

**Stormwater Management Facility  
Operation and Maintenance (O&M) Manual**

**for:**

***Homestead at Sterling Ranch Filing No. 2***

**Located at:**

***Homestead at Sterling Ranch Filing No. 2: Bounded by  
Wheatland Drive, Briargate Parkway, Dines Boulevard and Sand Creek***

**Prepared for:**

***SR Land, LLC  
20 Boulder Crescent, Suite 201  
Colorado Springs, CO 80903  
Jim Morley (719) 471-1742***

**Prepared by:**

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**SF-19-004**

Reference:

**This manual is adapted from Town of Parker, Colorado, *STORMWATER  
PERMANENT BEST MANAGEMENT PRACTICES (PBMP) LONG-TERM OPERATION  
AND MAINTENANCE MANUAL*, October 2004**

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Operation and Maintenance (O&M) Manual**

**Comment on sheet 55.**

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## **Stormwater Management Facility Operation and Maintenance (O&M) Manual**

### **I. Compliance with Stormwater Facility Maintenance Requirements**

All property owners are responsible for ensuring that stormwater facilities installed on their property are properly maintained and that they function as designed. In some cases, this maintenance responsibility may be assigned to others through special agreements. The maintenance responsibility for a stormwater facility may be designated on the subdivision plat, the site development plan, and/or within a maintenance agreement for the property. Property owners should be aware of their responsibilities regarding stormwater facility maintenance. Maintenance agreement(s) associated with this property are provided in Appendix A.

In some cases, the El Paso County (EPC) may agree to provide the required inspection and maintenance for some or all private stormwater facilities. In these cases, an EPC maintenance agreement will be included in Appendix A for those facilities that are agreed to be included in the EPC routine maintenance program.

### **II. Inspection & Maintenance – Annual Reporting**

Requirements for the inspection and maintenance of stormwater facilities, as well as reporting requirements are included in this Stormwater Management Facility Operation and Maintenance (O&M) Manual.

**Verification that the Stormwater facilities have been properly inspected and maintained; submittal of the required Inspection and Maintenance Forms and Inspector qualifications shall be provided to EPC on an annual basis. The annual reporting form shall be provided to EPC prior to May 31st of each year.**

Copies of the Inspection and Maintenance forms for each of the stormwater facilities are located in Appendix D and E. A standard annual reporting form is provided in Appendix F. Each form shall be reviewed and submitted by the property owner or property manager to EPC.

Property owners are not required to provide Inspection and Maintenance Reports for stormwater facilities that have been agreed to be maintained by EPC. These reports will be generated through EPC's inspection & maintenance program.

### **III. Preventative Measures to Reduce Maintenance Costs**

The most effective way to maintain your water quality facility is to prevent the pollutants from entering the facility in the first place. Common pollutants include sediment, trash & debris, chemicals, dog wastes, runoff from stored materials, illicit discharges into the storm drainage system and many others. A thoughtful maintenance program will include measures to address these

potential contaminants, and will save money and time in the long run. Key points to consider in your maintenance program include:

- Educate property owners/residents to be aware of how their actions affect water quality, and how they can help reduce maintenance costs.
- Keep properties, streets and gutters, and parking lots free of trash, debris, and lawn clippings.
- Ensure the proper disposal of hazardous wastes and chemicals.
- Plan lawn care to minimize the use of chemicals and pesticides.
- Sweep paved surfaces and put the sweepings back on the lawn.
- Be aware of automobiles leaking fluids. Use absorbents such as cat litter to soak up drippings – dispose of properly.
- Re-vegetate disturbed and bare areas to maintain vegetative stabilization.
- Clean out the upstream components of the storm drainage system, including inlets, storm sewers and outfalls.
- Do not store materials outdoors (including landscaping materials) unless properly protected from runoff.

#### **IV. Access and Easements**

All stormwater management facilities located on the site have both a designated access location as well as a maintenance easement. Refer to the Stormwater Facilities Map located in Appendix G for access and easement locations.

#### **V. Safety**

Keep safety considerations at the forefront of inspection procedures at all times. Likely hazards should be anticipated and avoided. Never enter a confined space (outlet structure, manhole, etc) without proper training or equipment. A confined space should never be entered without at least one additional person present.

If a toxic or flammable substance is discovered, leave the immediate area and contact the local Sheriff at 911.

Potentially dangerous (e.g., fuel, chemicals, hazardous materials) substances found in the areas must be referred to the local Sheriff's Office immediately for response by the Hazardous Materials Unit. The emergency contact number is 911.

Vertical drops may be encountered in areas located within and around the facility. Avoid walking on top of retaining walls or other structures that have a significant vertical drop. If a vertical drop is identified within the pond that is greater than 48" in height, make the appropriate note/comment on the maintenance inspection form.

**If any hazard is found within the facility area that poses an immediate threat to public safety, contact the local Sheriff's Office immediately.**

## **VI. Field Inspection Equipment**

It is imperative that the appropriate equipment is taken to the field with the inspector(s). This is to ensure the safety of the inspector and allow the inspections to be performed as efficiently as possible. Below is a list of the equipment that may be necessary to perform the inspections of all Stormwater Management Facilities:

- Protective clothing and boots.
- Safety equipment (vest, hard hat, confined space entry equipment).
- Communication equipment.
- Operation and Maintenance Manual for the site including stormwater management facility location maps.
- Clipboard.
- Stormwater Facility Maintenance Inspection Forms (See Appendix D).
- Manhole Lid Remover
- Shovel.

Some of the items identified above need not be carried by the inspector (manhole lid remover, shovel, and confined space entry equipment). However, this equipment should be available in the vehicle driven to the site.

## **VII. Inspecting Stormwater Management Facilities**

The quality of stormwater entering the waters of the state relies heavily on the proper operation and maintenance of permanent best management practices. Stormwater management facilities must be periodically inspected to ensure that they function as designed. The inspection will determine the appropriate maintenance that is required for the facility.

### **A. Inspection Procedures**

All stormwater management facilities are required to be inspected by a qualified individual at a minimum of once per year. Inspections should follow the inspection guidance found in the SOP for the specific type of facility. (Appendix C of this manual).

### **B. Inspection Report**

The person(s) conducting the inspection activities shall complete the appropriate inspection report for the specific facility. Inspection reports are located in Appendix D.

The following information explains how to fill out the Inspection Forms:

### General Information

This section identifies the facility location, person conducting the inspection, the date and time the facility was inspected, and approximate days since the last rainfall. Property classification is identified as single-family residential, multi-family residential, commercial, or other.

The reason for the inspection is also identified on the form depending on the nature of the inspection. All facilities should be inspected on an annual basis at a minimum. In addition, all facilities should be inspected after a significant precipitation event to ensure the facility is draining appropriately and to identify any damage that occurred as a result of the increased runoff.

### Inspection Scoring

For each inspection item, a score must be given to identify the urgency of required maintenance. The scoring is as follows:

- 0 = No deficiencies identified.
- 1 = Monitor – Although maintenance may not be required at this time, a potential problem exists that will most likely need to be addressed in the future. This can include items like minor erosion, concrete cracks/spalling, or minor sediment accumulation. This item should be revisited at the next inspection.
- 2 = Routine Maintenance Required – Some inspection items can be addressed through the routine maintenance program (See SOP in appendix A). This can include items like vegetation management or debris/trash removal.
- 3 = Immediate Repair Necessary – This item needs immediate attention because failure is imminent or has already occurred. This could include items such as structural failure of a feature (outlet works, forebay, etc), significant erosion, or significant sediment accumulation. This score should be given to an item that can significantly affect the function of the facility.
- N/A This is checked by an item that may not exist in a facility. Not all facilities have all of the features identified on the form (forebay, micro-pool, etc.).

### Inspection Summary/Additional Comments

Additional explanations to inspection items, and observations about the facility not covered by the form, are recorded in this section.

### Overall Facility Rating

An overall rating must be given for each facility inspected. The overall facility rating should correspond with the highest score (0, 1, 2, 3) given to any feature on the inspection form.

### C. Verification of Inspection and Form Submittal

The Stormwater Management Facility Inspection Form provides a record of inspection of the facility. Inspection Forms for each facility type are provided in Appendix D. Verification of the inspection of the stormwater facilities, the facility inspection form(s), and Inspector Qualifications shall be provided to EPC on an annual basis. The verification and the inspection form(s) shall be reviewed and submitted by the property owner or property manager.

Refer to Section II of this Manual regarding the annual reporting of inspections.

## **VIII. Maintaining Stormwater Management Facilities**

Stormwater management facilities must be properly maintained to ensure that they operate correctly and provide the water quality treatment for which they were designed. Routine maintenance performed on a frequently scheduled basis, can help avoid more costly rehabilitative maintenance that results when facilities are not adequately maintained.

### A. Maintenance Categories

Stormwater management facility maintenance programs are separated into three broad categories of work. These categories are based largely on the Urban Drainage and Flood Control District's Maintenance Program for regional drainage facilities. The categories are separated based upon the magnitude and type of the maintenance activities performed. A description of each category follows:

#### Routine Work

The majority of this work consists of scheduled mowings and trash and debris pickups for stormwater management facilities during the growing season. This includes items such as the removal of debris/material that may be clogging the outlet structure well screens and trash racks. It also includes activities such as weed control, mosquito treatment, and algae treatment. These activities normally will be performed numerous times during the year. These items can be completed without any prior

correspondence with EPC; however, completed inspection and maintenance forms shall be submitted to EPC for each inspection and maintenance activity.

#### Restoration Work

This work consists of a variety of isolated or small-scale maintenance and work needed to address operational problems. Most of this work can be completed by a small crew, with minor tools, and small equipment. These items require prior correspondence with EPC and require that completed maintenance forms be submitted to EPC for each maintenance activity.

#### Rehabilitation Work

This work consists of large-scale maintenance and major improvements needed to address failures within the stormwater management facilities. This work requires consultation with EPC and may require an engineering design with construction plans to be prepared for review and approval. This work may also require more specialized maintenance equipment, surveying, construction permits or assistance through private contractors and consultants. These items require prior correspondence with EPC and require that completed maintenance forms be submitted to EPC for each maintenance activity.

#### B. Maintenance Personnel

Maintenance personnel must be qualified to properly maintain stormwater management facilities. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs.

#### C. Maintenance Forms

The Stormwater Management Facility Maintenance Form provides a record of maintenance activities. Maintenance Forms for each facility type are provided in Appendix E. Maintenance Forms shall be completed by the contractor completing the required maintenance items. The form shall then be reviewed by the property owner or an authorized agent of the property owner and submitted on an annual basis to the Southeast Metro Stormwater Authority.

Refer to Section II of this Manual regarding the annual reporting of inspections and maintenance activities performed.



## APPENDIX A

**PRIVATE DETENTION BASIN /  
STORMWATER QUALITY BEST MANAGEMENT PRACTICE  
MAINTENANCE AGREEMENT AND EASEMENT**

This PRIVATE DETENTION BASIN / STORMWATER QUALITY BEST MANAGEMENT PRACTICE MAINTENANCE AGREEMENT AND EASEMENT (Agreement) is made by and between EL PASO COUNTY by and through THE BOARD OF COUNTY COMMISSIONERS OF EL PASO COUNTY, COLORADO (Board or County) and SR Land, LLC (“Owner or Developer”) and STERLING RANCH METROPOLITAN DISTRICT NO. 1 (“District”), a quasi-municipal corporation and political subdivision of the State of Colorado. The above may occasionally be referred to herein singularly as “Party” and collectively as “Parties.”

Recitals

A. WHEREAS, the District provides various municipal services to certain real property in El Paso County, Colorado referred to as Sterling Ranch; and

B. WHEREAS, Developer is the owner of certain real estate in El Paso County, Colorado, which Property is legally described in Exhibit A attached hereto and incorporated herein by this reference; and

C. WHEREAS, Developer desires to plat and develop on the Property a subdivision to be known as Homestead at Sterling Ranch Filing No. 2; and

D. WHEREAS, the development of this Property will substantially increase the volume of water runoff and will decrease the quality of the stormwater runoff from the Property, and, therefore, it is in the best interest of public health, safety and welfare for the County to condition approval of this subdivision on Developer’s promise to construct adequate drainage, water runoff control facilities, and stormwater quality structural Best Management Practices (“BMPs”) for the subdivision; and

E. WHEREAS, Chapter 8, Section 8.4.5 of the El Paso County Land Development Code, as periodically amended, promulgated pursuant to Section 30-28-133(1), Colorado Revised Statutes (C.R.S.), requires the County to condition approval of all subdivisions on a developer’s promise to so construct adequate drainage, water runoff control facilities, and BMPs in subdivisions; and

F. WHEREAS, the Drainage Criteria Manual, Volume 2, as amended by Appendix I of the El Paso County Engineering Criteria Manual (ECM), as each may be periodically amended, promulgated pursuant to the County’s Colorado Discharge Permit System General Permit (MS4 Permit) as required by Phase II of the National Pollutant Discharge Elimination System (NPDES), which MS4 Permit requires that the County take measures to protect the quality of stormwater from sediment and other contaminants, requires subdividers, developers, landowners, and owners of facilities located in the County’s rights-of-way or easements to provide adequate permanent stormwater quality BMPs with new development or significant redevelopment; and

G. WHEREAS, Section 2.9 of the El Paso County Drainage Criteria Manual provides for a developer's promise to maintain a subdivision's drainage facilities in the event the County does not assume such responsibility; and

H. WHEREAS, developers in El Paso County have historically chosen water runoff detention basins as a means to provide adequate drainage and water runoff control in subdivisions, which basins, while effective, are less expensive for developers to construct than other methods of providing drainage and water runoff control; and

I. WHEREAS, Developer desires to construct for the subdivision **two** detention basin/stormwater quality BMP(s) ("detention basin/BMP(s)") as the means for providing adequate drainage and stormwater runoff control and to meet requirements of the County's MS4 Permit, and to provide for operating, cleaning, maintaining and repairing such detention basin/BMP(s); and

J. WHEREAS, Developer desires to construct the detention basin/BMP(s) on property that is or will be platted as Homestead Sterling Ranch Filing No. 2, Lots 24-27 and Tract B, and as set forth on Exhibit B attached hereto; and

K. WHEREAS, Developer and the District shall be charged with the duty of constructing the detention basin/BMP(s) and the District shall be charged with the duties of operating, maintaining and repairing the detention basin/BMP(s) on the Property described in Exhibit B; and

L. WHEREAS, it is the County's experience that subdivision developers and property owners historically have not properly cleaned and otherwise not properly maintained and repaired these detention basins/BMPs, and that these detention basins/BMPs, when not so properly cleaned, maintained, and repaired, threaten the public health, safety and welfare; and

M. WHEREAS, the County, in order to protect the public health, safety and welfare, has historically expended valuable and limited public resources to so properly clean, maintain, and repair these detention basins/BMPs when developers and property owners have failed in their responsibilities, and therefore, the County desires the means to recover its costs incurred in the event the burden falls on the County to so clean, maintain and repair the detention basin/BMP(s) serving this Subdivision due to the Developer's or the District's failure to meet its obligations to do the same; and

N. WHEREAS, the County conditions approval of this Subdivision on the Developer's promise to so construct the detention basin/BMP(s), and further conditions approval on the District's promise to reimburse the County in the event the burden falls upon the County to so clean, maintain and/or repair the detention basin/BMP(s) serving this Subdivision; and

O. WHEREAS, the County could condition subdivision approval on the Developer's promise to construct a different and more expensive drainage, water runoff control system and BMPs than those proposed herein, which more expensive system would not create the possibility of the burden of cleaning, maintenance and repair expenses falling on the County; however, the County is willing to forego such right upon the performance of Developer's and the District's promises contained herein; and

P. WHEREAS, the County, in order to secure performance of the promises contained herein, conditions approval of this Subdivision upon the Developer's grant herein of a perpetual

Easement over a portion of the Property for the purpose of allowing the County to periodically access, inspect, and, when so necessary, to clean, maintain and/or repair the detention basin/BMP(s); and

Q. WHEREAS, Pursuant to Colorado Constitution, Article XIV, Section 18(2) and Section 29-1-203, Colorado Revised Statutes, governmental entities may cooperate and contract with each other to provide any function, services, or facilities lawfully authorized to each.

### Agreement

NOW, THEREFORE, in consideration of the mutual Promises contained herein, the sufficiency of which are hereby acknowledged, the Parties agree as follows:

1. Incorporation of Recitals: The Parties incorporate the Recitals above into this Agreement.

2. Covenants Running with the Land: Developer and the District agree that this entire Agreement and the performance thereof shall become a covenant running with the land, which land is legally described in Exhibit A attached hereto, and that this entire Agreement and the performance thereof shall be binding upon themselves, their respective successors and assigns.

3. Construction: Developer or the District shall construct on that portion of the Property described in Exhibit B attached hereto and incorporated herein by this reference, a detention basins/BMP(s). Developer or the District shall not commence construction of the detention basin/BMP(s) until the El Paso County Development Services Department (DSD) has approved in writing the plans and specifications for the detention basin/BMP(s) and this Agreement has been signed by all Parties and returned to the DSD. Developer or the District shall complete construction of the detention basin/BMP(s) in substantial compliance with the County-approved plans and specifications for the detention basin/BMP(s). Failure to meet these requirements shall be a material breach of this Agreement, and shall entitle the County to pursue any remedies available to it at law or in equity to enforce the same. Construction of the detention basin/BMP(s) shall be substantially completed within one (1) year (defined as 365 days), which one year period will commence to run on the date the approved plat of this Subdivision is recorded in the records of the El Paso County Clerk and Recorder. Rough grading of the detention basin/BMP(s) must be completed and inspected by the El Paso County Development Services Department prior to commencing road construction.

In the event construction is not substantially completed within the one (1) year period, then the County may exercise its discretion to complete the project, and shall have the right to seek reimbursement from the Developer or the District and their respective successors and assigns, for its actual costs and expenses incurred in the process of completing construction. The term actual costs and expenses shall be liberally construed in favor of the County, and shall include, but shall not be limited to, labor costs, tool and equipment costs, supply costs, and engineering and design costs, regardless of whether the County uses its own personnel, tools, equipment and supplies, etc. to correct the matter. In the event the County initiates any litigation or engages the services of legal counsel in order to enforce the Provisions arising herein, the County shall be entitled to its damages and costs, including reasonable attorney fees, regardless of whether the County contracts with outside legal counsel or utilizes in-house legal counsel for the same.

4. Maintenance: The District agrees for itself and its successors and assigns, that it will regularly and routinely inspect, clean and maintain the detention basin/BMP(s), and otherwise keep the same in good repair, all at its own cost and expense. No trees or shrubs that will impair the structural integrity of the detention basin/BMP(s) shall be planted or allowed to grow on the detention basin/BMP(s).

