

**Stormwater Management Facility  
Operation and Maintenance (O&M) Manual  
Underground Detention & Water Quality**

**for:**

**CROSSROADS MIXED USE FILING NO. 1**

**Located near:**

**HWY 24 AND NEWT DRIVE INTERSECTION  
EI PASO COUNTY, CO**

**Prepared for:**

**Crossroads Metropolitan District No. 2  
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**Prepared by:**

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**CIVIL CONSULTANTS, INC.**

Project #18-003  
**PCD File No. CDR232**

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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. Reporting to be provided to EPC as outlined in the Pilot Program.**

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.
- Sediment Probe
- Measuring Tape

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 CROSSROADS METROPOLITAN DISTRICT NO. 2 (Owner and Developer). The above may occasionally be referred to herein singularly as “Party” and collectively as “Parties.”

Recitals

A. WHEREAS, Developer is the owner of certain real estate (the Property or Subdivision) in El Paso County, Colorado, which Property is legally described in [Exhibit A](#) attached hereto and incorporated herein by this reference; and

B. WHEREAS, Developer desires to plat and develop on the Property a subdivision/land use to be known as CROSSROADS MIXED USE FILING NO. 1; and

C. 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/land use on Developer’s promise to construct adequate drainage, water runoff control facilities, and stormwater quality structural Best Management Practices (“BMPs”) for the subdivision/land use; and

D. 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

E. 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

F. 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

G. 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

H. WHEREAS, Developer desires to construct for the subdivision/land use one (1) 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 operate, clean, maintain and repair such detention basin/BMP(s); and

I. WHEREAS, Developer desires to construct the detention basin/BMP(s) on property that is or will be platted as TRACT A, as indicated on the final plat of the subdivision, and as set forth on Exhibit B attached hereto; and

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

K. 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

L. 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/land use due to the Developer/Owner’s failure to meet its obligations to do the same; and

M. WHEREAS, the County conditions approval of this subdivision/land use on the Developer’s promise to so construct the detention basin/BMP(s), and conditions approval on the Owner’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

N. WHEREAS, the County could condition subdivision/land use 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/Owner’s promises contained herein; and

O. WHEREAS, the County, in order to secure performance of the promises contained herein, conditions approval of this subdivision/land use 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

## 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/Owner agrees 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 itself, its successors and assigns.

3. Construction: Developer shall construct on that portion of the Property described in Exhibit B attached hereto and incorporated herein by this reference, **one (1)** detention basin/BMP(s). Developer shall not commence construction of the detention basin/BMP(s) until the El Paso County Planning and Community Development Department (PCD) 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 PCD. Developer 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. In cases where a subdivision is not required, the one year period will commence to run on the date the Erosion and Stormwater Quality Control Permit (ESQCP) is issued. Rough grading of the detention basin/BMP(s) must be completed and inspected by the El Paso County Planning and Community Development 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/Owner and its 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 Developer/Owner 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/Owner hereby grants the County 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 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/Owner and its 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/Owner agrees and covenants, for itself, its successors and assigns, that it 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 Land Use/Land Disturbance Approval: Developer/Owner's execution of this Agreement is a condition of land use/land disturbance approval.

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 Planning and Community Development Department and/or El Paso County Department of Public Works: Any and all actions and decisions to be made hereunder by the County shall be made by the Director of the El Paso County Planning and Community Development Department and/or the Director of the El Paso County Department of Public Works. Accordingly, any and all documents, submissions, plan approvals, inspections, etc. shall be submitted to and shall be made by the Director of the Planning and Community Development Department and/or the Director of the El Paso County Department of Public Works.

10. Indemnification and Hold Harmless: To the extent authorized by law, Developer/Owner agrees, for itself, its successors and assigns, that it 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 its intentional or negligent acts, errors or omissions or that of its 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/Owner, 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/Owner 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/Owner, 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.

IN WITNESS WHEREOF, the Parties affix their signatures below.

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

CROSSROADS METROPOLITAN DISTRICT NO. 2

By: \_\_\_\_\_  
Danny Mientka, Owner

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,

Witness my hand and official seal.

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

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

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

BOARD OF COUNTY COMMISSIONERS  
OF EL PASO COUNTY, COLORADO

By: \_\_\_\_\_  
Craig Dossey, Executive Director  
Planning and Community Development Department  
Authorized signatory pursuant to LDC

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_, 2018, by \_\_\_\_\_, Executive Director of El Paso County Planning and Community Development Department.

Witness my hand and official seal.

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

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

Approved as to Content and Form:

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



212 N. Wahsatch Ave, Ste 305  
Colorado Springs, CO 80903  
Mail to: PO Box 1360  
Colorado Springs, CO 80901  
719.955.5485

## **CROSSROADS MIXED USE FILING NO. 1 LEGAL DESCRIPTION**

A PARCEL OF LAND IN THE SOUTH HALF (S 1/2) OF SECTION 8, T14S, R65W OF THE 6TH P.M., EL PASO COUNTY, COLORADO MORE PARTICULARLY DESCRIBED AS FOLLOWS;

TRACT B AS SHOWN ON THE PLAT OF "24/94 BUSINESS PARK FILING NO. 1" UNDER RECEPTION NO. 2177139393 IN THE RECORDS OF EL PASO COUNTY, COLORADO, AND AS AMENDED BY SURVEYOR'S AFFIDAVIT OF CORRECTION UNDER RECEPTION NO. 219097386 OF SAID COUNTY RECORDS.

SAID DESCRIBED PARCEL CONTAINS 1,264,738.1 SQUARE FEET (29.034 ACRES, MORE OR LESS).

PREPARED BY:

VERNON P. TAYLOR, COLORADO PLS NO. 25966      DATE  
FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC



# CROSSROADS MIXED USE FILING NO. 1

A REPLAT OF TRACT B "24/94 BUSINESS PARK FILING NO. 1", BEING A TRACT OF LAND IN THE SOUTH HALF (S 1/2) OF SECTION 8, T14S, R65W, OF THE 6TH P.M., EL PASO COUNTY, COLORADO

14975

**BE IT KNOWN BY THESE PRESENTS:**

THAT COLORADO SPRINGS EQUITIES, LLC, A COLORADO LIMITED LIABILITY COMPANY, BEING THE OWNERS OF THE FOLLOWING DESCRIBED TRACT OF LAND:

**LEGAL DESCRIPTION:**

A PARCEL OF LAND IN THE SOUTH HALF OF SECTION 8, T14S, R65W OF THE 6TH P.M., EL PASO COUNTY, COLORADO BEING TRACT B "24/94 BUSINESS PARK FILING NO. 1" AS RECORDED UNDER RECEPTION NO. 217713939 OF THE RECORDS OF EL PASO COUNTY, COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHEAST CORNER OF "SOFTBALL WEST SUBDIVISION NO 2"; THENCE N03°58'20"E ALONG THE EASTERLY LINE THEREOF, 1,170.16 FEET; THENCE N03°56'37"E ALONG THE EASTERLY LINE THEREOF, 57.75 FEET TO THE SOUTHWEST CORNER OF MEADOWBROOK PARKWAY RIGHT-OF-WAY; THENCE ALONG THE SOUTHERLY LINE THEREOF THE FOLLOWING FIVE (5) COURSES:

1. THENCE N89°43'00"E A DISTANCE OF 940.70 FEET TO A POINT OF CURVE;
2. THENCE 221.10 FEET ALONG THE ARC OF A CURVE TO THE LEFT, SAID CURVE HAVING A RADIUS OF 605.00 FEET, A CENTRAL ANGLE OF 20°56'21", THE CHORD OF 219.87 FEET WHICH BEARS N79°14'49"E;
3. THENCE N89°43'06"E, NON-TANGENT TO THE PREVIOUS COURSE, 44.80 FEET;
4. THENCE N51°19'02"E A DISTANCE OF 198.81 FEET;
5. THENCE S41°14'31"E A DISTANCE OF 397.89 FEET TO THE NORTHERLY RIGHT-OF-WAY LINE OF U.S. HIGHWAY 24;

THENCE ALONG THE NORTHERLY LINE THEREOF THE FOLLOWING FOUR (4) COURSES:

1. THENCE 682.61 FEET ALONG THE ARC OF A CURVE TO THE RIGHT, SAID CURVE HAVING A RADIUS OF 7,514.00 FEET, A CENTRAL ANGLE OF 5°12'18", THE CHORD OF 682.38 FEET WHICH BEARS S51°24'05"W TO A POINT OF TANGENT;
2. THENCE S54°01'07"W A DISTANCE OF 497.15 FEET;
3. THENCE S57°40'23"W A DISTANCE OF 163.43 FEET;
4. THENCE S98.63 FEET ALONG THE ARC OF A CURVE TO THE RIGHT, SAID CURVE HAVING A RADIUS OF 1,780.00 FEET, A CENTRAL ANGLE OF 22°29'17", THE CHORD OF 694.16 FEET WHICH BEARS S65°14'17"W TO THE POINT OF BEGINNING.

SAID PARCEL CONTAINS A CALCULATED AREA OF 1,265,357 SQUARE FEET (29.049 ACRES MORE OR LESS).

SEE GENERAL PLAT NOTE 1 FOR BASIS OF BEARING.

**DEDICATION:**

THE UNDERSIGNED, BEING ALL THE OWNERS, MORTGAGEES, BENEFICIARIES OF DEEDS OF TRUST AND HOLDERS OF OTHER INTERESTS IN THE LAND DESCRIBED HEREIN, HAVE LAID OUT, SUBDIVIDED, AND PLATTED SAID LANDS INTO LOTS, TRACTS, STREETS, AND EASEMENTS (USE WHICH ARE APPLICABLE) AS SHOWN HEREON UNDER THE NAME AND SUBDIVISION OF "CROSSROADS MIXED USE FILING NO. 1". ALL PUBLIC IMPROVEMENTS SO PLATTED ARE HEREBY DEDICATED TO PUBLIC USE AND SAID OWNER DOES HEREBY COVENANT AND AGREE THAT THE PUBLIC IMPROVEMENTS WILL BE CONSTRUCTED TO EL PASO COUNTY STANDARDS AND THAT PROPER DRAINAGE AND EROSION CONTROL FOR SAME WILL BE PROVIDED AT SAID OWNER'S EXPENSE, ALL TO THE SATISFACTION OF THE BOARD OF COUNTY COMMISSIONERS OF EL PASO COUNTY, COLORADO. UPON ACCEPTANCE BY RESOLUTION, ALL PUBLIC IMPROVEMENTS SO DEDICATED WILL BECOME MATTERS OF MAINTENANCE BY EL PASO COUNTY, COLORADO. THE UTILITY EASEMENTS SHOWN HEREON ARE HEREBY DEDICATED FOR PUBLIC UTILITIES AND COMMUNICATION SYSTEMS AND OTHER PURPOSES AS SHOWN HEREON. THE ENTITIES RESPONSIBLE FOR PROVIDING THE SERVICES FOR WHICH THE EASEMENTS ARE ESTABLISHED ARE HEREBY GRANTED THE PERPETUAL RIGHT OF INGRESS AND EGRESS FROM AND TO ADJACENT PROPERTIES FOR INSTALLATION, MAINTENANCE, AND REPLACEMENT OF UTILITY LINES AND RELATED FACILITIES.

BY: Danny Mientka  
MANAGER, COLORADO SPRINGS EQUITIES, LLC, A COLORADO LIMITED LIABILITY COMPANY

**NOTARIAL:**

STATE OF COLORADO }  
COUNTY OF EL PASO } SS

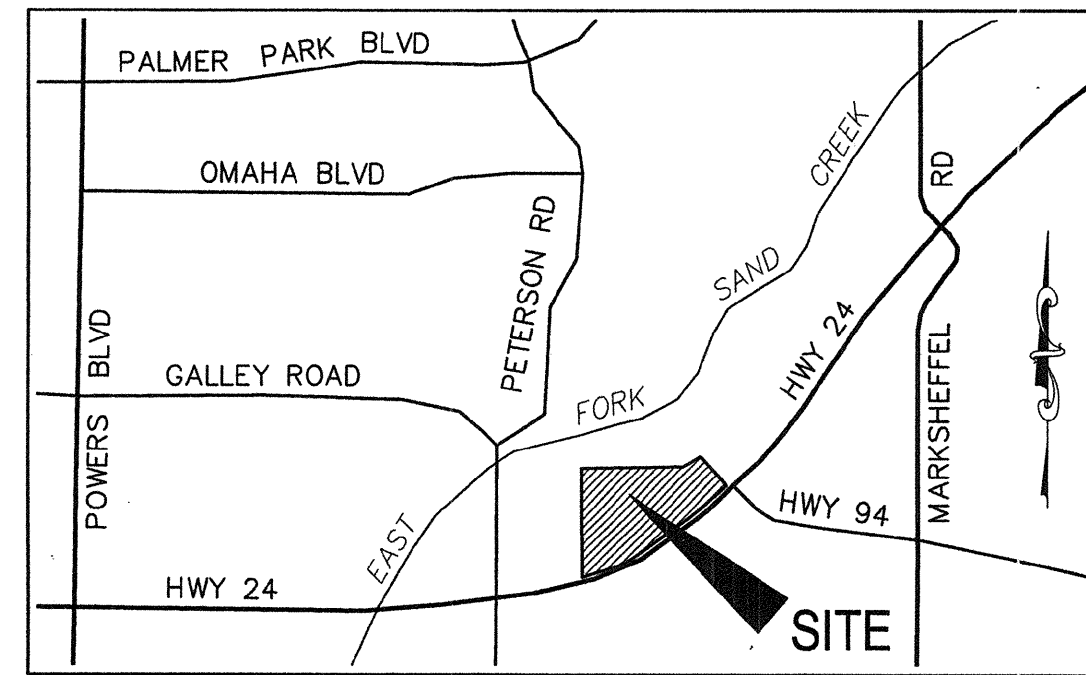
ACKNOWLEDGED BEFORE ME THIS 21st DAY OF June, 2022 BY  
DANNY MIENTKA, AS MANAGER, COLORADO SPRINGS EQUITIES, LLC, A COLORADO  
LIMITED LIABILITY COMPANY

WITNESS MY HAND AND OFFICIAL SEAL:

MY COMMISSION EXPIRES: December 3, 2025

NOTARY PUBLIC: Sybil Skull

SYBLAR SHULL  
NOTARY PUBLIC  
STATE OF COLORADO  
NOTARY ID 20214047126  
MY COMMISSION EXPIRES DECEMBER 03, 2025



VICINITY MAP  
N.T.S.

**LIEN HOLDER STATEMENT:**

FRANK W. HOWARD #2 LIMITED PARTNERSHIP, L.L.P., A COLORADO LIMITED LIABILITY LIMITED PARTNERSHIP, OWNER AND HOLDER OF A LIEN AGAINST THE PROPERTY DESCRIBED IN THE PLAT KNOWN AS "CROSSROADS MIXED USE FILING NO. 1", SAID LIEN BEING EVIDENCED BY A DEED OF TRUST OF RECORD UNDER RECEPTION NO. 22118423 OF THE REAL PROPERTY RECORDS OF EL PASO COUNTY, COLORADO, DO HEREBY RATIFY AND CONFIRM SAID SUBDIVISION AND DEDICATION, AND DO HEREBY IN ALL THINGS SUBJECT TO SAID PLAT SAID LIENS. I HEREBY CONFIRM THAT I AM THE PRESENT OWNER OF SAID LIENS AND HAVE NOT ASSIGNED THE SAME NOR ANY PART THEREOF.

BY: Kevin Howard AS Co-Partner FRANK W. HOWARD #2 LIMITED PARTNERSHIP, L.L.P., A COLORADO LIMITED LIABILITY LIMITED PARTNERSHIP

**NOTARIAL:**

STATE OF COLORADO }  
COUNTY OF EL PASO } SS

THE ABOVE AND AFOREMENTIONED INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS 22nd DAY OF June, 2022, A.D. BY Kevin Howard AS Co-Partner OF FRANK W. HOWARD #2 LIMITED PARTNERSHIP, L.L.P., A COLORADO LIMITED LIABILITY LIMITED PARTNERSHIP

WITNESS MY HAND AND OFFICIAL SEAL:

MY COMMISSION EXPIRES: December 3, 2025

NOTARY PUBLIC: Sybil Skull

SYBLAR SHULL  
NOTARY PUBLIC  
STATE OF COLORADO  
NOTARY ID 20214047126  
MY COMMISSION EXPIRES DECEMBER 03, 2025

**LIEN HOLDER STATEMENT:**

LEGACY BANK, ORGANIZED AND EXISTING UNDER THE LAWS OF COLORADO, OWNER AND HOLDER OF A LIEN AGAINST THE PROPERTY DESCRIBED IN THE PLAT KNOWN AS "CROSSROADS MIXED USE FILING NO. 1", SAID LIEN BEING EVIDENCED BY A DEED OF TRUST OF RECORD UNDER RECEPTION NO. 219089188, PARTIAL RELEASE OF DEED OF TRUST OF RECORD UNDER RECEPTION NUMBER 221158823, AND MODIFICATION OF DEED OF TRUST OF RECORD UNDER RECEPTION NUMBER 222015688 OF THE REAL PROPERTY RECORDS OF EL PASO COUNTY, COLORADO, DO HEREBY RATIFY AND CONFIRM SAID SUBDIVISION AND DEDICATION, AND DO HEREBY IN ALL THINGS SUBJECT TO SAID PLAT SAID LIENS. I HEREBY CONFIRM THAT I AM THE PRESENT OWNER OF SAID LIENS AND HAVE NOT ASSIGNED THE SAME NOR ANY PART THEREOF.

BY: Josh Stensrud AS SA. Vice President LEGACY BANK, ORGANIZED AND EXISTING UNDER THE LAWS OF COLORADO

**NOTARIAL:**

STATE OF COLORADO }  
COUNTY OF EL PASO } SS

THE ABOVE AND AFOREMENTIONED INSTRUMENT WAS ACKNOWLEDGED BEFORE ME THIS 21st DAY OF June, 2022, A.D. BY Josh Stensrud AS SVP OF LEGACY BANK, ORGANIZED AND EXISTING UNDER THE LAWS OF COLORADO

WITNESS MY HAND AND OFFICIAL SEAL:

MY COMMISSION EXPIRES: 8-13-2024

NOTARY PUBLIC: Darlene J. Robinson

DARLENE J. ROBINSON  
NOTARY PUBLIC  
STATE OF COLORADO  
NOTARY ID 19664019963  
MY COMMISSION EXPIRES AUGUST 13, 2024

**EASEMENTS:**

UNLESS OTHERWISE INDICATED, ALL SIDE, FRONT, AND REAR LOT LINES ARE HEREBY PLATTED ON EITHER SIDE WITH A 10 FOOT PUBLIC UTILITY AND DRAINAGE EASEMENT UNLESS OTHERWISE INDICATED. ALL EXTERIOR SUBDIVISION BOUNDARIES ARE HEREBY PLATTED WITH A 20 FOOT PUBLIC UTILITY AND DRAINAGE EASEMENT. THE SOLE RESPONSIBILITY FOR MAINTENANCE OF THESE EASEMENTS IS HEREBY VESTED WITH THE INDIVIDUAL PROPERTY OWNERS.

