or soil surface shall be roughened prior to application of Compost Storm Water Blanket.
8. Compost Storm Water Blankets shall be applied at a minimum depth of 2 in. or at a rate of 270 cubic yards/ac.
9. Seeds shall be throughly mixed with the Filtrexx® GrowingMedia™ prior to application or surface applied to Filtrexx® GrowingMedia™ at the time of application.
10. Compost Storm Water Blankets shall not be installed in areas of concentrated storm runoff flow, including channels and ditches.
11. Compost Storm Water Blankets installed on slopes greater than 4:1 shall be tracked; installation on slopes greater than 2:1 shall be tracked and use other support practices, such as Filtrexx® Lockdown™ Netting or Filtrexx® Tackifying agent.

Figure 1.2. Unit Hydrograph of a Compost Storm Water Blanket Relative to a Bare Study Clay Loam for a 4in/hr 1 hr Storm Event.

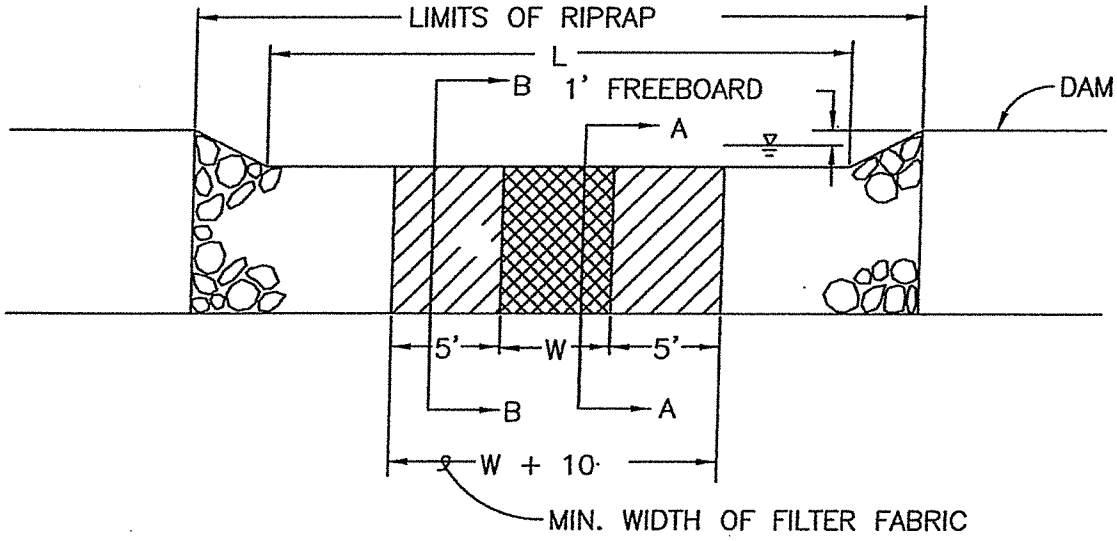




SECTION B – B

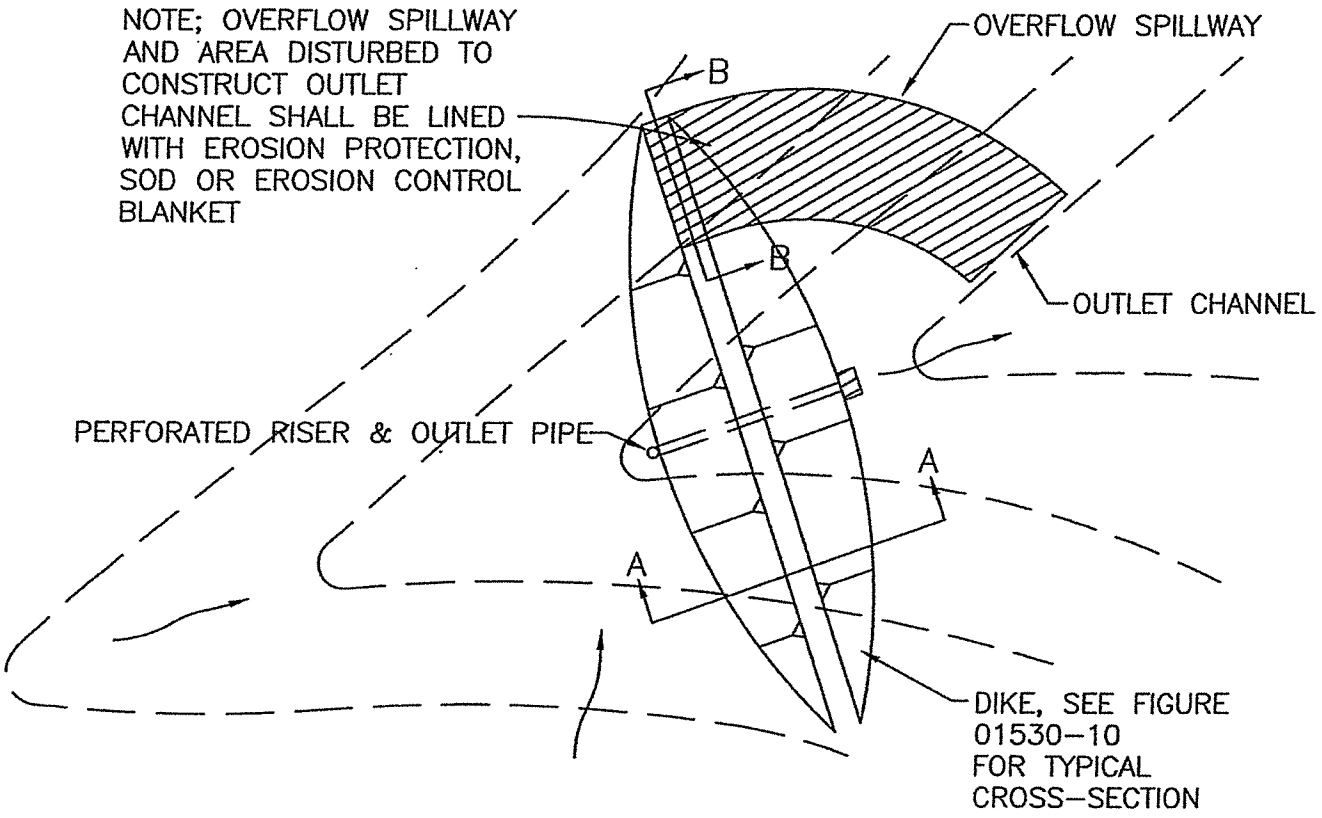


SECTION A – A (THRU GRAVEL FILTER)



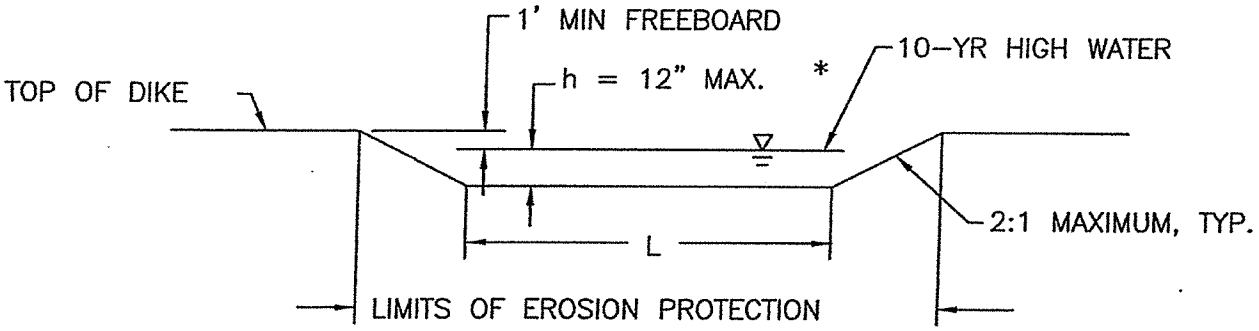
L = LENGTH REQUIRED TO PASS Q_{10} WHILE MAINTAINING 1 FT. OF FREEBOARD
W = WIDTH OF ROCK FILTER AREA

	GRAVEL FILTER DAM DETAIL	NTS	DATE 4–18–06	REVISION 0



TYPICAL COMPONENTS OF TEMPORARY SEDIMENT BASIN PLAN

(PERFORATED RISER PIPE AND OVERFLOW SPILLWAY SHOWN. GRAVEL FILTER DAM AND EROSION PROTECT OVERFLOW SPILLWAY AS SHOWN IN FIGURE 01530-8 MAY ALSO BE USED.)