5. Creation of Easement: Developer hereby grants the County and the District a non-exclusive perpetual easement upon and across that portion of the Property described in Exhibit B. The purpose of the easement is to allow the County and the District to access, inspect, clean, repair and maintain the detention basin/BMP(s); however, the creation of the easement does not expressly or implicitly impose on the County a duty to so inspect, clean, repair or maintain the detention basin/BMP(s).

6. County's Rights and Obligations: Any time the County determines, in the sole exercise of its discretion, that the detention basin/BMP(s) is not properly cleaned, maintained and/or otherwise kept in good repair, the County shall give reasonable notice to the Developer, the District and their respective successors and assigns, that the detention basin/BMP(s) needs to be cleaned, maintained and/or otherwise repaired. The notice shall provide a reasonable time to correct the problem(s). Should the responsible parties fail to correct the specified problem(s), the County may enter upon the Property to so correct the specified problem(s). Notice shall be effective to the above by the County's deposit of the same into the regular United States mail, postage pre-paid. Notwithstanding the foregoing, this Agreement does not expressly or implicitly impose on the County a duty to so inspect, clean, repair or maintain the detention basin/BMP(s).

7. Reimbursement of County's Costs / Covenant Running With the Land: The Developer and the District agree and covenant, for themselves, their respective successors and assigns, that they will reimburse the County for its costs and expenses incurred in the process of completing construction of, cleaning, maintaining, and/or repairing the detention basin/BMP(s) pursuant to the provisions of this Agreement.

The term "actual costs and expenses" shall be liberally construed in favor of the County, and shall include, but shall not be limited to, labor costs, tools and equipment costs, supply costs, and engineering and design costs, regardless of whether the County uses its own personnel, tools, equipment and supplies, etc. to correct the matter. In the event the County initiates any litigation or engages the services of legal counsel in order to enforce the provisions arising herein, the County shall be entitled to its damages and costs, including reasonable attorney's fees, regardless of whether the County contracts with outside legal counsel or utilizes in-house legal counsel for the same.

8. Contingencies of Subdivision Approval: Developer's and the Metro District's execution of this Agreement is a condition of subdivision approval. Additional conditions of this Agreement include, but are not limited to, the following:

- a. Conveyance of Lots 24-27 and Tract B, Homestead at Sterling Ranch Filing No. 2, from Developer to the District (which will include a reservation of easement in favor of the County for purposes of accessing, inspecting, cleaning, maintaining, and repairing the detention basin/BMP(s)), and recording of the Deed for the same; and

- b. A copy of the Covenants of the Subdivision, if applicable, establishing that the District is obligated to inspect, clean, maintain, and repair the detention basin/BMP(s).

The County shall have the right, in the sole exercise of its discretion, to approve or disapprove any documentation submitted to it under the conditions of this Paragraph, including but not limited to, any separate agreement or amendment, if applicable, identifying any specific maintenance responsibilities not addressed herein. The County's rejection of any documentation submitted hereunder shall mean that the appropriate condition of this Agreement has not been fulfilled.

9. Agreement Monitored by El Paso County Development Services Department and/or El Paso County Department of Transportation: Any and all actions and decisions to be made hereunder by the County shall be made by the Director of the El Paso County Development Services Department and/or the Director of the El Paso County Department of Transportation. Accordingly, any and all documents, submissions, plan approvals, inspections, etc. shall be submitted to and shall be made by the Director of the Development Services Department and/or the Director of the El Paso County Department of Transportation.

10. Indemnification and Hold Harmless: To the extent authorized by law, Developer and the District agree, for themselves, their respective successors and assigns, that they will indemnify, defend, and hold the County harmless from any and all loss, costs, damage, injury, liability, claim, lien, demand, action and causes of action whatsoever, whether at law or in equity, arising from or related to their respective intentional or negligent acts, errors or omissions or that of their agents, officers, servants, employees, invitees and licensees in the construction, operation, inspection, cleaning (including analyzing and disposing of any solid or hazardous wastes as defined by State and/or Federal environmental laws and regulations), maintenance, and repair of the detention basin/BMP(s), and such obligation arising under this Paragraph shall be joint and several. Nothing in this Paragraph shall be deemed to waive or otherwise limit the defense available to the County pursuant to the Colorado Governmental Immunity Act, Sections 24-10-101, *et seq.* C.R.S., or as otherwise provided by law.

11. Severability: In the event any Court of competent jurisdiction declares any part of this Agreement to be unenforceable, such declaration shall not affect the enforceability of the remaining parts of this Agreement.

12. Third Parties: This Agreement does not and shall not be deemed to confer upon or grant to any third party any right to claim damages or to bring any lawsuit, action or other proceeding against either the County, the Developer, the District, or their respective successors and assigns, because of any breach hereof or because of any terms, covenants, agreements or conditions contained herein.

13. Solid Waste or Hazardous Materials: Should any refuse from the detention basin/BMP(s) be suspected or identified as solid waste or petroleum products, hazardous substances or hazardous materials (collectively referred to herein as "hazardous materials"), the Developer and the District shall take all necessary and proper steps to characterize the solid waste or hazardous materials and properly dispose of it in accordance with applicable State and/or Federal environmental laws and regulations, including, but not limited to, the following: Solid Wastes Disposal Sites and Facilities Acts, §§ 30-20-100.5 – 30-20-119, C.R.S., Colorado Regulations Pertaining to Solid Waste Disposal Sites and Facilities, 6 C.C.R. 1007-2, *et seq.*, Solid Waste Disposal Act, 42 U.S.C. §§ 6901-6992k, and Federal Solid Waste Regulations 40 CFR Ch. I. The County shall not be responsible or liable for identifying, characterizing, cleaning up, or disposing of such solid waste or hazardous materials. Notwithstanding

the previous sentence, should any refuse cleaned up and disposed of by the County be determined to be solid waste or hazardous materials, the Developer and the District, but not the County, shall be responsible and liable as the owner, generator, and/or transporter of said solid waste or hazardous materials.

14. Applicable Law and Venue: The laws, rules, and regulations of the State of Colorado and El Paso County shall be applicable in the enforcement, interpretation, and execution of this Agreement, except that Federal law may be applicable regarding solid waste or hazardous materials. Venue shall be in the El Paso County District Court.

15. Limitation on Developer's Obligation and Liability: The obligation and liability of the Developer hereunder shall only continue until such time as the Final Plat as described in Paragraph Three (3) of the Recitals set forth above is recorded and the Developer or District completes the construction of the detention basin/BMP(s) and the Developer has transferred all applicable maintenance and operation responsibilities to the District. By execution of this agreement, the District agrees to accept all responsibilities and to perform all duties assigned to it, including those of the Developer, as specified herein, upon transfer of Lots 24-27 and Tract B from Developer to the District.

IN WITNESS WHEREOF, the Parties affix their signatures below.

Executed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by:

**SR LAND, LLC**

By: \_\_\_\_\_  
James Morley, Its Manager

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_, 2016, by James Morley, Manager, SR Land, LLC.

Witness my hand and official seal.

My commission expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

Executed this \_\_\_\_\_ day of \_\_\_\_\_, 2016, by:

**STERLING RANCH METROPOLITAN DISTRICT NO. 1**

By: \_\_\_\_\_  
James Morley, President

Attest:

By: \_\_\_\_\_  
Secretary

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of 2016.

2016, by James Morley, President, STERLING RANCH METROPOLITAN DISTRICT No. 1

Witness my hand and official seal.

My commission expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

Executed this \_\_\_\_\_ day of \_\_\_\_\_, 2016, by:

**BOARD OF COUNTY COMMISSIONERS  
OF EL PASO COUNTY, COLORADO**

By: \_\_\_\_\_  
\_\_\_\_\_, Chair

Attest:

\_\_\_\_\_  
County Clerk and Recorder

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_, 2016, by \_\_\_\_\_, Chair of the Board of County Commissioners of El Paso County, Colorado, as Attested to by \_\_\_\_\_, County Clerk and Recorder.



Witness my hand and official seal.

My commission expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

Approved as to Content and Form:

\_\_\_\_\_  
Assistant County Attorney

**EL PASO COUNTY DEVELOPMENT SERVICES DEPARTMENT**

By: \_\_\_\_\_  
Craig Dossey, Executive Director



20 Boulder Crescent, STE 110  
Colorado Springs, CO 80903  
Mail to: PO Box 1360  
Colorado Springs, CO 80901  
719.955.5485

**POND 1 – HOMESTEAD AT STERLING RANCH FILING NO. 2  
MAINTENANCE AGREEMENT  
EXHIBIT “A”**

M&S Job No. 09-007  
FEBRUARY 22, 2019

A PARCEL OF LAND LOCATED IN A PORTION OF THE SOUTHWEST QUARTER (SW 1/4) OF THE NORTHEAST QUARTER (NE 1/4) OF SECTION 33, TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6TH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO;

BASIS OF BEARINGS: THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW1/4) OF SECTION 34, TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6TH PRINCIPLE MERIDIAN, THE SECTION CORNER COMMON TO SECTIONS 33, 34, 3, AND 4 BEING MONUMENTED WITH A 2-1/2" ALUMINUM CAP STAMPED "LS 11624" AND AT THE QUARTER CORNER COMMON TO SECTIONS 34 AND 3 WITH A 2-1/2" ALUMINUM CAP STAMPED "LS 11624", SAID LINE BEARS N89°14'14" E, A DISTANCE OF 2,722.56 FEET.

COMMENCING AT SAID SOUTHWEST CORNER OF SAID SOUTHWEST QUARTER (SW1/4) OF SAID SECTION 34; THENCE N31°01'13" W, A DISTANCE OF 4121.66 FEET TO A POINT A POINT ON THE WESTERLY LINE OF TRACT D AS SHOWN ON THE PLAT OF "STERLING RANCH FILING NO. 1" UNDER RECEPTION NUMBER 218714151 OF THE RECORDS OF EL PASO COUNTY, COLORADO, AND THE POINT OF BEGINNING OF THE PARCEL HEREIN DESCRIBED;

THENCE ALONG SAID WESTERLY LINES OF TRACT D THE FOLLOWING THREE (3) COURSES):

- 1) THENCE S69°43'31"W A DISTANCE OF 88.65 FEET;
- 2) THENCE S81°55'47"W A DISTANCE OF 111.14 FEET;
- 3) THENCE N71°56'55"W, A DISTANCE OF 75.60 FEET TO THE NORTHEAST CORNER OF TRACT F OF AFORESAID "STERLING RANCH FILING NO. 1";

THENCE ALONG THE NORTHERLY LINES OF SAID TRACT F THE FOLLOWING THREE (3) COURSES):

- 1) THENCE N71°56'55"W, A DISTANCE OF 80.38 FEET;
- 2) THENCE N54°41'05"W, A DISTANCE OF 37.80 FEET;
- 3) THENCE N31°24'46"W, A DISTANCE OF 36.61 FEET;

THENCE N35°18'43"E A DISTANCE OF 131.72 FEET;

THENCE 268.18 FEET ON THE ARC OF A NON-TANGENT CURVE TO THE LEFT, SAID CURVE HAVE A RADIUS OF 225.00 FEET, A CENTRAL ANGLE OF 68°17'28" (THE CHORD OF WHICH BEARS S76°07'45"E A DISTANCE OF 252.58 FEET) TO A POINT OF TANGENT;

THENCE N69°43'31"E A DISTANCE OF 30.37 FEET;

THENCE S20°16'29"E A DISTANCE OF 120.00 FEET TO THE POINT OF BEGINNING;

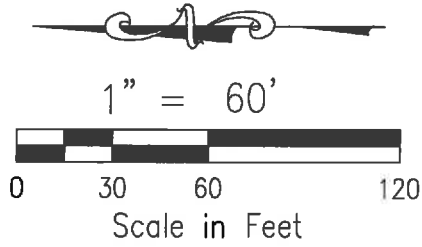
CONTAINING A CALCULATED AREA OF 47,128 SQUARE FEET (1.082 ACRES) MORE OR LESS.

PREPARED BY:

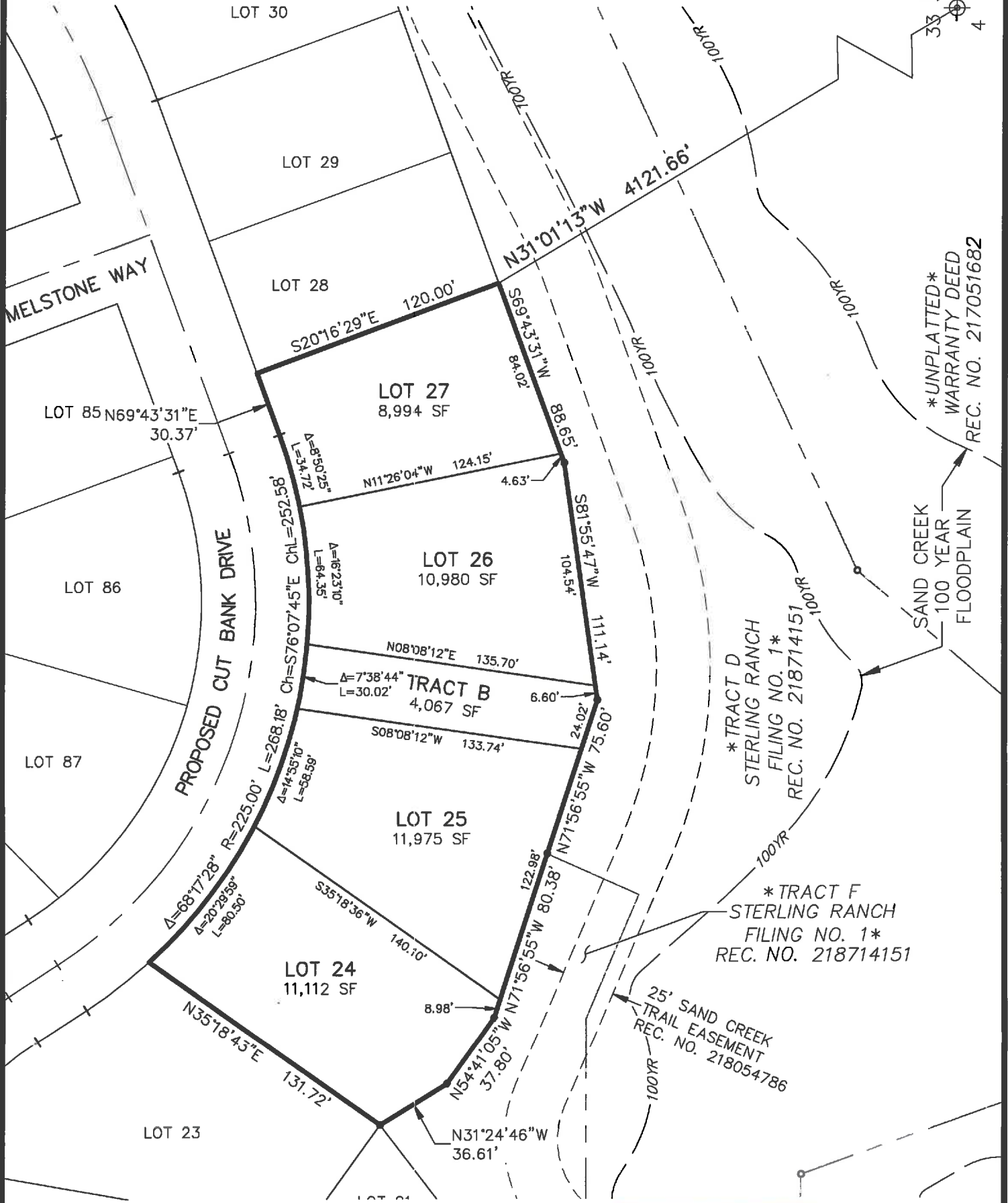
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VERNON P. TAYLOR, COLORADO PLS NO. 25966      DATE  
FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC  
20 BOULDER CRESCENT, SUITE 110  
COLORADO SPRINGS, CO 80903

# POND 1 - HOMESTEAD AT STERLING RANCH FILING NO. 2 MAINTENANCE AGREEMENT EXHIBIT "B"



**NOTE;**  
LOTS AND TRACTS SHOWN HEREON ARE  
PROPOSED UNLESS OTHERWISE INDICATED.



POND 1 - HOMESTEAD AT  
STERLING RANCH FILING NO. 2  
MAINTENANCE AGREEMENT  
EXHIBIT "B"  
JOB NO. 09--007  
DATE PREPARED: 02/22/2019



20 BOULDER CRESCENT, SUITE 110  
COLORADO SPRINGS, CO 80903  
PHONE: 719.955.5485

THIS DRAWING DOES NOT REPRESENT  
A MONUMENTED LAND SURVEY AND  
IS ONLY INTENDED TO DEPICT THE  
LEGAL DESCRIPTION.

## **APPENDIX B**

## Appendix B

### General Location and Description of Stormwater Management Facilities

#### A. General Site Description

Homestead at Sterling Ranch Filing No. 2 is located in the SE  $\frac{1}{4}$  of the NW  $\frac{1}{4}$ , the SW  $\frac{1}{4}$  of the NE  $\frac{1}{4}$ , and the NW  $\frac{1}{4}$  of the NE  $\frac{1}{4}$  of Section 33, Township 12 South, Range 65 West of the 6<sup>th</sup> Principal Meridian, and the NE  $\frac{1}{4}$  of the SW  $\frac{1}{4}$  of Section 33, Township 12 South, Range 65 West of the 6<sup>th</sup> Principal Meridian within unincorporated El Paso County, Colorado. The site is bound on the south by an existing detention pond, to the north by Briargate Parkway and to the east by Sand Creek. Existing Dines Boulevard runs along the western site boundary. An existing residential development, Homestead at Sterling Ranch Filing No. 1, bounds the site to the west and a future commercial parcel bounds the site to the northwest. Sterling Ranch lies within the Sand Creek Drainage Basin. Flows from this site are tributary to Sand Creek.

Homestead at Sterling Ranch Filing No. 2 consists of 29.658 acres and is presently undeveloped. Vegetation is sparse, consisting of native grasses. Existing site terrain generally slopes from north to southwest at grade rates that vary between 2% and 6%.

#### B. General Stormwater Management Description

All stormwater is conveyed via curb and gutter and conventional reinforced concrete pipe (RCP) storm sewer to a temporary Full Spectrum Detention Facility. Interim Pond 1 functions as a water quality facility for runoff produced from onsite tributary Basins to Interim Pond 1.