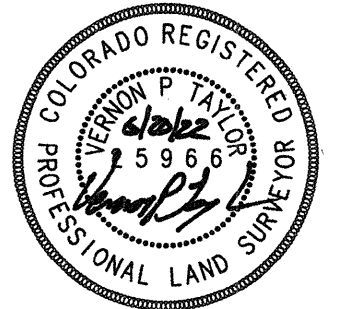
EASEMENTS ARE AS SHOWN ON SHEETS 4 AND 5 OF THIS PLAT.

**SURVEYORS CERTIFICATE**

I, VERNON P. TAYLOR, A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF COLORADO, DO HEREBY CERTIFY THAT THIS PLAT TRULY AND CORRECTLY REPRESENTS THE RESULTS OF A SURVEY MADE APRIL 2021, BY ME OR UNDER MY DIRECT SUPERVISION AND THAT ALL MONUMENTS EXIST AS SHOWN HEREON; THAT MATHEMATICAL CLOSURE ERRORS ARE LESS THAN 1:10,000; AND THAT SAID PLAT HAS BEEN PREPARED IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS OF THE STATE OF COLORADO DEALING WITH MONUMENTS, SUBDIVISION, OR SURVEYING OF LAND AND ALL APPLICABLE PROVISIONS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE.

I ATTEST THE ABOVE ON THIS 20th DAY OF JUNE, 2022.

Vernon P. Taylor  
VERNON P. TAYLOR DATE  
COLORADO PLS NO. 259966,  
FOR AND ON BEHALF OF  
M&S CIVIL CONSULTANTS, INC



**NOTICE:**

ACCORDING TO COLORADO LAW, YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT, MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.

**PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT EXECUTIVE DIRECTOR CERTIFICATE:**

THIS PLAT FOR "CROSSROADS MIXED USE FILING NO. 1" WAS APPROVED FOR FILING BY THE EL PASO COUNTY, COLORADO PLANNING AND COMMUNITY DEVELOPMENT DIRECTOR ON THE 20th DAY OF JUNE, 2022, SUBJECT TO ANY NOTES SPECIFIED HEREON AND ANY CONDITIONS INCLUDED IN THE RESOLUTION OF APPROVAL. THE DEDICATIONS OF LAND TO THE PUBLIC (STREETS, TRACTS, AND EASEMENTS) ARE ACCEPTED, BUT PUBLIC IMPROVEMENTS THEREON WILL NOT BECOME THE MAINTENANCE RESPONSIBILITY OF EL PASO COUNTY UNTIL PRELIMINARY ACCEPTANCE OF THE PUBLIC IMPROVEMENTS IN ACCORDANCE WITH THE REQUIREMENTS OF THE LAND DEVELOPMENT CODE AND ENGINEERING CRITERIA MANUAL, AND THE SUBDIVISION IMPROVEMENTS AGREEMENT.

Kevin M. Stensrud 6/22/22  
INTERIM EXECUTIVE DIRECTOR, PLANNING AND  
COMMUNITY DEVELOPMENT DEPARTMENT DATE

**CLERK AND RECORDER:**

STATE OF COLORADO }  
COUNTY OF EL PASO } SS

I HEREBY CERTIFY THAT THIS INSTRUMENT WAS FILED FOR RECORD IN MY OFFICE AT 4:04 O'CLOCK pm THIS 22nd DAY OF June, 2022, A.D., AND DULY RECORDED UNDER RECEPTION NO. 222114975 OF THE RECORDS OF EL PASO COUNTY, COLORADO.

FEES: \$50.00 CHUCK BROERMAN, RECORDER

SURCHARGE: \$3.00 BY: Cayla Young DEPUTY

**FEES:**

DRAINAGE FEE:	\$ 292,304.57
BRIDGE FEE:	\$ 119,566.96
SCHOOL FEE:	\$ 31,212.00
URBAN PARK FEE:	\$ 88,740.00
REGIONAL PARK FEE:	\$ 140,760.00

**SUMMARY:**

1 LOT	12.703 ACRES	43.73%
4 TRACTS	16.292 ACRES	56.08%
RIGHTS-OF-WAY	0.054 ACRES	0.19%
TOTAL	29.049 ACRES	100.00%

COLORADO SPRINGS EQUITIES, LLC  
90 S. CASCADE AVE., SUITE 1500  
COLORADO SPRINGS, CO 80903  
PHONE: 719-475-7621

PREPARED BY:  
ERIC L. YOKOM  
FOR AND ON  
BEHALF OF  
212 N. WAHSATCH AVE., STE 305  
COLORADO SPRINGS, CO 80903  
PHONE: 719.955.5485

FINAL PLAT  
CROSSROADS MIXED USE  
FILING NO. 1  
JOB NO. 18-003  
DATE PREPARED: 06/23/2021  
DATE REVISED: 06/20/2022  
ISSUED FOR MYLAR



PCD FIL. NO. SF-21-029

CIVIL CONSULTANTS, INC.

SHEET 1 OF 5

# CROSSROADS MIXED USE FILING NO. 1

A REPLAT OF TRACT B "24/94 BUSINESS PARK FILING NO. 1", BEING A TRACT OF LAND IN THE SOUTH HALF (S 1/2) OF SECTION 8, T14S, R65W, OF THE 6TH P.M., EL PASO COUNTY, COLORADO

14975

## GENERAL PLAT NOTES:

1. BASIS OF BEARINGS: A PORTION OF THE EASTERLY LINE OF "SOFTBALL WEST SUBDIVISION NO. 2" RECORDED IN PLAT BOOK T-3 AT PAGE 112 OF THE RECORDS OF EL PASO COUNTY, COLORADO, BEING MONUMENTED ON THE SOUTH WITH A NO. 4 REBAR, FROM WHICH A NO. 5 REBAR WITH BLUE PLASTIC CAP STAMPED: RAMPART PLS 32820" BEARS N03°58'20"E A DISTANCE OF 1,170.16 FEET. THE UNIT OF MEASUREMENT FOR THIS PLAT IS THE U.S. SURVEY FOOT.
2. THE FLOOD INSURANCE RATE MAP (FIRM) PANELS NO. 08041C0752 G AND 08041C0742 G, WITH AN EFFECTIVE DATE OF DECEMBER 7, 2018 HAVE BEEN EXAMINED AS THEY RELATE TO THE PROPERTY BEING PLATTED. SUBJECT PROPERTY LIES WITHIN ZONE X (AREA OF MINIMAL FLOOD HAZARD).
3. A COMMITMENT FOR TITLE INSURANCE ISSUED BY LAND TITLE GUARANTEE COMPANY, AS AGENT FOR OLD REPUBLIC NATIONAL TITLE INSURANCE COMPANY, ORDER NO. SC59090533.2-8, WITH AN EFFECTIVE DATE OF JUNE 4, 2022, HAS BEEN EXAMINED AS IT RELATES TO THE SUBJECT PROPERTY. THE FOLLOWING EXCEPTIONS AS NUMBERED THEREIN ARE HEREBY NOTED.
  - i. (TC#9) ALL RIGHTS AND RESERVATIONS AS CONTAINED IN PATENT OF THE UNITED STATES RECORDED JANUARY 10, 1874 IN BOOK K AT PAGE 47 AND AUGUST 2, 1875 IN BOOK K AT PAGE 550.
  - ii. (TC#10) RIGHT OF WAY EASEMENT AS GRANTED TO COLORADO TELEPHONE COMPANY IN INSTRUMENT RECORDED MARCH 03, 1905, IN BOOK 358 AT PAGE 565. SAID EASEMENT WAS ASSIGNED TO THE MOUNTAIN STATES TELEPHONE AND TELEGRAPH COMPANY IN WARRANTY DEED RECORDED AUGUST 5, 1911 IN BOOK 482 AT PAGE 190.
  - iii. (TC#11) THE EFFECT OF INCLUSION OF SUBJECT PROPERTY IN THE CHEROKEE WATER AND SANITATION DISTRICT, AS EVIDENCED BY INSTRUMENT RECORDED APRIL 25, 1984, IN BOOK 3862 AT PAGE 949 AND JULY 10, 1984, IN BOOK 3892 AT PAGE 529 AND WITHIN THE CIMARRON HILLS STREET IMPROVEMENT DISTRICT AS EVIDENCED BY INSTRUMENT RECORDED OCTOBER 2, 1984 IN BOOK 3923 AT PAGE 890, NOW COLLECTIVELY KNOWN AS CHEROKEE METROPOLITAN DISTRICT AS EVIDENCED BY INSTRUMENT RECORDED MAY 27, 1992 IN BOOK 5983 AT PAGE 83. ANY AND ALL WATER RIGHTS AS SET FORTH IN DECREE OF WATER COURT REGARDING CHEROKEE METROPOLITAN DISTRICT RECORDED DECEMBER 1, 2008 UNDER RECEPTION NO. 208127656.
  - iv. (TC#12) THE EFFECT OF RESOLUTION NO. 02-384 REGARDING SKETCH PLAN, RECORDED FEBRUARY 19, 2003, UNDER RECEPTION NO. 203036141.
  - v. (TC#13) COAL RESERVATION AS CONTAINED IN WARRANTY DEEDS RECORDED NOVEMBER 27, 1918 IN BOOK 565 AT PAGE 97 AND OCTOBER 18, 1919 IN BOOK 610 AT PAGE 332.
  - vi. (TC#14) EACH AND EVERY RIGHT OR RIGHTS OF ACCESS AS CONVEYED BY INSTRUMENT RECORDED FEBRUARY 24, 1967 IN BOOK 2167 AT PAGE 591.
  - vii. (TC#15) THE EFFECT OF INCLUSION OF SUBJECT PROPERTY IN THE CIMARRON HILLS FIRE PROTECTION DISTRICT, AS EVIDENCED BY INSTRUMENT RECORDED DECEMBER 13, 1972, UNDER RECEPTION NO. 941974.
  - viii. (TC#16) THE EFFECT OF RESOLUTIONS, RECORDED AUGUST 08, 1985, IN BOOK 5045 AT PAGE 248.
  - ix. (TC#17) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN POSSESSION AND USE AGREEMENT RECORDED SEPTEMBER 04, 2002 UNDER RECEPTION NO. 202148485.
  - x. (TC#18) EACH AND EVERY RIGHT OF ACCESS AS CONTAINED IN RULE AND ORDER RECORDED DECEMBER 3, 2004 UNDER RECEPTION NO. 204198867.
  - xi. (TC#19) TERMS, CONDITIONS, PROVISIONS, BURDENS, OBLIGATIONS AND EASEMENTS AS SET FORTH AND GRANTED IN PERMANENT EASEMENT RECORDED FEBRUARY 08, 2008 UNDER RECEPTION NO. 208015362.
  - xii. (TC#20) THE EFFECT OF RESOLUTION NO. 14-294, RECORDED AUGUST 13, 2014, UNDER RECEPTION NO. 214072945.
  - xiii. (TC#21) TERMS, CONDITIONS, PROVISIONS, BURDENS, OBLIGATIONS AND EASEMENTS AS SET FORTH AND GRANTED IN AVIGATION EASEMENT RECORDED AUGUST 12, 2016 UNDER RECEPTION NO. 216090669.
  - xiv. (TC#22) THE EFFECT OF INCLUSION OF THE SUBJECT PROPERTY INTO THE SANDS METROPOLITAN DISTRICT NO. 4, AS EVIDENCED BY INSTRUMENTS RECORDED OCTOBER 5, 2016 UNDER RECEPTION NO. 216114674 AND NOVEMBER 28, 2016, UNDER RECEPTION NO. 216137221 AND DECEMBER 27, 2016 UNDER RECEPTION NO. 216149730 AND DECEMBER 27, 2016 UNDER RECEPTION NO. 216149731 AND JANUARY 27, 2017 UNDER RECEPTION NO. 217011026. ORDER OF EXCLUSION OF PROPERTY RECORDED MARCH 31, 2020 UNDER RECEPTION NO. 220044159.
  - xv. (TC#23) THE EFFECT OF RESOLUTION NO. 16-383, RECORDED NOVEMBER 08, 2016, UNDER RECEPTION NO. 216129983.
  - xvi. (TC#24) THE EFFECT OF RESOLUTION NO. 16-384, RECORDED NOVEMBER 08, 2016, UNDER RECEPTION NO. 216129984.
  - xvii. (TC#25) EASEMENTS, CONDITIONS, COVENANTS, RESTRICTIONS, RESERVATIONS AND NOTES ON THE PLAT OF 24/94 BUSINESS PARK FILING NO. 1 RECORDED APRIL 14, 2017 UNDER RECEPTION NO. 217713939, AS AMENDED BY SURVEYOR'S AFFIDAVIT OF CORRECTION RECORDED JUNE 26, 2017 UNDER RECEPTION NO. 217074318. RATIFICATION OF PLAT RECORDED AUGUST 2, 2019 UNDER RECEPTION NO. 219089187.
  - xviii. (TC#26) TERMS, CONDITIONS, PROVISIONS, BURDENS, OBLIGATIONS AND LICENSE AS SET FORTH AND GRANTED IN LICENSE AGREEMENT RECORDED APRIL 14, 2017 UNDER RECEPTION NO. 217042639.

## GENERAL PLAT NOTES: (CONT.)

- xix. (TC#27) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN SUBDIVISION IMPROVEMENTS AGREEMENT RECORDED APRIL 14, 2017 UNDER RECEPTION NO. 217042640.
  - xx. (TC#28) EASEMENTS AND RESTRICTIVE COVENANTS, WHICH DO NOT CONTAIN A FORFEITURE OR REVERTER CLAUSE, BUT OMITTING ANY COVENANTS OR RESTRICTIONS, IF ANY, BASED UPON RACE, COLOR, RELIGION, SEX, SEXUAL ORIENTATION, FAMILIAL STATUS, MARITAL STATUS, DISABILITY, HANDICAP, NATIONAL ORIGIN, ANCESTRY, OR SOURCE OF INCOME, AS SET FORTH IN APPLICABLE STATE OR FEDERAL LAWS, EXCEPT TO THE EXTENT THAT SAID COVENANT OR RESTRICTION IS PERMITTED BY APPLICABLE LAW, AS CONTAINED IN DECLARATION OF COVENANTS, CONDITIONS, RESTRICTIONS AND EASEMENTS FOR THE 24/92 BUSINESS PARK FILING NO. 1, RECORDED APRIL 26, 2017, UNDER RECEPTION NO. 217047603.
  - xxi. (TC#29) THE EFFECT OF RESOLUTION NO. 19-158, RECORDED MAY 09, 2019, UNDER RECEPTION NO. 219049801.
  - xxii. (TC#30) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN RESOLUTION NO. 20-386 SERVICE PLAN FOR CROSSROADS METRO DIST. # 1 & 2 RECORDED NOVEMBER 27, 2020 UNDER RECEPTION NO. 220172025.
  - xxiii. (TC#31) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN RESOLUTION NO. 20-386 RECORDED DECEMBER 08, 2020 UNDER RECEPTION NO. 220200054.
  - xxiv. (TC#32) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN DECREE REGARDING CROSSROADS METROPOLITAN DISTRICT NO. 1 RECORDED MARCH 11, 2021 UNDER RECEPTION NO. 221048427.
  - xxv. (TC#33) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN NOTICE REGARDING CROSSROADS METROPOLITAN DISTRICTS 1 & 2 RECORDED MARCH 17, 2021 UNDER RECEPTION NO. 221052090.
  - xxvi. (TC#34) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN RESOLUTION RECORDED MAY 11, 2021 UNDER RECEPTION NO. 221093290.
  - xxvii. (TC#35) DEED OF TRUST FROM COLORADO SPRINGS EQUITIES LLC, A COLORADO LIMITED LIABILITY COMPANY TO THE PUBLIC TRUSTEE OF EL PASO FOR THE USE OF FRANK W. HOWARD 2 LP TO SECURE THE AGGREGATE SUM OF \$500,000.00 RECORDED JUNE 8, 2021 UNDER RECEPTION NO. 221116423.
  - xxviii. (TC#36) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN ORDER RECORDED AUGUST 02, 2021 UNDER RECEPTION NO. 221146212.
  - xxix. (TC#37) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS SET FORTH IN RESOLUTION RECORDED OCTOBER 27, 2021 UNDER RECEPTION NO. 221199436.
  - xxx. (TC#38) DEED OF TRUST FROM COLORADO SPRINGS EQUITIES INC. TO THE PUBLIC TRUSTEE OF EL PASO FOR THE USE OF LEGACY BANK TO SECURE THE AGGREGATE SUM OF \$6,000,000.00 RECORDED AUGUST 02, 2019 UNDER RECEPTION NO. 219089189. MODIFIED BY AGREEMENT RECORDED FEBRUARY 1, 2022 UNDER RECEPTION NO. 222015688. PARTIAL RELEASE RECORDED AUGUST 23, 2021 UNDER RECEPTION NO. 221158823.
  - xxxi. (TC#39) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN DECLARATION OF COVENANTS IMPROVING AND IMPLEMENTING THE CROSSROADS RETAIL CENTER PUBLIC IMPROVEMENT FEE RECORDED MARCH 22, 2022 UNDER RECEPTION NO. 222040230.
  - xxxii. (TC#40) TERMS, CONDITIONS, PROVISIONS, BURDENS AND OBLIGATIONS AS SET FORTH IN NOTICE RECORDED JUNE 01, 2022, UNDER RECEPTION NO. 222075857.
4. WATER AND WASTEWATER SERVICES FOR THIS SUBDIVISION ARE PROVIDED BY THE CHEROKEE METROPOLITAN DISTRICT SUBJECT TO THE DISTRICTS RULES REGULATIONS AND SPECIFICATIONS.
  5. ALL STRUCTURAL FOUNDATIONS SHALL BE LOCATED AND DESIGNED BY A PROFESSIONAL ENGINEER, CURRENTLY REGISTERED IN THE STATE OF COLORADO.
  6. THE ADDRESSES EXHIBITED ON THIS PLAT ARE FOR INFORMATIONAL PURPOSES ONLY. THEY ARE NOT THE LEGAL DESCRIPTION AND ARE SUBJECT TO CHANGE.
  7. THERE SHALL BE NO DIRECT ACCESS TO U.S. HIGHWAY 24, NEWT ROAD, OR MEADOWBROOK PARKWAY ALLOWED. LOT 1 ACCESS TO MEADOWBROOK PARKWAY IS LIMITED TO THE APPROVED LOCATION SHOWN ON THE PLAT.
  8. NO DRIVEWAY SHALL BE ESTABLISHED UNLESS AN ACCESS PERMIT HAS BEEN GRANTED BY EL PASO COUNTY.
  9. MAILBOXES SHALL BE INSTALLED IN ACCORDANCE WITH ALL EL PASO COUNTY AND UNITED STATES POSTAL SERVICES REGULATIONS.
  10. NOTICE OF POTENTIAL AIRCRAFT OVERFLIGHT AND NOISE IMPACT ASSOCIATED WITH AIRPORT: THIS SERVES AS NOTICE OF POTENTIAL AIRCRAFT OVERFLIGHT AND NOISE IMPACTS ON THIS PROPERTY DUE TO ITS CLOSE PROXIMITY TO AN AIRPORT, WHICH IS BEING DISCLOSED TO ALL PROSPECTIVE PURCHASERS CONSIDERING THE USE OF THIS PROPERTY FOR RESIDENTIAL AND OTHER PURPOSES. THIS PROPERTY IS SUBJECT TO THE OVERFLIGHT AND ASSOCIATED NOISE OF ARRIVING AND DEPARTING AIRCRAFT DURING THE COURSE OF NORMAL AIRPORT OPERATIONS.