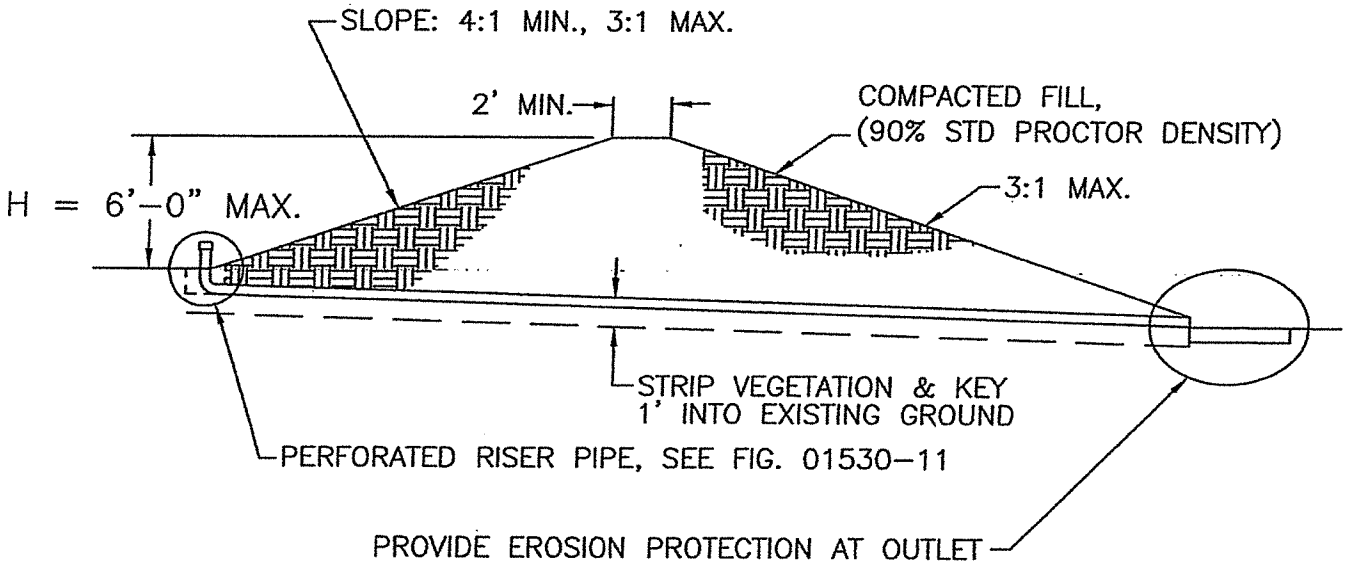


*h = 6" MAX. IF SOD LINING USED

SECTION B -B

TYPICAL OVERFLOW SPILLWAY CROSS-SECTION

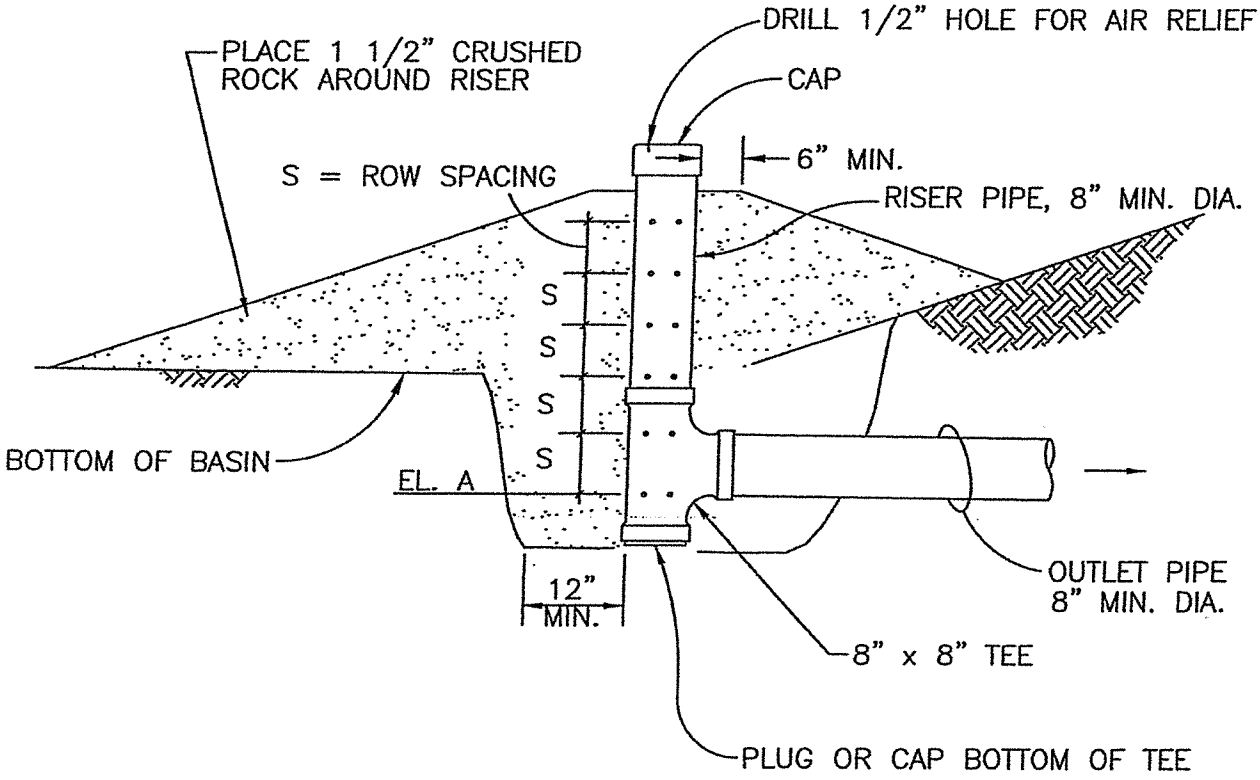
	TEMPORARY SEDIMENT BASIN DETAIL NTS	DATE 4-18-06	REVISION 0



SECTION A – A

	BERM & OUTLET STRUCTURE DETAIL NTS	DATE 4-18-06	REVISION 0

n = NUMBER OF HOLES PER ROW
d = HOLE DIAMETER



NOTE: BOTTOM ROW OF HOLES SHALL BE SET NO HIGHER THAN BOTTOM OF BASIN. ELEVATION OF BOTTOM ROW OF HOLES SHALL BE SET EQUAL TO INVERT ELEVATION OF OUTLET PIPE (EL. A). THIS ELEVATION MUST BE SPECIFIED ON THE DRAWING.

	PERFORATED RISER PIPE DETAIL NTS	DATE 4-18-06	REVISION 0

POLICE FIRING RANGE
FOR THE CITY OF NIXA, MO
BID FORM

Before completing and executing the following Bid Form, each Bidder shall examine the Bidding Requirements, Contract Forms, Supplementary Conditions, Specifications, Drawings, and other proposed Contract Documents, and all Addenda thereto; and shall be acquainted with and fully understanding (1) the extent and character of the work covered by this Bid Form; (2) the location, character and condition of existing roads, streets, highways, railroads, pavements, surfacing, walks, driveways, curbs, gutters, trees, sewers, utilities, drainage courses and structures, and other installations, both surface and underground, which may affect or be affected by the proposed work; (3) the location, arrangement, and specified requirements of the proposed work; (4) the nature and extent of excavations to be made, and the type, character, and general condition of materials to be excavated; (5) the necessary handling and rehandling of excavated materials, including construction of fills and embankments; (6) the location and extent of necessary or probable dewatering requirements; (7) the difficulties and hazards to the work which might be caused by storm or flood water; (8) local conditions relative to labor, transportation, hauling, and rail delivery facilities; and (9) all other factors and conditions affecting or which may be affected by the work.

Each bidder shall hereby propose to furnish all materials, equipment, supplies, and appurtenances, to provide all construction equipment and tools; to perform all necessary labor and supervision; and to construct, install, erect, equip, and complete all work stipulated in, required by, and in accordance with the proposed contract documents and the drawings, specification, and other documents referred to therein (as altered, amended or modified by addenda) at the unit or lump sum prices stated on the following next pages.

Each Bidder shall fully and accurately complete the following Bid Form and shall provide a unit price (where applicable) and a total price for each item shown. Prices provided shall include all labor, materials, overhead, profit, insurance, mobilization, license fees, and other costs, considerations, and requirements as indicated in the plans, specifications, and other contract documents.

Attention of the Bidder is directed to the Instructions to Bidders and Measurement and Payment Sections of the Specifications and Contract Documents in addition to the other contract documents, specifications and construction plans.

Execution of this Bid Form by the Bidder affirms the Bidder's acceptance and understanding thereof.

POLICE FIRING RANGE
FOR THE CITY OF NIXA, MO
BID FORM

SCHEDULE A - GENERAL					
ITEM NO.	DECRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
A1	Mobilization & Bonds	1	LS	35,000	35,000
A2	Contractor Furnished Construction Staking (Shaffer & Hines will provide 4 Control Points to "Box the Site In" for Contractors Use at no cost to the Contractor)	1	LS	10,000	10,000
SCHEDULE A TOTAL					45,000

SCHEDULE B - STORM SEWER & CULVERTS					
ITEM NO.	DECRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
B1	24" RCP	58	LF	100	5,800
B2	18" RCP	95	LF	80	7,600
B3	24" RCP FES	1	EA	1,500	1,500
B4	Rip Rap Pad	100	SF	10	1,000
B5	Area Inlet A1 (incl. conc. Slope protection)	1	LS	8,000	8,000
B6	Area Inlet A2 (incl. conc. Slope protection)	1	LS	6,000	6,000
SCHEDULE B TOTAL					29,900

POLICE FIRING RANGE
FOR THE CITY OF NIXA, MO
BID FORM

SCHEDULE C - GRADING & EROSION CONTROL					
ITEM NO.	DECRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
C1	Grading - Unclassified Cut (19,346 CY Plan Quantity; this quantity does not include any overexcavation that will be required; overexcavation is considered incidental and shall be included in this lump sum price)	1	LS	120,000	120,000
C2	Grading - Fill (19,269 CY Plan Quantity; see Plan Notes on compaction requirements for different areas)	1	LS	80,000	80,000
C3	Clearing & Grubbing	1	LS	10,000	10,000
C4	Clean-up; Provide 4" thick Topsoil; Hydro-seed all disturbed areas	1	LS	80,000	80,000
C5	Temporary Slope Blankets on all Slopes 3:1 or Steeper, including Roadway Ditches; North Amreican Green Rollmax SC-150 or equal	1	LS	90,000	90,000
C6	Implement, Maintain, & Modify SWPPP per Land Distrubance Permit / Sediment & Erosion Control	1	LS	20,000	20,000
SCHEDULE C TOTAL					400,000

SCHEDULE D - ROADWAYS, DRIVEWAYS, PARKING, GRAVEL PADS					
ITEM NO.	DECRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
D1	Gravel Road / Gravel Driveway / Gravel Parking - 6" Thick Type 5 Compacted Aggregate Baserock on Compacted Subgrade	2,506	SY	13	32,578
D2	Gravel Pad & Driveway on Firing Range Floor - 6" Thick Type 5 Compacted Aggregate Baserock on Compacted Subgrade	1,430	SY	13	18,590
SCHEDULE D TOTAL					51,168

TOTAL BASE BID	526,068.00

POLICE FIRING RANGE
FOR THE CITY OF NIXA, MO
BID FORM

AWARD OF CONTRACT

It is intended that one contract will be entered into by the City of Nixa. The basis of award will be to the lowest responsive and responsible bidder based on base bid plus any listed additive alternates to provide the most amount of work within the City of Nixa's budget.

Unless otherwise agreed to the undersigned bidder agrees to enter into a contract within ten (10) days after acceptance of this bid No bid may be withdrawn for 60 days after the bid opening.

Dated on this 29 day of April, 2022.