#### C. Stormwater Facilities Site Plan

Inspection or maintenance personnel may utilize the Stormwater Facilities Map located in Appendix G for locating the Interim Pond 1 within this development.

#### D. On-Site Stormwater Management Facilities

##### **Volume Reduction Facilities**

Roof drains will be directed to side yard swales to aid in minimizing direct connection of impervious surfaces.

##### **Storage Facilities (Detention)**

Interim Pond 1, the water quality facility is designed to treat 0.247 ac-ft of water quality storage (WQCV), 0.701 ac-feet of excess urban runoff volume (EURV) and 1.283 ac-ft of 100-year storage. An emergency spillway, riprap stilling basin and trickle channel, outlet structure, and maintenance access road has been designed for Interim Pond 1. The pond is temporary in nature and designed to provide water quality during the interim period before ultimate channel improvements to Sand Creek have been completed.

### **Water Quality Facilities**

Interim Pond 1, the water quality facility is designed to treat 0.247 ac-ft of water quality storage (WQCV).

### **Source Control Best Management Practices**

The O&M manual does not include any nonstructural BMPs.

## APPENDIX C

Standard Operation Procedures  
for  
Inspection and Maintenance

Extended Detention Basins  
(EDBs)

November 2007



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## **EDB-1 BACKGROUND**

Extended Detention Basins (EDBs) are one of the most common types of Stormwater Management Facilities utilized within the Front Range of Colorado. An EDB is a sedimentation basin designed to “extend” the runoff detention time, but to drain completely dry sometime after stormwater runoff ends. The EDB’s drain time for the water quality portion of the facility is typically 40 hours. The basins are considered to be “dry” because the majority of the basin is designed not to have a significant permanent pool of water remaining between runoff events.

EDBs are an adaptation of a detention basin used for flood control, with the primary difference is the addition of forebays, micropools and a slow release outlet design. Forebays are shallow concrete “pans” located at the inflow point to the basin and are provided to facilitate sediment removal within a contained area prior to releasing into the pond. These forebays collect and briefly hold stormwater runoff resulting in a process called sedimentation, dropping sediment out of the stormwater. The stormwater is then routed from the forebay into the concrete trickle channel and upper basin, the large grassy portion of the basin. The EDB uses a much smaller outlet that extends the emptying time of the more frequently occurring runoff events to facilitate pollutant removal. An EDB should have a small micropool just upstream of the outlet. This micropool is designed to hold a small amount of water to keep sediment and floatables from blocking the outlet orifices.

## **EDB-2 INSPECTING EXTENDED DETENTION BASINS (EDBs)**

### **EDB-2.1 Access and Easements**

Inspection or maintenance personnel may utilize the stormwater facility map located in Appendix G containing the location(s) of the access points and maintenance easements of the EDB(s) within this development.

### **EDB-2.2 Stormwater Management Facilities Locations**

Inspection or maintenance personnel may utilize the stormwater facility map located in Appendix G containing the location(s) of the EDB(s) within this development.

### **EDB-2.3 Extended Detention Basin (EDB) Features**

EDBs have a number of features that are designed to serve a particular function. Many times the proper function of one feature depends on another. For example, if a forebay is not properly maintained, it could negatively affect the performance of a feature downstream (trickle channel, micropool, etc.). Therefore, it is critical that each feature of the EDB is properly inspected and

maintained to ensure that the overall facility functions as it was intended. Below is a list and description of the most common features within an EDB and the corresponding maintenance inspection items that can be anticipated:

**Table EDB-1  
Typical Inspection & Maintenance Requirements Matrix**

<b>EDB Features</b>	<b>Sediment Removal</b>	<b>Mowing/ Weed control</b>	<b>Trash &amp; Debris Removal</b>	<b>Erosion</b>	<b>Overgrown Vegetation Removal</b>	<b>Standing Water (mosquito/ algae control)</b>	<b>Structure Repair</b>
<b>Inflow Points (outfalls)</b>	X		X				X
<b>Forebay</b>	X		X				X
<b>Low-flow channel</b>	X		X	X	X		X
<b>Bottom Stage</b>	X	X	X	X	X	X	
<b>Micropool</b>	X		X		X	X	X
<b>Outlet Works</b>	X		X				X
<b>Emergency Spillway</b>			X	X	X		X
<b>Upper Stage</b>			X	X			
<b>Embankment</b>		X		X	X		

#### EDB-2.3.1 Inflow Points

Inflow Points or Outfalls into EDBs are the point source of the stormwater discharge into the facility. An inflow point is commonly a storm sewer pipe with a flared end section that discharges into the EDB. In some instances, an inflow point could be a drainage channel or ditch that flows into the facility.

An energy dissipater (riprap or hard armor protection) is typically immediately downstream of the discharge point into the EDB to protect from erosion. In some cases, the storm sewer outfall can have a toe-wall or cut-off wall immediately below the structure to prevent undercutting of the outfall from erosion.

*The typical maintenance items that are found with inflow points are as follows:*

*a. Riprap Displaced* – Many times, because the repeated impact/force of water, the riprap can shift and settle. If any portion of the riprap apron appears to have settled, soil is present between the riprap, or the riprap has shifted, maintenance may be required to ensure future erosion is prevented.

*b. Erosion Present/Outfall Undercut* – In some situations, the energy dissipater may not have been sized, constructed, or maintained appropriately and erosion has occurred. Any erosion within the vicinity of the inflow point will require maintenance to prevent damage to the structure(s) and sediment transport within the facility.

*c. Sediment Accumulation* – Because of the turbulence in the water created by the energy dissipater, sediment often deposits immediately downstream of the inflow point. To prevent a loss in hydraulic performance of the upstream infrastructure, sediment that accumulates in this area must be removed in a timely manner.

*d. Structural Damage* – Structural damage can occur at anytime during the life of the facility. Typically, for an inflow, the structural damage occurs to the pipe flared end section (concrete or steel). Structural damage can lead to additional operating problems with the facility, including loss of hydraulic performance.

*e. Woody Growth/Weeds Present* – Undesirable vegetation can grow in and around the inflow area to an EDB that can significantly affect the performance of the drainage facilities discharging into the facility. This type of vegetation includes trees (typically cottonwoods) and dense areas of shrubs (willows). If woody vegetation is not routinely mowed/removed, the growth can cause debris/sediment to accumulate, resulting in blockage of the discharge. Also, tree roots can cause damage to the structural components of the inflow. Routine maintenance is essential for trees (removing a small tree/sapling is much cheaper and “quieter” than a mature tree). In addition, noxious weeds growing in the facility can result in the loss of desirable native vegetation and impact adjacent open spaces/land.

### EDB-2.3.2 Forebay

A forebay is a solid surface (pad), typically constructed of concrete, immediately downstream of the inflow point. The forebay is designed to capture larger particles and trash to prevent them from entering the main portion of the EDB. The solid surface is designed to facilitate mechanical sediment removal (skid steer). The forebay typically includes a small diameter discharge pipe or v-notch weir on the downstream end and designed to drain the forebay in a specified period of time to promote sedimentation. The forebays vary in size and depth depending on the design and site constraints.

*The typical maintenance items that are found with forebays are as follows:*

*a. Sediment/Debris Accumulation* – Because this feature of the EDB is designed to provide the initial sedimentation, debris and sediment frequently accumulate in this area. If the sediment and debris is not removed from the forebay on a regular basis, it can significantly affect the function of other features within the EDB. Routine sediment removal from the forebay can **significantly** reduce the need for dredging of the main portion of the EDB using specialized equipment (long reach excavators). Routine removal of sediment from the forebay can **substantially** decrease the long-term sediment removal costs of an EDB.

*b. Concrete Cracking/Failing* – The forebay is primarily constructed of concrete, which cracks, spalls, and settles. Damage to the forebay can result in decreased performance and impact maintenance efforts.

*c. Drain Pipe/Weir Clogged* – Many times the drainpipe or weir can be clogged with debris, and prevent the forebay from draining properly. If standing water is present in the forebay (and there is not a base flow), the forebay is most likely not draining properly. This can result in a decrease in performance and create potential nuisances with stagnant water (mosquitoes).

*d. Weir/Drain Pipe Damaged* – Routine maintenance activities, vandalism, or age may cause the weir or drain pipe in the forebay to become damaged. Weirs are typically constructed of concrete, which cracks and spalls. The drainpipe is typically smaller in diameter and constructed with plastic, which can fracture.

### EDB-2.3.3 Trickle Channel (Low-Flow)

The trickle channel conveys stormwater from the forebay to the micro-pool of the EDB. The trickle channel is typically made of concrete. However, grass lined (riprap sides protected) is also common and can provide for an additional means of water quality within the EDB. The trickle channel is typically 6-9 inches in depth and can vary in width.

*The typical maintenance items that are found with trickle channels are as follows:*

*a. Sediment/Debris Accumulation* – Trickle channels are typically designed with a relatively flat slope that can promote sedimentation and the collection of debris. Also, if a trickle channel is grass lined it can accumulate sediment and debris at a much quicker rate. Routine removal of accumulated sediment and debris is essential in preventing

flows from circumventing the trickle channel and affecting the dry storage portion of the pond.

*b. Concrete/Riprap Damage* – Concrete can crack, spall, and settle and must be repaired to ensure proper function of the trickle channel. Riprap can also shift over time and must be replaced/repared as necessary.

*c. Woody Growth/Weeds Present* – Because of the constant moisture in the area surrounding the trickle channel, woody growth (cottonwoods/willows) can become a problem. Trees and dense shrub type vegetation can affect the capacity of the trickle channel and can allow flows to circumvent the feature.

*d. Erosion Outside of Channel* – In larger precipitation events, the trickle channel capacity will likely be exceeded. This can result in erosion immediately adjacent to the trickle channel and must be repaired to prevent further damage to the structural components of the EDB.

#### EDB-2.3.4 Bottom Stage

The bottom stage is at least 1.0 to 2.0 feet deeper than the upper stage and is located in front of the outlet works structure. The bottom stage is designed to store the smaller runoff events, assists in keeping the majority of the basin bottom dry resulting in easier maintenance operations, and enhances the facilities pollutant removal capabilities. This area of the EDB may develop wetland vegetation.

*The typical maintenance items that are found with the bottom stage are as follows:*

*a. Sediment/Debris Accumulation* – The micro-pool can frequently accumulate sediment and debris. This material must be removed to maintain pond volume and proper function of the outlet structure.

*b. Woody Growth/Weeds Present* - Because of the constant moisture in the soil surrounding the micro-pool, woody growth (cottonwoods/willows) can create operational problems for the EDB. If woody vegetation is not routinely mowed/removed, the growth can cause debris/sediment to accumulate outside of the micro-pool, which can cause problems with other EDB features. Also, tree roots can cause damage to the structural components of the outlet works. Routine management is essential for trees (removing a small tree/sapling is much cheaper and “quieter” than a mature tree).

*c. Bank Erosion* – The micro-pool is usually a couple feet deeper than the other areas of the ponds. Erosion can be caused by water dropping into the micro-pool if adequate protection/armor is not present. Erosion in this area must be mitigated to prevent sediment transport and other EDB feature damage.

*d. Mosquitoes/Algae Treatment* – Nuisance created by stagnant water can result from improper maintenance/treatment of the micro-pool. Mosquito larvae can be laid by adult mosquitoes within the permanent pool. Also, aquatic vegetation that grows in shallow pools of water can decompose causing foul odors. Chemical/mechanical treatment of the micro-pool may be necessary to reduce these impacts to adjacent homeowners.

*e. Petroleum/Chemical Sheen* – Many indicators of illicit discharges into the storm sewer systems will be present in the micro-pool area of the EDB. These indicators can include sheens, odors, discolored soil, and dead vegetation. If it is suspected that an illicit discharge has occurred, contact the supervisor immediately. Proper removal/mitigation of contaminated soils and water in the EDB is necessary to minimize any environmental impacts downstream.

#### EDB-2.3.5 Micro-pool

The micro-pool is a concrete or grouted boulder walled structure directly in front of the outlet works. At a minimum, the micropool is 2.5 feet deep and is designed to hold water. The micro-pool is critical in the proper function of the EDB; it allows suspended sediment to be deposited at the bottom of the micro-pool and prevents these sediments from being deposited in front of the outlet works causing clogging of the outlet structure, which results in marshy areas within the top and bottom stages.

*The typical maintenance items that are found with micro-pools are as follows:*

*a. Sediment/Debris Accumulation* – The micro-pool can frequently accumulate sediment and debris. This material must be removed to maintain pond volume and proper function of the outlet structure.

*b. Woody Growth/Weeds Present* - Because of the constant moisture in the soil surrounding the micro-pool, woody growth (cottonwoods/willows) can create operational problems for the EDB. If woody vegetation is not routinely mowed/removed, the growth can cause debris/sediment to accumulate outside of the micro-pool, which can cause problems with other EDB features. Also, tree roots can

cause damage to the structural components of the outlet works. Routine management is essential for trees (removing a small tree/sapling is much cheaper and “quieter” than a mature tree).

*c. Mosquitoes/Algae Treatment* – Nuisance created by stagnant water can result from improper maintenance/treatment of the micro-pool. Mosquito larvae can be laid by adult mosquitoes within the permanent pool. Also, aquatic vegetation that grows in shallow pools of water can decompose causing foul odors. Chemical/mechanical treatment of the micro-pool may be necessary to reduce these impacts to adjacent homeowners.

*d. Petroleum/Chemical Sheen* – Many indicators of illicit discharges into the storm sewer systems will be present in the micro-pool area of the EDB. These indicators can include sheens, odors, discolored soil, and dead vegetation. If it is suspected that an illicit discharge has occurred, contact the supervisor immediately. Proper removal/mitigation of contaminated soils and water in the EDB is necessary to minimize any environmental impacts downstream.

#### EDB-2.3.6 Outlet Works

The outlet works is the feature that drains the EDB in specified quantities and periods of time. The outlet works is typically constructed of reinforced concrete into the embankment of the EDB. The concrete structure typically has steel orifice plates anchored/embedded into it to control stormwater release rates. The larger openings (flood control) on the outlet structure typically have trash racks over them to prevent clogging. The water quality orifice plate (smaller diameter holes) will typically have a well screen covering it to prevent smaller materials from clogging it. The outlet structure is the single most important feature in the EDB operation. Proper inspection and maintenance of the outlet works is essential in ensuring the long-term operation of the EDB.

*The typical maintenance items that are found with the outlet works are as follows:*

*a. Trash Rack/Well Screen Clogged* – Floatable material that enters the EDB will most likely make its way to the outlet structure. This material is trapped against the trash racks and well screens on the outlet structure (which is why they are there). This material must be removed on a routine basis to ensure the outlet structure drains in the specified design period.



*b. Structural Damage* - The outlet structure is primarily constructed of concrete, which can crack, spall, and settle. The steel trash racks and well screens are also susceptible to damage.

*c. Orifice Plate Missing/Not Secure* – Many times residents, property owners, or maintenance personnel will remove or loosen orifice plates if they believe the pond is not draining properly. Any modification to the orifice plate(s) will significantly affect the designed discharge rates for water quality and/or flood control. Modification of the orifice plates is not allowed without approval from EPC.

*d. Manhole Access* – Access to the outlet structure is necessary to properly inspect and maintain the facility. If access is difficult or not available to inspect the structure, chances are it will be difficult to maintain as well.

*e. Woody Growth/Weeds Present* - Because of the constant moisture in the soil surrounding the outlet works, woody growth (cottonwoods/willows) can create operational problems for the EDB. If woody vegetation is not routinely mowed/removed, the growth can cause debris/sediment to accumulate around the outlet works, which can cause problems with other EDB features. Also, tree roots can cause damage to the structural components of the outlet works. Routine management is essential for trees (removing a small tree/sapling is much cheaper and “quieter” than a mature tree).

#### EDB-2.3.7 Emergency Spillway

An emergency spillway is typical of all EDBs and designed to serve as the overflow in the event the volume of the pond is exceeded. The emergency spillway is typically armored with riprap (or other hard armor) and is sometimes buried with soil. The emergency spillway is typically a weir (notch) in the pond embankment. Proper function of the emergency spillway is essential to ensure flooding does not affect adjacent properties.

*The typical maintenance items that are found with emergency spillways are as follows:*

*a. Riprap Displaced* – As mentioned before, the emergency spillway is typically armored with riprap to provide erosion protection. Over the life of an EDB, the riprap may shift or dislodge due to flow.

*b. Erosion Present* – Although the spillway is typically armored, stormwater flowing through the spillway can cause erosion damage.

Erosion must be repaired to ensure the integrity of the basin embankment, and proper function of the spillway.

*c. Woody Growth/Weeds Present* – Management of woody vegetation is essential in the proper long-term function of the spillway. Larger trees or dense shrubs can capture larger debris entering the EDB and reduce the capacity of the spillway.

*d. Obstruction Debris* – The spillway must be cleared of any obstruction (man made or natural) to ensure the proper design capacity.

#### EDB-2.3.8 Upper Stage (Dry Storage)

The upper stage of the EDB provides the majority of the water quality flood detention volume. This area of the EDB is higher than the micro-pool and typically stays dry, except during storm events. The upper stage is the largest feature/area of the basin. Sometimes, the upper stage can be utilized for park space and other uses in larger EDBs. With proper maintenance of the micro-pool and forebay(s), the upper stage should not experience much sedimentation; however, bottom elevations should be monitored to ensure adequate volume.

*The typical maintenance items that are found with upper stages are as follows:*

*a. Vegetation Sparse* – The upper basin is the most visible part of the EDB, and therefore aesthetics is important. Adequate and properly maintained vegetation can greatly increase the overall appearance and acceptance of the EDB by the public. In addition, vegetation can reduce the potential for erosion and subsequent sediment transport to the other areas of the pond.

*b. Woody Growth/Undesirable Vegetation* – Although some trees and woody vegetation may be acceptable in the upper basin, some thinning of cottonwoods and willows may be necessary. Remember, the basin will have to be dredged to ensure volume, and large trees and shrubs will be difficult to protect during that operation.

*c. Standing Water/Boggy Areas* – Standing water or boggy areas in the upper stage is typically a sign that some other feature in the pond is not functioning properly. Routine maintenance (mowing, trash removal, etc) can be extremely difficult for the upper stage if the ground is saturated. If this inspection item is checked, make sure you have identified the root cause of the problem.

*d. Sediment Accumulation* – Although other features within the EDB are designed to capture sediment, the upper storage area will collect sediment over time. Excessive amounts of sedimentation will result in a loss of storage volume. It may be more difficult to determine if this area has accumulated sediment without conducting a field survey.