## GENERAL PLAT NOTES: (CONT.)

11. ALL PROPERTY WITHIN THIS SUBDIVISION IS SUBJECT TO AVIGATION EASEMENTS AS RECORDED AT RECEPTION NO. 203019547 AND RECEPTION NO. 206095824 OF THE RECORDS OF THE EL PASO COUNTY CLERK AND RECORDER AS SUCH, FUTURE OWNERS SHOULD MAKE THEMSELVES FAMILIAR WITH THE FOLLOWING STIPULATIONS AND FACTS.
  - NO MAN-MADE OR NON MAN-MADE OBSTRUCTIONS SHALL BE ALLOWED TO PENETRATE THE 40:1 APPROACH SURFACE.
  - ALL EXTERIOR LIGHTING PLANS SHALL BE APPROVED BY THE DIRECTOR OF AVIATION TO PREVENT A HAZARD TO AIRCRAFT.
  - NO ELECTROMAGNETIC LIGHT, NOR ANY PHYSICAL EMISSIONS WHICH MAY INTERFERE WITH AIRCRAFT, AVIGATION, COMMUNICATIONS OR NAVIGATIONAL AIDS SHALL BE ALLOWED.
  - WHILE NOT A REQUIREMENT, A RECOMMENDATION IS MADE THAT A 25 DB REDUCTION IN INTERIOR NOISE (IN THE OFFICES OR ANY INHABITED WORK AREAS SUSCEPTIBLE TO AIRCRAFT NOISE) BE OBTAINED BY SOUNDPROOFING USING FAA RECOMMENDED CONSTRUCTION TECHNIQUES AND PERFORMED BY A CERTIFIED ACOUSTICAL ENGINEER.
  - IF A CRANE IS USED DURING CONSTRUCTION, AN FAA FORM 7460-1 WILL NEED TO BE FILED THROUGH THE AIRPORT OPERATIONS OFFICE AND APPROVED BY THE FEDERAL AVIATION ADMINISTRATION BEFORE ANY BUILDING PERMIT IS ISSUED BY THE CITY OR COUNTY. NORMAL TIME REQUIRED FOR APPROVAL IS 30 TO 50 WORKING DAYS.
12. ALL PROPERTY OWNERS ARE RESPONSIBLE FOR MAINTAINING PROPER STORM WATER DRAINAGE IN AND THROUGH THEIR PROPERTY. PUBLIC DRAINAGE EASEMENTS AS SPECIFICALLY NOTED ON THE PLAT SHALL BE MAINTAINED BY THE INDIVIDUAL LOT OWNERS UNLESS OTHERWISE INDICATED. STRUCTURES, FENCES, MATERIALS, OR LANDSCAPING THAT COULD IMPEDE THE FLOW OF RUNOFF SHALL NOT BE PLACED IN DRAINAGE EASEMENT. THE RETAINING WALL LOCATED ALONG THE WEST BOUNDARY WITHIN THE DRAINAGE EASEMENT AREA IS NECESSARY FOR MAINTAINING THE GRADE DIFFERENCE BETWEEN LOT 1 AND THE ADJACENT PARCEL (LOT 1, SOFTBALL WEST SUBDIVISION NO. 2) AND IS THUS PLACED IN THE EASEMENT AREA. THIS RETAINING WALL DOES NOT (WILL NOT) IMPEDE THE FLOW OF RUN-OFF IN THE EASEMENT AREA.
- ~~13. THE PROPERTY IS SUBJECT TO THE DECLARATION OF COVENANTS, CONDITIONS, AND RESTRICTIONS AND GRANT OF EASEMENTS AS RECORDED AT RECEPTION NO. 217042640 OF THE RECORDS OF EL PASO COUNTY.~~
14. THE FOLLOWING REPORTS HAVE BEEN SUBMITTED IN ASSOCIATION WITH THE FINAL PLAT FOR THIS SUBDIVISION AND ARE ON FILE AT THE COUNTY PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT: TRANSPORTATION IMPACT STUDY; DRAINAGE REPORT.
15. PUBLIC AND COMMON SUBDIVISION IMPROVEMENTS: NO LOT OR INTEREST THEREIN, SHALL BE SOLD, CONVEYED, OR TRANSFERRED WHETHER BY DEED OR BY CONTRACT, NOR SHALL BUILDING PERMITS BE ISSUED, UNTIL AND UNLESS EITHER THE REQUIRED PUBLIC AND COMMON DEVELOPMENT IMPROVEMENTS HAVE BEEN CONSTRUCTED AND COMPLETED AND PRELIMINARILY ACCEPTED IN ACCORDANCE WITH THE SUBDIVISION IMPROVEMENTS AGREEMENT BETWEEN THE APPLICANT/OWNER AND EL PASO COUNTY AS RECORDED UNDER RECEPTION NO. ~~203065401~~ **222085403** IN THE OFFICE OF THE CLERK AND RECORDER OF EL PASO COUNTY, COLORADO OR, IN THE ALTERNATIVE, OTHER COLLATERAL IS PROVIDED TO MAKE PROVISION FOR THE COMPLETION OF SAID IMPROVEMENTS IN ACCORDANCE WITH THE EL PASO COUNTY LAND DEVELOPMENT CODE AND ENGINEERING CRITERIA MANUAL. ANY SUCH ALTERNATIVE COLLATERAL MUST BE APPROVED BY THE BOARD OF COUNTY COMMISSIONERS OR, IF PERMITTED BY THE SUBDIVISION IMPROVEMENTS AGREEMENT, BY THE PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT DIRECTOR AND MEET THE POLICY AND PROCEDURE REQUIREMENTS OF EL PASO COUNTY PRIOR TO THE RELEASE BY THE COUNTY OF ANY LOTS FOR SALE, CONVEYANCE OR TRANSFER. THIS PLAT RESTRICTION MAY BE REMOVED OR RESCINDED BY THE BOARD OF COUNTY COMMISSIONERS OR, IF PERMITTED BY THE SUBDIVISION IMPROVEMENTS AGREEMENT, BY THE PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT DIRECTOR UPON EITHER APPROVAL OF AN ALTERNATIVE FORM OF COLLATERAL OR COMPLETION AND PRELIMINARY ACCEPTANCE BY THE EL PASO BOARD OF COUNTY COMMISSIONERS OF ALL IMPROVEMENTS REQUIRED TO BE CONSTRUCTED AND COMPLETED IN ACCORDANCE WITH SAID SUBDIVISION IMPROVEMENTS AGREEMENT. THE PARTIAL RELEASE OF LOTS FOR SALE, CONVEYANCE OR TRANSFER MAY ONLY BE GRANTED IN ACCORDANCE WITH ANY PLANNED PARTIAL RELEASE OF LOTS AUTHORIZED BY THE SUBDIVISION IMPROVEMENTS AGREEMENT.
16. TRACT A OF THIS PROPERTY IS SUBJECT TO A PRIVATE DETENTION BASIN/ STORMWATER QUALITY BMP MAINTENANCE AGREEMENT AND EASEMENT AS RECORDED AT RECEPTION NO. ~~203065401~~ **222085403** OF THE RECORDS OF EL PASO COUNTY. CROSSROADS METROPOLITAN DISTRICT NO. 1 IS RESPONSIBLE FOR MAINTENANCE OF THE SUBJECT DRAINAGE FACILITIES. FOR TRACT OWNERSHIP AND MAINTENANCE RESPONSIBILITIES, SEE TRACT TABLE, SHEET 5.
17. DEVELOPER SHALL COMPLY WITH FEDERAL AND STATE LAWS, REGULATIONS, ORDINANCES, REVIEW AND PERMIT REQUIREMENTS, AND OTHER AGENCY REQUIREMENTS, IF ANY, OF APPLICABLE AGENCIES INCLUDING, BUT NOT LIMITED TO, THE COLORADO DIVISION OF WILDLIFE, COLORADO DEPARTMENT OF TRANSPORTATION, U.S. ARMY CORPS OF ENGINEERS AND THE U.S. FISH AND WILDLIFE SERVICE REGARDING THE ENDANGERED SPECIES ACT, PARTICULARLY AS IT RELATES TO THE LISTED SPECIES.
18. THE PRIVATE ROADS AS SHOWN ON THIS PLAT WILL NOT BE MAINTAINED BY EL PASO COUNTY UNTIL AND UNLESS THE STREETS ARE CONSTRUCTED IN CONFORMANCE WITH EL PASO COUNTY STANDARDS IN EFFECT AT THE DATE OF THE REQUEST FOR DEDICATION AND MAINTENANCE.

## GENERAL PLAT NOTES: (CONT.)

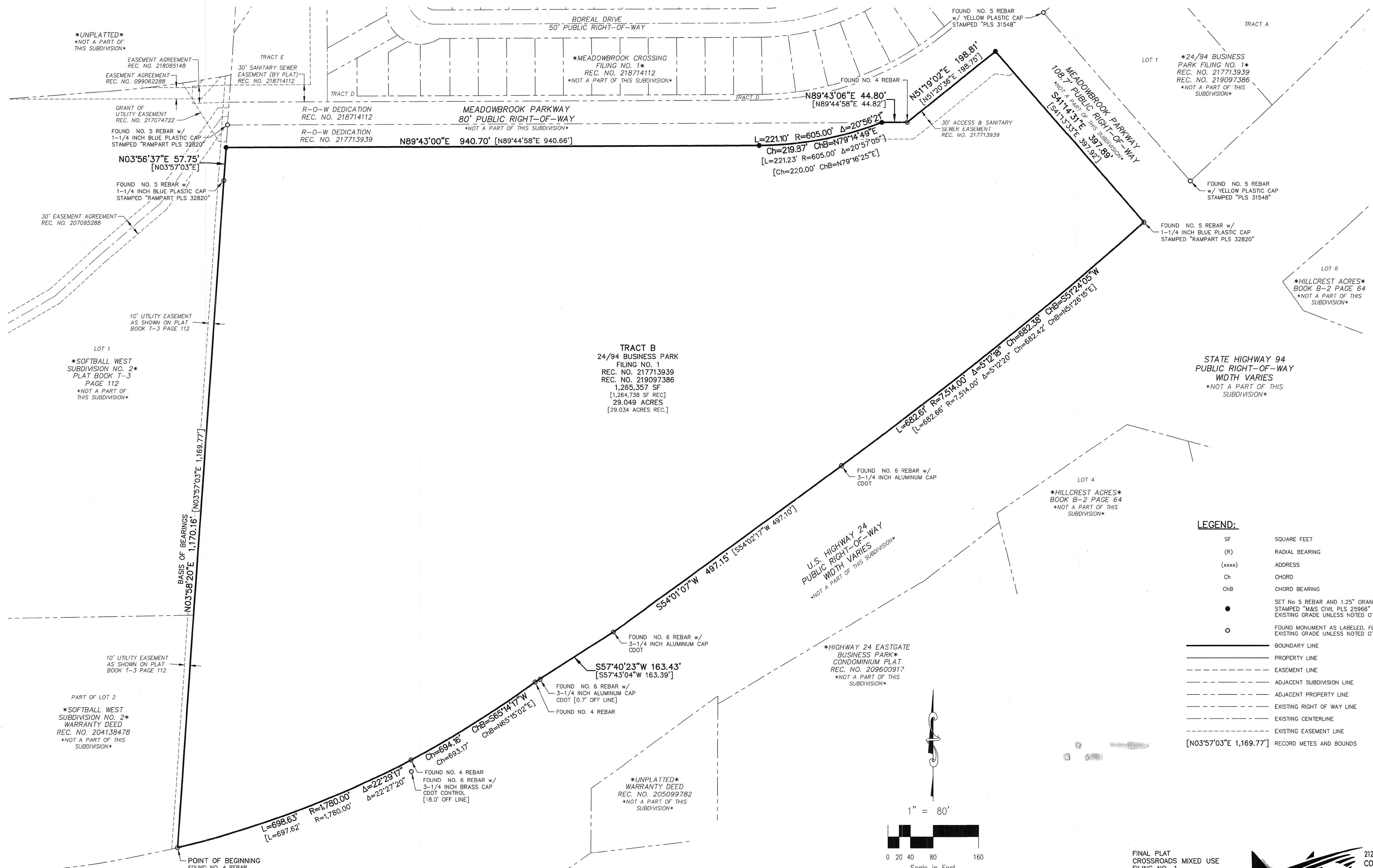
19. THE SUBDIVIDER(S) AGREES ON BEHALF OF HIM/HERSELF AND ANY DEVELOPER OR BUILDER SUCCESSORS AND ASSIGNS THAT SUBDIVIDER AND/OR SAID SUCCESSORS AND ASSIGNS SHALL BE REQUIRED TO PAY TRAFFIC IMPACT FEES IN ACCORDANCE WITH THE COUNTYWIDE TRANSPORTATION IMPROVEMENT FEE RESOLUTION (RESOLUTION 19-471), AS AMENDED, AT OR PRIOR TO THE TIME OF BUILDING PERMIT SUBMITTALS. THE FULL FEE OBLIGATION FOR LOT 1 SHALL BE PAID UP FRONT. THE METHOD OF PAYMENT FOR THE REMAINING PORTIONS OF THE OBLIGATED FEES SHALL BE DOCUMENTED ON ALL SALES DOCUMENTS AND ON PLAT NOTES TO ENSURE THAT A TITLE SEARCH WOULD FIND THE FEE OBLIGATION BEFORE THE SALE OF THE PROPERTY.
20. ANY PERSON WHO KNOWINGLY REMOVES, ALTERS OR DEFACTS ANY PUBLIC LAND SURVEY MONUMENT OR LAND BOUNDARY MONUMENT OR ACCESSORY COMMITS A CLASS TWO (2) MISDEMEANOR PURSUANT TO C.R.S. § 18-4-508.
21. A "SOILS AND GEOLOGY STUDY, CROSSROADS COMMERCIAL, PARCEL NO. 5408007005, EL PASO COUNTY, COLORADO" WAS COMPLETED BY THE ROCKY MOUNTAIN GROUP (RMG) ON AUGUST 18, 2020, JOB NO. 177025, REVISED MARCH 3, 2021. MITIGATION MEASURES AND A MAP OF THE HAZARD AREAS ARE IN SAID REPORT, PCD FILE NO. SP-2011, AVAILABLE AT THE EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT.
22. PER THE PRELIMINARY PLAN OF CROSSROADS MIXED USE (FILE NO. SP-20-011), THE STATE HAS DETERMINED WATER SUFFICIENCY FOR THE SITE.



# CROSSROADS MIXED USE FILING NO. 1

14975

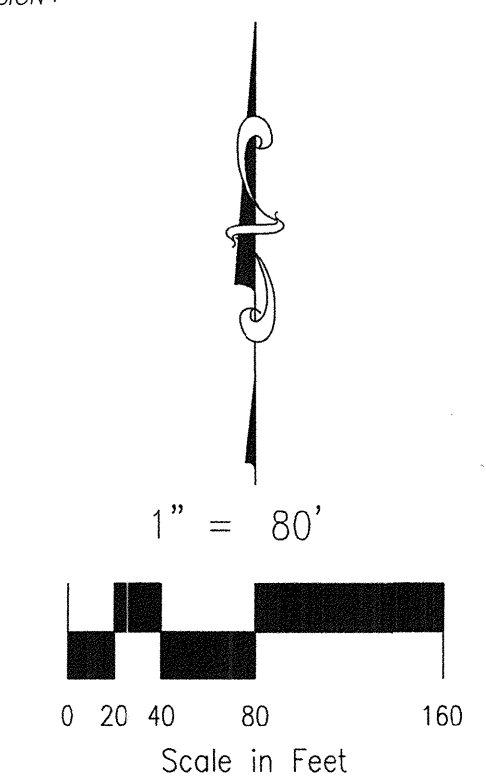
A REPLAT OF TRACT B "24/94 BUSINESS PARK FILING NO. 1", BEING A TRACT OF LAND IN THE SOUTH HALF (S 1/2) OF SECTION 8, T14S, R65W, OF THE 6TH P.M., EL PASO COUNTY, COLORADO



**TRACT B**  
 24/94 BUSINESS PARK  
 FILING NO. 1  
 REC. NO. 217713939  
 REC. NO. 219097386  
 1,265,357 SF  
 [1,264,738 SF REC.]  
 28.049 ACRES  
 [29.034 ACRES REC.]

**LEGEND:**

SF	SQUARE FEET
(R)	RADIAL BEARING
(xxxx)	ADDRESS
Ch	CHORD
ChB	CHORD BEARING
●	SET NO. 5 REBAR AND 1.25" ORANGE CAP STAMPED "M&S CIVIL PLS 25966" FLUSH W/ EXISTING GRADE UNLESS NOTED OTHERWISE
○	FOUND MONUMENT AS LABELED, FLUSH W/ EXISTING GRADE UNLESS NOTED OTHERWISE
—	BOUNDARY LINE
- - -	PROPERTY LINE
- - - - -	EASEMENT LINE
- - - - -	ADJACENT SUBDIVISION LINE
- - - - -	ADJACENT PROPERTY LINE
- - - - -	EXISTING RIGHT OF WAY LINE
- - - - -	EXISTING CENTERLINE
- - - - -	EXISTING EASEMENT LINE
[N03°57'03"E 1,169.77']	RECORD METES AND BOUNDS



AS PLATTED

FINAL PLAT  
 CROSSROADS MIXED USE  
 FILING NO. 1  
 JOB NO. 18-003  
 DATE PREPARED: 06/23/2021  
 DATE REVISED: 06/20/2022  
 ISSUED BY: MYLAR



212 N. WAHSATCH AVE., STE 305  
 COLORADO SPRINGS, CO 80903  
 PHONE: 719.955.5465

PCD FIL. NO. SF-21-029

CIVIL CONSULTANTS, INC.