SIGNATURE OF BIDDER

If an Individual: _____, doing

business as _____.

If a Partnership: _____

by _____, partner.

If a Corporation: D & E Plumbing & Heating Inc

by Steve Eoff

Title President (SEAL)

acknowledge ADD No I

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These General Conditions are taken from Standard Conditions of the Construction Contract, NSPE Form No. 1910-8 (1983) Edition.

ARTICLE 1 - DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

Addenda: Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the bidding documents or the Contract Documents.

Agreement: The written agreement between Owner and Contractor covering the work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

Application for Payment: The form accepted by Engineer which is to be used by Contractor in requesting progress or final payments and which is to include such supporting documentation as is required by the Contract Documents.

Bid: The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the work to be performed. Bonds: Bid, performance and payment bonds and other instruments of security.

Change Order: A document recommended by Engineer, which is signed by Contractor and Owner and authorizes an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Time issued on or after the Effective Date of Agreement.

Contract Documents: The Agreement, Addenda (which pertain to the Contract Documents), Contractor's Bid (including documentation accompanying the Bid and any post-Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all amendments, modifications and supplements issued pursuant to paragraphs 3.4 and 3.5 on or after the Effective Date of the Agreement.

Contract Price: The moneys payable by Owner to Contractor under the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.9.1 in the case of Unit Price Work).

Contract Time: The number of days (computed as provided in paragraph 17.2) or the date stated in the Agreement for the completion of the work.

Contractor: The person, firm or corporation with whom Owner has entered into Agreement.

Defective: An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty, or deficient, or does not conform to the Contract Documents, or does not meet the requirements of any inspection, test or approval referred to in the Contract Documents, or has been damaged prior to the Engineer's recommendation of final payment (unless

responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with paragraph 14.8 or 14.10).

Drawings: The drawings which show the character and scope of the Work to be performed and which have been prepared or approved by Engineer and are referred to in the Contract Documents.

Effective Date of the Agreement: The date indicated in the Agreement on which it becomes effective, but if no such date is indicated it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

Engineer: The person, firm or corporation named as such in the Agreement.

Field Order: A written order issued by Engineer which orders minor changes in the Work in accordance with paragraph 9.5 but which does not involve a change in the Contract Price or the Contract Time.

General Requirements: Sections of Division 1 of the Specifications.

Laws and Regulations - Laws or Regulations: Laws, rules, regulations, ordinances, codes and/or orders.

Notice of Award: The written notice by Owner to the apparent successful bidder stating that upon compliance by the apparent successful bidder with the conditions precedent enumerated therein, within the time specified, Owner will sign and deliver the Agreement.

Notice to Proceed: A written notice given by Owner to Contractor (with a copy to Engineer) fixing the date on which the Contract Time will commence to run and on which Contractor shall start to perform Contractor's obligations under the Contract Documents.

Owner: The public body or authority, corporation, association, firm or person with whom Contractor has entered into the Agreement and for whom the Work is to be provided.

Partial Utilization: Placing a portion of the Work in service for the purpose for which it is intended (or a related purpose) before reaching Substantial Completion for all the Work.

Project: The total construction of which the work to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.

Resident Project Representative: The authorized representative of Engineer who assigned to the site or any part thereof.

Shop Drawings: All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for Contractor to illustrate some portion of the work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams, and other

information prepared by a Supplier and submitted by Contractor to illustrate material or equipment for some portion of the Work.

Specifications: Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standard and workmanship as applied to the Work and certain administrative details applicable thereto.

Subcontractor: An individual, firm or corporation having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the site.

Substantial Completion: The Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer as evidenced by Engineer's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the work (or specified part) can be utilized for the purposes for which it is intended; or if there be no such certificate issued, when final payment is due in accordance with paragraph 14.13 The terms "substantially complete" and "substantially completed" as applied to any Work refer to Substantial Completion thereof.

Supplementary Conditions: The part of the Contract Documents which amends or supplements these General Conditions.

Supplier: A manufacturer, fabricator, supplier, distributor, material man or vendor.

Underground Facilities: All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

Unit Price Work: Work to be paid for on the basis of unit prices.

Work: The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.

Work Directive Change: A written directive to Contractor, issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed as provided in paragraph 4.2 or 4.3 or to emergencies under paragraph 6.22. A Work Directive Change may not change the Contract Price or the Contract Time, but is evidence that the parties expect that the change directed or documented by a Work Directive Change will be incorporated in a subsequently issued Change Order following negotiations be the parties as to its effect, if any, on the Contract Price or Contract Time as provided in paragraph 10.2.

Written Amendment: A written amendment of the Contract Documents, signed by Owner and Contractor on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly Work-related aspects of the Contracts Documents.

ARTICLE 2 - PRELIMINARY MATTERS

2.1 Delivery of Bonds: When Contractor delivers the executed Agreements to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish in accordance with paragraph 5.1.

2.2 Copies of Documents: Owner shall furnish to Contractor up to ten (10) copies (unless otherwise specified in the Supplementary Conditions) of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.

2.3 Commencement of Contract Time - Notice to Proceed: The Contract Time will commence to run on the thirtieth day after the Effective Date of the Agreement. In no event will the Contract Time commence to run later than the seventy-fifth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.4 Starting the Project: Contractor shall start to perform the Work on the date when the Contract Time commences to run, but no work shall be done at the site prior to the date on which the Contract Time commences to run.

2.5 Before Starting Construction: Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby; however, Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error or discrepancy in the Contract Documents, unless Contractor had actual knowledge thereof or should reasonably have known thereof.

2.6 Within ten (10) days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to the Engineer for review:

2.6.1 an estimated progress schedule indicating the starting and completion dates of the various stages of the Work;

2.6.2 a preliminary schedule of Shop Drawing submissions; and

2.6.3 a preliminary schedule of values of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction.

Such prices will include an appropriate amount of overhead and profit applicable to each item of Work which will be confirmed in writing by Contractor at the time of submission.

2.7 Before any Work at the site is started, Contractor shall deliver to Owner, with a copy to Engineer, certificates (and other evidence of insurance requested by Owner) which Contractor is required to purchase and maintain in accordance with paragraphs 5.3 and 5.4, and Owner shall deliver to Contractor certificates (and other evidence of insurance requested by Contractor) which Owner is required to purchase and maintain in accordance with paragraphs 5.6 and 5.7.

2.8 Preconstruction Conference: Within twenty (20) days after the Effective Date of the Agreement, but before Contractor starts the work at the site, a conference attended by Contractor, Engineer and others as appropriate will be held to discuss the schedules referred to in paragraph 2.6, to discuss procedures for handling Shop Drawings and other submittals and for processing Applications for Payment, and to establish a working understanding among the parties as to the work.

2.9 Finalizing Schedules: At least ten (10) days before submission of the first Application for Payment a conference attended by Contractor, Engineer and others as appropriate will be held to finalize the schedules submitted in accordance with Paragraph 2.6. The finalized progress schedule will be acceptable to Engineer as providing an orderly progression of the Work to completion within the Contract Time, but such acceptance will neither impose on Engineer responsibility for the progress or scheduling of the Work nor relieve Contractor from full responsibility therefore. The finalized schedule of Shop Drawing submission will be acceptable to Engineer as providing a workable arrangement for processing the submissions. The finalized schedule of values will be acceptable to Engineer as to form and substance.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.1 Intent: The Contract Documents comprise the entire Agreement between Owner and Contractor concerning the work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be constructed in accordance with the law of the place of the Project.

3.2 It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any work that may reasonably be inferred from the Contract Documents as being required to produce the intended result will be supplied whether or not specifically called for. When words which have a well-known technical or trade meaning are used to describe Work, materials or equipment such words shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or Laws or Regulations in effect at the time of opening of Bids (or, on the effective date

of the Agreement if there were no Bids), except as may be otherwise specifically stated. However, no provision of any referended standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) will be effective to change the duties and responsibilities of Owner, Contractor, or Engineer, or any of their consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.15 or 9.16. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in paragraph 9.4.

3.3 If, during the performance of the work, Contractor finds a conflict, error or discrepancy in the Contract Documents, Contractor shall report it to Engineer in writing at once and before proceeding with the Work affected thereby shall obtain a written interpretation or clarification from Engineer; however, Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof or should reasonably have known thereof.

3.4 Amending and Supplementing Contract Documents: The Contact Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

3.4.1 a formal Written Amendment,

3.4.2 a Change Order (pursuant to paragraph 10.4), or

3.4.3 a Work Directive Change (pursuant to paragraph 10.1).

As indicated in Paragraphs 11.2 and 12.1, Contract Price and Contract Time may only be changed by a Change Order or a Written Amendment.

3.5 In addition, the requirements of the Contract Documents may be supplemented and minor variations and deviations in the Work may be authorized, in one or more of the following ways:

3.5.1 a Field Order (pursuant to paragraph 9.5),

3.5.2 Engineer's approval of a Shop Drawing or sample (pursuant to paragraphs 6.26 and 6.27), or

3.5.3 Engineer's written interpretation or clarification (Pursuant to paragraph 9.4).

3.6 Reuse of Documents: Neither Contractor nor any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with Owner shall have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer; and they shall not reuse any of them on extensions of the Project or any other

project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

ARTICLE 4 - AVAILABILITY OF LANDS: PHYSICAL CONDITIONS; AND REFERENCE POINTS

4.1 Availability of Lands: Owner shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of Contractor. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by Owner, unless otherwise provided in the Contract Documents. If Contractor believes that any delay in Owner's furnishing these lands, rights-of-ways or easements entitles Contractor to an extension of the Contract Time, Contractor may make a claim therefore as provided in Article 12. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.2 Physical Conditions:

4.2.1 Explorations and Reports: Reference is made to the Supplementary Conditions for identification of those reports of explorations and tests of subsurface conditions at the site that have been utilized by Engineer in preparation of the Contract Documents Contractor may rely upon the accuracy of the technical data contained in such reports but not upon nontechnical data, interpretations or opinions contained therein the completeness thereof for Contractor's purposes. Except as indicated in the immediately preceding sentence and in paragraph 4.2.6, Contractor shall have full responsibility with respect subsurface conditions at the site.