Below is a list of indicators:

1. Ground adjacent to the trickle channel appears to be several inches higher than concrete/riprap
2. Standing water or boggy areas in upper stage
3. Uneven grades or mounds
4. Micro-pool or Forebay has excessive amounts of sediment

*e. Erosion (banks and bottom)* – The bottom grades of the dry storage are typically flat enough that erosion should not occur. However, inadequate vegetative cover may result in erosion of the upper stage. Erosion that occurs in the upper stage can result in increased dredging/maintenance of the micro-pool.

*f. Trash/Debris* – Trash and debris can accumulate in the upper area after large events, or from illegal dumping. Over time, this material can accumulate and clog the EDB outlet works.

*g. Maintenance Access* – Most EDBs typically have a gravel/concrete maintenance access path to either the upper stage or forebay. This access path should be inspected to ensure the surface is still drivable. Some of the smaller EDBs may not have maintenance access paths; however, the inspector should verify that access is available from adjacent properties.

#### EDB-2.3.9 Miscellaneous

There are a variety of inspection/maintenance issues that may not be attributed to a single feature within the EDB. This category on the inspection form is for maintenance items that are commonly found in the EDB, but may not be attributed to an individual feature.

*a. Encroachment in Easement Area* – Private lots/property can sometimes be located very close to the EDBs, even though they are required to be located in tracts with drainage easements. Property owners may place landscaping, trash, fencing, or other items within the easement area that may affect maintenance or the operation of the facility.

*b. Graffiti/Vandalism* – Damage to the EDB infrastructure can be caused by vandals. If criminal mischief is evident, the inspector should forward this information to the local Sheriff’s Office.

*c. Public Hazards* – Public hazards include items such as vertical drops of greater than 4-feet, containers of unknown/suspicious substances, exposed metal/jagged concrete on structures. **If any hazard is found within the facility area that poses an immediate threat to public safety, contact the local Sheriff at 911 immediately!**

*d. Burrowing Animals/Pests* – Prairie dogs and other burrowing rodents may cause damage to the EDB features and negatively affect the vegetation within the EDB.

*e. Other* – Any miscellaneous inspection/maintenance items not contained on the form should be entered here.

#### **EDB-2.4 Inspection Forms**

EDB Inspection forms are located in Appendix D. Inspection forms shall be completed by the person(s) conducting the inspection activities. Each form shall be reviewed and submitted by the property owner or property manager to the El Paso County per the requirements of the Operations and Maintenance Manual. These inspection forms shall be kept indefinitely and made available to the El Paso County upon request.

### **EDB-3 MAINTAINING EXTENDED DETENTION BASINS (EDBS)**

#### **EDB-3.1 Maintenance Personnel**

Maintenance personnel must be qualified to properly maintain EDBs. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs.

#### **EDB-3.2 Equipment**

It is imperative that the appropriate equipment and tools are taken to the field with the operations crew. The types of equipment/tools will vary depending on the task at hand. Below is a list of tools, equipment, and material(s) that may be necessary to perform maintenance on an EDB:

- 1.) Loppers/Tree Trimming Tools
- 2.) Mowing Tractors
- 3.) Trimmers (extra string)

- 4.) Shovels
- 5.) Rakes
- 6.) All Surface Vehicle (ASVs)
- 7.) Skid Steer
- 8.) Back Hoe
- 9.) Track Hoe/Long Reach Excavator
- 10.) Dump Truck
- 11.) Jet-Vac Machine
- 12.) Engineers Level (laser)
- 13.) Riprap (Minimum - Type M)
- 14.) Filter Fabric
- 15.) Erosion Control Blanket(s)
- 16.) Seed Mix (Native - Foothills)
- 17.) Illicit Discharge Cleanup Kits
- 18.) Trash Bags
- 19.) Tools (wrenches, screw drivers, hammers, etc)
- 20.) Chain Saw
- 21.) Confined Space Entry Equipment
- 22.) Approved Stormwater Facility Operation and Maintenance Manual

Some of the items identified above may not be needed for every maintenance operation. However, this equipment should be available to the maintenance operations crews should the need arise.

### **EDB-3.3 Safety**

Vertical drops may be encountered in areas located within and around the facility. Avoid walking on top of retaining walls or other structures that have a significant vertical drop. If a vertical drop is identified within the EDB that is greater than 48" in height, make the appropriate note/comment on the maintenance inspection form.

### **EDB-3.4 Maintenance Forms**

The EDB Maintenance Form provides a record of each maintenance operation performed by maintenance contractors. The EDB Maintenance Form shall be filled out in the field after the completion of the maintenance operation. Each form shall be reviewed and submitted by the property owner or property manager to the El Paso County per the requirements of the Operations and Maintenance Manual. The EDB Maintenance form is located in Appendix E.

### **EDB-3.5 Maintenance Categories and Activities**

A typical EDB Maintenance Program will consist of three broad categories of work. Within each category of work, a variety of maintenance activities can be performed on an EDB. A maintenance activity can be specific to each feature within the EDB, or general to the overall facility. This section of the SOP explains each of the categories and briefly describes the typical maintenance activities for an EDB.

A variety of maintenance activities are typical of EDBs. The maintenance activities range in magnitude from routine trash pickup to the reconstruction of drainage infrastructure. Below is a description of each maintenance activity, the objectives, and frequency of actions:

### **EDB-3.6 Routine Maintenance Activities**

The majority of this work consists of regularly scheduled mowing and trash and debris pickups for stormwater management facilities during the growing season. This includes items such as the removal of debris/material that may be clogging the outlet structure well screens and trash racks. It also includes activities such as weed control, mosquito treatment, and algae treatment. These activities normally will be performed numerous times during the year. These items can be completed without any prior correspondence with the El Paso County; however, completed inspection and maintenance forms shall be submitted to the EPC for each inspection and maintenance activity.

The Maintenance Activities are summarized below, and further described in the following sections.

### **TABLE – EDB-2**

### Summary of Routine Maintenance Activities

MAINTENANCE ACTIVITY	MINIMUM FREQUENCY	LOOK FOR:	MAINTENANCE ACTION
Mowing	Twice annually	Excessive grass height/aesthetics	Mow grass to a height of 4" to 6"
Trash/Debris Removal	Twice annually	Trash & debris in EDB	Remove and dispose of trash and debris
Outlet Works Cleaning	As needed - after significant rain events – twice annually min.	Clogged outlet structure; ponding water	Remove and dispose of debris/trash/sediment to allow outlet to function properly
Weed control	Minimum twice annually	Noxious weeds; Unwanted vegetation	Treat w/ herbicide or hand pull; Consult the local weed specialist
Mosquito Treatment	As needed	Standing water/mosquito habitat	Treat w/ EPA approved chemicals
Algae Treatment	As needed	Standing water/ Algal growth/green color	Treat w/ EPA approved chemicals

#### EDB-3.6.1 Mowing

Occasional mowing is necessary to limit unwanted vegetation and to improve the overall appearance of the EDB. Native vegetation should be mowed to a height of 4-to-6 inches tall. Grass clippings should be collected and disposed of properly.

*Frequency* – Routine - Minimum of twice annually or depending on aesthetics.

#### EDB-3.6.2 Trash/Debris Removal

Trash and debris must be removed from the entire EDB area to minimize outlet clogging and to improve aesthetics. This activity must be performed prior to mowing operations.

*Frequency* – Routine – Prior to mowing operations and minimum of twice annually.

#### EDB-3.6.3 Outlet Works Cleaning

Debris and other materials can clog the outlet work's well screen, orifice plate(s) and trash rack. This activity must be performed anytime other maintenance activities are conducted to ensure proper operation.

*Frequency* - Routine – After significant rainfall event or concurrently with other maintenance activities.

#### EDB-3.6.4 Weed Control

Noxious weeds and other unwanted vegetation must be treated as needed throughout the EDB. This activity can be performed either through mechanical means (mowing/pulling) or with herbicide. Consultation with the local Weed Inspector is highly recommended prior to the use of herbicide.

*Frequency* – Routine – As needed based on inspections.

#### EDB-3.6.5 Mosquito/Algae Treatment

Treatment of permanent pools is necessary to control mosquitoes and undesirable aquatic vegetation that can create nuisances. Only EPA approved chemicals/materials can be used in areas that are warranted.

*Frequency* – As needed.

### **EDB- 3.7 Minor Maintenance Activities**

This work consists of a variety of isolated or small-scale maintenance or operational problems. Most of this work can be completed by a small crew, tools, and small equipment. These items require prior correspondence with EPC and require completed inspection and maintenance forms to be submitted to EPC for each inspection and maintenance activity.

**Table – EDB-3  
Summary of Minor Maintenance Activities**



MAINTENANCE ACTIVITY	MINIMUM FREQUENCY	LOOK FOR:	MAINTENANCE ACTION
<b>Sediment Removal</b>	As needed; typically every 1 –2 years	Sediment build-up; decrease in pond volume	Remove and dispose of sediment
<b>Erosion Repair</b>	As needed, based upon inspection	Rills/gullies forming on side slopes, trickle channel, other areas	Repair eroded areas Revegetate; address source of erosion
<b>Vegetation Removal/Tree Thinning</b>	As needed, based upon inspection	Large trees/wood vegetation in lower chamber of pond	Remove vegetation; restore grade and surface
<b>Drain Cleaning/Jet Vac</b>	As needed, based upon inspection	Sediment build-up /non draining system	Clean drains; Jet Vac if needed

#### EDB-3.7.1 Sediment Removal

Sediment removal is necessary to maintain the original design volume of the EDB and to ensure proper function of the infrastructure. Regular sediment removal (minor) from the forebay, inflow(s), and trickle channel can significantly reduce the frequency of major sediment removal activities (dredging) in the upper and lower stages. The minor sediment removal activities can typically be addressed with shovels and smaller equipment. Major sediment removal activities will require larger and more specialized equipment. The major sediment activities will also require surveying with an engineer’s level, and consultation with EPC Engineering Staff to ensure design volumes/grades are achieved.

Stormwater sediments removed from EDBs do not meet the criteria of “hazardous waste”. However, these sediments are contaminated with a wide array of organic and inorganic pollutants and handling must be done with care. Sediments from permanent pools must be carefully removed to minimize turbidity, further sedimentation, or other adverse water quality impacts. Sediments should be transported by motor vehicle only after they are dewatered. All sediments must be taken to a landfill for proper disposal. Prompt and thorough cleanup is important should a spill occur during transportation.

*Frequency* – Nonroutine – As necessary based upon inspections. Sediment removal in the forebay and trickle channel may be necessary as frequently as every 1-2 years.

#### EDB-3.7.2 Erosion Repair

The repair of eroded areas is necessary to ensure the proper function of the EDB, minimize sediment transport, and to reduce potential impacts to other features. Erosion can vary in magnitude from minor repairs to trickle channels, energy dissipaters, and rilling to major gullies in the embankments and spillways. The repair of eroded areas may require the use of excavators, earthmoving equipment, riprap, concrete, erosion control blankets, and turf reinforcement mats. Major erosion repair to the pond embankments, spillways, and adjacent to structures will require consultation with EPC engineering staff.

*Frequency* – Nonroutine – As necessary based upon inspections.

#### EDB-3.7.3 Vegetation Removal/Tree Thinning

Dense stands of woody vegetation (willows, shrubs, etc) or trees can create maintenance problems for the infrastructure within an EDB. Tree roots can damage structures and invade pipes/channels thereby blocking flows. Also, trees growing in the upper and lower stages of the EDB will most likely have to be removed when sediment/dredging operations occur. A small tree is easier to remove than a large tree, therefore, regular removal/thinning is imperative. All trees and woody vegetation that is growing in the bottom of the EDB or near structures (inflows, trickle channels, outlet works, emergency spillways, etc) should be removed. Any trees or woody vegetation in the EDB should be limited to the upper portions of the pond banks.

*Frequency* – Nonroutine – As necessary based upon inspections.

#### EDB-3.7.4 Clearing Drains/Jet-Vac

An EDB contains many structures, openings, and pipes that can be frequently clogged with debris. These blockages can result in a decrease of hydraulic capacity and create standing water in areas outside of the micro-pool. Many times the blockage to this infrastructure can be difficult to access and/or clean. Specialized equipment (jet-vac machines) may be necessary to clear debris from these difficult areas.

*Frequency* – Nonroutine – As necessary based upon inspections.

### **EDB-3.8 Major Maintenance Activities**

This work consists of larger maintenance/operational problems and failures within the stormwater management facilities. All of this work requires

consultation with EPC to ensure the proper maintenance is performed. This work requires that the engineering staff review the original design and construction drawings to assess the situation and assign the necessary maintenance. **A public improvements permit shall be required for all major maintenance activities.** This work may also require more specialized maintenance equipment, design/details, surveying, or assistance through private contractors and consultants.

**Table – EDB-4  
Summary of Major Maintenance Activities**

<b>MAINTENANCE ACTIVITY</b>	<b>MINIMUM FREQUENCY</b>	<b>LOOK FOR:</b>	<b>MAINTENANCE ACTION</b>
Major Sediment Removal	As needed – based upon scheduled inspections	Large quantities of sediment; reduced pond capacity	Remove and dispose of sediment. Repair vegetation as needed
Major Erosion Repair	As needed – based upon scheduled inspections	Severe erosion including gullies, excessive soil displacement, areas of settlement, holes	Repair erosion – find cause of problem and address to avoid future erosion
Structural Repair	As needed – based upon scheduled inspections	Deterioration and/or damage to structural components – broken concrete, damaged pipes, outlet works	Structural repair to restore the structure to its original design

#### EDB-3.8.1 Major Sediment Removal

Major sediment removal consists of removal of large quantities of sediment or removal of sediment from vegetated areas. Care shall be given when removing large quantities of sediment and sediment deposited in vegetated areas. Large quantities of sediment need to be carefully removed, transported and disposed of. Vegetated areas need special care to ensure design volumes and grades are preserved.

*Frequency* – Nonroutine – Repair as needed based upon inspections.

#### EDB-3.8.2 Major Erosion Repair

Major erosion repair consist of filling and revegetating areas of severe erosion. Determining the cause of the erosion as well as correcting the condition that caused the erosion should also be part of the erosion

repair. Care should be given to ensure design grades and volumes are preserved.

*Frequency* – Nonroutine – Repair as needed based upon inspections.

### EDB-3.8.3 Structural Repair

An EDB includes a variety of structures that can deteriorate or be damaged during the course of routine maintenance. These structures are constructed of steel and concrete that can degrade or be damaged and may need to be repaired or re-constructed from time to time. These structures include items like outlet works, trickle channels, forebays, inflows and other features. In-house operations staff can perform some of the minor structural repairs. Major repairs to structures may require input from a structural engineer and specialized contractors. Consultation with EPC Engineering Staff should take place prior to all structural repairs.

*Frequency* – Nonroutine – Repair as needed based upon inspections.

#### Reference:

**This manual is adapted from Town of Parker, Colorado, *STORMWATER PERMANENT BEST MANAGEMENT PRACTICES (PBMP) LONG-TERM OPERATION AND MAINTENANCE MANUAL*, October 2004**

## APPENDIX D

# EXTENDED DETENTION BASIN (EDB) INSPECTION FORM

Date: \_\_\_\_\_

Subdivision/Business Name: \_\_\_\_\_ Inspector: \_\_\_\_\_

Subdivision/Business Address: \_\_\_\_\_

Weather: \_\_\_\_\_

Date of Last Rainfall: \_\_\_\_\_ Amount: \_\_\_\_\_ Inches

**Property Classification:** Residential    Multi Family    Commercial    Other: \_\_\_\_\_  
(Circle One)

**Reason for Inspection:** Routine                      Complaint                      After Significant Rainfall Event  
(Circle One)

**INSPECTION SCORING** - For each facility inspection item, insert one of the following scores:  
0 = No deficiencies identified                      2 = Routine maintenance required  
1 = Monitor (potential for future problem)                      3 = Immediate repair necessary  
N/A = Not applicable

## FEATURES

### 1.) Inflow Points

- Riprap Displaced
- Erosion Present/Outfall Undercut
- Sediment Accumulation
- Structural Damage (pipe, end-section, etc.)
- Woody Growth/Weeds Present

### 2.) Forebay

- Sediment/Debris Accumulation
- Concrete Cracking/Failing
- Drain Pipe/Wier Clogged (not draining)
- Wier/Drain Pipe Damage

### 3.) Trickle Channel (Low-flow)

- Sediment/Debris Accumulation
- Concrete/Riprap Damage
- Woody Growth/Weeds Present
- Erosion Outside Channel

### 4.) Bottom Stage (Micro-Pool)

- Sediment/Debris Accumulation
- Woody Growth/Weeds Present
- Bank Erosion
- Mosquitoes/Algae Treatment
- Petroleum/Chemical Sheen

### 5.) Outlet Works

- Trash Rack/Well Screen Clogged
- Structural Damage (concrete, steel, subgrade)
- Orifice Plate(s) Missing/Not Secure
- Manhole Access (cover, steps, etc.)
- Woody Growth/Weeds Present

### 6.) Emergency Spillway

- Riprap Displaced
- Erosion Present
- Woody Growth/Weeds Present
- Obstruction/Debris

### 7.) Upper Stage (Dry Storage)

- Vegetation Sparse
- Woody Growth/Undesirable Vegetation
- Standing Water/Boggy Areas
- Sediment Accumulation
- Erosion (banks and bottom)
- Trash/Debris
- Maintenance Access

### 8.) Miscellaneous

- Encroachment in Easement Area
- Graffiti/Vandalism
- Public Hazards
- Burrowing Animals/Pests
- Other

Inspection Summary / Additional Comments: \_\_\_\_\_

## **OVERALL FACILITY RATING (Circle One)**

0 = No Deficiencies Identified                      2 = Routine Maintenance Required  
1 = Monitor (potential for future problem exists)                      3 = Immediate Repair Necessary

This inspection form shall be kept indefinitely and made available to the El Paso County upon request.