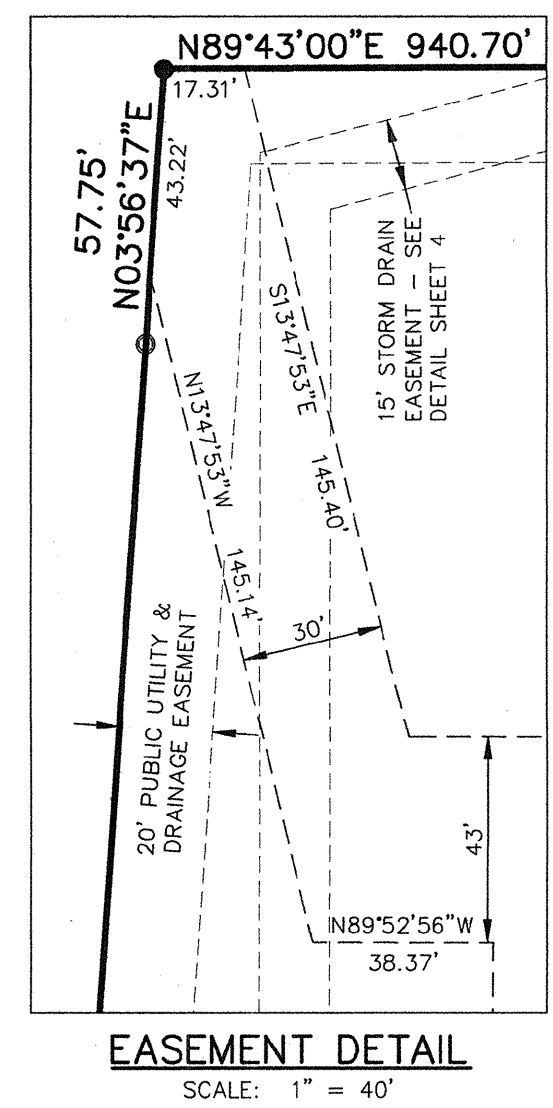
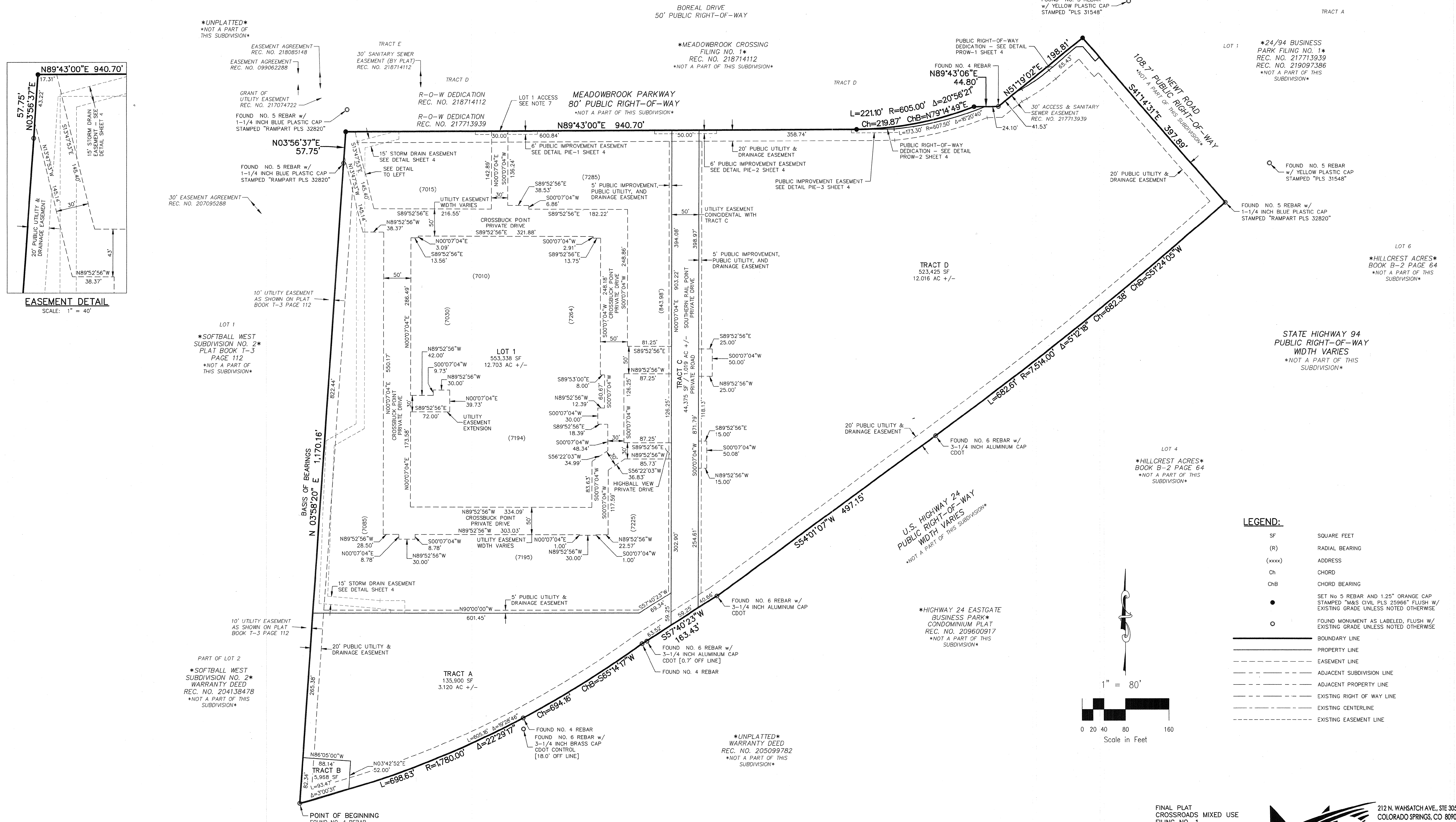
SHEET 3 OF 5

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# CROSSROADS MIXED USE FILING NO. 1

14975

A REPLAT OF TRACT B "24/94 BUSINESS PARK FILING NO. 1", BEING A TRACT OF LAND IN THE SOUTH HALF (S 1/2) OF SECTION 8, T14S, R65W, OF THE 6TH P.M., EL PASO COUNTY, COLORADO



\*UNPLATTED\*  
\*NOT A PART OF THIS SUBDIVISION\*

\*MEADOWBROOK CROSSING FILING NO. 1\*  
REC. NO. 218714112  
\*NOT A PART OF THIS SUBDIVISION\*

\*24/94 BUSINESS PARK FILING NO. 1\*  
REC. NO. 217713939  
REC. NO. 219097386  
\*NOT A PART OF THIS SUBDIVISION\*

LOT 6  
\*HILLCREST ACRES\*  
BOOK B-2 PAGE 64  
\*NOT A PART OF THIS SUBDIVISION\*

STATE HIGHWAY 94  
PUBLIC RIGHT-OF-WAY  
WIDTH VARIES  
\*NOT A PART OF THIS SUBDIVISION\*

LOT 4  
\*HILLCREST ACRES\*  
BOOK B-2 PAGE 64  
\*NOT A PART OF THIS SUBDIVISION\*

LOT 1  
\*SOFTBALL WEST SUBDIVISION NO. 2\*  
PLAT BOOK T-3 PAGE 112  
\*NOT A PART OF THIS SUBDIVISION\*

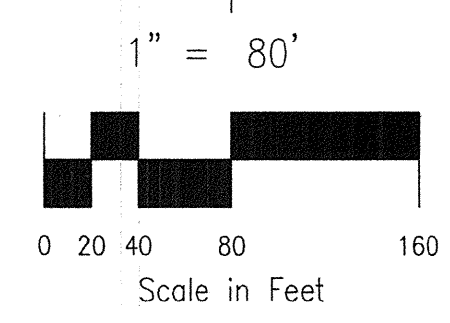
PART OF LOT 2  
\*SOFTBALL WEST SUBDIVISION NO. 2\*  
WARRANTY DEED  
REC. NO. 204138478  
\*NOT A PART OF THIS SUBDIVISION\*

\*HIGHWAY 24 EASTGATE BUSINESS PARK\*  
CONDOMINIUM PLAT  
REC. NO. 209600917  
\*NOT A PART OF THIS SUBDIVISION\*

\*UNPLATTED\*  
WARRANTY DEED  
REC. NO. 205099782  
\*NOT A PART OF THIS SUBDIVISION\*

**LEGEND:**

- SF SQUARE FEET
- (R) RADIAL BEARING
- (xxxx) ADDRESS
- Ch CHORD
- ChB CHORD BEARING
- SET NO. 5 REBAR AND 1.25" ORANGE CAP STAMPED "M&S CIVIL PLS 25966" FLUSH W/ EXISTING GRADE UNLESS NOTED OTHERWISE
- FOUND MONUMENT AS LABELED, FLUSH W/ EXISTING GRADE UNLESS NOTED OTHERWISE
- BOUNDARY LINE
- - - PROPERTY LINE
- - - EASEMENT LINE
- - - ADJACENT SUBDIVISION LINE
- - - ADJACENT PROPERTY LINE
- - - EXISTING RIGHT OF WAY LINE
- - - EXISTING CENTERLINE
- - - EXISTING EASEMENT LINE



AS REPLATTED

RBD

FINAL PLAT  
CROSSROADS MIXED USE  
FILING NO. 1  
JOB NO. 18-003  
DATE PREPARED: 06/23/2021  
DATE REVISED: 06/20/2022  
ISSUED FOR MYLAR



212 N. WAHSATCH AVE., STE 305  
COLORADO SPRINGS, CO 80903  
PHONE: 719.955.5465

PCD FIL. NO. SF-21-029

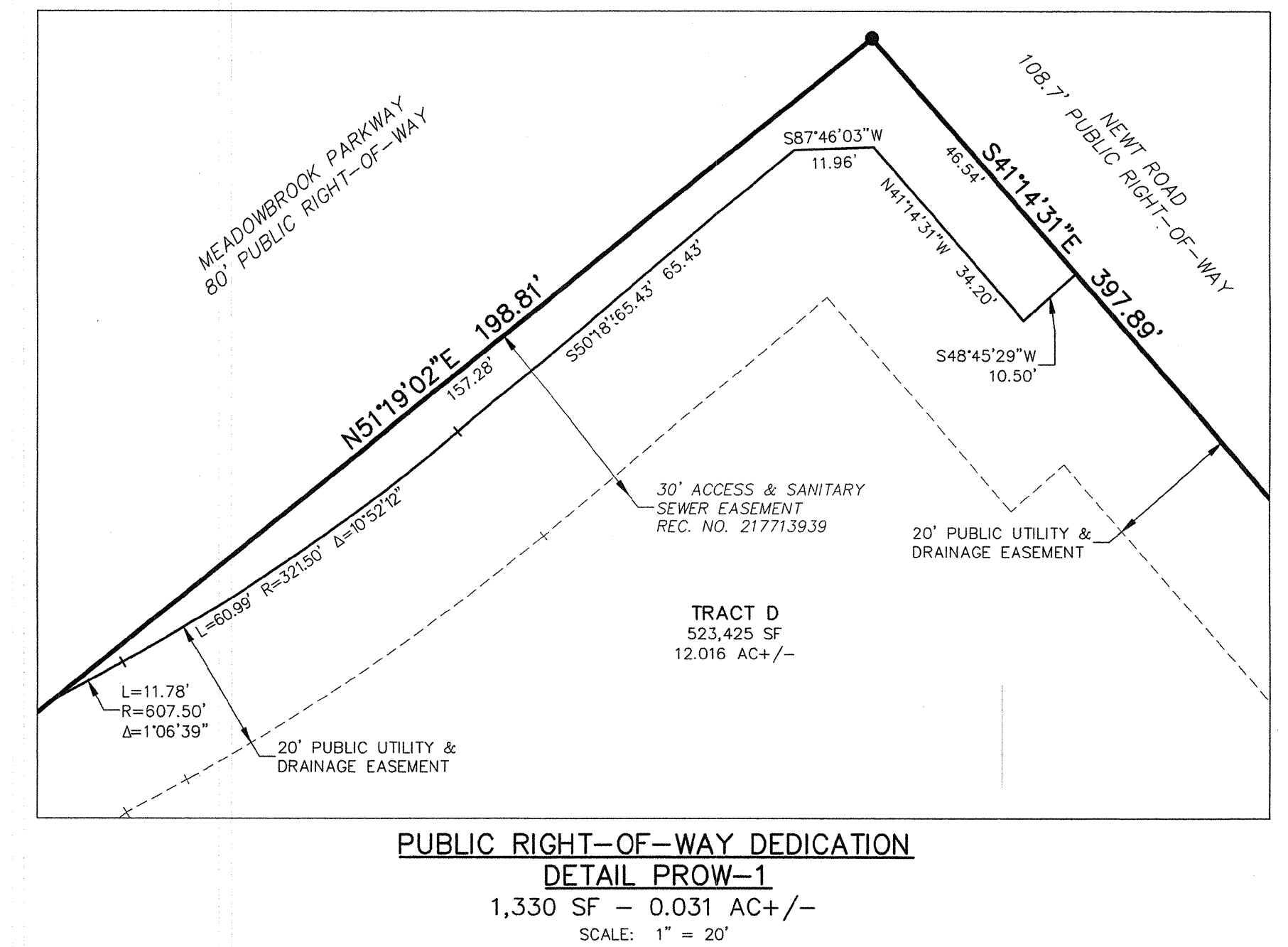
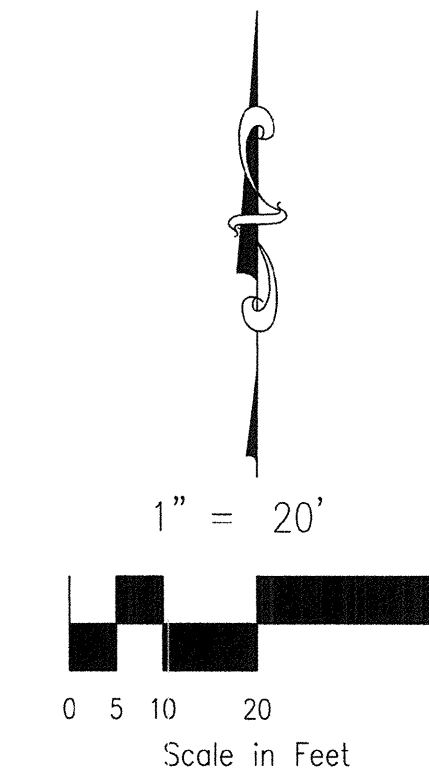
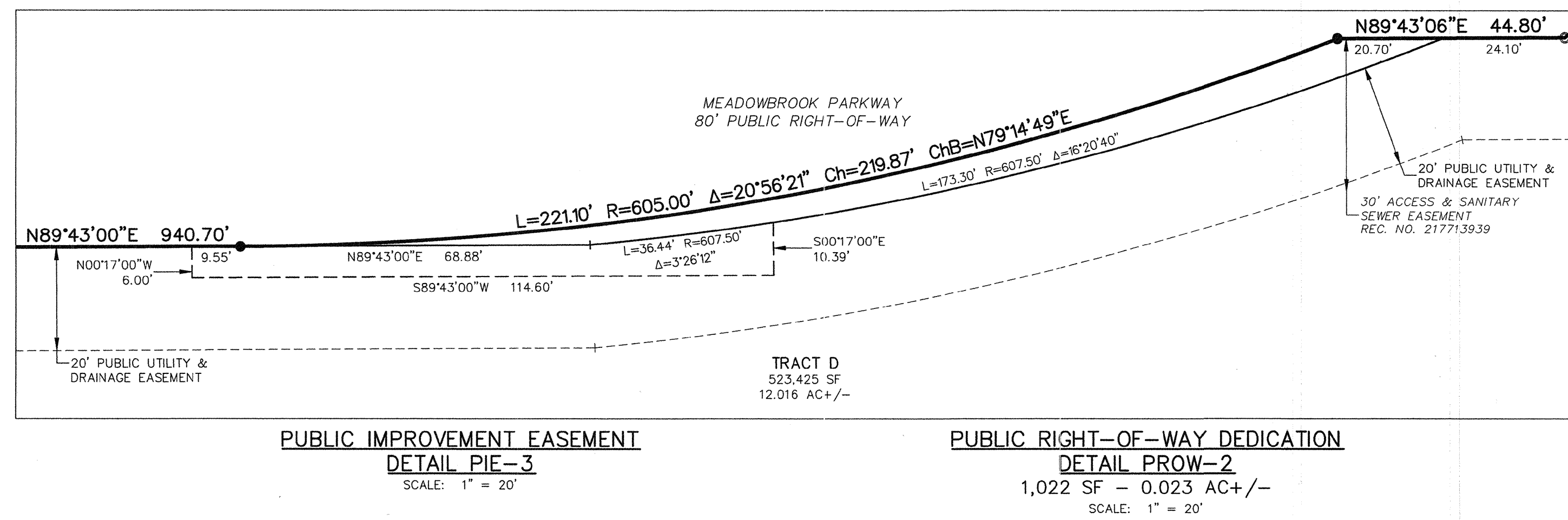
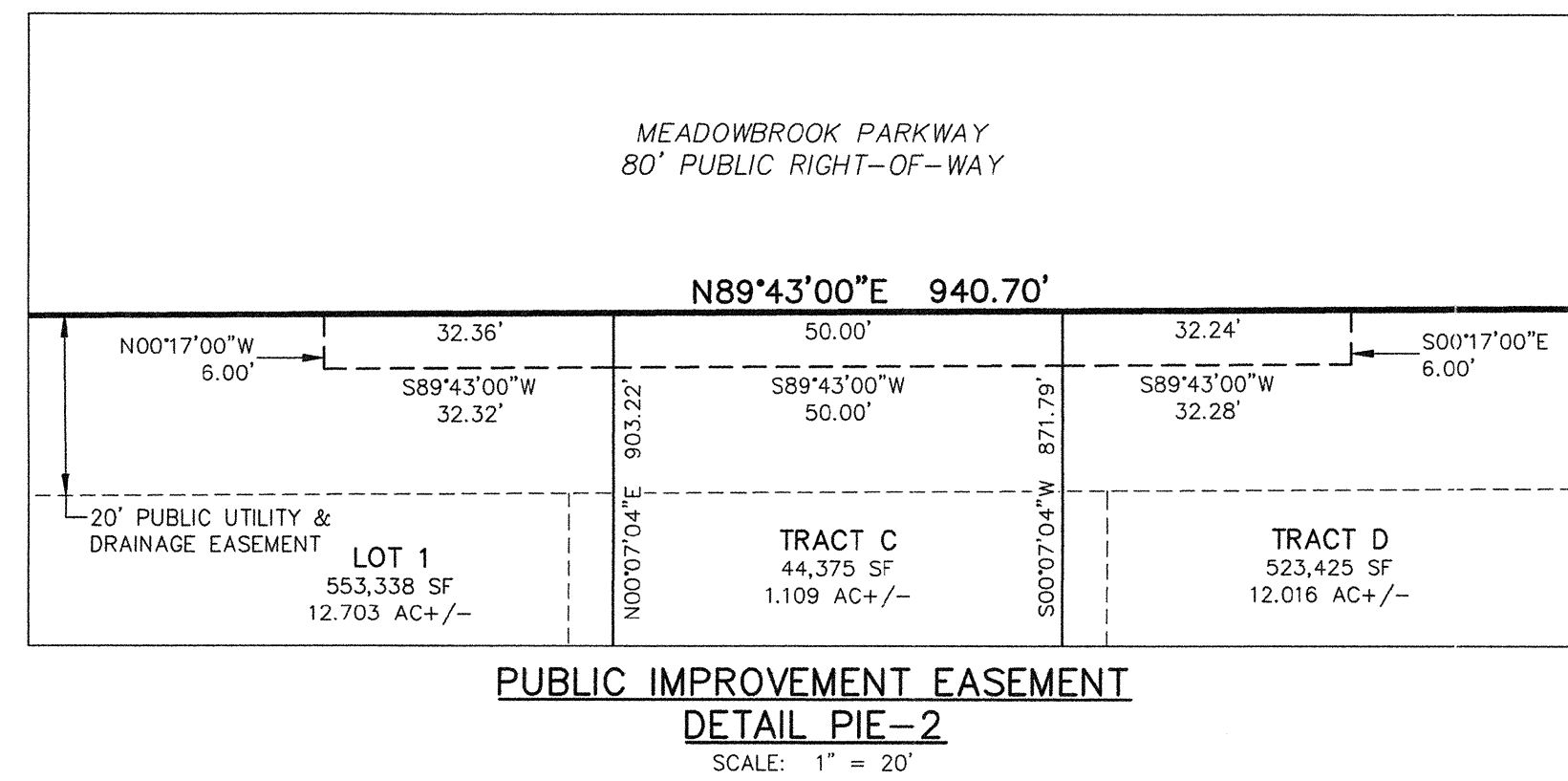
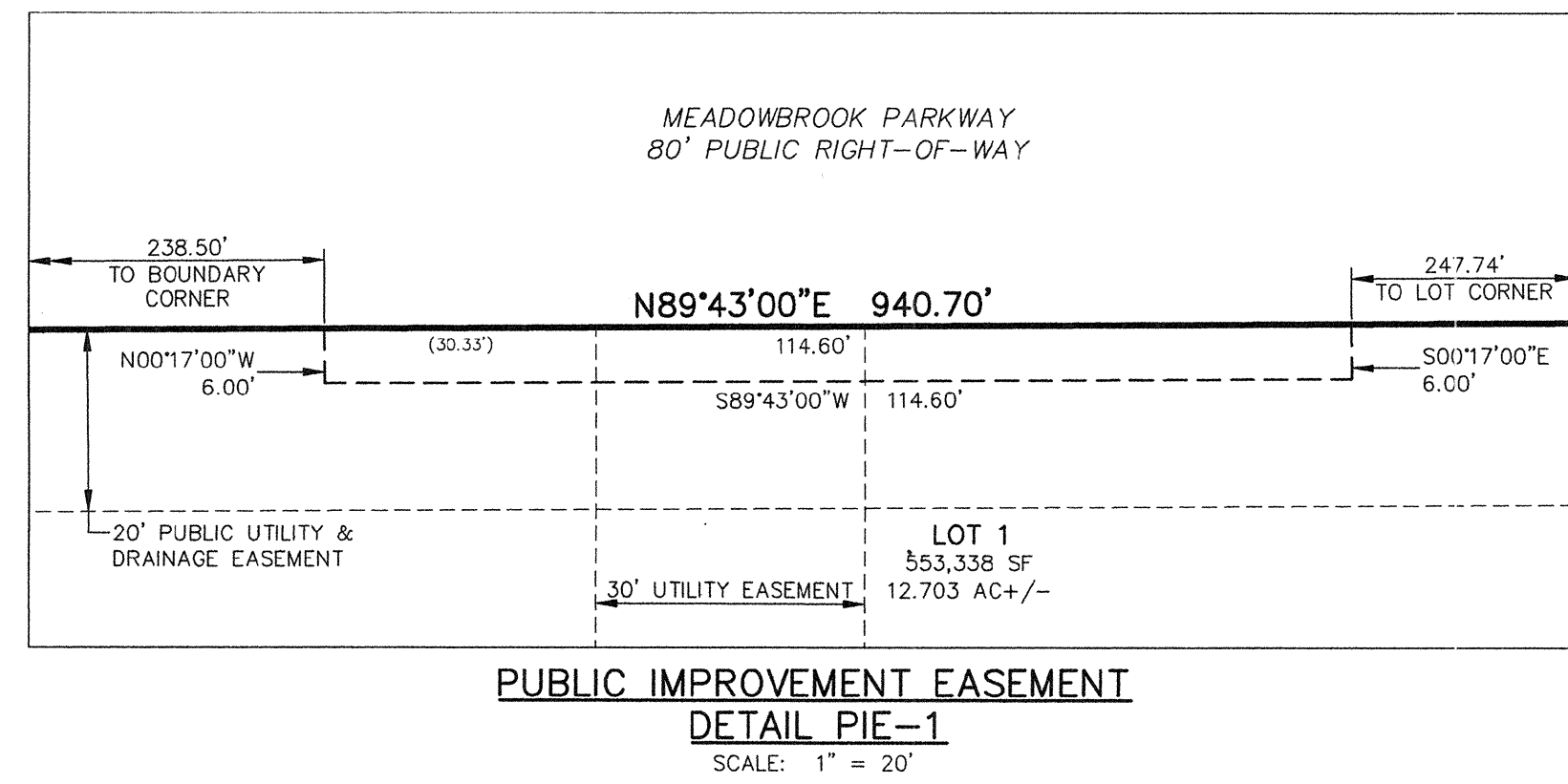
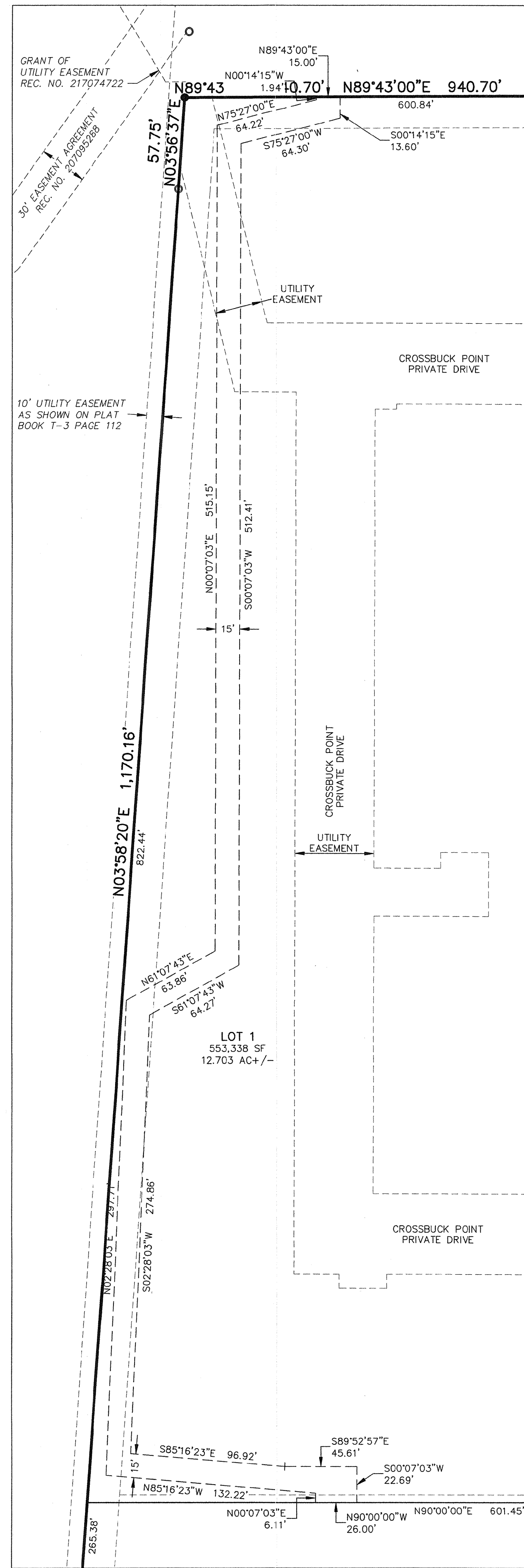
SHEET 4 OF 5