4.2.2 Existing Structures: Reference is made to the Supplementary Conditions for identification of those drawings of physical conditions in or relating to existing surface or subsurface structures (except Underground Facilities referred to in Paragraph 4.3) which are at or contiguous to the site that have been utilized by Engineer in preparation of the Contract Documents. Contractor may rely upon the accuracy of the technical data contained in such drawings, but not for the completeness thereof for Contractor's purposes. Except as indicated in the immediately preceding sentence and in Paragraph 4.2.6 Contractor shall have full responsibility with respect to physical conditions in or relating to structures.

4.2.3 Report of Differing Conditions: If Contractor believes that:

4.2.3.1 any technical data on which Contractor is entitled to rely as provided in Paragraph 4.2.1 and 4.2.2 is inaccurate, or

4.2.3.2 any physical condition uncovered or revealed at the site differs materially from that indicated, reflected or referred to in the Contract Documents.

Contractor shall, promptly after becoming aware thereof and before performing any Work in connection therewith (except in an emergency as permitted by paragraph 6.22), notify Owner and Engineer in writing about the inaccuracy or difference.

4.2.4 Engineer's Review: Engineer will promptly review the pertinent conditions, determine the necessity of obtaining additional explorations or tests with respect thereto and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

4.2.5. Possible Document Change: If Engineer concludes that there is a material error in the Contract Documents or that because of newly discovered conditions a change in the Contract Documents is required, a Work Directive Change or a Change Order will be issued as provided in Article 10 to reflect and document the consequences of the inaccuracy or difference.

4.2.6 Possible Price and Time Adjustments: In each such case, and increase or decrease in the Contract Price or an extension or shortening of the Contract Time, or any combination thereof, will be allowable to the extent that they are attributable to any such inaccuracy or difference. If Owner and Contractor are unable to agree as to the amount or length thereof, a claim may be made therefore as provided in Articles 11 and 12.

4.3 Physical Conditions - Underground Facilities:

4.3.1 Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

4.3.1.1 Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and,

4.3.1.2 Contractor shall have full responsibility for reviewing and checking all such information and data, for locating all Underground Facilities shown or indicated in the Contract Documents, for coordination of the Work with the owners of such Underground Facilities during construction, for the safety and protection thereof as provided in paragraph 6.20 and repairing any damage thereto resulting from the Work, the cost of all which will be considered as having been included in the Contract Price.

4.3.2 Not Shown or Indicated. If an Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents and which Contractor could not reasonably have been expected to be aware of, Contractor shall, promptly after becoming aware thereof and before performing any Work affected thereby (except in an emergency as permitted by paragraph 6.22), identify the owner of such Underground Facility and give written notice thereof to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility to determine the

extent to which the Contract Documents should be modified to reflect and document the consequences of the existence of the Underground Facility, and the Contract Documents will be amended or supplemented to the extent necessary. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility as provided in paragraph 6.20. Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and which Contractor could not reasonably have been expected to be aware of. If the parties are unable to agree as to the amount or length thereof, Contractor may make a claim therefore as provided in Articles 11 and 12.

4.4 Reference Points: Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgement are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work (unless otherwise specified in the General Requirements), shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.

ARTICLE 5 - BONDS AND INSURANCE

5.1 Performance and Other Bonds: Contractor shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all Contractor's obligations under the Contract Documents. These bonds shall remain in effect at least until one year after the date of final payment becomes due, except as otherwise provided by Law or Regulation or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions. All bonds shall be in the forms prescribed by Law or Regulation or by the Contract Documents and be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of the authority to act

5.2 If the surety on any Bond furnished by Contractor is declared a bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.1, Contractor shall within five (5) days thereafter substitute another Bond and Surety, both of which shall be acceptable to Owner.

5.3 The Contractor shall procure and maintain insurance at its own cost and expense, throughout the duration of the Contract. This insurance shall remain in full force until the work is completed and accepted by the City of Nixa. The insurance shall be of such types

and in such amounts as may be necessary to protect the Contractor/Bidder and the interest of the City of Nixa against all hazards or risks of loss as specified by the City.

INSURANCE REQUIREMENTS:

Such policies shall name the City of Nixa as an additional named insured with limits of liability not less than the sovereign immunity limits for Missouri public entities calculated by the Missouri Department of Insurance as of January 1 each calendar year and published annually in the Missouri Register pursuant to Section 537.610, RSMo.
(See, HTTP:\\www.insurance.mo.gov\industry\sovimmunity.htm).

The minimum coverage for the insurance referred to herein shall be as set out below:

a. Workers' Compensation....Statutory coverage per RSMo 287.010 et seq
Employer's Liability..... $1,000,000.00

b. Commercial General Liability Insurance, including coverage for Premises, Operations, Products and Completed Operations, Contractual Liability, Broad Form Property Damage, Independent Contractors, Explosion, Collapse, and Underground Property Damage and endorsed for blasting if blasting required. Such coverage shall apply to bodily injury and property damage on an "Occurrence Form Basis" with limits of at least Two Million Dollars and No Cents ($2,000,000.00) for all claims arising out of a single accident or occurrence and at least Three Hundred Thousand Dollars and No Cents ($300,000.00) with respect to injuries and/or death of any one person in a single occurrence and an amount not less than at least $1,000,000 for all claims to property arising out of a single occurrence and at least $100,000 to any one owner with respect to damages to property.

c. Automobile Liability Insurance covering bodily injury and property damage for owned, non-owned and hired vehicles, with limits of at least Two Million Dollars and No Cents ($2,000,000.00) for all claims arising out of a single accident or occurrence and at least Three Hundred Thousand Dollars and No Cents ($300,000.00) with respect to injuries and/or death of any one person in a single accident or occurrence.

d. Owner's and Contractor's Protective Liability Insurance to protect the City, its agents, servants and employees from claims which may arise from the performance of this Contract, with limits of at least Two Million Dollars and No Cents ($2,000,000.00) for all claims arising out of a single accident or occurrence and at least Three Hundred Thousand Dollars and No Cents ($300,000.00) with respect to injuries and/or death of any one person in a single accident or occurrence.

The Owner's and Contractor's Protective Liability Insurance must:

(1) Be a separate policy with the named insured being: The City of Nixa;

(2) Contain an endorsement that disclaims coverage for any claim barred by the doctrines of sovereign immunity or official immunity, except attorney's fees and other litigation costs incurred in defending a claim. Nothing contained in this policy (or this endorsement thereto) shall constitute any waiver of whatever kind of these defenses or sovereign immunity or official immunity for any monetary amount whatsoever.

e. Builders Risk Insurance for contracts involving unoccupied structures. The Contractor shall secure All Risk Builder's Risk Insurance. Unless specifically authorized by the City, the amount of such insurance shall not be less than the total contract price. The policy shall name as insured the Contractor and the City of Nixa.

f. 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. Contractor shall require any and all subcontractors with whom it enters into a contract to perform work on this project to protect the City of Nixa through insurance against applicable hazards or risks and shall, upon request of the City, provide evidence of such insurance.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.1 Supervision and Superintendence: Contractor shall supervise and direct the work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, but Contractor shall not be responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence or procedure of construction which is indicated in and required by the Contract Documents. Contractor shall be responsible to see that the finished Work complies accurately with the Contract Documents.

Contractor shall keep on the Work at all times during its progress a competent resident superintendent, who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The authority to act on behalf of Contractor. All communications given to the superintendent shall be as binding as if given to Contractor.

6.2 Labor, Materials and Equipment: Contractor shall provide competent, suitably qualified personnel to survey and lay out the work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the Work or property at the site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the site shall be performed during regular working hours, and Contractor will not permit overtime work or the performance of work on Saturday, Sunday, or any legal holiday without Owner's written consent given after prior written notice to Engineer.

6.3 Unless otherwise specified in the General Requirements, Contractor shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction

equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

6.4 All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable Supplier except as otherwise provided in the Contract Documents; but no provision of any such instructions will be effective to assign to Engineer, or any of Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.15 or 9.16.

6.5 Adjusting Progress Schedule: Contractor shall submit to Engineer for acceptance (to the extent indicated in paragraph 2.9) adjustments in the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

6.6 Substitutes or "Or-Equal" Items:

6.6.1 Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other Suppliers may be accepted by Engineer if sufficient information is submitted by Contractor to allow Engineer to determine that the materials or equipment proposed is equivalent to that named. The procedure for review by Engineer will include the following as supplemented in the General Requirements. Requests for review of substitute items of material and equipment will not be accepted by Engineer from anyone other than Contractor. If Contractor wishes to furnish or use a substitute items of material and equipment will not be accepted by Engineer from anyone other than Contractor. If Contractor wishes to furnish or use a substitute item of material or equipment, Contractor shall make written application to Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will state that the evaluation and acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will state that the evaluation and acceptance of the proposed substitute will not prejudice contractor's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for the work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is

subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application and available maintenance, repair, and replacement service will be indicated. The application will also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by Engineer in evaluating the proposed substitute. Engineer may require Contractor to furnish at Contractor's expense additional data about the proposed substitute.

6.6.2 If a specific means, method, technique, sequence or procedure of construction is indicated in or required be the Contract Documents, Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to Engineer, if Contractor submits sufficient information to allow Engineer to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents. The procedure for review by Engineer will be similar to that provided in paragraph 6.7.1 as applied by Engineer and as may be supplemented in the General Requirements.

6.6.3 Engineer will be allowed a reasonable time within which to evaluate each proposed substitute. Engineer will be the sole judge of acceptability, and no substitute shall be ordered, installed or utilized without Engineer's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute. Engineer will record time required by Engineer and Engineer's consultants in evaluating substitutions proposed by Contractor and in making changes in the Contract Documents occasioned thereby. Whether or not Engineer accepts a proposed substitute, Contractor shall reimburse Owner for the charges of Engineer and Engineer's consultants for evaluating each proposed substitute.

6.7 Concerning Subcontractors:

6.7.1 Contractor shall not employ any Subcontractor, Supplier or other person or organization (including those acceptable to Owner and Engineer as indicated in paragraph 6.8.2), whether initially or as a substitute, against whom Owner or Engineer may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier or other person or organization against whom Contractor has reasonable objection.