## **APPENDIX E**

**EXTENDED DETENTION BASIN (EDB)  
MAINTENANCE FORM**

Subdivision/Business Name: \_\_\_\_\_ Completion Date: \_\_\_\_\_

Subdivision/Business Address: \_\_\_\_\_ Contact Name: \_\_\_\_\_

**Maintenance Category:**                      Routine                      Restoration                      Rehabilitation  
(Circle All That Apply)

**MAINTENANCE ACTIVITIES PERFORMED**

**ROUTINE WORK**

- \_\_\_ MOWING
- \_\_\_ TRASH/DEBRIS REMOVAL
- \_\_\_ OUTLET WORKS CLEANING (TRASH RACK/WELL SCREEN)
- \_\_\_ WEED CONTROL (HERBICIDE APPLICATION)
- \_\_\_ MOSQUITO TREATMENT
- \_\_\_ ALGAE TREATMENT

**RESTORATION WORK**

- \_\_\_ SEDIMENT REMOVAL
  - \_\_\_ FOREBAY
  - \_\_\_ TRICKLE CHANNEL
  - \_\_\_ INFLOW
- \_\_\_ EROSION REPAIR
  - \_\_\_ INFLOW POINT
  - \_\_\_ TRICKLE CHANNEL
- \_\_\_ VEGETATION REMOVAL/TREE THINNING
  - \_\_\_ INFLOW(S)
  - \_\_\_ TRICKLE CHANNEL
  - \_\_\_ UPPER STAGE
  - \_\_\_ BOTTOM STAGE
- \_\_\_ REVEGETATION
- \_\_\_ JET-VAC/CLEARING DRAINS
  - \_\_\_ FOREBAY
  - \_\_\_ OUTLET WORKS
  - \_\_\_ INFLOWS

**REHABILITATION WORK**

- \_\_\_ SEDIMENT REMOVAL (DREDGING)
  - \_\_\_ BOTTOM STAGE
  - \_\_\_ UPPER STAGE
- \_\_\_ EROSION REPAIR
  - \_\_\_ OUTLET WORKS
  - \_\_\_ UPPER STAGE
  - \_\_\_ BOTTOM STAGE
  - \_\_\_ SPILLWAY
- \_\_\_ STRUCTURAL REPAIR
  - \_\_\_ INFLOW
  - \_\_\_ OUTLET WORKS
  - \_\_\_ FOREBAY
  - \_\_\_ TRICKLE CHANNEL

OTHER \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

ESTIMATED TOTAL MANHOURS: \_\_\_\_\_

EQUIPMENT/MATERIAL USED: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

COMMENTS/ADDITIONAL INFO: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



## APPENDIX F

Annual Inspection and Maintenance Reporting Form  
for  
Stormwater Facilities

*(This form to be submitted to EPC prior to May 31 of each year)*

**Date:** \_\_\_\_\_

**To: El Paso County Department of Public Works  
Attn: Stormwater Facility Operations and Maintenance Program  
2880 International Circle, Suite 7437 South Fairplay Street  
Colorado Springs, CO 80922**

**Re: Certification of Inspection and Maintenance; Submittal of forms**

Property/Subdivision Name: \_\_\_\_\_

Property Address: \_\_\_\_\_

Contact Name: \_\_\_\_\_

I verify that the required stormwater facility inspections and required maintenance have been completed in accordance with the Stormwater Facilities Maintenance Agreement and the Operations and Maintenance Manual associated with the above referenced property.

The required Stormwater Facility Inspection and Maintenance forms are hereby provided.

\_\_\_\_\_  
Name of Party Responsible for Inspection  
& Maintenance

\_\_\_\_\_  
Property Owner

\_\_\_\_\_  
Authorized Signature

\_\_\_\_\_  
Signature

## **APPENDIX G**

**OPERATION AND MAINTENANCE SITE PLANS  
EXTENDED DETENTION BASIN (EDB)  
CHECKLIST FOR REQUIRED ITEMS**

**PLAN AND PROFILE SHEET**

Plan view shall include:

- Location and labels for all major features of EDB (inflow structure(s), forebay, micropool, trickle channel, access road, outlet work(s), spillway, maintenance access ramps, embankment, etc.)
- Contours
- Other utilities in vicinity of EDB
- Cross-reference to EDB Operation and Maintenance Details sheet
- Linework for right-of-way lines, lot lines, easements, and tracts
- Hatch indicating permanent water elevation in micropool.

Profile view shall include:

- Location and labels for all major features of EDB (inflow structure(s), forebay, micropool, trickle channel, access road, outlet work(s), spillway, maintenance access ramps, embankment, etc.)
- Invert elevations at major features of EDB (inflow structure(s), forebay, micropool, outlet work(s))
- Permanent pool elevation of micropool
- Water quality water surface elevation
- Water surface elevation of all applicable storm events
- Label for upper and bottom stages for EDB

**DETAIL SHEET**

Detail sheet shall include:

- Volume provided by the EDB forebay and micropool, including the WQCV
- WQCV drain time
- Seed mix
- Total mow area including approximate mow boundaries on each side of EDB
- Duplicate the following tables from the "Standard Operation Procedure for Extended Detention Basin Inspection and Maintenance" document:
  - o Inspection and Maintenance Requirements at Specific EDB Features
  - o Summary of Routine Maintenance Activities for an EDB
  - o Summary of Minor Maintenance Activities for an EDB
  - o Summary of Major Maintenance Activities for an EDB
- Water quality outlet works detail
- Water quality plate detail

- Maintenance access road detail
- Trickle channel typical section
- Forebay edge detail (or cross section) which includes maximum allowed sediment depth in forebay
- Forebay release structure detail
- Spillway detail(s), including cutoff wall

**OPERATION AND MAINTENANCE SITE PLANS  
STORMWATER FACILITIES MAP  
CHECKLIST FOR REQUIRED ITEMS**

Stormwater facilities map shall include:

- Labels for all streets (includes linework for edge of street and street name)
- Linework for right-of-way lines, lot lines, and tracts
- Linework and labels for all major drainageways
- Label roadways, developments, etc adjacent to project site
- Labels for all BMPs being constructed on project site including a summary table when multiple BMPs are present
- Legend for identifying features/line types on drawing (optional)

# HOMESTEAD AT STERLING RANCH FILING NO. 2

## COUNTY OF EL PASO, STATE OF COLORADO

# FINAL GRADING/EROSION CONTROL PLANS

### STANDARD CONSTRUCTION NOTES:

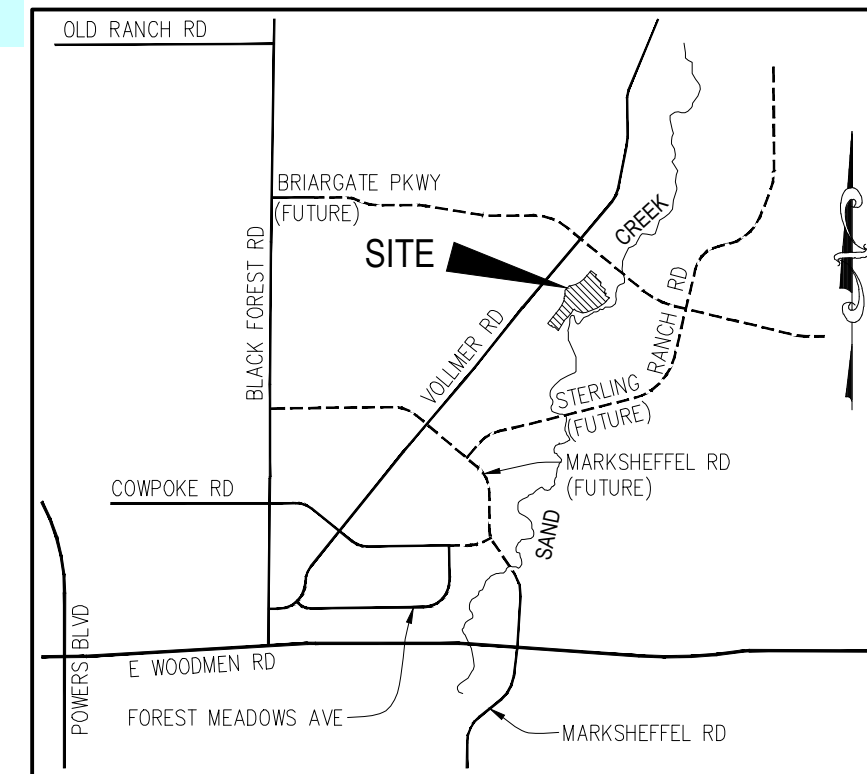
- ALL DRAINAGE AND ROADWAY CONSTRUCTION SHALL MEET THE STANDARDS AND SPECIFICATIONS OF THE CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL VOLUMES 1 AND 2, AND THE EL PASO COUNTY ENGINEERING CRITERIA MANUAL.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE NOTIFICATION AND FIELD LOCATION OF ALL EXISTING UTILITIES, WHETHER SHOWN ON THE PLANS OR NOT, BEFORE BEGINNING CONSTRUCTION. LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. CALL 811 TO CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO SPRINGS.
- CONTRACTOR SHALL KEEP A COPY OF THESE APPROVED PLANS, THE GRADING AND EROSION CONTROL PLAN, THE STORMWATER MANAGEMENT PLAN (SWMP), THE SOILS AND GEOTECHNICAL REPORT AND THE APPROPRIATE DESIGN AND CONSTRUCTION STANDARDS AND SPECIFICATIONS AT THE JOB SITE AT ALL TIME INCLUDING THE FOLLOWING:
  - EL PASO COUNTY ENGINEERING CRITERIA MANUAL (ECM)
  - CITY OF COLORADO SPRINGS/EL PASO COUNTY ENGINEERING CRITERIA MANUAL VOLUMES 1 AND 2.
  - COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARDS SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION.
  - CDOT M&S STANDARDS.
- IT IS THE DESIGN ENGINEERS RESPONSIBILITY TO ACCURACY SHOW EXISTING CONDITION BOTH ON-SITE AND OFF-SITE ON THE CONSTRUCTION PLANS. ANY MODIFICATION NECESSARY DUE TO CONFLICT OMISSIONS OR CHANGED CONDITIONS WILL BE ENTIRELY THE DEVELOPERS RESPONSIBILITY TO RECTIFY.
- ONCE THE ESQCP HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL THE INITIAL STAGE EROSION AND SEDIMENT CONTROL BMPs AS INDICATED ON THE GEC. A PRECONSTRUCTION MEETING BETWEEN THE CONTRACTOR, ENGINEER, AND EL PASO COUNTY WILL BE HELD PRIOR TO ANY CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COORDINATE THE MEETING TIME AND PLACE WITH COUNTY DSD INSPECTIONS STAFF.
- IT IS THE CONTRACTORS RESPONSIBILITY TO UNDERSTAND THE REQUIREMENTS OF ALL JURISDICTIONAL AGENCIES AND TO OBTAIN ALL REQUIRED PERMITS, INCLUDING BUT NOT LIMITED TO EL PASO COUNTY EROSION AND STORM WATER QUALITY CONTROL PERMIT (ESQCP), US ARMY CORPS OF ENGINEER ISSUED 401 AND/OR 404 PERMITS AND COUNTY AND STATE FUGITIVE DUST PERMITS.
- ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE CONSTRUCTION SITE AT APPROVED CONSTRUCTION ACCESS POINTS.
- ANY TEMPORARY SIGNAGE AND STRIPING SHALL COMPLY WITH EL PASO COUNTY DOW AND MUTCD CRITERIA.
- CONTRACTOR SHALL OBTAIN ANY PERMITS REQUIRE BY EL PASO COUNTY DOT INCLUDING WORK WITHIN THE RIGHT-OF-WAY AND SPECIAL TRANSPORT PERMITS.
- THE LIMITS OF CONSTRUCTION SHALL REMAIN WITHIN THE PROPERTY LINE UNLESS OTHERWISE NOTED. THE OWNER/DEVELOPER SHALL OBTAIN WRITTEN PERMISSION AND EASEMENTS, WHERE REQUIRED, FROM ADJOINING PROPERTY OWNER(S) PRIOR TO ANY OFFSITE DISTURBANCE GRADING, OR CONSTRUCTION.