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# CROSSROADS MIXED USE FILING NO. 1

14975

A REPLAT OF TRACT B "24/94 BUSINESS PARK FILING NO. 1", BEING A TRACT OF LAND IN THE SOUTH HALF (S 1/2) OF SECTION 8, T14S, R65W, OF THE 6TH P.M., EL PASO COUNTY, COLORADO



TRACT TABLE				
TRACT	SIZE (ACRES)	USE	MAINT.	OWNER
A	3.120	PRIVATE DETENTION POND	CMD1	CMD1
B	0.137	SIGNAGE	CMD1	CSE
C	1.019	ACCESS, PUBLIC UTILITIES	CMD1	CMD1
D	12.016	FUTURE DEVELOPMENT	CSE	CSE
TOTAL	16.292			

CMD1 - CROSSROADS METROPOLITAN DISTRICT NO. 1  
 CSE - COLORADO SPRINGS EQUITIES, LLC

FINAL PLAT  
 CROSSROADS MIXED USE  
 FILING NO. 1  
 JOB NO. 18-003  
 DATE PREPARED: 06/23/2021  
 DATE REVISED: 06/20/2022  
 ISSUED FOR MYLAR



212 N. WAHSATCH AVE., STE 305  
 COLORADO SPRINGS, CO 80903  
 PHONE: 719.955.5485

PCD FIL. NO. SF-21-029

SHEET 5 OF 5

FILE: 0:\1803\4-Crossroads Mixed Use\Colorado Springs Equities LLC\Survey\Draw\18-003\_Crossroads\_MU\_Final\_Plat.dwg PlotDate: 6/21/2022 10:22 AM

## **Appendix B**

## Appendix B

### General Location and Description of Stormwater Management Facilities Underground Detention & Water Quality

#### A. General Site Description

The subject site is located at 0 Meadowbrook Parkway in the southwestern quarter of Section 8, Township 14 South, Range 65 West of the 6<sup>th</sup> P.M. in El Paso County, Colorado. The 29.049 Acre site is currently undeveloped. The site is bound to the west by undeveloped Softball West Subdivision Filing No. 2, to the north by Meadowbrook Crossing Subdivision, south by Highway 24, and to the east by Newt Drive.

The proposed site is will be developed into ten (10) commercial lots, one (1) multifamily residential lot, and three (3) tracts for detention and roadway use. The development will extend Meadowbrook Parkway to the west and will include a single lane roundabout to be constructed at the intersection of the Meadowbrook Parkway and Newt Drive. The property is within the commercial aviation district overlay. A rezone application has been approved to rezone 12.703 acres from CR to the RM-30 Zone.

#### B. General Stormwater Management Description

All of the stormwater is conveyed via storm sewer piping and surface flows to a private underground detention facility located near the southwest boundary of the site that provides 100 year storage and water quality treatment for runoff. Flows from the underground detention basin will be discharged into the HWY 24 right-of-way. The facility is owned and maintained by the Crossroads Metropolitan District No. 1.

#### C. Stormwater Facilities Site Plan

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

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

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

The detention pond submitted for Crossroads Mixed Use Filing No. 1- contains a private underground detention facility (UGD) which will reduce the 100-yr peak post development flow from 83.5 cfs peak inflow to 14.5 peak outflow, compared to 14.5 cfs pre-development 100-yr peak outflow. The site utilizes Level I MDCIA – More impervious base material drains to a grass swale, then to the UGD pond. The grass swale keeps flows low and shallow, facilitating sedimentation. Approx. 3.12 acres of proposed land (Tract A) within the project has been set aside for an UGD facility.

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

The detention pond submitted for Crossroads Mixed Use Filing No. 1- contains a underground detention facility (UGD) which will store the 100 year volume of 4.668 ac-ft.

### **Water Quality Facilities**

Pond 1 submitted for Crossroads Mixed Use Filing No. 1- Underground Detention Facility contains an Underground Detention Basin (UGD) for water quality. The UGD has been designed and shall be constructed as follows.

WQCV Provided=	0.696 ac-ft
EURV Provided=	3.297 ac-ft
Q100 Volume Provided=	4.400 ac-ft
Q5 Release Proposed=	4.4 cfs
Q100 Release Proposed=	14.5 cfs

Flows from the UGD pond are routed via a proposed 18" RCP pipe to discharge in the HWY 24 right-of-way.

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

Proposed construction BMP's (silt fence, vehicle tracking, straw bale barriers, erosion control fabric and temporary sediment facility) will capture any sedimentation caused by construction before it can make it into the existing downstream tributaries. The water quality method meets the intent of treating impervious areas, based on the guidelines as set forth in the City of Colorado Springs/EI Paso County Drainage Criteria Manual – Volume II.



## APPENDIX C

Standard Operation Procedures  
for  
Inspection and Maintenance

Underground Detention Basin  
(UGD)

May 2021

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## **UGD-1 BACKGROUND**

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

UGDs are an adaptation of an extended detention basin used for flood control, with the primary difference is the addition of additional manufactured treatment devices (MTDs(Bayseparator)) but they also include a slow release outlet design. Forebays are replaced by the MTDs, located at the inflow point to the basin and are provided to remove floatables, coarse and fine sediment within a contained area prior to releasing into the pond (underground chambers). The MTDs 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 MTD into the Isolator row. The isolator row holds the sediment in one underground chamber for easier maintenance (removal of sediment & pollutants). The UGD also uses a smaller outlet, as compared to an above ground pond, that will extend the emptying time of the more frequently occurring runoff events to facilitate pollutant removal. An UGD does not have a small micropool just upstream of the outlet like an EDB. The micropool is not necessary to hold a small amount of water to keep sediment and floatables from blocking the outlet orifices because this occurs in the MTDs and isolator row(s).

## **UGD-2 INSPECTING UNDERGROUND DETENTION BASINS (UGD)**

### **UGD-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 UGD(s) within this development.

### **UGD-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 UGD(s) within this development.

### **UGD-2.3 Underground Detention Basin (UGD) Features**

UGDs 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 MTD is not properly maintained, it could negatively affect the performance of a feature downstream (isolator row, outlet structure, etc.). Therefore, it is critical that each feature of the UGD 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 UGD and the corresponding maintenance inspection items that can be anticipated:

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

UGD Features	Sediment Removal	Mowing/ Weed control	Trash & Debris Removal	Erosion	Overgrown Vegetation Removal	Standing Water (mosquito/ algae control)	Structure Repair
<b>Inflow Points (MTDs)</b>	X		X				X
<b>Isolator Rows</b>	X		X				X
<b>Outlet Works</b>	X		X				X

#### UGD-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 an EDB. However, an Inflow Point for a UGD must first pass through a MTD.

An energy dissipation occurs with flows through the MTD.

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

*a. 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.

*b. 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 UGD 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. However, since the inflow point is below ground, the presence of these natural materials will be less common.

#### UGD-2.3.2 Forebay (MTD (Bayseparator))

Manufactured Treatment Devices (MTDs) include many different types of proprietary devices that use various treatment processes and designs to remove targeted pollutants. The MTD (Bayseparator) primary manhole separates pollutants during the low-flow and high-flow events. The MTDs (Bayseparator) allow low flow rates to be treated in the offline storage manhole. Coarse sediments settle in primary manhole undisturbed. Finer sediments and floatables are conveyed through the Bayseparator into the storage manhole. Contaminants in the storage manhole are trapped offline. MTD (Bayseparator) systems must be inspected and maintained periodically. Inspection is made by checking the depth of the sediment in each manhole with a grade stick or similar device. Maintenance is required when the sediment depth in either manhole exceeds 2 feet. The frequency of inspection and maintenance varies by municipality. At a minimum the supplier recommends inspection/maintenance twice a year to maintain operation and function of MTD (Bayseparator) or as recommended by El Paso County.

*The maintenance items that are found with MTDs (Bayseparator) are as follows:*

a. *Storage Manhole*

1. Remove the entire volume of the contaminated water by vacuum truck.
2. Clean the manhole walls and flush out the manhole using a high pressure hose and remove flushing water by vacuum truck. Make certain manhole is clean.

b. *Primary Manhole*

1. Using a submersible pump, pump the clean water from the center of the manhole directly into the empty storage manhole until the water level falls to 1 foot above the sediment layer.
2. Remove the settled sediment and remaining water by vacuum truck.
3. Clean the manhole walls and flush out the manhole using a high pressure hose and remove flushing water by vacuum truck. Make certain manhole is clean.
4. Contaminated material removed from the manholes must be disposed of responsibly and legally by the operator of the vacuum truck.

*c. Concrete Cracking/Failing*

1. The MTD (Bayseparator) is primarily constructed of concrete, which cracks, spalls, and settles. Damage to the MTD can result in decreased performance and impact maintenance efforts.

UGD-2.3.3 Isolator Row

The Isolator Row is designed to capture the “first flush” runoff and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole provides access to the Isolator Row and includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row bypass through a manifold to the other chambers. This is achieved with an elevated bypass manifold or a high-flow weir. This creates a differential between the Isolator Row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row. After stormwater flows through the Isolator Row and into the rest of the chamber system it is either exfiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure. The frequency of inspection and maintenance varies by municipality. At a minimum the supplier recommends inspection/maintenance twice a year to maintain operation and function of the Isolator Row or as recommended by the municipality. Sediments are captured in the MTD (Bayseparator) and isolator rows protecting the adjacent stone and chambers detention storage areas from sediment accumulation.

*The inspection/maintenance items that are found with Isolator Rows are as follows:*

*Step 1) Inspect Isolator Row for sediment*

- A. Inspection ports (if present)
  - A.1 Remove/open lid on nyloplast inline drain

- A.2 Using a flashlight and stadia rod, measure depth of sediment and record on maintenance log
- A.3 Lower a camera into Isolator Row for a visual inspection or sediment levels (optional)
- A.4 If sediment is at, or above 3" (80 mm) proceed to Step 2. If not, proceed to Step 3.
- B. All Isolator Rows
  - B.1 Remove cover from structure at upstream end of Isolator Row
  - B.2 Using a flashlight, inspect down the Isolator Row through outlet pipe
    - i) mirrors on poles or cameras may be used to avoid a confined space entry
    - ii) follow OSHA regulations for confined space entry if entering manhole
  - B.3 If sediment is at, or above 3" (80 mm) proceed to Step 3.

*Step 2) Clean out Isolator Row using the jetvac process*

- A. A fixed floor culvert cleaning nozzle with a rear facing spread of 45" (1.1 m) or more is preferred
- B. Apply multiple passes of jetvac until backflush water is clean
- C. Vacuum structure sump as required

*Step 3) Replace all covers, grates, filters, and lids; record observations and actions.*

*Step 4) Inspect and clean basins and manholes upstream of the Stormtech system. Inspect every 6 months during the first year of operation. Adjust the inspection interval based on previous observations of sediment accumulation and high water elevations. Conduct jetting and vactoring annually or when inspection shows that maintenance is necessary.*

#### UGD-2.3.4 Trickle Channel (Low-Flow)

The trickle channels are not necessary in an UGD. Therefore, no maintenance is necessary.

#### UGD-2.3.6 Bottom Stage

The bottom stage is not necessary in an UGD since the facility is underground. Therefore, no maintenance is necessary.

#### UGD-2.3.7 Micro-pool



The micro-pool is not necessary in an UGD since the facility is underground. Therefore, no maintenance is necessary.

#### UGD-2.3.8 Outlet Works

The outlet works is the feature that drains the UGD in specified quantities and periods of time. The outlet works is constructed of reinforced concrete at the end of the UGD. 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, but due to the redundancy within the system (MTD and Isolator Row) the need for a grate is not needed. The water quality orifice plate (smaller diameter hole) will typically have a well screen covering it to prevent smaller materials from clogging it, but due to the redundancy within the system (MTD and Isolator Row) the need for a well screen is not needed.. The outlet structure is the single most important feature in the UGD operation. Proper inspection and maintenance of the outlet works is essential in ensuring the long-term operation of the UGD.

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

*a. Trash Rack/Well Screen Clogged* – No trash rack or well screen on this project.

*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 UGD. 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 UGD 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). However, since the outflow point is below ground, the presence of these natural materials will be less common.

#### UGD-2.3.9 Emergency Spillway

An emergency spillway is not a component of an UGD, but in the event the system becomes clogged there will be an overflow path from the outlet structure to the northwest corner of Tract A. It is important to keep the path clear and check for damage/erosion after an overflow event.

#### UGD-2.3.10 Upper Stage (Dry Storage)

There is no upper stage in an UGD, therefore no maintenance is necessary.

#### UGD-2.3.11 Miscellaneous

There are a variety of inspection/maintenance issues that may not be attributed to a single feature within the UGD. This category on the inspection form is for maintenance items that are commonly found in the UGD, 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 UGDs, 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 UGD infrastructure can be caused by vandals. If criminal mischief is evident, the inspector should forward this information to the local Sheriff’s Office. The UGD is mostly underground and un-visible. Therefore, vandalism would be an uncommon problem.