6.7.2 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of materials and equipment) to be submitted to Owner in advance of the specified date prior to the Effective Date of the Agreement for acceptance by Owner and Engineer and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's or Engineer's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection

in the bidding documents or the Contract Documents) of any such Subcontractor, Supplier or other person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case Contractor shall submit an acceptable substitute, the Contract Price will be increased by the difference in the cost occasioned by such substitution and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by Owner or Engineer of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of Owner or Engineer to reject defective work.

6.8 Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of his Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents shall create any contractual relationship between Owner or Engineer and any Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of Owner or Engineer to pay or to see the payment of any moneys due any such Subcontractor, supplier or other person or organization except as may otherwise be required by Laws and Regulations.

6.9 The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the work among Subcontractors or delineating the Work to be performed by any specific trade.

6.10 All work performed for Contractor by a Subcontractor will be pursuant to an appropriate agreement between Contractor and the Subcontractor which specifically binds the Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer and contains waiver provisions as required by paragraph 5.11. Contractor shall pay each Subcontractor a just share of any insurance moneys received by Contractor on account of losses under policies issued pursuant to paragraph 5.6 and 5.7.

6.11 Patent Fees and Royalties: Contractor shall pay all license fees and royalties and assume all costs incident to use in the performance of the Work or the incorporation in the Work of any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents. Contractor shall indemnify and hold harmless Owner and Engineer and anyone directly or indirectly employed by either of them from and against all claims, damages, losses and expenses (including attorneys' fees and court and arbitration costs) arising out of any infringement of patent rights or copyrights incident to the use in the performance of the work or resulting from the incorporation in the Work of any invention, design, process, product or device not specified in the Contract Documents, and shall defend all such claims in connection with any alleged infringement of such rights.

6.12 Permits: Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids. Contractor shall pay all charges of utility owners for connections to the Work, and Owner shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees.

6.13 Laws and Regulations:

6.13.1 Contractor shall give all notices and comply with all Laws and Regulations applicable to furnishing and performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

6.13.2 If Contractor observes that the Specifications or Drawings are at variance with any Laws or Regulations, Contractor shall give Engineer prompt written notice thereof, and any necessary changes will be authorized by one of the methods indicated in paragraph 3.4. If Contractor performs any Work knowing or having reason to know that it is contrary to such Laws and Regulations, and without such notice to Engineer, Contractor shall bear all costs arising therefrom; however, it shall not be Contractor's primary responsibility to make certain that Specifications and Drawings are in accordance with such Laws and Regulations.

6.14 Taxes: Contractor shall pay all sales, consumer, use and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.15 Use of Premises: Contractor shall confine construction equipment, the storage of materials and equipment and the operations of workers to the Project site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by Laws and Regulations, rights-of-way, permits and easements and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any land or areas contiguous thereto, resulting from the performance of the Work. Should any claim be made against Owner or Engineer by any such owner or occupant because of the performance of the Work, Contractor shall promptly attempt to settle with such other party by agreement or otherwise resolve the claim by arbitration or at law. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold Owner and Engineer harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any such other party against Owner or Engineer to the extent based on a claim arising out of Contractor's performance of the Work.

6.16 During the progress of the Work, Contractor shall keep the premises free from

accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work Contractor shall remove all waste materials , rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery, and surplus materials, and shall leave the site clean and ready for occupancy by Owner. Contractor shall restore to their original condition all property not designated for alteration by the Contract Documents.

6.17 Contractor shall not load nor permit any part of any structure to be loaded in any matter that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.18 Record Documents: Contractors shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Directive Changes, Field Orders and written interpretations and clarifications (issued pursuant to paragraph 9.4) in good order and annotated to show all changes made during construction. These record documents together with all approved samples and counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, samples and Shop Drawings will be delivered to Engineer for Owner.

6.19 Safety and Protection: Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

6.19.1 all employees on the Work and other persons and organizations who may be affected thereby;

6.19.2 all the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

6.19.3 other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and Underground Facilities not designated for removal, relocation or replacement in the course of construction.

Contractor shall comply with all applicable Laws and Regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury, or loss to any property referred to in paragraph 6.20.2 or 6.20.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or

Engineer or anyone employed by either of them or anyone whose acts either of them may be liable, and not attributable directly or indirectly, in whole or in part, to the fault or negligence of Contractor). Contractor's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with paragraph 14.13 that Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.20 Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be Contractor's superintendent unless otherwise designated in writing by Contractor to Owner.

6.21 Emergencies: In emergencies affecting the safety of protection of persons or the work of property at the site or adjacent thereto, Contractor, without special instruction or authorization from Engineer or Owner, is obligated to act to prevent threatened damage, injury or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If Engineer determines that a change in the Contract Document is required because of the action taken in response to an emergency, a Work Directive Change Order will be issued to document the consequences of the changes or variations.

6.22 Shop Drawings and Samples: After checking and verifying all field measurements and after complying with applicable procedures specified in the General Requirements, Contractor shall submit to Engineer for review and approval in accordance with the accepted schedule of Shop Drawing submissions (see paragraph 2.9), or for other appropriate action if so indicated in the General Requirements) of all Shop Drawings, which will bear a stamp or specific written indication that Contractor has satisfied Contractor's responsibilities under the Contract Documents with respect to the review of the submission. All submissions will be identified as Engineer may require. The data on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to enable Engineer to review the information as required.

6.23 Contractor shall also submit to Engineer for review and approval with such promptness as to cause no delay in Work, all samples required by the Contract Documents. All samples will have been checked by and accompanied by a specific written indication that Contractor has satisfied Contractor's responsibilities under the Contract Documents with respect to the review of the submission. All submissions will be identified as Engineer may require. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to enable Engineer to review the information as required.

6.23.1 Before submission of each Shop Drawing or sample Contractor shall have determined and verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each Shop Drawing or sample with other Shop Drawings and samples and with the requirements of the Work and the Contract Documents.

6.23.2 At the time of each submission, Contractor shall give Engineer specific written notice of each variation that the Shop Drawings or samples may have from the requirements of the Contract Documents, and, in addition, shall cause a specific notation to be made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

6.24 Engineer will review and approve with reasonable promptness shop Drawings and samples, but Engineer's review and approval shall be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents and shall not extend to means, methods, techniques, sequences or procedures of construction (except where a specific means, methods, technique, sequence or procedure of construction is indicated in or required by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. Contractor shall make any corrections required by Engineer, and shall return the required number of corrected copies of Shop Drawings and submit as required new samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.25 Engineer's review and approval of Shop Drawings or samples shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has in writing called Engineer's attention to such variation at the time of submission as required by paragraph 6.23.2 and Engineer has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the Shop Drawing or sample approval; nor will any such approval by Engineer relieve Contractor from responsibility for errors or omissions in the Shop Drawings or from responsibility for having complied with the provisions of paragraph 6.23.1.

6.26 Where a Shop Drawing or sample is required by the Specifications, any related Work performed prior to Engineer's review and approval of the pertinent submission will be the sole expense and responsibility of Contractor.

6.27 Continuing the Work: Contractor shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as Contractor and Owner may otherwise agree in writing.

6.28 Indemnification: To the fullest extent permitted by Laws and Regulations Contractor shall indemnify and hold harmless Owner and Engineer and their consultants, agents and employees from and against all claims, damages, losses and expenses, direct, indirect or consequential (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense (a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom

and (b) is caused in whole or in part by any negligent act or omission of Contractor, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder or arises by or is imposed by Law and Regulations regardless of the negligence of any such party.

6.29 In any and all claims against Owner or Engineer or any of their consultants, agents or employees by any employee of Contractor, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.30 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or any such Subcontractor or other person or organization under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

6.30 The obligations of Contractor under paragraph 6.28 shall not extend to the liability of Engineer, Engineer's consultants, agents or employees arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs or specifications.

ARTICLE 7 - WORK BY OTHERS

7.1 Related Work at Site: Owner may perform other work related to the Project at the site by Owner's own forces, have other work performed by utility owners or let other direct contracts therefore which shall contain General Conditions similar to these. If the fact that such other work is to be performed was not noted in the Contract Documents, written notice thereof will be given to Contractor prior to starting any such other work; and, if Contractor believes that such performance will involve additional expense to Contractor or requires additional time and the parties are unable to agree as to the extent thereof, Contractor may make a claim therefore as provided in Articles 11 and 12.

7.2 Contractor shall afford each utility owner and other contractor who is a party to such direct contract (or Owner, if Owner is performing the additional work with Owner's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of work, and shall properly connect and coordinate the Work with theirs. Contractor shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating or otherwise altering their work and others whose work will be affected. The duties and responsibilities of Contractor under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

7.3 If any part of Contractor's Work depends for proper execution or results upon the work of

any such other contractor or utility owner (or Owner), Contractor shall inspect and promptly report to Engineer in writing any delays, defects or deficiencies in such work that render it unavailable or unsuitable for such proper execution and results. Contractor's failure so to report will constitute an acceptance of the other work as fit and proper for integration with Contractor's Work except for latent or nonapparent defects and deficiencies in the other work.

7.4 Coordination: If Owner contracts with others for the performance of other work on the Project at the site, the person or organization who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified in the Supplementary Conditions, and the specific matters to be covered by such authority and responsibility will be itemized, and the extent of such authority and responsibilities will be provided, in the Supplementary Conditions. Unless otherwise provided in the Supplementary Conditions, neither Owner nor Engineer shall have any authority or responsibility in respect of such coordination.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.1 Owner shall issue all communications to Contractor through Engineer.

8.2 In case of termination of the employment of Engineer, Owner shall appoint an engineer against whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer. Any dispute in connection with such appointment shall be subject to arbitration.

8.3 Owner shall furnish the data required of Owner under the Contract Documents promptly and shall make payments to Contractor promptly after they are due as provided in paragraphs 14.4 and 14.13.

8.4 Owner's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.1 and 4.4. Paragraph 4.2 refers to Owner's identifying and making available to Contractor copies of reports of explorations and test of subsurface conditions at the site and in existing structures which have been utilized by Engineer in preparing the Drawings and Specifications.

8.5 Owner's responsibilities in respect of purchasing and maintaining liability and property insurance are set forth in paragraphs 5.5 through 5.8.