### GRADING AND EROSION CONTROL NOTES:

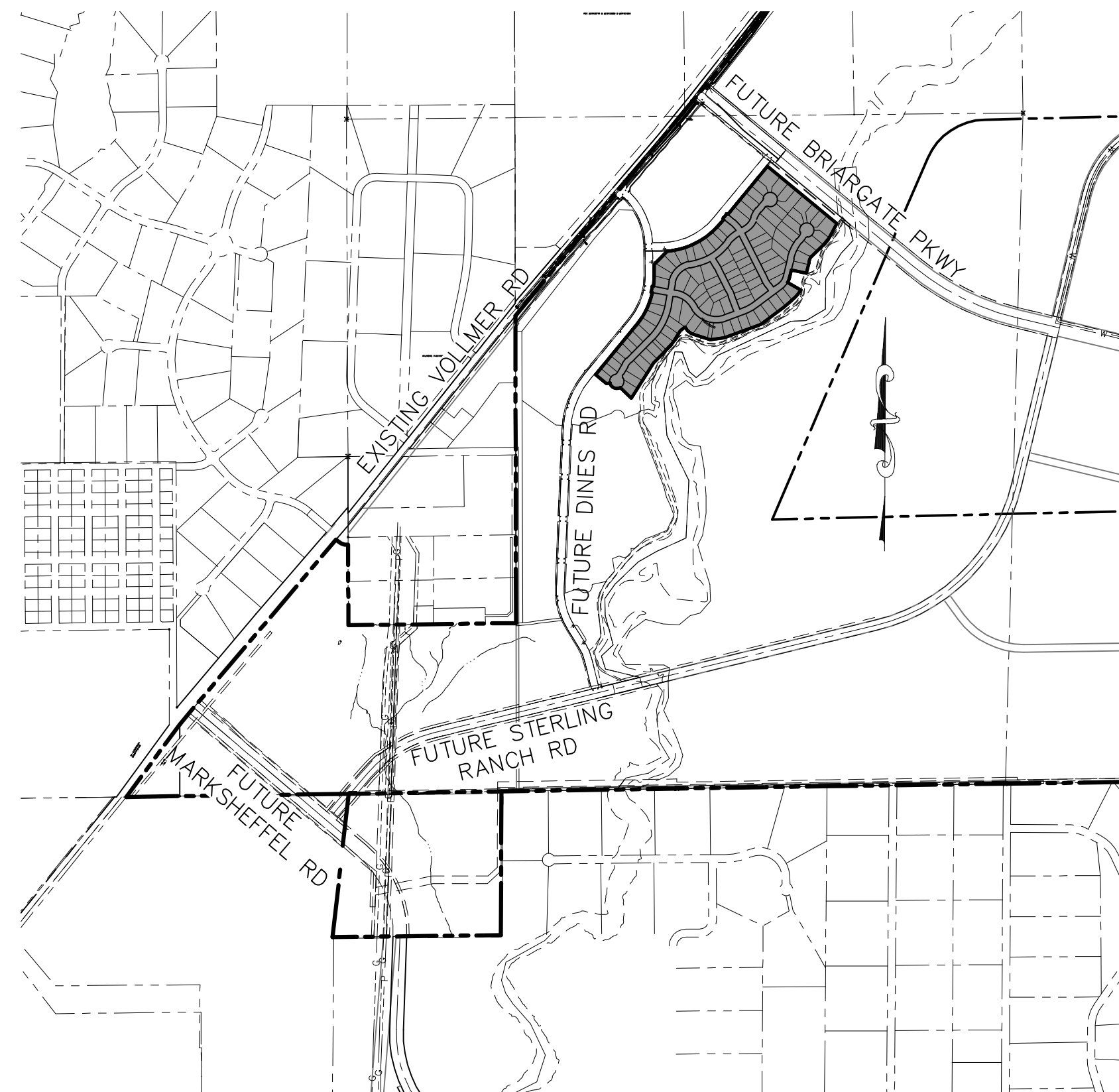
- STORMWATER DISCHARGES FROM CONSTRUCTION SITES SHALL NOT CAUSE OR THREATEN TO CAUSE POLLUTION, CONTAMINATION, OR DEGRADATION OF STATE WATERS. ALL WORK AND EARTH DISTURBANCE SHALL BE DONE IN A MANNER THAT MINIMIZES POLLUTION OF ANY ON-SITE OR OFF SITE WATERS, INCLUDING WETLANDS.
- NOTWITHSTANDING ANYTHING DEPICTED IN THESE PLANS IN WORDS OR GRAPHIC REPRESENTATION, ALL DESIGN AND CONSTRUCTION RELATED TO ROADS, STORM DRAINAGE AND EROSION CONTROL SHALL CONFORM TO THE STANDARDS AND REQUIREMENTS OF THE MOST RECENT VERSION OF THE RELEVANT ADOPTED EL PASO COUNTY STANDARDS, INCLUDING THE LAND DEVELOPMENT CODE, THE ENGINEERING CRITERIA MANUAL, THE DRAINAGE CRITERIA MANUAL, AND THE DRAINAGE CRITERIA MANUAL VOLUME 2. ANY DEVIATIONS TO REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING.
- A SEPARATE STORMWATER MANAGEMENT PLAN (SWMP) FOR THIS PROJECT SHALL BE COMPLETED AND AN EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP) ISSUED PRIOR TO COMMENCING CONSTRUCTION. DURING CONSTRUCTION THE SWMP IS THE RESPONSIBILITY OF THE DESIGNATED STORMWATER MANAGER, SHALL BE LOCATED ON SITE AT ALL TIMES AND SHALL BE KEPT UP TO DATE WITH WORK PROGRESS AND CHANGES IN THE FIELD.
- ONCE THE ESQCP HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL THE INITIAL STAGE EROSION AND SEDIMENT CONTROL BMPs AS INDICATED ON THE GEC. A PRECONSTRUCTION MEETING BETWEEN THE CONTRACTOR, ENGINEER, AND EL PASO COUNTY WILL BE HELD PRIOR TO ANY CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COORDINATE THE MEETING TIME AND PLACE WITH COUNTY DSD INSPECTIONS STAFF.
- SOIL EROSION CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN 21 CALENDAR DAYS AFTER FINAL GRADING, OR FINAL EARTH DISTURBANCE, HAS BEEN COMPLETED. DISTURBED AREAS AND STOCKPILES WHICH ARE NOT AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 30 DAYS SHALL ALSO BE MULCHED WITHIN 21 DAYS AFTER INTERIM GRADING. AN AREA THAT IS GOING TO REMAIN IN AN INTERIM STATE FOR MORE THAN 60 DAYS SHALL ALSO BE SEEDDED. ALL TEMPORARY SOIL EROSION CONTROL MEASURES AND BMPs SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED AND ESTABLISHED.
- TEMPORARY SOIL EROSION CONTROL FACILITIES SHALL BE REMOVED AND EARTH DISTURBANCE AREAS GRADED AND STABILIZED WITH PERMANENT SOIL EROSION CONTROL MEASURES PURSUANT TO STANDARDS AND SPECIFICATION PRESCRIBED IN THE DCM VOLUME II AND THE ENGINEERING CRITERIA MANUAL (ECM) APPENDIX I.
- ALL PERSONS ENGAGED IN EARTH DISTURBANCE SHALL IMPLEMENT AND MAINTAIN ACCEPTABLE SOIL EROSION AND SEDIMENT CONTROL MEASURES INCLUDING BMPs IN CONFORMANCE WITH THE EROSION CONTROL TECHNICAL STANDARDS OF THE DRAINAGE CRITERIA MANUAL (DCM) VOLUME II AND IN ACCORDANCE WITH THE STORMWATER MANAGEMENT PLAN (SWMP).
- ALL TEMPORARY EROSION CONTROL FACILITIES INCLUDING BMPs AND ALL PERMANENT FACILITIES INTENDED TO CONTROL EROSION OF ANY EARTH DISTURBANCE OPERATIONS, SHALL BE INSTALLED AS DEFINED IN THE APPROVED PLANS, THE SWMP AND THE DCM VOLUME II AND MAINTAINED THROUGHOUT THE DURATION OF THE EARTH DISTURBANCE OPERATION.
- ANY EARTH DISTURBANCE SHALL BE CONDUCTED IN SUCH A MANNER SO AS TO EFFECTIVELY REDUCE ACCELERATED SOIL EROSION AND RESULTING SEDIMENTATION. ALL DISTURBANCES SHALL BE DESIGNED, CONSTRUCTED, AND COMPLETED SO THAT THE EXPOSED AREA OF ANY DISTURBED LAND SHALL BE LIMITED TO THE SHORTEST PRACTICAL PERIOD OF TIME.
- ANY TEMPORARY OR PERMANENT FACILITY DESIGNED AND CONSTRUCTED FOR THE CONVEYANCE OF STORMWATER AROUND, THROUGH, OR FROM THE EARTH DISTURBANCE AREA SHALL BE DESIGNED TO LIMIT THE DISCHARGE TO A NON-EROSIVE VELOCITY.
- CONCRETE WASH WATER SHALL BE CONTAINED AND DISPOSED OF IN ACCORDANCE WITH THE SWMP. NO WASH WATER SHALL BE DISCHARGED TO OR ALLOWED TO RUNOFF TO STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES.
- EROSION CONTROL BLANKETING IS TO BE USED ON SLOPES STEEPER THAN 3:1.
- BUILDING, CONSTRUCTION, EXCAVATION, OR OTHER WASTE MATERIALS SHALL NOT BE TEMPORARILY PLACED OR STORED IN THE STREET, ALLEY, OR OTHER PUBLIC WAY, UNLESS IN ACCORDANCE WITH AN APPROVED TRAFFIC CONTROL PLAN. BMPs MAY BE REQUIRED BY EL PASO COUNTY ENGINEERING IF DEEMED NECESSARY, BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES.
- VEHICLE TRACKING OF SOILS AND CONSTRUCTION DEBRIS OFF-SITE SHALL BE MINIMIZED. MATERIALS TRACKED OFF-SITE SHALL BE CLEANED UP AND PROPERLY DISPOSED OF IMMEDIATELY.
- CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL WASTES FROM THE CONSTRUCTION SITE FOR DISPOSAL IN ACCORDANCE WITH LOCAL AND STATE REGULATORY REQUIREMENTS. NO CONSTRUCTION DEBRIS, TREE SLASH, BUILDING MATERIAL WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURIED, DUMPED, OR DISCHARGED AT THE SITE.
- THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, AND SAND THAT MAY ACCUMULATE IN THE STORM SEWER OR OTHER DRAINAGE CONVEYANCE SYSTEM AND STORMWATER APPURTENANCES AS A RESULT OF SITE DEVELOPMENT.
- THE QUANTITY OF MATERIALS STORED ON THE PROJECT SITE SHALL BE LIMITED, AS MUCH AS PRACTICAL, TO THAT QUANTITY REQUIRED TO PERFORM THE WORK IN AN ORDERLY SEQUENCE. ALL MATERIALS STORED ON-SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER, IN THEIR ORIGINAL CONTAINERS, WITH ORIGINAL MANUFACTURER'S LABELS.
- NO CHEMICALS ARE TO BE USED BY THE CONTRACTOR, WHICH HAVE THE POTENTIAL TO BE RELEASED IN STORMWATER UNLESS PERMISSION FOR THE USE OF SPECIFIC CHEMICAL IS GRANTED IN WRITING BY THE ECM ADMINISTRATOR. IN GRANTING THE USE OF SUCH CHEMICALS, SPECIAL CONDITIONS AND MONITORING MAY BE REQUIRED.
- BULK STORAGE STRUCTURES FOR PETROLEUM PRODUCTS AND OTHER CHEMICALS SHALL HAVE ADEQUATE PROTECTION SO AS TO CONTAIN ALL SPILLS AND PREVENT ANY SPILLED MATERIAL FROM ENTERING STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES.
- NO PERSON SHALL CAUSE THE IMPEDIMENT OF STORMWATER FLOW IN THE FLOW LINE OF THE CURB AND GUTTER OR IN THE DITCHLINE.
- INDIVIDUALS SHALL COMPLY WITH THE "COLORADO WATER QUALITY CONTROL ACT" (TITLE 25, ARTICLE 8, CRS), AND THE "CLEAN WATER ACT" (33 USC 1344), IN ADDITION TO THE REQUIREMENTS INCLUDED IN THE DCM VOLUME II AND THE ECM APPENDIX I. ALL APPROPRIATE PERMITS MUST BE OBTAINED BY THE CONTRACTOR PRIOR TO CONSTRUCTION (NPDES, FLOODPLAIN, 404, FUGITIVE DUST, ETC.). IN THE EVENT OF CONFLICTS BETWEEN THESE REQUIREMENTS AND LAWS, RULES, OR REGULATIONS OF OTHER FEDERAL, STATE, OR COUNTY AGENCIES, THE MORE RESTRICTIVE LAWS, RULES, OR REGULATIONS SHALL APPLY.
- ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE AT APPROVED CONSTRUCTION ACCESS POINTS.
- PRIOR TO ACTUAL CONSTRUCTION, THE PERMITEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.
- A WATER SOURCE SHALL BE AVAILABLE ON-SITE DURING EARTHWORK OPERATIONS AND UTILIZED AS REQUIRED TO MINIMIZE DUST FROM EARTHWORK EQUIPMENT AND WIND.
- THE SOILS REPORT FOR THIS SITE HAS BEEN PREPARED BY CTL THOMPSON, INC. AND SHALL BE CONSIDERED A PART OF THESE PLANS.
- AT LEAST TEN DAYS PRIOR TO THE ANTICIPATED START OF CONSTRUCTION, FOR PROJECTS THAT WILL DISTURB 1 ACRE OR MORE, THE OWNER OR OPERATOR OF CONSTRUCTION ACTIVITY SHALL SUBMIT A PERMIT APPLICATION FOR STORMWATER DISCHARGE TO THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, WATER QUALITY DIVISION. THE APPLICATION CONTAINS CERTIFICATION OF COMPLETION OF A STORMWATER MANAGEMENT PLAN (SWMP), OF WHICH THIS GRADING AND EROSION CONTROL PLAN MAY BE A PART. FOR INFORMATION OR APPLICATION MATERIALS CONTACT:  
COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT  
WATER QUALITY CONTROL DIVISION  
WQCD - PERMITS  
4300 CHERRY CREEK DRIVE SOUTH  
DENVER, CO 80246-1530  
ATTN: PERMITS UNIT
- NO PORTION OF THIS PROPERTY IS LOCATED WITHIN A DESIGNATED FEMA FLOODPLAIN IN ACCORDANCE WITH FLOOD INSURANCE RATE MAPS (FIRM) 08041C0535F, EFFECTIVE DATE MARCH 17, 1997.

Up date per comments on GEC submittal.

FEBRUARY 2019  
SF-19-004



VICINITY MAP  
N.T.S.



SITE MAP  
N.T.S.

### BENCHMARKS

- THE TOP OF AN ALUMINUM SURVEYORS CAP, STAMPED "9853", AT THE SOUTHEAST BOUNDARY CORNER OF BARBARICK SUBDIVISION  
NORTHING = 411416.273  
EASTING = 235167.071  
ELEVATION = 7023.42
- THE TOP OF A RED PLASTIC SURVEYORS CAP, ILLEGIBLE, AT THE NORTHWEST BOUNDARY CORNER OF PAWNEE RANCHEROS SUBDIVISION  
NORTHING = 410095.404  
EASTING = 235052.131  
ELEVATION = 7000.40
- THE TOP OF A RED PLASTIC SURVEYORS CAP, STAMPED "38141", AT THE SOUTHWEST BOUNDARY CORNER OF BARBARICK SUBDIVISION  
NORTHING = 411399.962  
EASTING = 233849.817  
ELEVATION = 7030.82

### ADDITIONAL NOTES:

STAGING AREA TO BE DETERMINED BY CONTRACTOR IN THE FIELD. THE LOCATIONS SHALL BE DELINEATED ON THIS PLAN BY THE CONTRACTOR.

THE EROSION CONTROL DELINEATED ON THIS PLAN SHALL BE REGULARLY UPDATED BY THE CONTRACTOR.

### AGENCIES

- OWNER/DEVELOPER: SR LAND, LLC  
20 BOULDER CRESCENT, SUITE 201  
COLORADO SPRINGS, CO 80901  
JIM MORLEY (719) 471-1742
- CIVIL ENGINEER: M & S CIVIL CONSULTANTS, INC.  
20 BOULDER CRESCENT, SUITE 110  
COLORADO SPRINGS, CO 80903  
VIRGIL A. SANCHEZ P.E. (719) 955-5485
- COUNTY ENGINEERING: EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT  
2880 INTERNATIONAL CIRCLE, SUITE 110  
COLORADO SPRINGS, CO 80910  
JEFF RICE, P.E. (719) 520-6300
- TRAFFIC ENGINEERING: EL PASO COUNTY DEPARTMENT OF PUBLIC WORKS  
3275 AKERS DRIVE  
COLORADO SPRINGS, CO 80922  
JENNIFER IRVINE, P.E. (719) 520-6460
- WATER RESOURCES: STERLING RANCH METRO DISTRICT ENGINEERS  
JDS-HYDRO CONSULTANTS  
545 E. PIKES PEAK AVE., SUITE 300  
COLORADO SPRINGS, CO 80903  
JOHN MCGINN (719) 668-8769
- FIRE DISTRICT: BLACK FOREST FIRE PROTECTION DISTRICT  
11445 TEACOUTH ROAD  
COLORADO SPRINGS, CO 80908  
CHIEF BRYAN JACK (719) 495-4300
- GAS DEPARTMENT: COLORADO SPRINGS UTILITIES  
7710 DURANT DR.  
COLORADO SPRINGS, CO 80947  
TIM WENDT (719) 668-3556
- ELECTRIC DEPARTMENT: MOUNTAIN VIEW ELECTRIC  
11140 E. WOODMEN ROAD  
FALCON, CO 80831  
(719) 495-2283
- COMMUNICATIONS: QWEST COMMUNICATIONS  
(U.N.C.C. LOCATORS) (800) 922-1987  
AT&T (LOCATORS) (719) 635-3674

### ENGINEER'S STATEMENT:

THIS GRADING AND EROSION CONTROL PLAN WAS PREPARED UNDER MY DIRECTION AND SUPERVISION AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. SAID PLAN HAS BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR GRADING AND EROSION CONTROL PLANS. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARING THIS REPORT.

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160 \_\_\_\_\_ DATE  
FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

### DEVELOPER'S STATEMENT:

THE UNDERSIGNED OWNER/DEVELOPER HAS READ AND WILL COMPLY WITH ALL THE REQUIREMENTS SPECIFIED IN THESE CONSTRUCTION PLANS AND THE ACCOMPANYING DRAINAGE REPORT.

JIM MORLEY \_\_\_\_\_ DATE  
SR LAND, LLC  
20 BOULDER CRESCENT, SUITE 201  
COLORADO SPRINGS, CO 80901  
(719) 471-1742

### EL PASO COUNTY:

COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA AND ENGINEERING CRITERIA MANUAL AS AMENDED.

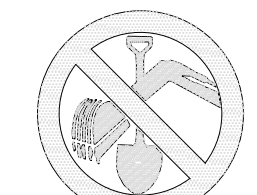
JENNIFER IRVINE, P.E. \_\_\_\_\_ DATE  
COUNTY ENGINEER/ECM ADMINISTRATOR

### SHEET INDEX

SHEET	TITLE SHEET
SHEET 1	TITLE SHEET
SHEET 2	GRADING & EROSION CONTROL PLAN
SHEET 3	GRADING & EROSION CONTROL PLAN
SHEET 4	GRADING & EROSION CONTROL DETAILS
SHEET 5	GRADING & EROSION CONTROL DETAILS
SHEET 6	GRADING & EROSION CONTROL DETAILS

### STATEMENT:

THE CITY OF COLORADO SPRINGS REGIONAL DESIGN ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN; THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY. RESUBMITTAL REQUIRED IF CONSTRUCTION HAS NOT COMMENCED WITHIN 180 DAYS AFTER APPROVAL DATE.



FOR BURIED UTILITY INFORMATION  
48 HRS BEFORE YOU DIG  
CALL 1-800-922-1987

HOMESTEAD AT STERLING RANCH FILING NO. 2

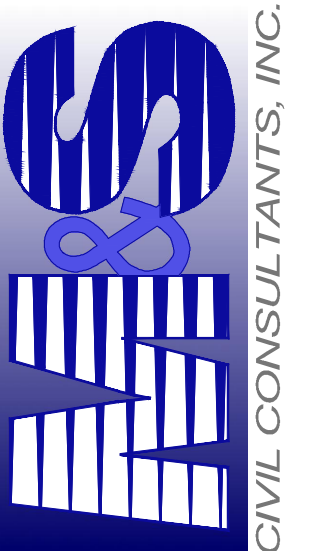
FINAL GRADING / EROSION CONTROL PLAN

PROJECT NO. 09-007 FILE: \\ang\Constr\Draw\Grading & Erosion Control Plans\FGR01.dwg DATE: 02-13-19