*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 UGD features and negatively affect the components within the UGD.

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

#### **UGD-2.4 Inspection Forms**

UGD 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. Inspections involving measurements of the sediment depth should be done at least 5 days after the last storm event to allow all water to drain from the system.

### **UGD-3 MAINTAINING UNDERGROUND DETENTION BASINS (UGD)**

#### **UGD-3.1 Maintenance Personnel**

Maintenance personnel must be qualified to properly maintain UGDs. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs. Maintenance shall be the responsibility of Crossroads Metropolitan District No. 1 and/or third party hired by Crossroads Metropolitan District No. 1.

#### **UGD-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 UGD:

- 1.) All Surface Vehicle (ASVs) (MTA/Isolator Row, Outlets Structure)
- 2.) Dump Truck/VAC Truck – Truck to haul sediment and/or debris (MTA/Isolator Row, Outlets Structure)
- 3.) Jet-Vac Machine- A fixed floor culvert cleaning nozzle with a rear facing spread of 45” (1.1 m) or more is preferred. Preferred

Isolator row lengths are 200' (61 m), hose length required to be greater than 200'. (Isolator Row)

- 4.) Confined Space Entry Equipment- OSHA approved confined space entry equipment. (MTA/Isolator Row, Outlet Structure)
- 5.) Approved Stormwater Facility Operation and Maintenance Manual (MTA/Isolator Row)
- 6.) Mirror on pole, camera, flashlight (MTA/Isolator Row, Outlets Structure)
- 7.) Stadia Rod, Sediment Probe (MTA/Isolator Row, Outlets Structure)
- 8.) Tape Measure (MTA/Isolator Row, Outlets Structure)
- 9.) Maintenance Log (MTA/Isolator Row, Outlets Structure)
- 10.) Shovel (MTA/Isolator Row, Outlets Structure)
- 11.) Buckets to remove sediment and/or trash debris (MTA/Isolator Row, Outlets Structure)

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.

### **UGD-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 UGD that is greater than 48" in height, make the appropriate note/comment on the maintenance inspection form.

### **UGD-3.4 Maintenance Forms**

The UGD Maintenance Form provides a record of each maintenance operation performed by maintenance contractors. The UGD 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 UGD Maintenance form is located in Appendix E.

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

A typical UGD 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 UGD. A maintenance activity can be specific to each feature within the UGD, 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 UGD.

A variety of maintenance activities are typical of UGDs. 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:

The Isolator Row PLUS was designed to reduce the cost of periodic maintenance. By “isolating” sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries. Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row PLUS while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45” are best. StormTech recommends a maximum nozzle pressure of 2000 psi be utilized during cleaning. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row PLUS up to 50 chambers long. The JetVac process shall only be performed on StormTech Isolator Row PLUS that have ADS PLUS Fabric (as specified by StormTech) over their angular base stone.

## ISOLATOR ROW PLUS STEP BY STEP MAINTENANCE PROCEDURES

### STEP 1

Inspect Isolator Row PLUS for sediment.

- A) Inspection ports (if present)
  - i. Remove lid from from box frame
  - ii. Remove cap from inspection riser
  - iii. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.
  - iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

### B) All Isolator Row PLUS

- i. Remove cover from manhole at upstream end of Isolator Row PLUS
- ii. Using a flashlight, inspect down Isolator Row PLUS through outlet pipe
  - 1. Mirrors on poles or cameras may be used to avoid a confined space entry
  - 2. Follow OSHA regulations for confined space entry if entering manhole

iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

**STEP 2**

Clean out Isolator Row PLUS using the JetVac process.

- A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
- B) Apply multiple passes of JetVac until backflush water is clean
- C) Vacuum manhole sump as required

**STEP 3**

Replace all caps, lids and covers, record observations and actions.

**STEP 4**

Inspect & clean catch basins and manholes upstream of the StormTech system.

Per the operation of this system, sediments are captured in the MTD (Bayseparator) and isolator rows protecting the adjacent stone and chambers detention storage areas from sediment accumulation.

**UGD-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 **upstream** of the UDG. This includes items such as the removal of debris/material that may be clogging the upstream stormwater inlets. 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 – UGD-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 UGD	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

#### UGD-3.6.1 Mowing

Mowing is necessary to limit **upstream** unwanted vegetation and to remove the overall pollutants allowed to enter the UGD. 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.

#### UGD-3.6.2 Trash/Debris Removal

Trash and debris must be removed from the MTDs and entire UGD area to minimize inlet/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.

#### UGD-3.6.3 Outlet Works Cleaning

Debris and other materials can clog the outlet work's orifice plate(s). 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.

#### UGD-3.6.4 Weed Control

**Upstream** Noxious weeds and other unwanted vegetation must be treated as needed prior to reaching the UGD. 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.

#### UGD-3.6.5 Mosquito/Algae Treatment

Treatment of permanent pools **upstream** to the UGD 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.

### UGD- 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. Sediment loading calculations provided at the end of this Appendix C.

**Table – UGD-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



### UGD-3.7.1 Sediment Removal

Sediment removal is necessary to maintain the original design volume of the UGD and to ensure proper function of the infrastructure. Regular sediment removal (minor) from the MTD(s), and inflow(s), can significantly reduce the frequency of major sediment removal activities (dredging) in the isolator row. The minor and major sediment removal activities can typically be addressed with a vac-truck.

Stormwater sediments removed from UGDs 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. The jetvac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. 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.

### UGD-3.7.2 Erosion Repair

The repair of eroded areas upstream of the UGD is necessary to minimize eroded material from reaching the UGD, minimize sediment transport, and to reduce potential impacts to other features. Erosion can vary in magnitude from minor repairs or major repairs on developments upstream of the UGD. 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.

### UGD-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 UGD. Tree roots can damage structures and invade pipes/channels thereby

blocking flows. Also, trees growing on or around the UGD will have to be removed. 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 on top of the UGD or near structures (inflows, outlet works, etc) should be removed. Any trees or woody vegetation within 30 feet of the UGD should be monitored for root growth.

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

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

An UGD contains many structures, openings, vaults and pipes that can be frequently clogged with debris. These blockages can result in a decrease of hydraulic capacity. 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.

### UGD-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 (A GEC permit for major earth moving and/or excavation).** This work may also require more specialized maintenance equipment, design/details, surveying, or assistance through private contractors and consultants.

**Table – UGD-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	Repair erosion – find cause of problem and address to avoid future erosion

		of settlement, holes	
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

### UGD-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. Per the operation of this system, sediments are captured in the MTD (Bayseparator) and isolator rows protecting the adjacent stone and chambers detention storage areas from sediment accumulation.

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

### UGD-3.8.2 Major Erosion Repair

Major erosion repair consists 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.

### UGD-3.8.3 Structural Repair

An UGD 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, MTD, 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.

### Annual Mass Load and Maintenance Interval Calculations

Incorporates the Isolator Row Pre-Treatment System



1 Location Scenario	Isolator Row Chambers	2 Area	3 Runoff Coeff	4 Annual Rainfall	5 Annual Runoff	6 TSS EMC**	7 Mass Load	8 Spec Wt of solids*	9 Annual Sediment	10 Runoff Treated	11 Runoff Treated	12 Isolator Efficien.	13 Sediment Captured	14 Sediment Lost to Voids	15 Service Life	16 Sediment Accum.	Maintenance				
																	20 SC-160LP Maint. Interval	17 SC-310 Maint. Interval	18 SC-740 / DC-780 Maint. Interval	19 MC-3500 Maint. Interval	20 MC-7200 Maint. Interval
		A (Ac)	C	P (in)	V <sub>r</sub> (ft <sup>3</sup> )	(mg/l)	M (lbs)	(lbs/ft <sup>3</sup> )	S <sub>s</sub> (ft <sup>3</sup> )	%	V <sub>t</sub> (ft <sup>3</sup> )	%	S <sub>c</sub> (ft <sup>3</sup> /yr)	SL (ft <sup>3</sup> )	(years)	(ft <sup>3</sup> )	(years)	(years)	(years)	(years)	
East Side Inlet (CO Springs, CO)	29	18.5	0.84	17.4	981537	80	4899	80	61.24	90%	883384	80%	44.09	17.15	50	857.3	2	3	4	7	8
North Side Inlet (CO Springs, CO)	14	11.4	0.79	17.4	568837	80	2839	80	35.49	90%	511953	80%	25.55	9.94	50	496.9	1	2	4	6	7
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			0.9		0	80	0	80	0.00	90%	0	80%	0.00	0.00	50	0.0	NOT APP.	NOT APP.	NOT APP.	NOT APP.	NOT APP.
			0.9		0	80	0	80	0.00	90%	0	80%	0.00	0.00	50	0.0	NOT APP.	NOT APP.	NOT APP.	NOT APP.	NOT APP.
			0.9		0	80	0	80	0.00	90%	0	80%	0.00	0.00	50	0.0	NOT APP.	NOT APP.	NOT APP.	NOT APP.	NOT APP.
			0.9		0	80	0	80	0.00	90%	0	80%	0.00	0.00	50	0.0	NOT APP.	NOT APP.	NOT APP.	NOT APP.	NOT APP.
			0.9		0	80	0	80	0.00	90%	0	80%	0.00	0.00	50	0.0	NOT APP.	NOT APP.	NOT APP.	NOT APP.	NOT APP.
			0.9		0	80	0	80	0.00	90%	0	80%	0.00	0.00	50	0.0	NOT APP.	NOT APP.	NOT APP.	NOT APP.	NOT APP.

3	inch depth of sediment in Isolator Row
2.58	cubic feet of storage for SC-160 chambers
4.2	cubic feet of storage for SC-310 chambers
6.58	cubic feet of storage for SC-740/DC-780 chambers
10.24	cubic feet of storage for MC-3500 chambers
12.46	cubic feet of storage for MC-7200 chambers

General Notes:  
 Conversions used are: 28.3 L/ft<sup>3</sup> and 2.2046 lbs/kg  
 EMC is the Event Mean Concentration of sediment for a storm event.  
 \* - Specific weight of stormwater sediments varies from 93 lbs/ft<sup>3</sup> for sand, 82 for silt and 78 for clay. Stormtech uses 80 lbs/ft<sup>3</sup> as an average default value.  
 \*\* - Based on a NURP/USGS study, the national median is 54.5 mg/l. StormTech uses 80 mg/l as a default value.

EMC Reference Scenarios:  
 1 - Clayton Cnty, GA. EMC = 38 (mg/l) Based on Atlanta Regional Commission, calculated concentration generating 400 pounds per impervious acre per year.  
 2 - Cookeville, TN. EMC = 57 (mg/l) Based on Cookeville, TN study concentration from impervious area.  
 3 - Durham, NH. EMC = 37 (mg/l) Based on University of New Hampshire Stormwater Center's 2005 Data Report from impervious area.  
 4 - Milwaukee, WI. EMC = 140 (mg/l) Based on Milwaukee study, median value of 297 tons/sqmi from watershed of pervious and impervious area.

# Standard Operation Procedures for Inspection and Maintenance

## Underground Detention Basin (UGD)

May 2021

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## **UGD-1 BACKGROUND**

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

UGDs are an adaptation of an extended detention basin used for flood control, with the primary difference is the addition of additional manufactured treatment devices (MTDs(Bayseparator)) but they also include a slow release outlet design. Forebays are replaced by the MTDs, located at the inflow point to the basin and are provided to remove floatables, coarse and fine sediment within a contained area prior to releasing into the pond (underground chambers). The MTDs 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 MTD into the Isolator row. The isolator row holds the sediment in one underground chamber for easier maintenance (removal of sediment & pollutants). The UGD also uses a smaller outlet, as compared to an above ground pond, that will extend the emptying time of the more frequently occurring runoff events to facilitate pollutant removal. An UGD does not have a small micropool just upstream of the outlet like an EDB. The micropool is not necessary to hold a small amount of water to keep sediment and floatables from blocking the outlet orifices because this occurs in the MTDs and isolator row(s).

## **UGD-2 INSPECTING UNDERGROUND DETENTION BASINS (UGD)**

### **UGD-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 UGD(s) within this development.

### **UGD-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 UGD(s) within this development.

### **UGD-2.3 Underground Detention Basin (UGD) Features**

UGDs 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 MTD is not properly maintained, it could negatively affect the performance of a feature downstream (isolator row, outlet structure, etc.). Therefore, it is critical that each feature of the UGD 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 UGD and the corresponding maintenance inspection items that can be anticipated:

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

UGD Features	Sediment Removal	Mowing/ Weed control	Trash & Debris Removal	Erosion	Overgrown Vegetation Removal	Standing Water (mosquito/ algae control)	Structure Repair
Inflow Points (MTDs)	X		X				X
Isolator Rows	X		X				X
Outlet Works	X		X				X

#### UGD-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 an EDB. However, an Inflow Point for a UGD must first pass through a MTD.

An energy dissipation occurs with flows through the MTD.

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

*a. 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.

*b. 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 UGD 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. However, since the inflow point is below ground, the presence of these natural materials will be less common.

#### UGD-2.3.2 Forebay (MTD (Bayseparator))

Manufactured Treatment Devices (MTDs) include many different types of proprietary devices that use various treatment processes and designs to remove targeted pollutants. The MTD (Bayseparator) primary manhole separates pollutants during the low-flow and high-flow events. The MTDs (Bayseparator) allow low flow rates to be treated in the offline storage manhole. Coarse sediments settle in primary manhole undisturbed. Finer sediments and floatables are conveyed through the Bayseparator into the storage manhole. Contaminants in the storage manhole are trapped offline. MTD (Bayseparator) systems must be inspected and maintained periodically. Inspection is made by checking the depth of the sediment in each manhole with a grade stick or similar device. Maintenance is required when the sediment depth in either manhole exceeds 2 feet. The frequency of inspection and maintenance varies by municipality. At a minimum the supplier recommends inspection/maintenance twice a year to maintain operation and function of MTD (Bayseparator) or as recommended by El Paso County.

*The maintenance items that are found with MTDs (Bayseparator) are as follows:*

a. *Storage Manhole*

1. Remove the entire volume of the contaminated water by vacuum truck.
2. Clean the manhole walls and flush out the manhole using a high pressure hose and remove flushing water by vacuum truck. Make certain manhole is clean.

b. *Primary Manhole*

1. Using a submersible pump, pump the clean water from the center of the manhole directly into the empty storage manhole until the water level falls to 1 foot above the sediment layer.
2. Remove the settled sediment and remaining water by vacuum truck.
3. Clean the manhole walls and flush out the manhole using a high pressure hose and remove flushing water by vacuum truck. Make certain manhole is clean.
4. Contaminated material removed from the manholes must be disposed of responsibly and legally by the operator of the vacuum truck.

*c. Concrete Cracking/Failing*

1. The MTD (Bayseparator) is primarily constructed of concrete, which cracks, spalls, and settles. Damage to the MTD can result in decreased performance and impact maintenance efforts.

UGD-2.3.3 Isolator Row

The Isolator Row is designed to capture the “first flush” runoff and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole provides access to the Isolator Row and includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row bypass through a manifold to the other chambers. This is achieved with an elevated bypass manifold or a high-flow weir. This creates a differential between the Isolator Row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row. After stormwater flows through the Isolator Row and into the rest of the chamber system it is either exfiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure. The frequency of inspection and maintenance varies by municipality. At a minimum the supplier recommends inspection/maintenance twice a year to maintain operation and function of the Isolator Row or as recommended by the municipality. Sediments are captured in the MTD (Bayseparator) and isolator rows protecting the adjacent stone and chambers detention storage areas from sediment accumulation.

*The inspection/maintenance items that are found with Isolator Rows are as follows:*

*Step 1) Inspect Isolator Row for sediment*

- A. Inspection ports (if present)
  - A.1 Remove/open lid on nyloplast inline drain

- A.2 Using a flashlight and stadia rod, measure depth of sediment and record on maintenance log
- A.3 Lower a camera into Isolator Row for a visual inspection or sediment levels (optional)
- A.4 If sediment is at, or above 3" (80 mm) proceed to Step 2. If not, proceed to Step 3.
- B. All Isolator Rows
  - B.1 Remove cover from structure at upstream end of Isolator Row
  - B.2 Using a flashlight, inspect down the Isolator Row through outlet pipe
    - i) mirrors on poles or cameras may be used to avoid a confined space entry
    - ii) follow OSHA regulations for confined space entry if entering manhole
  - B.3 If sediment is at, or above 3" (80 mm) proceed to Step 3.

*Step 2) Clean out Isolator Row using the jetvac process*

- A. A fixed floor culvert cleaning nozzle with a rear facing spread of 45" (1.1 m) or more is preferred
- B. Apply multiple passes of jetvac until backflush water is clean
- C. Vacuum structure sump as required

*Step 3) Replace all covers, grates, filters, and lids; record observations and actions.*

*Step 4) Inspect and clean basins and manholes upstream of the Stormtech system. Inspect every 6 months during the first year of operation. Adjust the inspection interval based on previous observations of sediment accumulation and high water elevations. Conduct jetting and vactoring annually or when inspection shows that maintenance is necessary.*

#### UGD-2.3.4 Trickle Channel (Low-Flow)

The trickle channels are not necessary in an UGD. Therefore, no maintenance is necessary.

#### UGD-2.3.6 Bottom Stage

The bottom stage is not necessary in an UGD since the facility is underground. Therefore, no maintenance is necessary.

#### UGD-2.3.7 Micro-pool

The micro-pool is not necessary in an UGD since the facility is underground. Therefore, no maintenance is necessary.

#### UGD-2.3.8 Outlet Works

The outlet works is the feature that drains the UGD in specified quantities and periods of time. The outlet works is constructed of reinforced concrete at the end of the UGD. 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, but due to the redundancy within the system (MTD and Isolator Row) the need for a grate is not needed. The water quality orifice plate (smaller diameter hole) will typically have a well screen covering it to prevent smaller materials from clogging it, but due to the redundancy within the system (MTD and Isolator Row) the need for a well screen is not needed.. The outlet structure is the single most important feature in the UGD operation. Proper inspection and maintenance of the outlet works is essential in ensuring the long-term operation of the UGD.

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

*a. Trash Rack/Well Screen Clogged* – No trash rack or well screen on this project.

*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 UGD. 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 UGD 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). However, since the outflow point is below ground, the presence of these natural materials will be less common.

#### UGD-2.3.9 Emergency Spillway

An emergency spillway is not a component of an UGD, but in the event the system becomes clogged there will be an overflow path from the outlet structure to the northwest corner of Tract A. It is important to keep the path clear and check for damage/erosion after an overflow event.

#### UGD-2.3.10 Upper Stage (Dry Storage)

There is no upper stage in an UGD, therefore no maintenance is necessary.

#### UGD-2.3.11 Miscellaneous

There are a variety of inspection/maintenance issues that may not be attributed to a single feature within the UGD. This category on the inspection form is for maintenance items that are commonly found in the UGD, 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 UGDs, 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 UGD infrastructure can be caused by vandals. If criminal mischief is evident, the inspector should forward this information to the local Sheriff’s Office. The UGD is mostly underground and un-visible. Therefore, vandalism would be an uncommon problem.

*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 UGD features and negatively affect the components within the UGD.

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

#### **UGD-2.4 Inspection Forms**

UGD 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. Inspections involving measurements of the sediment depth should be done at least 5 days after the last storm event to allow all water to drain from the system.