8.6 Owner is obligated to execute Change Orders as indicated in paragraph 10.4.

8.7 Owner's responsibility in respect of certain inspections, tests and approvals is set forth in paragraph 13.4.

8.8 In connection with Owner's right to stop Work or suspend Work, see paragraphs 13.10 and 15.1. Paragraph 15.2 deals with Owner's right to terminate services of Contractor under

certain circumstances.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

9.1 Owner's Representative: Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents and shall not be extended without written consent of Owner and Engineer.

9.2 Visits to Site: Engineer will make visits to the site at intervals appropriate to the various stages of construction to observe the progress and quality of the executed Work and to determine, in general, if the Work is proceeding in accordance with Contract Documents. Engineer will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform to the Contract Documents. On the basis of such visits and on-site observations as an experienced and qualified design professional, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defects and deficiencies in the Work.

9.3 Project Representation: If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in observing the performance of the Work. The duties, responsibilities and limitations of authority of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions. If Owner designates another agent to represent Owner at the site who is not Engineer's agent or employee, the duties, responsibilities and limitations of authority of such other person will be as provided in the Supplementary Conditions.

9.4 Clarifications and Interpretations: Engineer will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as Engineer may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. If Contractor believes that a written clarification or interpretation justifies an increase in the Contract Price or an extension of the Contract Time and the parties are unable to agree to the amount or extent thereof, Contractor may make a claim therefore as provided in Article 11 or 12.

9.5 Authorized Variations in Work: Engineer may authorize variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Time and are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner, and also on Contractor who shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an increase in the Contract Price or an extension of the Contract Time and the parties are unable to agree as to the amount or extent thereof, Contractor may make a claim therefore as provided in Articles 11 or 12.

9.6 Rejecting Defective Work: Engineer will have authority to disapprove or reject Work which Engineer believes to be defective, and will also have authority to require special inspection or

testing of the Work as provided in paragraph 13.9, whether or not the Work is fabricated, installed or completed.

9.7 Shop Drawings, Change Orders and Payments: In connection with Engineer's responsibility for Shop Drawings and samples, see paragraphs 6.23 through 6.29 inclusive.

9.8 In connection with Engineer's responsibilities as to Change Orders, see Articles 10, 11, and 12.

9.9 In connection with Engineer's responsibilities in respect of Applications for payment, etc., see Article 14.

9.10 Determinations for Unit Prices: Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for payment or otherwise). Engineer's written decisions thereon will be final and binding upon Owner and Contractor, unless, within en (10) days after the date of any such decision, either Owner or Contractor delivers to the other party to the Agreement and to Engineer written notice of intention to appeal from such a decision.

9.11 Decisions on Disputes: Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and the matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work and claims under Articles 11 and 12 in respect of changes in the Contract Price or Contract Time will be referred initially to Engineer in writing with a request for a formal decision in accordance with this paragraph, which Engineer will render in writing within a reasonable time. Written notice of each such claim, dispute and other matter will be delivered by the claimant to Engineer and the other party to the Agreement promptly (but in no event later than thirty days) after the occurrence of the event giving rise thereto, and written supporting data will be submitted to Engineer and the other party within sixty days after such occurrence unless Engineer allows an additional period of time to ascertain more accurate data in support of the claim.

9.12 When functioning as interpreter and judge under paragraphs 9.10 and 9.11, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by Engineer pursuant to paragraphs 9.10 and 9.11 with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.16) will be a condition precedent to any exercise by Owner or Contractor of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such claim, dispute or other matter.

9.13 Limitations on Engineer's Responsibilities: Neither Engineer's authority to act under this Article 9 or elsewhere in the Contract Documents nor any decision made by Engineer in good faith either to exercise such authority shall give rise to any duty or responsibility of Engineer to Contractor, any Subcontractor, any Supplier, or any other person or organization performing any of the Work, or to any surety for any of them.

9.14 Whenever in the Contract Documents the terms "as ordered", "as directed", "as required", "as allowed", "as approved" or terms of like effect or import are used, or the adjectives "reasonable", "suitable", "acceptable", "proper" or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of Engineer as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate the Work for compliance with the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to Engineer any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraphs 9.15 or 9.16.

9.15 Engineer will not be responsible for Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, and Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.16 Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

ARTICLE 10 - CHANGES IN THE WORK

10.1 Without invalidating the Agreement and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions or revisions in the Work; these will be authorized by a Written Amendment, a Change Order, or a Work Directive Change. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

10.2 If Owner and Contractor are unable to agree as to the extent, if any, of an increase or decrease in the Contract Price or an extension or shortening of the Contract Time that should be allowed as a result of a Work Directive Change, a claim may be made therefore as provided in Article 11 or 12.

10.3 Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in paragraphs 3.4 and 3.5, except in the case of an emergency as provided in paragraph 6.22 and except in the case of uncovering Work as provided in paragraph 13.9.

10.4 Owner and Contractor shall execute appropriate Change Orders (or Written Amendments) covering:

10.4.1 changes in the Work which are ordered by Owner pursuant to paragraph 10.1, are required because acceptance of defective Work under paragraph 13.13 or correcting defective Work under paragraph 13.14, or are agreed to by the parties;

10.4.2 changes in the Contract Price or Contract Time which are agreed to by the parties; and

10.4.3 changes in the Contract Price or Contract Time which embody the substance of any written decision rendered by Engineer pursuant to paragraph 9.11;

provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.29.

10.5 If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Time) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be Contractor's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE 11 - CHANGE OF CONTRACT PRICE

11.1 The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at his expense without change in the Contract Price.

11.2 The Contract Price may only be changed by a Change Order or a Written Amendment. Any claim for an increase or decrease in the Contract Price shall be based on written notice delivered by the party making the claim to the other party and to Engineer promptly (but in no event later than thirty days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered within sixty days after such occurrence (unless Engineer allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by claimant's written statement that the amount claimed covers all known amounts (direct, indirect and consequential) to which the claimant is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Price shall be determined by Engineer in accordance with paragraph 9.11 if Owner and Contractor cannot otherwise agree on the amount involved. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this paragraph 11.2.

11.3 The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:

11.3.1 Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved (subject to the provisions of paragraphs 11.9.1 through 11.9.3, inclusive).

11.3.2 By mutual acceptance of a lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 11.6.2.1).

11.3.3 On the basis of the Cost of the Work (determined as provided in paragraphs 11.4 and 11.5) plus a Contractor's Fee for overhead and profit (determined as provided in paragraphs 11.6 and 11.7).

11.4 Cost of the Work: The term Cost of the Work means the sum of all costs necessarily incurred and paid by Contractor in the proper performance of the Work. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in paragraph 11.5:

11.4.1 Payroll cost for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to; salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workers' or workmen's compensation, health and retirement benefits bonuses, sick leave, vacation and holiday pay applicable thereto. Such employees shall include superintendents and foremen at the site. The expenses of performing Work after regular working hours on Saturday, Sunday or legal holidays shall be included in the above to the extent authorized by Owner.

11.4.2 Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and all returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

11.4.3 Payments made by Contractor to the Subcontractor for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Contractor and shall deliver such bids to Owner who will then determine, with the advice of Engineer, which bids will be accepted. If a subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work Plus a Fee, the Subcontractor's Cost of the Work shall be determined in the same manner

as Contractor's Cost of the Work. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

11.4.4 Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys and accountants) employed for services specifically related to the Work.

11.4.5 Supplemental costs including the following:

11.4.5.1 The proportion of necessary transportation, travel and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

11.4.5.2 Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost less market value of such items used but not consumed which remain the property of Contractor.

11.4.5.3 Rentals of all construction equipment and machinery and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, installation, dismantling and removal thereof -- all in accordance with terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

11.4.5.4 Sales, consumer, use or similar taxes related to the Work, and for which Contractor is liable, imposed by Laws and Regulations.

11.4.5.5 Deposits lost for causes other than negligence of Contractor, any Subcontractor or anyone directly or indirectly employed by any of them for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

11.4.5.6 Losses and damages (and related expenses), not compensated by insurance or otherwise, to the Work or otherwise sustained by Contractor in connection with the performance and furnishing of the Work (except losses and damages within the deductible amounts of property insurance established by Owner in accordance with paragraph 5.9), provided they have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's Fee. If, however, any such loss or damage requires reconstruction and Contractor is placed in charge thereof, Contractor shall be paid for services a fee proportionate to that stated in Paragraph 11.6.2.

11.4.5.7 The cost of utilities, fuel and sanitary facilities at the site.

11.4.5.8 Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.

11.4.5.9 Cost of premiums for additional Bonds and insurance required because of changes in the Work and premiums for property insurance coverage within the limits of the deductible amounts established by Owner in accordance with paragraph 5.9.

11.5 The term Cost of the Work shall not include any of the following:

11.5.1 Payroll costs and other compensation of Contractor's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by Contractor whether at the site or in Contractor's principal or a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.4.1 or specifically covered by paragraph 11.4.4 - all of which are to be considered administrative costs covered by the Contractor's Fee.

11.5.2 Expenses of Contractor's principal and branch offices other than Contractor's office at the site.

11.5.3 Any part of the Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

11.5.4 Cost of premiums for all Bonds and for all insurance whether or not Contractor is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by subparagraph 11.4.5.9 above).

11.5.5 Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied and making good any damage to property.

11.5.6 Other overhead or general expense cost of any kind and the costs of any item not specifically and expressly included in paragraph 11.4.

11.6 Contractor's Fee: The Contractor's Fee allowed to Contractor for overhead and profit shall be determined as follows:

11.6.1 A mutually acceptable fixed fee; or if none can be agreed upon,

11.6.2 A fee based on the following percentages of the various portions of the Cost of the Work:

11.6.2.1 for costs incurred under paragraphs 11.4.1 and 11.4.2, the Contractor's Fee shall be fifteen (15) percent;

11.6.2.2 for costs incurred under paragraph 11.4.3, the Contractor's Fee shall be five (5) percent; and if a subcontract is on the basis of Cost of the Work Plus a Fee, the maximum allowable to Contractor on account of overhead and profit of all Subcontractors be fifteen (15) percent;

11.6.2.3 no fee shall be payable on the basis of costs itemized under paragraphs 11.4.4, 11.4.5 and 11.5;

11.6.2.4 the amount of credit to be allowed by Contractor to Owner for any such change which results in a net decrease in cost will be the amount of the actual net decrease plus a deduction in Contractor's Fee by an amount equal to ten percent of the net decrease; and

11.6.2.5 when both additions and credits are involved in any one change, the adjustment in Contractor's Fee shall be computed on the basis of the net change in accordance with paragraphs 11.6.2.1 through 11.6.2.4, inclusive.