DESIGNED BY: JWP SCALE: N/A  
DRAWN BY: JWP HORIZ: N/A  
CHECKED BY: GW VERT: N/A

FGR01

20 BOULDER CRESCENT, SUITE 110  
COLORADO SPRINGS, CO 80903  
PHONE: 719.955.5485



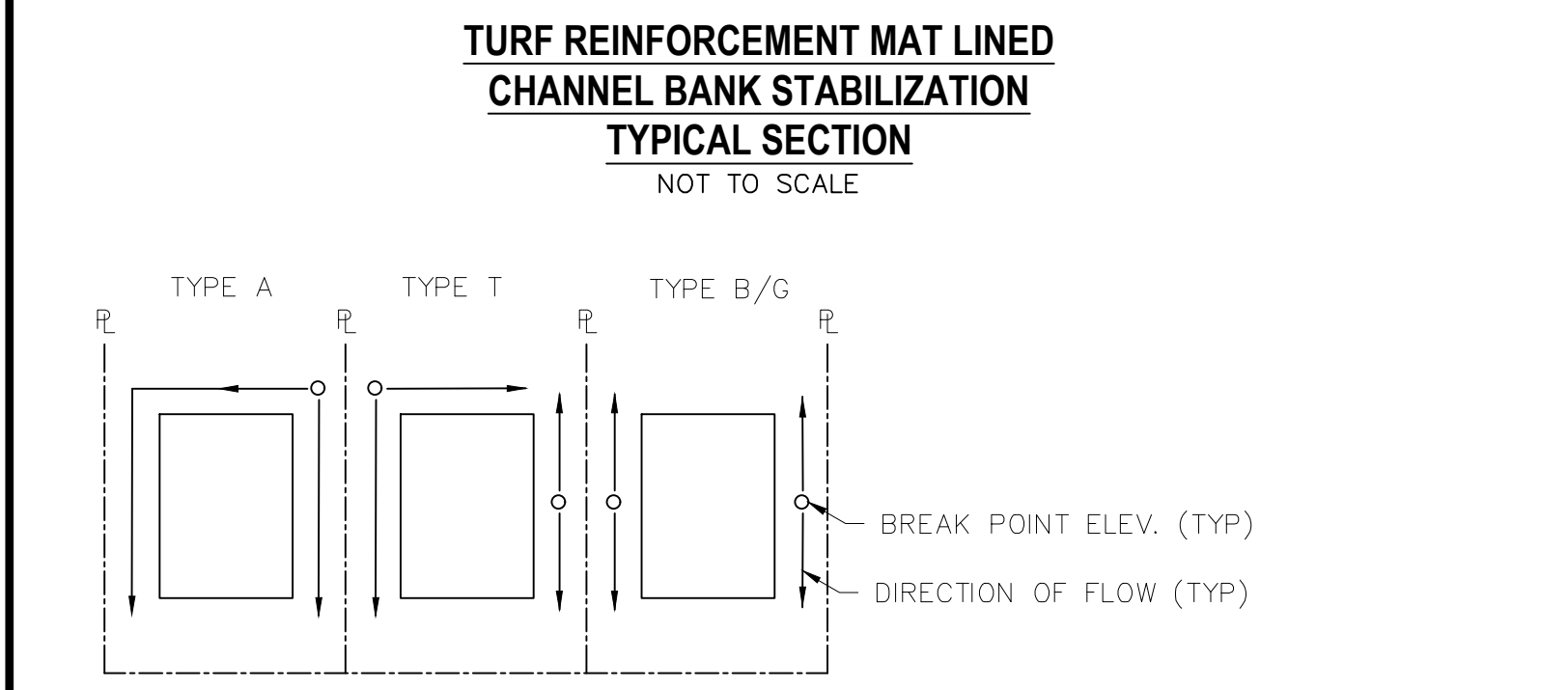
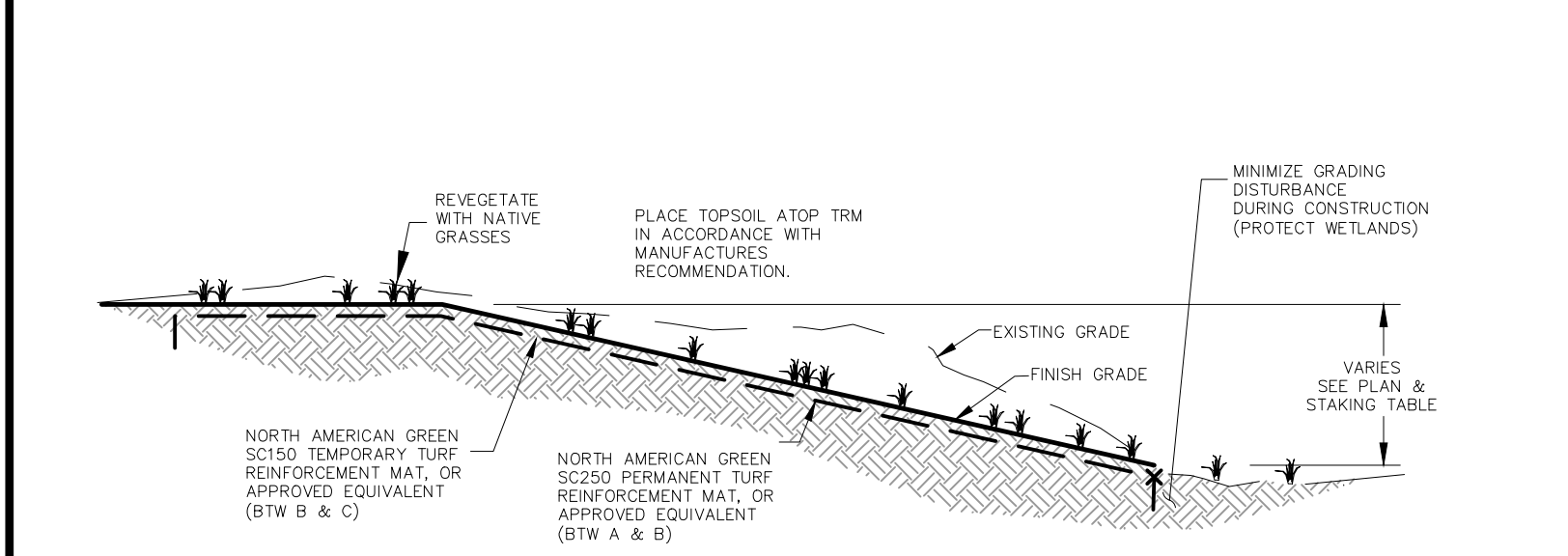
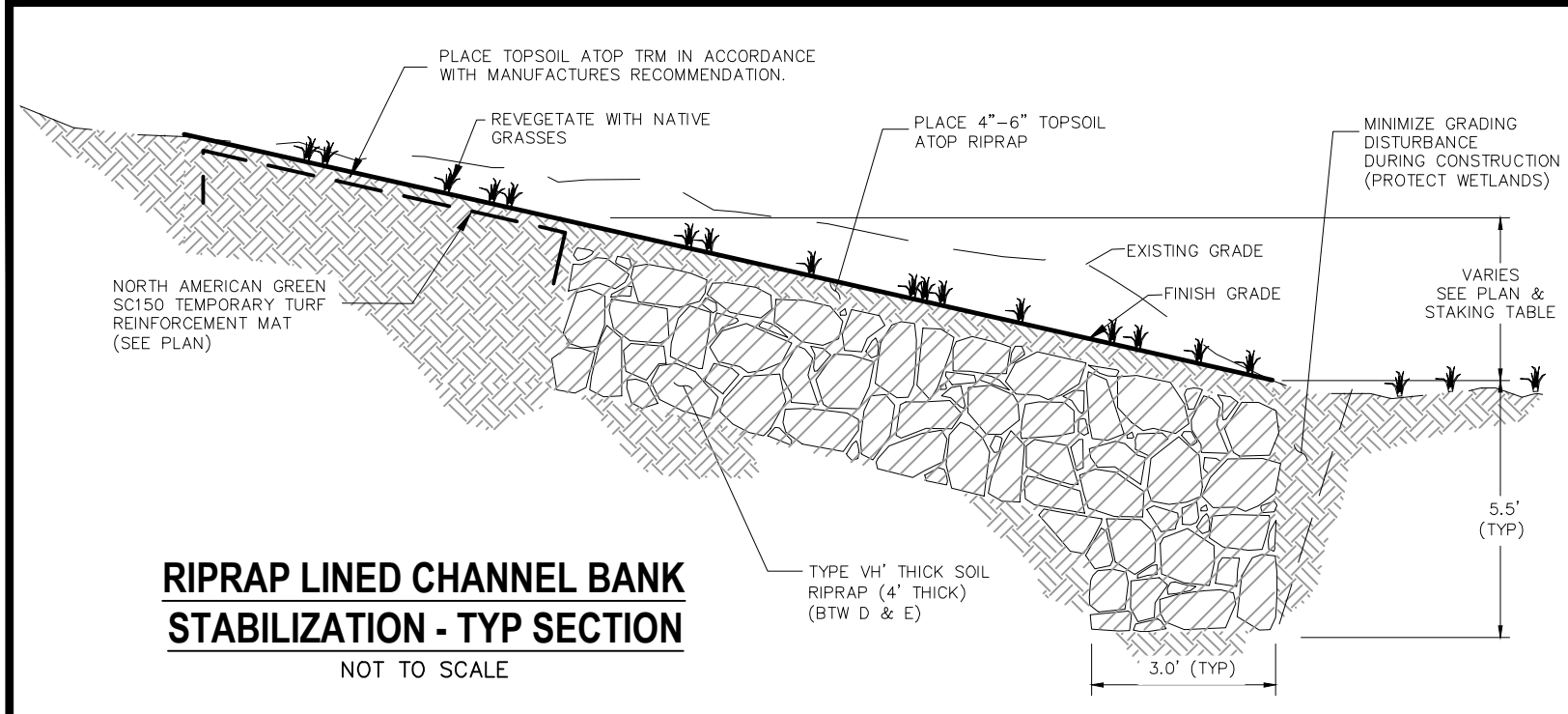
FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 37160

REVISIONS: NO. DATE: BY: DESCRIPTION:

THE ENGINEER PREPARES THESE PLANS WILL NOT BE RESPONSIBLE FOR UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

CAUTION



LOT DRAINAGE TYPES AND SWALE DIRECTION  
NOT TO SCALE

**ADDITIONAL NOTES:**  
STAGING, STORAGE AND STOCKPILE AREAS TO BE DETERMINED BY CONTRACTOR IN THE FIELD. THE LOCATIONS SHALL BE DELINEATED ON THIS PLAN BY THE CONTRACTOR.

THE EROSION CONTROL DELINEATED ON THIS PLAN SHALL BE REGULARLY UPDATED BY THE CONTRACTOR.

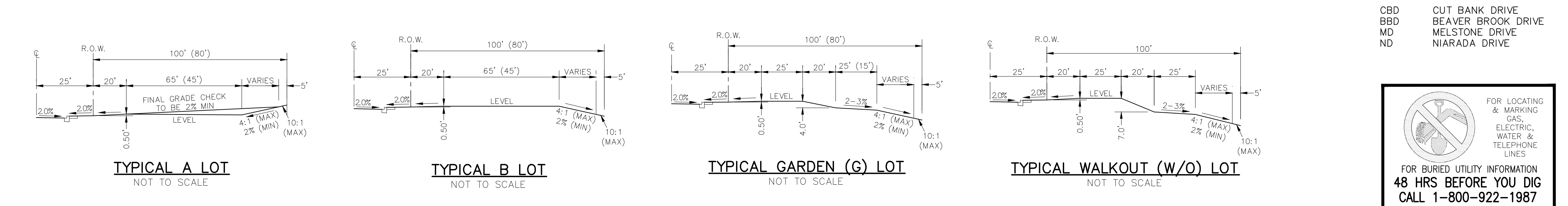
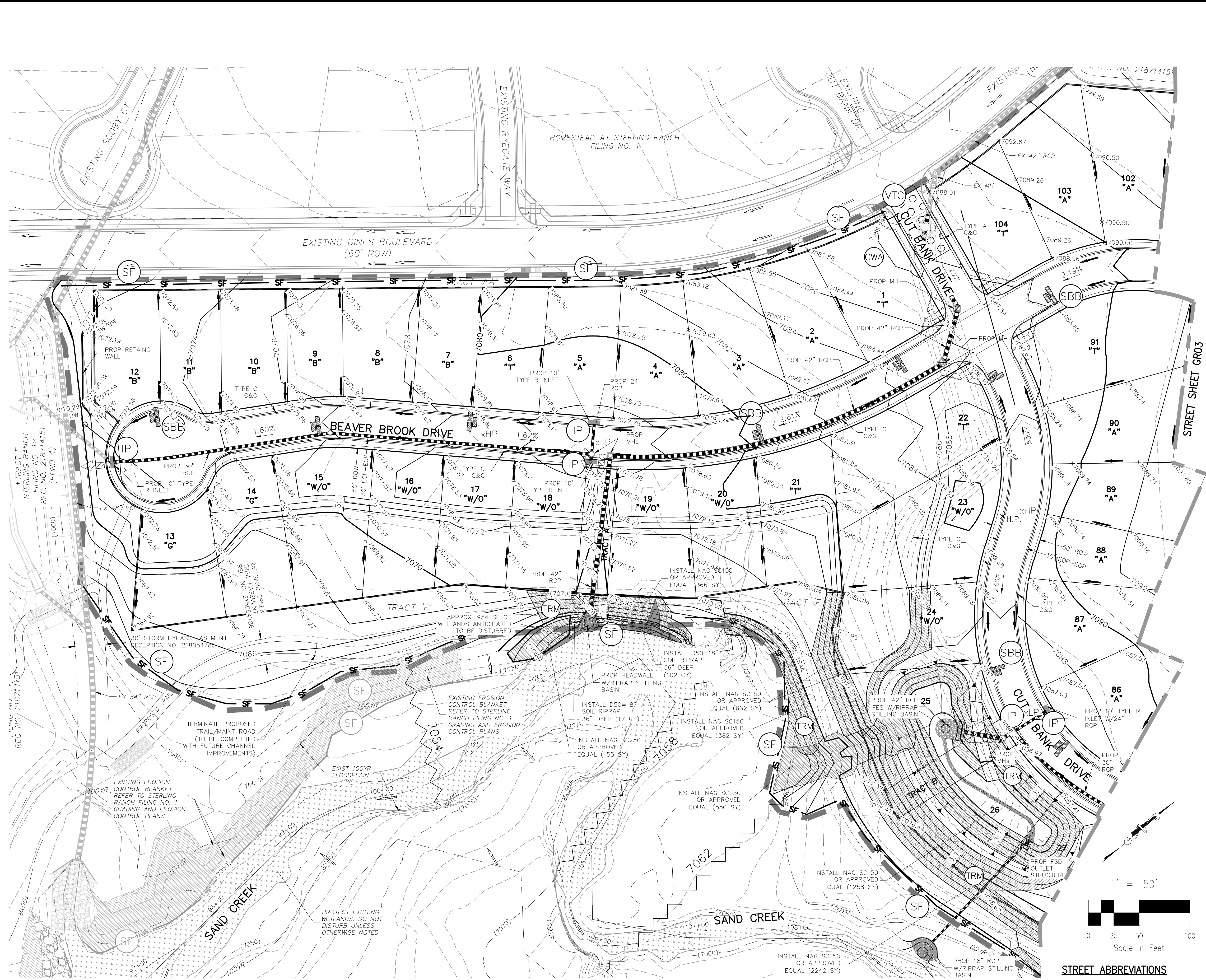
**CONSTRUCTION NOTES:**  
NO WETLANDS ARE TO BE PERMANENTLY DISTURBED PER THIS GRADING PLAN.  
NO EARLY GRADING IS TO OCCUR WITHIN THE 100 YEAR FLOODPLAIN.

ALL TEMPORARY RIPRAP SHOWN ON THE PLANS SHALL BE TYPE 'M'. RIPRAP SHALL BE PLACED IN THE LOCATIONS INDICATED BY THE PLAN OR IN AREAS AS THE CONTRACTOR SEES FIT TO CONTROL EROSION. ALL RIPRAP SHALL BE PLACED AT A MINIMUM THICKNESS OF 1.5' DEEP.

ALL TEMPORARY STORM SEWER SHOWN ON PLANS SHALL BE 24" DIA. HP POLYPROPYLENE BY ADS OR APPROVED EQUAL. ALL PIPE SHALL BE LAID TO ACHIEVE A MIN. SLOPE OF 0.5%.

**LEGEND**

(6920) ———	EXISTING MAJOR CONTOUR	□	INLET
(6918) - - - -	EXISTING MINOR CONTOUR	L.P./H.P.	LOW POINT/HIGH POINT
6920 ———	PROPOSED MAJOR CONTOUR	(2.0)%	FLOW DIRECTION & SLOPE
6918 - - - -	PROPOSED MINOR CONTOUR	→	FLOW DIRECTION ARROW
—————	FILING BOUNDARY LINE	→	EXISTING FLOW DIRECTION ARROW
—————	RIGHT-OF-WAY LINE	→	EMERGENCY OVERFLOW DIRECTION
—————	PROPOSED PROPERTY LINE	◀▶	RIPRAP TYP.
—————	FUTURE PROPERTY LINE	◐◑	CWA
—————	EXISTING PROPERTY LINE	◐◑	IP
—————	LIMITS OF DISTURBANCE/ CONSTRUCTION BOUNDARY	◐◑	SBB
—————	CURB & GUTTER FLOW LINE	◐◑	SF
—————	PROPOSED STORM DRAIN	◐◑	SF
—————	EXISTING STORM DRAIN	◐◑	SF
—————	SWALE	◐◑	SF
—————	100YR FLOOD PLAIN	◐◑	SF
A	TYPE A LOT	◐◑	SF
B	TYPE B LOT	◐◑	SF
G	TYPE G LOT	◐◑	SF
W/O	TYPE G LOT	◐◑	SF
T	TRANSITION LOT	◐◑	SF
◐◑	EX. WETLANDS	◐◑	SF
◐◑	WETLAND DISTURBANCE	◐◑	SF



TYPICAL A LOT NOT TO SCALE  
TYPICAL B LOT NOT TO SCALE  
TYPICAL GARDEN (G) LOT NOT TO SCALE  
TYPICAL WALKOUT (W/O) LOT NOT TO SCALE

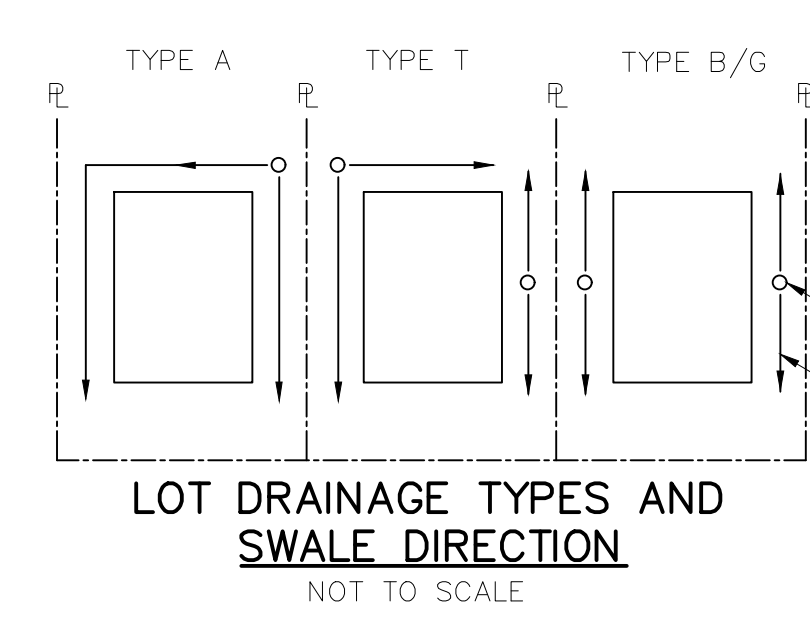
**HOMESTEAD AT STERLING RANCH FILING NO. 2**  
**FINAL GRADING / EROSION CONTROL PLAN**  
PROJECT NO. 09-007 DATE: 02-13-19  
SCALE: HORIZONTAL: 1"=50' VERTICAL: N/A  
DESIGNED BY: JWP DRAWN BY: JWP CHECKED BY: GW  
20 BOULDER CRESCENT SUITE 110 COLORADO SPRINGS, CO 80903 PHONE: 719.555.5485  
**CIVIL CONSULTANTS, INC.**  
FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.  
APPROVED BY: DATE: REVISIONS: NO. DATE: BY: DESCRIPTION:  
FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES  
FOR BURIED UTILITY INFORMATION  
48 HRS BEFORE YOU DIG  
CALL 1-800-922-1987  
CAUTION

File: C:\080071\Sterling Ranch No 6 (Veg)\Const Draw\Grading Plans\Final Grading Plan\FGR02-03.dwg PlotStamp: 2/22/2019 10:51 AM



**LEGEND**

(6920)	EXISTING MAJOR CONTOUR
(6918)	EXISTING MINOR CONTOUR
6920	PROPOSED MAJOR CONTOUR
6918	PROPOSED MINOR CONTOUR
---	FILING BOUNDARY LINE
---	RIGHT-OF-WAY LINE
---	PROPOSED PROPERTY LINE
---	FUTURE PROPERTY LINE
---	EXISTING PROPERTY LINE
---	LIMITS OF DISTURBANCE/ CONSTRUCTION BOUNDARY
---	CURB & GUTTER FLOW LINE
---	PROPOSED STORM DRAIN
---	EXISTING STORM DRAIN
---	SWALE
---	100-YR FLOOD PLAIN
A	TYPE A LOT
B	TYPE B LOT
G	TYPE G LOT
W/O	TYPE W/O LOT
T	TRANSITION LOT
[Pattern]	EX. WETLANDS
[Pattern]	WETLAND DISTURBANCE
[Symbol]	INLET
[Symbol]	LOW POINT/HIGH POINT (2.0%)
[Symbol]	FLOW DIRECTION & SLOPE
[Symbol]	FLOW DIRECTION ARROW
[Symbol]	EXISTING FLOW DIRECTION ARROW
[Symbol]	EMERGENCY OVERFLOW DIRECTION
[Symbol]	RIPRAP TYP.
[Symbol]	CONCRETE WASHOUT AREA (CWA)
[Symbol]	INLET PROTECTION (IP)
[Symbol]	STRAW BALE DITCH CHECK (SBB)
[Symbol]	SILT FENCE (SF)
[Symbol]	VEHICLE TRACKING CONTROL (VTC)
[Symbol]	NORTH AMERICAN GREEN SC250 PERMANENT EROSION CONTROL BLANKET (OR APPROVED EQUAL) (TRM)
[Symbol]	NORTH AMERICAN GREEN SC150 TEMPORARY EROSION CONTROL BLANKET (OR APPROVED EQUAL) (TRM)



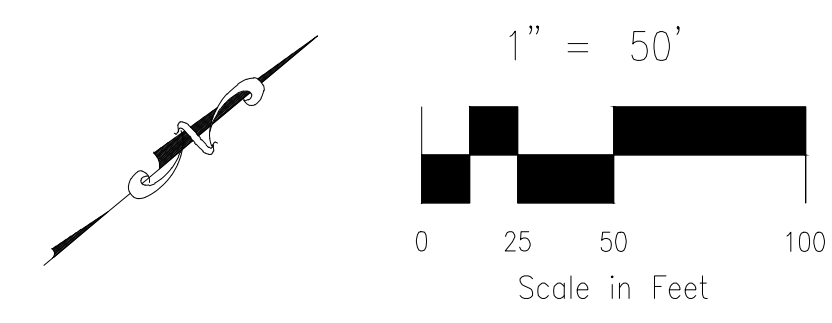
**ADDITIONAL NOTES:**  
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**STREET ABBREVIATIONS**

CBD	CUT BANK DRIVE
BBD	BEAVER BROOK DRIVE
MD	MELSTONE DRIVE
ND	NIARADA DRIVE

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES

FOR BURIED UTILITY INFORMATION  
48 HRS BEFORE YOU DIG  
CALL 1-800-922-1987

**HOMESTEAD AT STERLING RANCH FILING NO. 2**

**GRADING PLAN**

PROJECT NO. 09-007 DATE: 02-13-19

SCALE: HORIZONTAL: 1"=50' VERTICAL: N/A

DESIGNED BY: JWP DRAWN BY: JWP CHECKED BY: N/A

20 BOULDER CRESCENT, SUITE 110  
COLORADO SPRINGS, CO 80903  
PHONE: 719.555.5485

**CIVIL CONSULTANTS, INC.**

FOR AND ON BEHALF OF MAS CIVIL CONSULTANTS, INC.