### **UGD-3 MAINTAINING UNDERGROUND DETENTION BASINS (UGD)**

#### **UGD-3.1 Maintenance Personnel**

Maintenance personnel must be qualified to properly maintain UGDs. Inadequately trained personnel can cause additional problems resulting in additional maintenance costs. Maintenance shall be the responsibility of Crossroads Metropolitan District No. 1 and/or third party hired by Crossroads Metropolitan District No. 1.

#### **UGD-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 UGD:

- 1.) All Surface Vehicle (ASVs) (MTA/Isolator Row, Outlets Structure)
- 2.) Dump Truck/VAC Truck – Truck to haul sediment and/or debris (MTA/Isolator Row, Outlets Structure)
- 3.) Jet-Vac Machine- A fixed floor culvert cleaning nozzle with a rear facing spread of 45” (1.1 m) or more is preferred. Preferred

Isolator row lengths are 200' (61 m), hose length required to be greater than 200'. (Isolator Row)

- 4.) Confined Space Entry Equipment- OSHA approved confined space entry equipment. (MTA/Isolator Row, Outlet Structure)
- 5.) Approved Stormwater Facility Operation and Maintenance Manual (MTA/Isolator Row)
- 6.) Mirror on pole, camera, flashlight (MTA/Isolator Row, Outlets Structure)
- 7.) Stadia Rod, Sediment Probe (MTA/Isolator Row, Outlets Structure)
- 8.) Tape Measure (MTA/Isolator Row, Outlets Structure)
- 9.) Maintenance Log (MTA/Isolator Row, Outlets Structure)
- 10.) Shovel (MTA/Isolator Row, Outlets Structure)
- 11.) Buckets to remove sediment and/or trash debris (MTA/Isolator Row, Outlets Structure)

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.

### **UGD-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 UGD that is greater than 48" in height, make the appropriate note/comment on the maintenance inspection form.

### **UGD-3.4 Maintenance Forms**

The UGD Maintenance Form provides a record of each maintenance operation performed by maintenance contractors. The UGD 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 UGD Maintenance form is located in Appendix E.

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

A typical UGD 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 UGD. A maintenance activity can be specific to each feature within the UGD, 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 UGD.

A variety of maintenance activities are typical of UGDs. 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:

The Isolator Row PLUS was designed to reduce the cost of periodic maintenance. By “isolating” sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries. Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row PLUS while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45” are best. StormTech recommends a maximum nozzle pressure of 2000 psi be utilized during cleaning. Most JetVac reels have 400 feet of hose allowing maintenance of an Isolator Row PLUS up to 50 chambers long. The JetVac process shall only be performed on StormTech Isolator Row PLUS that have ADS PLUS Fabric (as specified by StormTech) over their angular base stone.

## ISOLATOR ROW PLUS STEP BY STEP MAINTENANCE PROCEDURES

### STEP 1

Inspect Isolator Row PLUS for sediment.

- A) Inspection ports (if present)
  - i. Remove lid from from box frame
  - ii. Remove cap from inspection riser
  - iii. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.
  - iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.

### B) All Isolator Row PLUS

- i. Remove cover from manhole at upstream end of Isolator Row PLUS
- ii. Using a flashlight, inspect down Isolator Row PLUS through outlet pipe
  - 1. Mirrors on poles or cameras may be used to avoid a confined space entry
  - 2. Follow OSHA regulations for confined space entry if entering manhole



iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

**STEP 2**

Clean out Isolator Row PLUS using the JetVac process.

- A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
- B) Apply multiple passes of JetVac until backflush water is clean
- C) Vacuum manhole sump as required

**STEP 3**

Replace all caps, lids and covers, record observations and actions.

**STEP 4**

Inspect & clean catch basins and manholes upstream of the StormTech system.

Per the operation of this system, sediments are captured in the MTD (Bayseparator) and isolator rows protecting the adjacent stone and chambers detention storage areas from sediment accumulation.

**UGD-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 **upstream** of the UDG. This includes items such as the removal of debris/material that may be clogging the upstream stormwater inlets. 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 – UGD-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 UGD	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

#### UGD-3.6.1 Mowing

Mowing is necessary to limit **upstream** unwanted vegetation and to remove the overall pollutants allowed to enter the UGD. 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.

#### UGD-3.6.2 Trash/Debris Removal

Trash and debris must be removed from the MTDs and entire UGD area to minimize inlet/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.

#### UGD-3.6.3 Outlet Works Cleaning

Debris and other materials can clog the outlet work's orifice plate(s). 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.

#### UGD-3.6.4 Weed Control

**Upstream** Noxious weeds and other unwanted vegetation must be treated as needed prior to reaching the UGD. 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.

#### UGD-3.6.5 Mosquito/Algae Treatment

Treatment of permanent pools **upstream** to the UGD 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.

### UGD- 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 – UGD-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

#### UGD-3.7.1 Sediment Removal

Sediment removal is necessary to maintain the original design volume of the UGD and to ensure proper function of the infrastructure.

Regular sediment removal (minor) from the MTD(s), and inflow(s), can significantly reduce the frequency of major sediment removal activities (dredging) in the isolator row. The minor and major sediment removal activities can typically be addressed with a vac-truck.

Stormwater sediments removed from UGDs 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. The jetvac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. 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.

#### UGD-3.7.2 Erosion Repair

The repair of eroded areas upstream of the UGD is necessary to minimize eroded material from reaching the UGD, minimize sediment transport, and to reduce potential impacts to other features. Erosion can vary in magnitude from minor repairs or major repairs on developments upstream of the UGD. 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.

#### UGD-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 UGD. Tree roots can damage structures and invade pipes/channels thereby blocking flows. Also, trees growing on or around the UGD will have to be removed. 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 on top of the UGD or near structures (inflows, outlet works, etc) should be removed. Any trees or woody

vegetation within 30 feet of the UGD should be monitored for root growth.

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

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

An UGD contains many structures, openings, vaults and pipes that can be frequently clogged with debris. These blockages can result in a decrease of hydraulic capacity. 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.

### UGD-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 access the situation and assign the necessary maintenance. **A public improvements permit shall be required for all major maintenance activities (A GEC permit for major earth moving and/or excavation).** This work may also require more specialized maintenance equipment, design/details, surveying, or assistance through private contractors and consultants.

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

MAINTENANCE ACTIVITY	MINIMUM FREQUENCY	LOOK FOR:	MAINTENANCE ACTION
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	Deterioration and/or damage to structural	Structural repair to restore the structure to its original design

	inspections	components – broken concrete, damaged pipes, outlet works	
--	-------------	--	--

### UGD-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. Per the operation of this system, sediments are captured in the MTD (Bayseparator) and isolator rows protecting the adjacent stone and chambers detention storage areas from sediment accumulation.

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

### UGD-3.8.2 Major Erosion Repair

Major erosion repair consists 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.

### UGD-3.8.3 Structural Repair

An UGD 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, MTD, 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.

## APPENDIX D

**UNDERGROUND DETENTION (UGD)  
INSPECTION FORM**

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

Subdivision/Business Name:  Crossroads Mixed Use Filing No. 1  Inspector: \_\_\_\_\_

Subdivision/Business Address:  Northwest of HWY 24 & Newt Drive Intersection

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 MTD (Bayseparator)**

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

**3.) Isolator Row**

- Sediment/Debris Accumulation
- End Cap/Chamber Damage
- Geotextile Fabric/Manhole Damage
- Woody Growth Above Chamber Present

**4.) Outlet Works**

- Sediment/Debris Accumulation
- Structural Damage (concrete, steel, Subgrade)
- Orifice Plate(s) Clogged, Missing/not secure
- Manhole Access (cover, steps, etc)
- Woody Growth/Weeds Present

**5.) Emergency Overflow Path**

- Woody Growth/Weeds Present
- Obstruction Debris

**6.) 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.



UNDERGROUND WQ INSPECTION SCHEDULE

Cross Roads Mixed Use Inspection Schedule <sup>1</sup>	PA Inspection	Defect Warrantee Year 1				Defect Warrantee Year 2				FA Inspection	ESQCP Closure	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6+			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
BaySaver	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	M	C	M	C	M	C	M	C	M	C	M				C
CCTV*	C									C	C					C		C		C		C		C		C		C		C					
Inspection Ports	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	M	C	M	C	M	C	M	C	M	C	M				C
Outlet Structure	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	M	C	M	C	M	C	M	C	M	C	M				C
Outfall	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	M	C	M	C	M	C	M	C	M	C	M				C

Notes:

C: EPC and Metro District Co-inspections

M: Metro District Only Inspections

ESQCP Closure may coincide with FA Inspection

Year 1 starts following FA Inspection or ESQCP Closure (whichever occurs last)

<sup>1</sup>Additional inspections shall be performed by the Metro District after every significant rainfall event

\*CCTV at inlet manholes, outlet manhole, and inspection ports

## APPENDIX E

# ISOLATOR ROW PLUS STEP BY STEP MAINTENANCE PROCEDURES

## STEP 1

Inspect Isolator Row PLUS for sediment.

- A) Inspection ports (if present)
  - i. Remove lid from floor box frame
  - ii. Remove cap from inspection riser
  - iii. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.
  - iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.
- B) All Isolator Row PLUS
  - i. Remove cover from manhole at upstream end of Isolator Row PLUS
  - ii. Using a flashlight, inspect down Isolator Row PLUS through outlet pipe
    1. Mirrors on poles or cameras may be used to avoid a confined space entry
    2. Follow OSHA regulations for confined space entry if entering manhole
  - iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

## STEP 2

Clean out Isolator Row PLUS using the JetVac process.

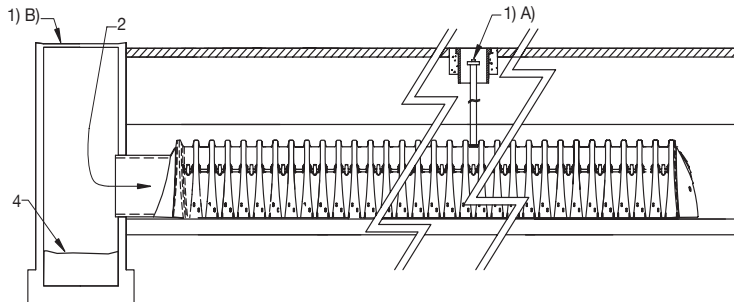
- A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
- B) Apply multiple passes of JetVac until backflush water is clean
- C) Vacuum manhole sump as required

## STEP 3

Replace all caps, lids and covers, record observations and actions.

## STEP 4

Inspect & clean catch basins and manholes upstream of the StormTech system.



## SAMPLE MAINTENANCE LOG

Date	Stadia Rod Readings		Sediment Depth (1)-(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/15/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row PLUS, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

# Maintenance Log

StormTech® Chamber System

Project Name:  
Location:

Date	Stadia Rod Readings		Sediment Depth (1) - (2)	Observations / Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			



[adspipe.com](http://adspipe.com)  
1-800-821-6710

# BaySeparator System Maintenance Manual

## Maintenance Instructions

**Note:** For each BaySaver System, there are 2 manholes to clean: the **primary manhole** and **storage manhole**.

1. Remove the manhole covers to provide access to the pollutant storage.
2. **Storage manhole:** Use a vacuum truck or other similar equipment to remove all water, debris, oils and sediment.
3. **Storage manhole:** Use a high pressure hose to clean the manhole of all the remaining sediment and debris. Then, use the vacuum truck to remove the water.
4. **Primary manhole:** Use a submersible pump to pump the bulk of the water from the primary manhole into the clean storage manhole:
  - a. Keep the pump intake below the water surface.
  - b. Stop pumping when the water surface is one (1) foot above the accumulated sediments.
5. **Primary manhole:** Use a vacuum truck or other similar equipment to remove all water, debris, oils and sediment.
6. **Primary manhole:** Use a high pressure hose to clean the manhole of all the remaining sediment and debris. Then, use the vacuum truck to remove the water.
7. **Primary manhole:** Fill the cleaned primary manhole with water until you have a depth of 8 feet (or 2.44 meters).
8. **Storage manhole:** Top off the storage manhole with water until you have a depth of 8 feet (or 2.44 meters).
9. Replace the two manhole covers.
10. Dispose of the polluted water, oils, sediment and trash at an approved facility.
  - Local regulations prohibit the discharge of solid material into the sanitary system. Check with the local sewer authority for authority to discharge the liquid.
  - Many places treat the pollutants as leachate. Check with local regulators about disposal requirements.

**Important:** Additional local regulations may apply to the maintenance procedure.

**Figure 5: Vacuum truck and high pressure hose**



**How can you tell the primary from the storage manhole?**

The **primary manhole** has the BaySaver unit with the T-pipes (see Figure 4).

The other manhole is the **storage manhole** (see Figure 3).

If you need further assistance or have any questions, please call **1-800-229-7283** or visit

[Baysaver.com](http://Baysaver.com)

## 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: \_\_ Crossroads Mixed Use Filing No. 1 \_\_\_\_\_

Property Address: \_\_ Northwest of HWY 24 & Newt Drive intersection \_\_\_\_\_

Contact Name: \_\_\_\_\_ Danny Mientka \_\_\_\_\_

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



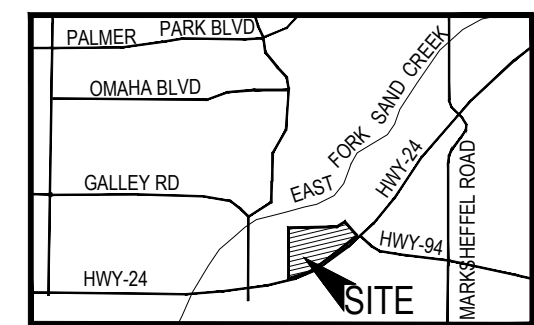
STANDARD NOTES FOR EL PASO COUNTY GRADING AND EROSION CONTROL PLANS

- 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 DEPICED 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 FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING.
- A SEPARATE STORMWATER MANAGEMENT PLAN (SMWP) FOR THIS PROJECT SHALL BE COMPLETED AND AN EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP) ISSUED PRIOR TO COMMENCING CONSTRUCTION. MANAGEMENT OF THE SWMP DURING CONSTRUCTION IS THE RESPONSIBILITY OF THE DESIGNATED QUALIFIED STORMWATER MANAGER OR CERTIFIED EROSION CONTROL INSPECTOR. THE SWMP SHALL BE LOCATED ON SITE AT ALL TIMES DURING CONSTRUCTION AND SHALL BE KEPT UP TO DATE WITH WORK PROGRESS AND CHANGES IN THE FIELD.
- ONCE THE ESQCP IS APPROVED AND A NOTICE TO PROCEED HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL THE INITIAL STAGE EROSION AND SEDIMENT CONTROL MEASURES AS INDICATED ON THE APPROVED 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 STAFF.
- CONTROL MEASURES MUST BE INSTALLED PRIOR TO COMMENCEMENT OF ACTIVITIES THAT COULD CONTRIBUTE POLLUTANTS TO STORMWATER. CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, AND DISTURBED LAND AREAS SHALL BE INSTALLED IMMEDIATELY UPON COMPLETION OF THE DISTURBANCE.
- ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE MAINTAINED AND REMAIN IN EFFECTIVE OPERATING CONDITION UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED AND FINAL STABILIZATION IS ESTABLISHED. ALL PERSONS ENGAGED IN LAND DISTURBANCE ACTIVITIES SHALL ASSESS THE ADEQUACY OF CONTROL MEASURES AT THE SITE AND IDENTIFY IF CHANGES TO THOSE CONTROL MEASURES ARE NEEDED TO ENSURE THE CONTINUED EFFECTIVE PERFORMANCE OF THE CONTROL MEASURES. ALL CHANGES TO TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES MUST BE INCORPORATED INTO THE STORMWATER MANAGEMENT PLAN.
- TEMPORARY STABILIZATION SHALL BE IMPLEMENTED ON DISTURBED AREAS AND STOCKPILES WHERE GROUND DISTURBING CONSTRUCTION ACTIVITY HAS PERMANENTLY CEASED OR TEMPORARILY CEASED FOR LONGER THAN 14 DAYS.
- FINAL STABILIZATION MUST BE IMPLEMENTED AT ALL APPLICABLE CONSTRUCTION SITES. FINAL STABILIZATION IS ACHIEVED WHEN ALL GROUND DISTURBING ACTIVITIES ARE COMPLETE AND ALL DISTURBED AREAS EITHER HAVE A UNIFORM VEGETATIVE COVER WITH INDIVIDUAL PLANT DENSITY OF 70 PERCENT OF PRE-DISTURBANCE LEVELS ESTABLISHED OR EQUIVALENT PERMANENT ALTERNATIVE STABILIZATION METHOD IS IMPLEMENTED. ALL TEMPORARY SEDIMENT AND EROSION CONTROL MEASURES SHALL BE REMOVED UPON FINAL STABILIZATION AND BEFORE PERMIT CLOSURE.
- ALL PERMANENT STORMWATER MANAGEMENT FACILITIES SHALL BE INSTALLED AS DESIGNED IN THE APPROVED PLANS. ANY PROPOSED CHANGES THAT EFFECT THE DESIGN OR FUNCTION OF PERMANENT STORMWATER MANAGEMENT STRUCTURES MUST BE APPROVED BY THE ECM ADMINISTRATOR PRIOR TO IMPLEMENTATION.
- EARTH DISTURBANCES SHALL BE CONDUCTED IN SUCH A MANNER SO AS TO EFFECTIVELY MINIMIZE 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 SMALLEST PRACTICAL PERIOD OF TIME. PRE-EXISTING VEGETATION SHALL BE PROTECTED AND MAINTAINED WITHIN 50 HORIZONTAL FEET OF A WATERS OF THE STATE UNLESS SHOWN TO BE INFEASIBLE AND SPECIFICALLY REQUESTED AND APPROVED.
- COMPACTION OF SOIL MUST BE PREVENTED IN AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES OR WHERE FINAL STABILIZATION WILL BE ACHIEVED BY VEGETATIVE COVER. AREAS DESIGNATED FOR INFILTRATION CONTROL MEASURES SHALL ALSO BE PROTECTED FROM SEDIMENTATION DURING CONSTRUCTION UNTIL FINAL STABILIZATION IS ACHIEVED. IF COMPACTION PREVENTION IS NOT FEASIBLE DUE TO SITE CONSTRAINTS, ALL AREAS DESIGNATED FOR INFILTRATION AND VEGETATION CONTROL MEASURES MUST BE LOOSENEED PRIOR TO INSTALLATION OF THE CONTROL MEASURE(S).
- ANY TEMPORARY OR PERMANENT FACILITY DESIGNED AND CONSTRUCTED FOR THE CONVEYANCE OF STORMWATER AROUND, THROUGH, OR FROM THE EARTH DISTURBANCE AREA SHALL BE A STABILIZED CONVEYANCE DESIGNED TO MINIMIZE EROSION AND THE DISCHARGE OF SEDIMENT OFF SITE.
- CONCRETE WASH WATER SHALL BE CONTAINED AND DISPOSED OF IN ACCORDANCE WITH THE SWMP. NO WASH WATER SHALL BE DISCHARGED TO OR ALLOWED TO ENTER STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES. CONCRETE WASHOUTS SHALL NOT BE LOCATED IN AN AREA WHERE SHALLOW GROUNDWATER MAY BE PRESENT, OR WITHIN 50 FEET OF A SURFACE WATER BODY, CREEK OR STREAM.
- DURING DEWATERING OPERATIONS OF UNCONTAMINATED GROUND WATER MAY BE DISCHARGED ON SITE, BUT SHALL NOT LEAVE THE SITE IN THE FORM OF SURFACE RUNOFF UNLESS AN APPROVED STATE DEWATERING PERMIT IS IN PLACE.
- EROSION CONTROL BLANKETING OR OTHER PROTECTIVE COVERING SHALL BE USED ON SLOPES STEEPER THAN 3:1.
- 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.
- 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. CONTROL MEASURES MAY BE REQUIRED BY EL PASO COUNTY ENGINEERING IF DEEMED NECESSARY, BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES.
- TRACKING OF SOILS AND CONSTRUCTION DEBRIS OFF-SITE SHALL BE MINIMIZED. MATERIALS TRACKED OFF-SITE SHALL BE CLEANED UP AND PROPERLY DISPOSED OF IMMEDIATELY.
- THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, SOIL, AND SAND THAT MAY ACCUMULATE IN ROADS, STORM DRAINS AND OTHER DRAINAGE CONVEYANCE SYSTEMS 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 CHEMICAL(S) HAVING THE POTENTIAL TO BE RELEASED IN STORMWATER ARE TO BE STORED OR USED ONSITE UNLESS PERMISSION FOR THE USE OF SUCH CHEMICAL(S) IS GRANTED IN WRITING BY THE ECM ADMINISTRATOR. IN GRANTING APPROVAL FOR THE USE OF SUCH CHEMICAL(S), SPECIAL CONDITIONS AND MONITORING MAY BE REQUIRED.
- BULK STORAGE OF ALLOWED PETROLEUM PRODUCTS OR OTHER ALLOWED LIQUID CHEMICALS IN EXCESS OF 55 GALLONS SHALL REQUIRE ADEQUATE SECONDARY CONTAINMENT PROTECTION TO CONTAIN ALL SPILLS ONSITE AND TO PREVENT ANY SPILLED MATERIALS FROM ENTERING STATE WATERS, ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR OTHER FACILITIES.
- NO PERSON SHALL CAUSE THE IMPEDIMENT OF STORMWATER FLOW IN THE CURB AND GUTTER OR DITCH EXCEPT WITH APPROVED SEDIMENT CONTROL MEASURES.
- OWNER/DEVELOPER AND THEIR AGENTS 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 OF THE LAND DEVELOPMENT CODE, DCM VOLUME II AND THE ECM APPENDIX I. ALL APPROPRIATE PERMITS MUST BE OBTAINED BY THE CONTRACTOR PRIOR TO CONSTRUCTION (1041, NPDES, FLOODPLAIN, 404, FUGITIVE DUST, ETC.). IN THE EVENT OF CONFLICTS BETWEEN THESE REQUIREMENTS AND OTHER LAWS, RULES, OR REGULATIONS OF OTHER FEDERAL, STATE, LOCAL, OR COUNTY AGENCIES, THE MOST RESTRICTIVE LAWS, RULES, OR REGULATIONS SHALL APPLY.
- ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE ONLY AT APPROVED CONSTRUCTION ACCESS POINTS.
- PRIOR TO CONSTRUCTION THE PERMITTEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.
- A WATER SOURCE SHALL BE AVAILABLE ON SITE DURING EARTHWORK OPERATIONS AND SHALL BE UTILIZED AS REQUIRED TO MINIMIZE DUST FROM EARTHWORK EQUIPMENT AND WIND.
- THE SOILS REPORT FOR THIS SITE HAS BEEN PREPARED BY RMG-ROCKY MOUNTAIN GROUP AUGUST 18, 2020, REVISED MARCH 3, 2021, AND SHALL BE CONSIDERED A PART OF THESE PLANS.
- AT LEAST TEN (10) DAYS PRIOR TO THE ANTICIPATED START OF CONSTRUCTION, FOR PROJECTS THAT WILL DISTURB ONE (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 (SMWP), 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  
WOOD - PERMITS  
4300 CHERRY CREEK DRIVE SOUTH  
DENVER, CO 80246-1530  
ATTN: PERMITS UNIT
- ALL PERMANENT CONTROL MEASURES REQUIRE AN ANNUAL INSPECTION AND APPLICABLE MAINTENANCE PER THE CITY MS4 PERMIT AND THE COLORADO SPRINGS AIRPORT INDUSTRIAL STORMWATER PERMIT. ALL COLORADO SPRINGS AIRPORT TENANTS WITH PERMANENT CONTROL MEASURES NEED TO SUBMIT ALL ANNUAL INSPECTION AND MAINTENANCE FORMS TO AIRPORT ENVIRONMENTAL ANNUALLY BY MAY 15TH SO ALL DOCUMENTATION CAN BE SUBMITTED TO CITY SWENT PRIOR TO THE END OF MAY EACH YEAR.