11.7 Whenever the cost of any Work is to be determined pursuant to paragraph 11.4 or 11.5, Contractor will submit in form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.8 Cash Allowances: It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be done by such Subcontractors or Suppliers and for such sums within the limit of the allowances as may be acceptable to Engineer. Contractor agrees that:

11.8.1 The allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the site, and all applicable taxes; and

11.8.2 Contractor's costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances. No demand for additional payment on account of any thereof will be valid.

Prior to final payment, an appropriate Change Order will be issued as commended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.9 Unit Price Work:

11.9.1 Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer in accordance with paragraph 9.10.

11.9.2 Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

11.9.3 Where the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the quantity of such item indicated in the Agreement and there is no corresponding adjustment with respect to any other item of Work and if Contractor believes that Contractor has incurred additional expense as a result thereof, Contractor may make a claim for an increase in the Contract Price in accordance with Article 11 if the parties are unable to agree as to the amount of any such increase.

ARTICLE 12 - CHANGE OF THE CONTRACT TIME

12.1 The Contract Time may only be changed by a Change Order or a Written Amendment. Any claim for an extension or shortening of the Contract Time shall be based on written notice delivered by the party making the claim to the other party and to Engineer promptly (but in no event later than thirty days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within sixty days after such occurrence (unless Engineer allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Time shall be determined by Engineer in accordance with paragraph 9.11 if Owner and Contractor cannot otherwise agree. No claim for an adjustment in the Contract Time will be valid if not submitted in accordance with the requirements of this paragraph 12.1.

12.2 The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of Contractor if a claim is made therefore as provided in paragraph 12.1. Such delays shall include, but not be limited to, acts or neglect by Owner or others performing additional work as contemplated by Article 7, or to fires, floods, labor disputes, epidemics, abnormal weather conditions or acts of God.

12.3 All time limits stated in the Contract Documents are of the essence of the Agreement. The provisions of this Article 12 shall not exclude recovery for damages (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) for delay by either party.

ARTICLE 13 - WARRANTY AND GUARANTEE; TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.1 Warranty and Guarantee: Contractor warrants and guarantees to Owner and Engineer that all Work will be in accordance with the Contract Documents and will not be defective. Prompt notice of all defects shall be given to Contractor. All defective Work, whether or not in place, may be rejected, corrected or accepted as provided in this Article 13.

13.2 Access to Work: Engineer and Engineer's representatives, other representatives of Owner, testing agencies and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their observation, inspecting and testing. Contractor shall provide proper and safe conditions for such access.

13.3 Tests and Inspections: Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests or approvals.

13.4 If any Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) to specifically be inspected, tested or approved, Contractor shall assume full responsibility therefore, pay all costs in connection therewith and furnish Engineer the required certificates of inspection, testing or approval. Contractor shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with Owner's or Engineer's acceptance of a Supplier of materials or equipment proposed to be incorporated in the Work, or of materials or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. The cost of all inspections, tests and approvals in addition to the above which are required by the Contract Documents shall be paid by Owner (unless otherwise specified).

13.5 All inspections, tests or approvals other than those required by Laws or Regulations of any public body having jurisdiction shall be performed by organizations acceptable to Owner and Contractor (or by Engineer if so specified).

13.6 If any Work (including the work of others) that is to be inspected, tested or approved is covered without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation. Such uncovering shall be at Contractor's expense unless contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.7 Neither observations by Engineer nor inspections, tests or approvals by others shall relieve Contractor from Contractor's obligations to perform the Work in accordance with the Contract Documents.

13.8 Uncovering Work: If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

13.9 If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose or otherwise make available for observation, inspection or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, Contractor shall bear all direct, indirect and consequential costs of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction (including but not limited to fees and charges of engineers, architects, attorneys and other professionals), and Owner shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, may make a claim therefore as provided in Article 11. If, however, such Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction; and, if the parties are unable to agree as to the amount or extent thereof, Contractor may make a claim therefore as provided in Articles 11 or 12.

13.10 Owner May Stop the Work: If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of Contractor or any other party.

13.11 Correction or Removal of Defective Work: If required by Engineer, Contractor shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by Engineer, remove it from the site and replace it with nondefective work. Contractor shall bear all direct, indirect and consequential costs of such correction or removal (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) made necessary thereby.

13.12 One Year Correction Period: If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions, either correct such defective Work, or, if it has been rejected by Owner, remove it from the site and replace it with nondefective Work. If Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk or loss or damage, Owner may have the defective Work corrected or the rejected Work removed and replaced, and all direct, indirect and consequential costs of such removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys and other

professionals) will be paid by Contractor. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

13.13 Acceptance of Defective Work: If, instead of requiring correction or removal and replacement of defective Work, Owner, (and, prior to Engineer's recommendation of final payment, also Engineer) prefers to accept it, Owner may do so. Contractor shall bear all direct, indirect and consequential costs attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness and to include but not be limited to fees and charges of engineers, architects, attorneys and other professionals).If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, Owner may make a claim therefore as provided in Article 11. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.14 Owner May Correct Defective Work: If Contractor fails within a reasonable time after written notice of Engineer to proceed to correct defective work or to remove and replace rejected Work as required by Engineer in accordance with the paragraph 13.11, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days' written notice to Contractor, correct and remedy any such deficiency. In exercising the rights under this paragraph Owner shall proceed expeditiously. To the extent necessary to complete corrective and remedial action, Owner may exclude Contractor from all or part of the site, take possession of all or part of the Work, and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the site and incorporate in the Work all materials and equipment stored at the site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner Representatives, agents and employees such access to the site as may be necessary to enable Owner to exercise the rights and remedies under this paragraph. All direct, indirect and consequential costs of Owner in exercising such rights shall be charged against Contractor in an amount approved as to reasonableness by Engineer, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, Owner may make a claim as provided in Article 11. Such direct, indirect and consequential costs will include but not be limited to fees and charges of engineers, architects, attorneys and other professionals, all court and arbitration costs and all costs of repair and replacement of work of others destroyed or damaged by correction, removal or replacement of Contractor's defective work. Contractor shall not be allowed an extension of the Contract Time because of any delay in performance of the Work attributable to the exercise by Owner of Owner's rights and remedies hereunder.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

14.1 Schedule of Values: The schedule of values established as provided in paragraph 2.9 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.2 Application for Progress Payment: At least twenty days before each progress payment is scheduled (but not more often than once a month) Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that Owner has received the materials and equipment free and clear of all liens, charges, security interests and encumbrances (which are hereinafter in these General Conditions referred to as "Liens") and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect Owner's interest therein, all of which will be satisfactory to Owner. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

14.3 Contractor's Warranty of Title: Contractor warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.4 Review of Application for Payment: Engineer will, within ten days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application. Ten days after presentation of the Application for Payment with Engineer's recommendation, the amount recommended will (subject to the provisions of the last sentence of paragraph 14.7) become due and when due will be paid by Owner to Contractor.

If the owner fails to make payment thirty (30) days after receipt of the Contractor's application for payment, in addition to other remedies available to the Contractor, there shall be added to each such payment interest in accordance with Section 34.057 RSMo. As amended.

14.5 Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's on-site observations of the Work in progress as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules that the Work has progressed to the point indicated; that, to the best of Engineer's knowledge,

information and belief, the quality of the Work is in accordance with the Contractor Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.10, and to any other qualifications stated in the recommendation); and that Contractor is entitled to payment of the amount recommended. However, by recommending any such payment Engineer will not thereby be deemed to have represented that exhaustive or continuous on-site inspections have been made to check the quality or quantity of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents or that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by the Owner or Owner to withhold payment to Contractor.

14.6 Engineer's recommendation of final payment will constitute an additional representation by Engineer to Owner that the conditions precedent to Contractor's being entitled to final payment as set forth in paragraph 14.13 have been fulfilled.

14.7 Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make such representations to Owner. Engineer may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or test, nullify any such payment previously recommended, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

14.7.1 the Work is defective, or completed Work has been damaged requiring correction or replacement.

14.7.2 the Contract Price has been reduced by Written Amendment or Change Order,

14.7.3 Owner has been required to correct defective Work or complete Work in accordance with paragraph 13.14, or

14.7.4 of Engineer's actual knowledge of the occurrence of any of the events enumerated in paragraphs 15.2.1 through 15.2.9 inclusive.

Owner may refuse to make payment of the full amount recommended by Engineer because claims have been made against Owner on account of Contractor's performance or furnishing of the Work or Liens have been filed in connection with the Work or there are other items entitling Owner to a set-off against the amount recommended, but Owner must give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action.

14.8 Substantial Completion: When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion. Within a reasonable time

thereafter, Owner, Contractor and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving his reasons therefore. If Engineer considers the Work substantially complete, Engineer will prepare and deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provision of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within fourteen days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefore. If, after consideration of the Owner's objections, Engineer considers the Work substantially complete, Engineer will within said fourteen days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner. At the time of delivery of the tentative certificate of Substantial Completion Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, heat, utilities, insurance, and warranties. Unless Owner and Contractor agree otherwise in writing and so inform Engineer prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

14.9 Owner shall have the right to exclude Contractor from the Work after the date of Substantial Completion, but Owner shall allow Contractor reasonable access to complete or correct items on the tentative list.