REVISIONS:

NO.	DATE	BY	DESCRIPTION

CAUTION

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EC-2 Temporary and Permanent Seeding (TS/PS)

soil amendments and rototill them into the soil to a depth of 6 inches or more.

Topsoil should be salvaged during grading operations for use and spread on areas to be revegetated later. Topsoil should be viewed as an important resource to be utilized for vegetation establishment, due to its water-holding capacity, structure, texture, organic matter content, biological activity, and nutrient content.

Where topsoil is not available, subsoils should be amended to provide an appropriate plant-growth medium. Organic matter, such as well digested compost, can be added to improve soil characteristics conducive to plant growth.

If the disturbed ground surface is compacted, rip or rototill the surface prior to placing topsoil. If adding compost to the existing soil surface, rontilling is necessary. Surface roughening will assist in placement of a stable topsoil layer on steeper slopes, and allow infiltration and root penetration to greater depth.

Seed Mix for Temporary Vegetation

To provide temporary vegetative cover on disturbed areas which will not be planted, built upon, or fully landscaped or worked for an extended period (typically 30 days or more), plant an annual grass appropriate for the time of planting and match the planted areas. Annual grasses suitable for the Denver metropolitan area are listed in Table TS/PS-1.

Seed Mix for Permanent Revegetation

To provide vegetative cover on disturbed areas that have reached final grade, a perennial grass mix should be established. Permanent seeding should be performed promptly (typically within 14 days) after reaching final grade. Each site will have different characteristics and a landscape professional or the local jurisdiction should be contacted to determine the most suitable seed mix for a specific site.

If desired for wildlife habitat or landscape diversity, shrubs such as rubber rabbitbrush (Chrysothamnus nauseosus), flowering salsbush (Atriplex canescens) and skunkbrush sumac (Rhus trilobata) could be added to the upland seedmixes at 0.25, 0.5 and 1 pound PLS/acre, respectively.

Table with 3 columns: TS/PS-2, Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3, June 2012

EC-2 Temporary and Permanent Seeding (TS/PS)

Table TS/PS-3. Seeding Dates for Annual and Perennial Grasses

Table with 6 columns: Seeding Dates, Annual Grasses (Warm, Cool), Perennial Grasses (Warm, Cool). Rows include January-March, March-April, May-July, July-September, and October-December.

Mulch

Cover seeded areas with mulch or an appropriate rolled erosion control product to promote establishment of vegetation. Anchor mulch by crimping, netting or use of a non-toxic tackifier. See the Mulching BMP Fact Sheet for additional guidance.

Maintenance and Removal

Monitor and observe seeded areas to identify areas of poor growth or areas that fail to germinate. Reseed and mulch these areas, as needed. An area that has been permanently seeded should have a good stand of vegetation within one growing season if irrigated and within three growing seasons without irrigation in Colorado.

Re-seed areas may require irrigation, particularly during extended dry periods. Targeted weed control may also be necessary. Protect seeded areas from construction equipment and vehicle access.

Table with 3 columns: TS/PS-6, Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3, June 2012

Temporary and Permanent Seeding (TS/PS) EC-2

Seeding dates for the highest success probability of perennial species along the Front Range are generally in the spring from April through early May and in the fall after the first of September until the ground freezes.

Table TS/PS-1. Minimum Drill Seeding Rates for Various Temporary Annual Grasses

Table with 5 columns: Species (Common name), Growth Season, Pure Live Seed (PLS)/acre, Planting Depth (Inches). Rows include Oats, Spring wheat, Spring barley, Annual ryegrass, Millet, and Sorghum.

Successful seeding of annual grass resulting in adequate plant growth will usually produce enough dead-plant residue to provide protection from wind and water erosion for an additional year. This assumes that the cover is not disturbed or moved closer than 8 inches.

Hydraulic seeding may be substituted for drilling only where slopes are steeper than 3:1 or where access limitations exist. When hydraulic seeding is used, hydraulic mulching should be applied as a separate operation, when practical, to prevent the seeds from being encapsulated in the mulch.

Table with 3 columns: June 2012, Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3, TS/PS-3

Revegetation Chapter 14

Table 14-12. Recommended Seed Mix for all other Soils in Upland Areas

Table with 6 columns: Common Name (Variety), Scientific Name, Growth Season, Growth Form, Seeds/Lb, Lbs PLS/Acre Drilled, Lbs PLS/Acre Broadcast or Hydroseeded. Rows include Sheep fescue, Cribby bluegrass, Thickspike wheatgrass, Western wheatgrass, Blue grama, Switchgrass, Side-oats grama, Annual rye, Wildflowers, Blanket flower, Prairie coneflower, Purple prairie clover, Gayfeather, Flax, Penstemon, and Yarrow.

The seed mixes in Tables 14-9 through 14-12 include recommended wildflowers that can be sown at the same time or after the grass seed mix. Table 14-13 includes a general wildflower seed mix that can be used in sunny locations.

Table with 3 columns: 14-24, City of Colorado Springs Drainage Criteria Manual, Volume 1, May 2014

EC-2 Temporary and Permanent Seeding (TS/PS)

Table TS/PS-2. Minimum Drill Seeding Rates for Perennial Grasses

Table with 6 columns: Common Name, Botanical Name, Growth Season, Growth Form, Seeds/Pound, Pounds of PLS/Acre. Rows include Alkali sacaton, Basin wildrye, Sodar streambank wheatgrass, Joee tall wheatgrass, Arriba western wheatgrass, Fertile Loamy Soil Seed Mix, Ephemeral crested wheatgrass, Dural hard fescue, Lincoln smooth brome, Sodar streambank wheatgrass, Arriba western wheatgrass, High Water Table Soil Seed Mix, Meadow fescue, Redtop, Reed canarygrass, Lincoln smooth brome, Pautlander switchgrass, Alta tall wheatgrass, Transition Turf Seed Mix, Ruessius Canadian bluegrass, Dural hard fescue, Citation perennial ryegrass, Lincoln smooth brome.

Table with 3 columns: TS/PS-4, Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3, June 2012

SC-6 Inlet Protection (IP)

IP-3. Rock Sock Inlet Protection for Sump/Area Inlet
IP-4. Silt Fence Inlet Protection for Sump/Area Inlet
IP-5. Over-excavation Inlet Protection
IP-6. Straw Bale Inlet Protection for Sump/Area Inlet
CIP-1. Culvert Inlet Protection
Proprietary inlet protection devices should be installed in accordance with manufacturer specifications.

Inlets Located in a Sump
When applying inlet protection in sump conditions, it is important that the inlet continue to function during larger runoff events. For curb inlets, the maximum height of the protective barrier should be lower than the top of the curb opening to allow overflow into the inlet during larger storms without excessive localized flooding.

Inlets Located on a Slope
For curb and gutter inlets on paved sloping streets, block and rock sock inlet protection is recommended in conjunction with curb socks in the gutter leading to the inlet. For inlets located along unpaved roads, also see the Check Dam Fact Sheet.

Maintenance and Removal
Inspect inlet protection frequently. Inspection and maintenance guidance includes:

- Inspect for tears that can result in sediment directly entering the inlet, as well as result in the contents of the BMP (e.g., gravel) washing into the inlet.
- Check for improper installation resulting in untreated flows bypassing the BMP and directly entering the inlet or bypassing to an unprotected downstream inlet.
- Look for displaced BMPs that are no longer protecting the inlet.
- Monitor sediment accumulation upgradient of the inlet protection.

Table with 3 columns: IP-2, Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3, August 2013

Temporary and Permanent Seeding (TS/PS) EC-2

Table TS/PS-2. Minimum Drill Seeding Rates for Perennial Grasses (cont.)

Table with 6 columns: Common Name, Botanical Name, Growth Season, Growth Form, Seeds/Pound, Pounds of PLS/Acre. Rows include Blue gram, Camper little bluestem, Prairie sandreed, Sand dropseed, Vaughn sidetons grama, Arriba western wheatgrass, Heavy Clay, Rocky Foothill Seed Mix, Ephemeral crested wheatgrass, Sodar streambank wheatgrass, Vaughn sidetons grama, Lincoln smooth brome, Arriba western wheatgrass.

Table with 3 columns: June 2012, Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3, TS/PS-5

Inlet Protection (IP) SC-6

Remove sediment accumulation from the area upstream of the inlet protection, as needed to maintain BMP effectiveness, typically when it reaches no more than half the storage capacity of the inlet protection. For silt fence, remove sediment when it accumulates to a depth of no more than 6 inches. Remove sediment accumulation from the area upstream of the inlet protection as needed to maintain the functionality of the BMP.

Proprietary inlet protection devices should be inspected and maintained in accordance with manufacturer specifications. If proprietary inlet insert devices are used, sediment should be removed in a timely manner to prevent devices from breaking and spilling sediment into the storm drain. Inlet protection must be removed and properly disposed of when the drainage area for the inlet has reached final stabilization.

Table with 3 columns: August 2013, Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3, IP-3

Silt Fence (SF) SC-1

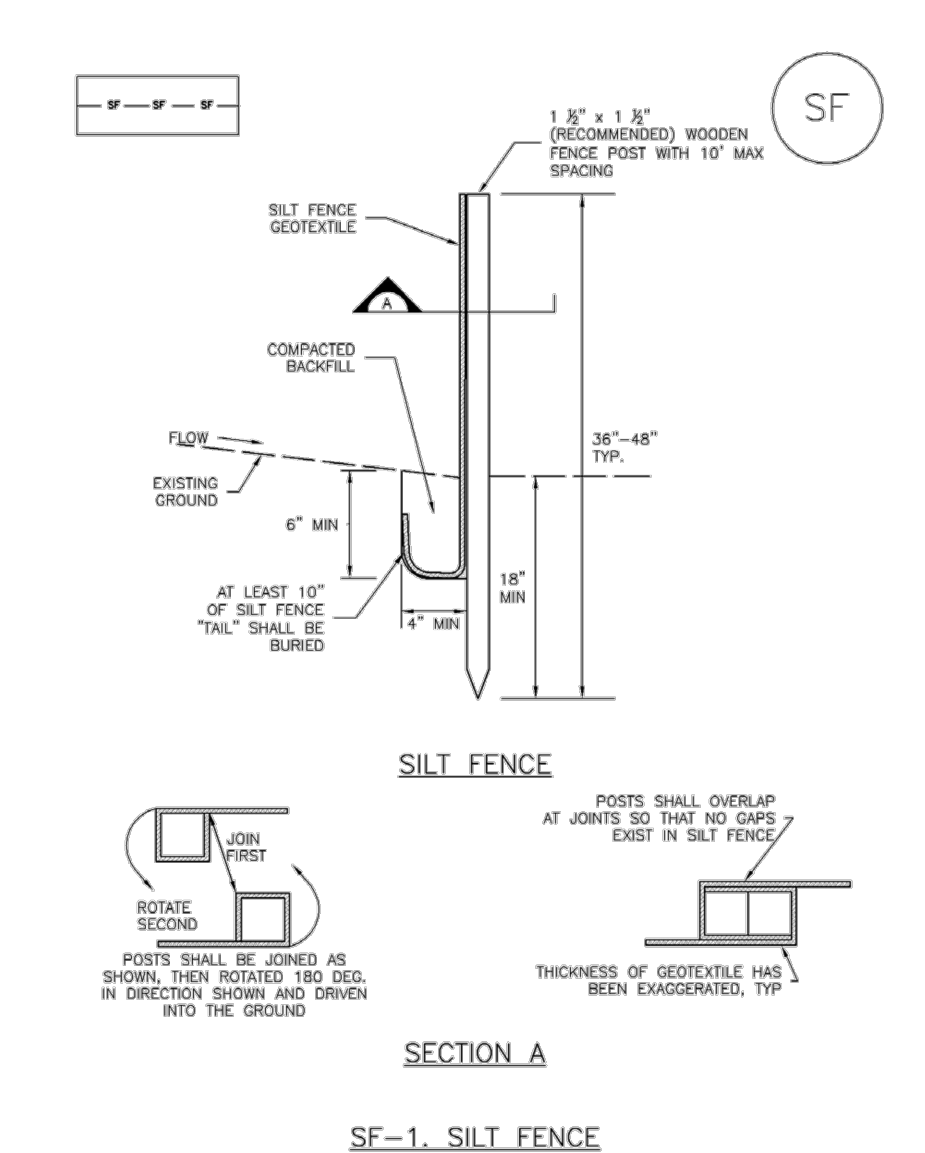


Table with 3 columns: November 2010, Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3, SF-3

SC-1 Silt Fence (SF)

SILT FENCE INSTALLATION NOTES
1. SILT FENCE MUST BE PLACED AWAY FROM THE TOE OF THE SLOPE TO ALLOW FOR WATER PONDING. SILT FENCE AT THE TOE OF A SLOPE SHOULD BE INSTALLED IN A FLAT LOCATION AT LEAST SEVEN FEET (2+9 FT) FROM THE TOE OF THE SLOPE TO ALLOW ROOM FOR PONDING AND DEPOSITION.

- 2. A UNIFORM 6" X 4" ANCHOR TRENCH SHALL BE EXCAVATED USING TREACHER OR SILT FENCE INSTALLATION GUIDE. NO ROAD GRADERS, BACKHOES, OR SIMILAR EQUIPMENT SHALL BE USED.
- 3. COMPACT ANCHOR TRENCH BY HAND WITH A "JUMPING JACK" OR BY WHEEL ROLLING. COMPACTOR SHALL BE SUCH THAT SILT FENCE RESISTS BEING PULLED OUT OF ANCHOR TRENCH BY HAND.
- 4. SILT FENCE SHALL BE PULLED TIGHT AS IT IS ANCHORED TO THE STAKES. THERE SHOULD BE NO NOTICEABLE GAPS BETWEEN STAKES AFTER IT HAS BEEN ANCHORED TO THE STAKES.
- 5. SILT FENCE FABRIC SHALL BE ANCHORED TO THE STAKES USING 1" HEAVY DUTY STAPLES OR NAILS WITH 1" HEADS. STAPLES AND NAILS SHOULD BE PLACED 3" ALONG THE FABRIC DOWN THE STAKE.
- 6. AT THE END OF A RUN OF SILT FENCE ALONG A CONTOUR, THE SILT FENCE SHOULD BE TURNED PERPENDICULAR TO THE CONTOUR TO CREATE A "J-HOOK". THE "J-HOOK" EXTENDING PERPENDICULAR TO THE CONTOUR SHOULD BE OF SUFFICIENT LENGTH TO KEEP RUNOFF FROM FLOWING AROUND THE END OF THE SILT FENCE (TYPICALLY 10' +/- 20').
- 7. SILT FENCE SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

Table with 3 columns: SF-4, Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3, November 2010

EROSION CONTROL CRITERIA:

EROSION CONTROL MEASURES SHALL BE IMPLEMENTED IN A MANNER THAT WILL PROTECT PROPERTIES AND PUBLIC FACILITIES FROM THE ADVERSE EFFECTS OF EROSION AND SEDIMENTATION AS A RESULT OF CONSTRUCTION AND EARTHWORK ACTIVITIES WITHIN THE PROJECT SITE.

- 1. PRIOR TO START OF GRADING OPERATIONS, LOCATE AND SET THE SEDIMENT BERM AND VEHICLE TRACKING CONTROL AS SHOWN ON THE EROSION CONTROL PLAN.
- 2. THE SEDIMENT BERM SHALL BE KEPT IN PLACE AND MAINTAINED UNTIL EROSION AND SEDIMENTATION POTENTIAL IS MITIGATED. REMOVAL OF SILT AND SEDIMENT COLLECTED BY THE SEDIMENT BERM IS REQUIRED ONCE IT REACHES HALF THE HEIGHT OF THE SEDIMENT BERM.
- 3. EROSION CONTROL DEVICES SHOULD BE CHECKED AFTER EVERY STORM OR NOT MORE THAN EVERY 14 DAYS. REPAIRS OR REPLACEMENT SHOULD BE MADE AS NECESSARY TO MAINTAIN PROPER PROTECTION.

SOIL EROSION CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN TWENTY-ONE (21) CALENDAR DAYS AFTER FINAL GRADING, OR FINAL EARTH DISTURBANCE HAS BEEN COMPLETED. DISTURBED AREAS AND STOCKPILES WHICH ARE NOT AT THE FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 30 DAYS SHALL ALSO BE MULCHED WITHIN 21 DAYS AFTER INTERIM GRADING. AN AREA THAT IS GOING TO REMAIN IN AN INTERIM STATE FOR MORE THAN 60 DAYS SHALL ALSO BE SEEDED. ALL TEMPORARY SOIL EROSION CONTROL MEASURES AND BMP'S SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED.

HOMESTEAD AT STERLING RANCH FILING NO. 2
GRADING & EROSION CONTROL DETAILS
PROJECT NO. 09-007 DATE: 02-13-19 SHEET 4 OF 6 FGR04
REVISIONS: NO. DATE: BY: DESCRIPTION:
FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES
FOR BURIED UTILITY INFORMATION 48 HRS BEFORE YOU DIG CALL 1-800-922-1987
CAUTION





# Markup Summary

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Steve Kuehster (4)

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FINAL GRADING/E

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Stormwater Management Facility  
Operation and Maintenance (O&M) 1  
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11400 Springs, CO at  
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SF-19-004

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