14.10 Partial Utilization: Use by Owner of any finished part of the Work, which has specifically been identified in the Contract Documents, or which Owner, Engineer and Contractor agree constitutes a separately functioning and useable part of the Work that can be used by Owner without significant interference with Contractor's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following:

14.10.1 Owner at any time may request Contractor in writing to permit Owner to use any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If Contractor agrees, Contractor will certify to Owner and Engineer that said part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, Owner, Contractor and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, the provisions of

paragraphs 14.8 and 14.9 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

14.10.2 Owner may at any time request Contractor in writing to permit Owner to take over operation of any such part of the Work although it is not substantially complete. A copy of such request will be sent to Engineer and within a reasonable time thereafter Owner, Contractor and Engineer shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If Contractor does not object in writing to Owner and Engineer that such part of the Work is not ready for separate operation by Owner, Engineer will finalize the list of items to be completed or corrected and will deliver such list to Owner and Contractor together with a written recommendation as to the division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, utilities, insurance, warranties and guarantees for that part of the Work which will become binding upon Owner and Contractor at the time when Owner takes over such operation (unless they shall have otherwise agreed in writing and so informed Engineer). During such operation and prior to Substantial Completion of such part of the Work, Owner shall allow Contractor reasonable access to complete or correct items on said list and to complete other related Work.

14.10.3 No occupancy or separate operation of part of the Work will be accomplished prior to compliance with the requirements of paragraph 5.15 in respect of property insurance.

14.11 Final Inspection: Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to remedy such deficiencies.

14.12 Final Application for Payment: After Contractor has completed all such corrections to the satisfaction of Engineer and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, marked-up record documents (as provided in paragraph 6.19) and other documents --all as required by the Contract Documents and after Engineer has indicated that the Work is acceptable (subject to the provisions of paragraph 14.16), Contractor may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied by all documentation called for in the Contract Documents, together with complete and legally effective releases or waivers (satisfactory to Owner) of all Liens arising out of or filed in connection with the Work. In lieu thereof and as approved by Owner, Contractor may furnish receipts or releases in full; an affidavit of Contractor that the releases and receipts include all labor, services, material and equipment bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible, have been paid or otherwise satisfied; and consent of the surety, if any, to final payment. If any Subcontractor or Supplier fails to furnish a release or receipt in full, Contractor may furnish a Bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

14.13 Final Payment and Acceptance: If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation -- all as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application to Owner for payment. Thereupon Engineer will give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of paragraph 14.16. Otherwise, Engineer will return the application to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application. Thirty days after presentation to Owner of the Application and accompanying documentation, in appropriate form and substance, and with Engineer's recommendation and notice of acceptability, the amount recommended by Engineer will become due and will be paid by Owner to Contractor.

14.14 If, through no fault of Contractor, final completion of the Work is significantly delayed and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment and recommendation of Engineer, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.1, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

14.15 Contractor's Continuing Obligation: Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by Engineer, not the issuance of a certificate of Substantial Completion, nor any payment by Owner to Contractor under the Contract Documents, nor any use or occupancy of the Work or any part thereof by Owner, nor any act of acceptance by Owner nor any failure to do so, nor any review and approval of a Shop Drawing or sample submission, nor the issuance of a notice of acceptability by Engineer pursuant to paragraph 14.13, nor any correction of defective Work by Owner will constitute an acceptance of Work not in accordance with the Contract Documents except as provided in paragraph 14.16.

14.16 Waiver of Claims: The making and acceptance of final payment will constitute:

14.16.1 a waiver of all claims by Owner against Contractor, except claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.11 or from failure to comply with the Contract Documents or the terms of any special guarantees specified therein; however, it will not constitute a waiver by

Owner of any rights in respect of Contractor's continuing obligations under the Contract Documents; and

14.16.2 a waiver of all claims by Contractor against Owner other than those previously made in writing and still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

15.1 Owner May Suspend Work: Owner may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than ninety (90) days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension if Contractor makes an approved claim therefore as provided in Articles 11 or 12.

15.2 Owner May Terminate: Upon the occurrence of any one or more of the following events:

15.2.1 if Contractor commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if Contractor takes any equivalent or similar action by filing a petition or otherwise under any other federal or state law in effect at such time relating to the bankruptcy or insolvency;

15.2.2 if a petition is filed against Contractor under any chapter of the Bankruptcy Code as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against Contractor under any other federal or state law in effect at the time relating to bankruptcy or insolvency;

15.2.3 if Contractor makes general assignment for the benefit of creditors;

15.2.4 if a trustee, receiver, custodian or agent of Contractor is appointed under applicable law or under contract, whose appointment or authority to take charge or property of Contractor is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of Contractor's creditors;

15.2.5 if Contractor admits in writing an inability to pay its debts generally as they become due;

15.2.6 if Contractor persistently fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.9 as revised from time to time);

15.2.7 if Contractor disregards Laws or Regulations of any public body having jurisdiction;

15.2.8 if Contractor disregards the authority of Engineer; or

15.2.9 if Contractor otherwise violates in any substantial way any provisions of the Contract Documents; Owner may, after giving Contractor (and the surety, if there be one) seven days written notice and to the extent permitted by Laws and Regulations, terminate the services of Contractor, exclude Contractor from the site and take possession of the Work and of all Contractor's tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion), incorporate in the Work all materials and equipment stored at the site of for which Owner has paid Contractor but which are stored elsewhere, and finish the Work as Owner may deem expedient. In such case Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct, indirect and consequential costs of completing the Work (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) such excess will be paid to Contractor. If such costs exceed such unpaid balance, Contractor shall pay the difference to Owner. Such costs incurred by Owner will be approved as to reasonableness by Engineer and incorporated in a Change Order, but when exercising any rights or remedies under this paragraph Owner shall not be required to obtain the lowest price for the Work performed.

15.3 Where Contractor's services have been so terminated by Owner, the termination shall not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

15.4 Upon seven days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy, elect to abandon the Work and terminate the Agreement. In such case, Contractor shall be paid for all Work executed and expense sustained plus reasonable termination expenses, which will include, but not be limited to, direct, indirect and consequential costs (including, but not limited to, fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs).

15.5 Contractor May Stop Work or Terminate: If, through no act or fault of Contractor, the Work is suspended for a period of more than ninety (90) days by Owner or under an order of court of other public authority, or Engineer fails to act on any Application for Payment within thirty days after it is submitted, or Owner fails for thirty days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days' written notice to Owner and Engineer, terminate the Agreement and recover from Owner payment for all Work executed and any expense sustained plus reasonable termination expenses. In addition and in lieu of terminating the Agreement, if Engineer has failed to make act on an Application for Payment or Owner has failed to make any payment as aforesaid, Contractor may upon seven days' notice to Owner and Engineer stop the Work until payment of all amount then due. The provisions of this paragraph shall not relieve Contractor of his obligations under paragraph 6.29 to carry on the Work in accordance with the progress schedule and without delay during disputes and disagreements with Owner.

ARTICLE 16 - ARBITRATION

16.1 All claims, disputes and other matters in question between Owner and Contractor arising out of, or relating to the Contract Documents or the breach thereof (except for claims which have been waived by the making or acceptance of final payment as provided in paragraph 14.16) will be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then obtaining subject to the limitations of this Article 16. This agreement so to arbitrate and any other agreement of consent to arbitrate entered into in accordance herewith as provided in this Article 16 will be specifically enforceable under the prevailing arbitration law of any court having jurisdiction.

16.2 No demand for arbitration of any claim, dispute or other matter that is required to be referred to Engineer initially for decision in accordance with paragraph 9.11 will be made until the earlier of (a) the date on which Engineer has rendered a decision or (b) the tenth day after the parties have presented their evidence to Engineer if a written decision has not been rendered by Engineer before that date. No demand for arbitration of any such claim, dispute or other matter shall be made no later than thirty (30) days after the date on which Engineer has rendered a written decision in respect thereof in accordance with paragraph 9.11; and the failure to demand arbitration within said thirty (30) days' period shall result in Engineer's decision being final and binding upon Owner and Contractor. If Engineer renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence but will not supersede the arbitration proceedings, except where the decision is acceptable to the parties concerned. No demand for arbitration of any written decision of Engineer rendered in accordance with paragraph 9.10 will be made later than ten days after the party making such demand has delivered written notice of intention to appeal as provided in paragraph 9.10.

16.3 Notice of the demand for arbitration will be filed in writing with the other party to the Agreement and with the American Arbitration Association, and a copy will be sent to Engineer for information. The demand for arbitration will be made within the thirty-day or ten-day period specified in paragraph 16.2 as applicable, and in all other cases within a reasonable time after the claim, dispute or other matter in question has arisen, and in no event shall any such demand be made after the date when institution of legal or equitable proceedings based on such claim, dispute or other matter in question would be barred by the applicable statute of limitations.

16.4 No arbitration arising out of or relating to the Contract Documents shall include by consolidation, joinder or in any other manner any other person or entity (including Engineer, Engineer's agents, employees or consultants) who is not a party to this contract unless:

16.4.1 the inclusion of such other person or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration,

16.4.2 such other person or entity is substantially involved in a question of law or fact which is common to those who are already parties to the arbitration and which will arise in such

proceedings, and

16.4.3 the written consent of the other person or entity sought to be included and of Owner and Contractor has been obtained for such inclusion, which consent shall make specific reference to this paragraph; but no such consent shall constitute consent to arbitration of any dispute not specifically described in such consent or to arbitration with any party not specifically identified in such consent.

16.5 The award rendered by the arbitrators will be final, judgment may be entered upon it in any court having jurisdiction thereof, and will not be subject to modification or appeal except to the extent permitted by Sections 10 and 11 of the Federal Arbitration Act (9 U.S.C. 10,11).

ARTICLE 17 – MISCELLANEOUS

17.1 Giving Notice: Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered mail, postage prepaid, to the last business address known to the giver to the notice.

17.2 Computation of Time:

17.2.1 When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from computation.

17.2.2 A calendar day of twenty-four hours measured from midnight to the next midnight shall constitute a day.

17.3 General: Should Owner or Contractor suffer injury or damage to person or property because of any error, omission or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim shall be made in writing to the other party within a reasonable time of the first observation of such injury or damage. The provision of this paragraph shall not be construed as a substitute for a waiver of the provisions of any applicable statute of limitations or repose.

17.4 The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and , in particular but without limitation, the warranties, guarantees, and obligations imposed upon Contractor by paragraphs 6.30, 13.1, 13.12, 13.14, 14.3, and 15.2 and all of the rights and remedies available to Owner and Engineer thereunder, are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee or by other provisions of

the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply. All representations, warranties and guarantees made in the Contract Documents shall survive final payment and termination or completion of the Agreement.