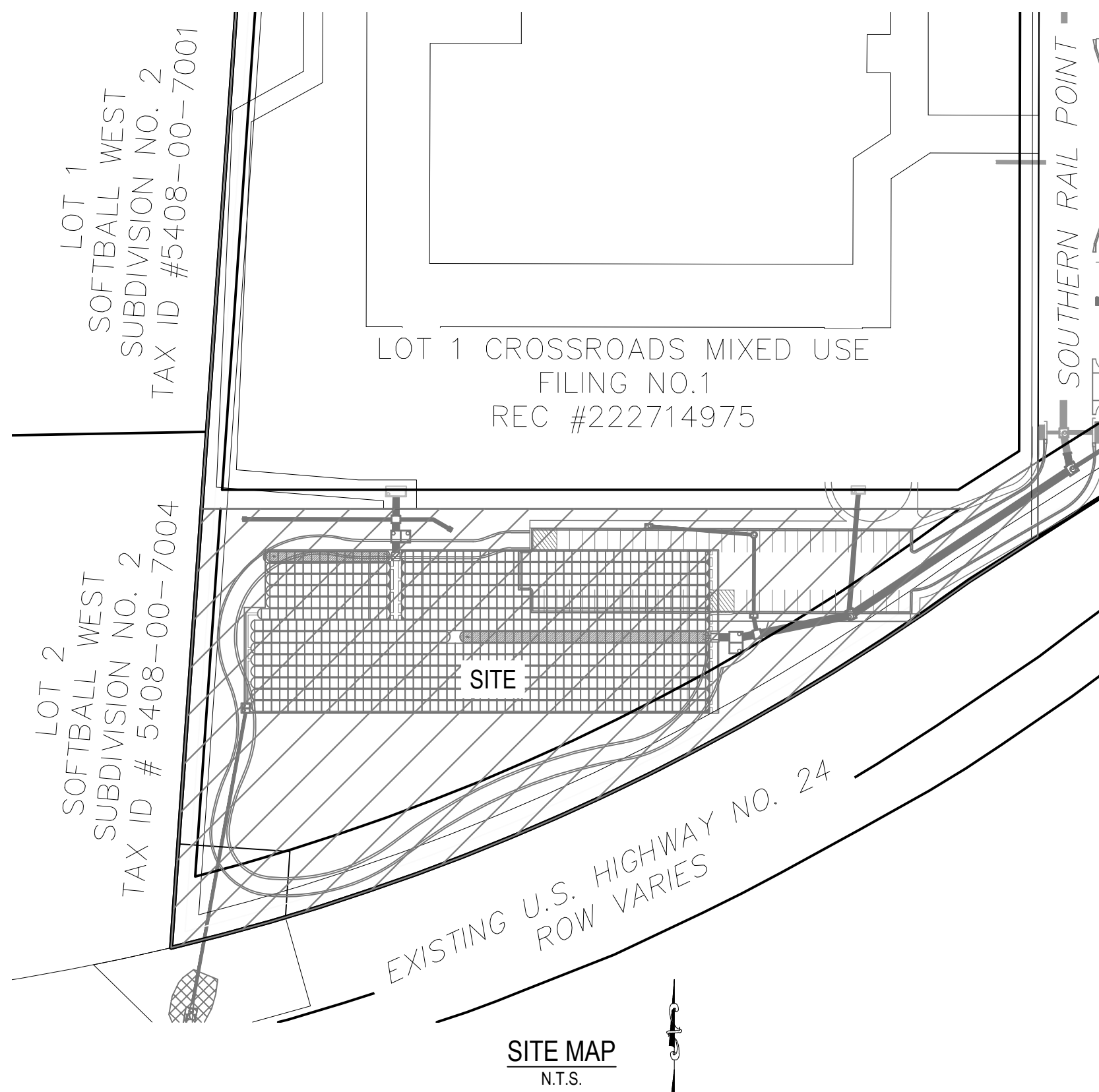
# CROSSROADS MIXED USE FILING NO. 1 UNDERGROUND DETENTION (UGD) GRADING & EROSION CONTROL PLANS

COUNTY OF EL PASO, STATE OF COLORADO

FEBRUARY 2023



VICINITY MAP  
N.T.S.



SITE MAP  
N.T.S.

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:  
3.1 EL PASO COUNTY ENGINEERING CRITERIA MANUAL (ECM)  
3.2 CITY OF COLORADO SPRINGS/EL PASO COUNTY ENGINEERING CRITERIA MANUAL VOLUMES 1 AND 2.  
3.3 COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARDS SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION.  
3.4 CDOT M&S STANDARDS.
- IT IS THE DESIGN ENGINEERS RESPONSIBILITY TO ACCURATELY SHOW EXISTING CONDITION BOTH ONSITE AND OFFSITE 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 PCO 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 DPW AND MUTCD CRITERIA.
- CONTRACTOR SHALL OBTAIN ANY PERMITS REQUIRE BY EL PASO COUNTY DPW 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.

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.
- TEMPORARY SEDIMENT TRAP LOCATIONS WILL BE DETERMINED BY THE CONTRACTOR IN THE FIELD.
- EXISTING SITE TERRAIN GENERALLY SLOPES FROM NORTH TO SOUTHWEST AT GRADE RATES THAT VARY BETWEEN 2% TO 6%.
- THERE ARE NO BATCH PLANTS ON SITE.
- AREAS LEFT OPEN FOR 30 DAYS OR MORE, OTHER THAN FOR UTILITY AND DRAINAGE CONSTRUCTION SHALL BE SEEDED AND/OR MULCHED.
- NO PORTION OF THIS PROPERTY IS LOCATED WITHIN A DESIGNATED FEMA FLOODPLAIN IN ACCORDANCE WITH FLOOD INSURANCE RATE MAPS (FIRM) 08041C07566, EFFECTIVE DATE DECEMBER 7, 2018.
- EXISTING VEGETATION: THE SITE ORIGINALLY CONSISTED OF PRAIRIE GRASSES AND SHRUBS. NO OTHER NOTABLE VEGETATION EXISTED. THE SITE IS PROPOSED FOR AN INDUSTRIAL PARK SUBDIVISION. IF THE SUBDIVISION IS NOT COMPLETED, THE ENTIRE SITE SHOULD BE RESEEDED PER EPC SPECIFICATIONS. FOR AREAS OUTSIDE OF THE DEVELOPED LOTS, THE GROUND SHOULD BE RESEEDED PER EPC CRITERIA AS SHOWN ON THE GRADING AND EROSION CONTROL PLAN. THE VEGETATION SHOULD BE VISUALLY INSPECTED TO EXCEED THE AMOUNT OF VEGETATION THAT EXISTS IN NON-DISTURBED AREAS AROUND THE SITE.

AGENCIES

OWNER:	COLORADO SPRINGS EQUITIES LLC 90 S. CASCADE, SUITE 1500 COLORADO SPRINGS, CO 80903 DANNY MIENTKA (719) 475-7621
CIVIL ENGINEER:	M & S CIVIL CONSULTANTS, INC. 212 N WANSATCH AVENUE, SUITE 305 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 GILBERT LAFORCE (719)-520-7945
TRAFFIC ENGINEERING:	EL PASO COUNTY PUBLIC SERVICES & TRANS. DEPT. 3275 AVERS DRIVE COLORADO SPRINGS, CO 80922 JENNIFER IRVINE, P.E. (719) 520-6460
WATER RESOURCES:	CHEROKEE METRO DISTRICT 8250 PALMER PARK BLVD. COLORADO SPRINGS, CO 80915 (719) 597-5080
GAS DEPARTMENT:	COLORADO SPRINGS UTILITIES 7710 DURANT DR. COLORADO SPRINGS, CO 80947 TIM WENDT (719) 668-3556
ELECTRIC DEPARTMENT:	COLORADO SPRINGS UTILITIES 7710 DURANT DR. COLORADO SPRINGS, CO 80920 SARAH LABARRE (719) 668-4933
COMMUNICATIONS:	QWEST COMMUNICATIONS (U.N.C.C. LOCATORS) (800) 922-1987 AT&T (LOCATORS) (719) 635-3674

DESIGN 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 PLAN.

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

OWNER/DEVELOPER'S STATEMENT:

I, THE OWNER/DEVELOPER HAVE READ AND WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN.

DANNY MIENTKA, COLORADO SPRINGS EQUITIES LLC OWNER DATE \_\_\_\_\_

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 MANUAL, VOLUMES 1 AND 2, AND ENGINEERING CRITERIA MANUAL AS AMENDED.

IN ACCORDANCE WITH ECM SECTION 1.12, THESE CONSTRUCTION DOCUMENTS WILL BE VALID FOR CONSTRUCTION FOR A PERIOD OF 2 YEARS FROM THE DATE SIGNED BY THE EL PASO COUNTY ENGINEER. IF CONSTRUCTION HAS NOT STARTED WITHIN THOSE 2 YEARS, THE PLANS WILL NEED TO BE RESUBMITTED FOR APPROVAL, INCLUDING PAYMENT OF REVIEW FEES AT THE PLANNING AND COMMUNITY DEVELOPMENT DIRECTORS DISCRETION.

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

BENCHMARK:

- NATIONAL GEODETIC VERTICAL DATUM OF 1929, MONUMENT R76 SET IN TOP OF CONCRETE MONUMENT  
ELEVATION = 6286.32'
- NATIONAL GEODETIC VERTICAL DATUM OF 1929, FOUND #5 REBAR AND ORANGE CAP PLS  
ELEVATION = 6325.50'

SHEET INDEX

SHEET 1	TITLE SHEET
SHEET 2	SITE GRADING PLAN
SHEET 3	GEC DETAILS
SHEET 4	GEC DETAILS
SHEET 5	GEC DETAILS

TIMING: SPRING 2023-WINTER 2024  
ANTICIPATED STARTING AND COMPLETION TIME PERIOD OF SITE GRADING: SPRING 2024  
EXPECTED DATE ON WHICH THE FINAL STABILIZATION WILL BE COMPLETED: \_\_\_\_\_  
AREAS: +/- 3.120 AC  
TOTAL AREA OF THE SITE TO BE CLEARED, EXCAVATED OR GRADED: \_\_\_\_\_  
RECEIVING WATERS: SAND CREEK

CROSSROADS MIXED USE FILING NO. 1 UGD  
GRADING & EROSION CONTROL TITLE SHEET  
PROJECT NO. 18-003 DATE: 02/20/2023  
SCALE: HORIZONTAL: N/A VERTICAL: N/A  
DESIGNED BY: GT SHEET 1 OF 5  
DRAWN BY: GT  
CHECKED BY: VAS

212 N WANSATCH AVE., STE 305  
COLORADO SPRINGS, CO 80903  
PHONE: 719.955.5485  
M&S CIVIL CONSULTANTS, INC.

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

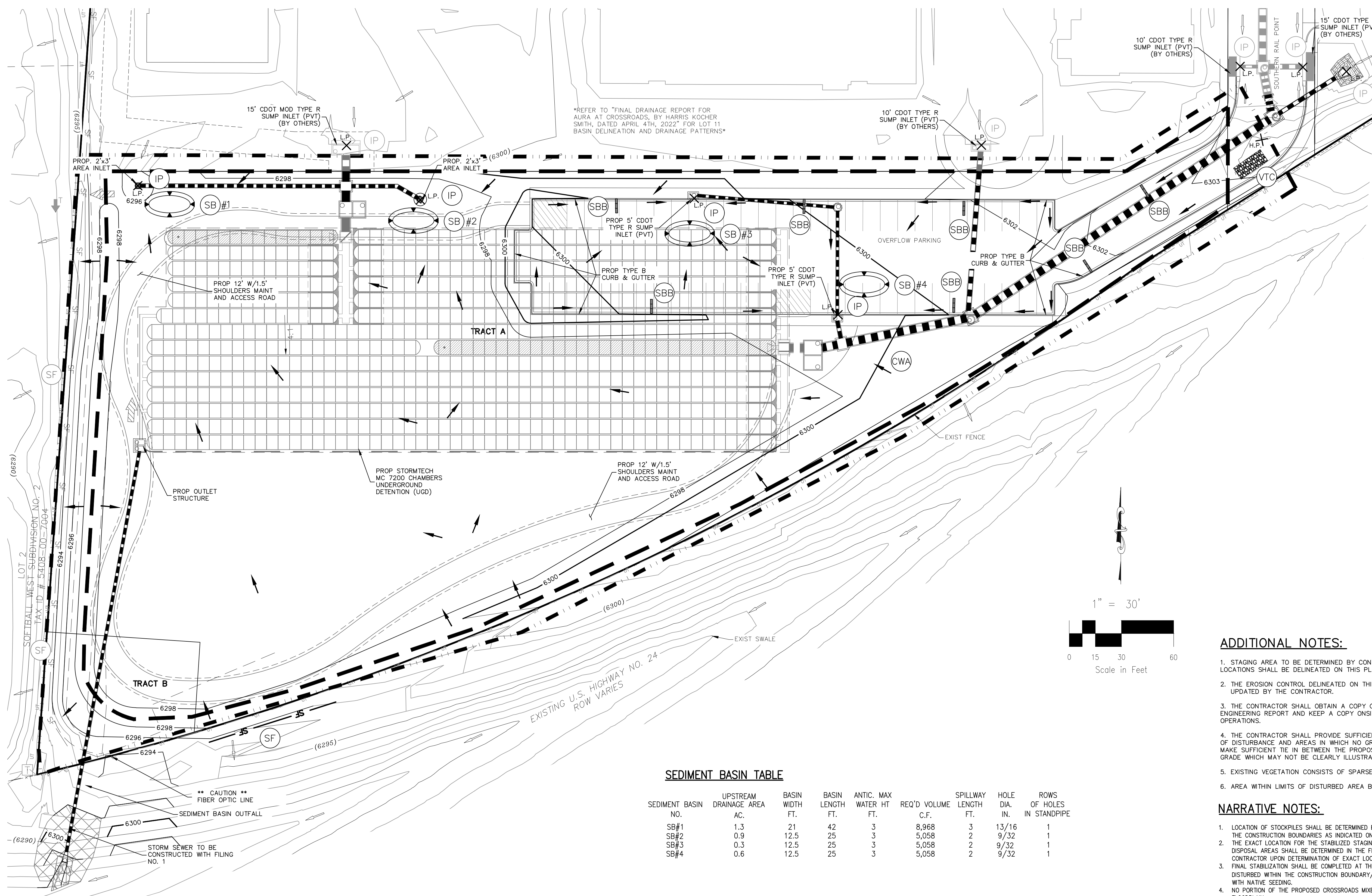
NO.	DATE	BY	DESCRIPTION

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE OR LIABLE 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

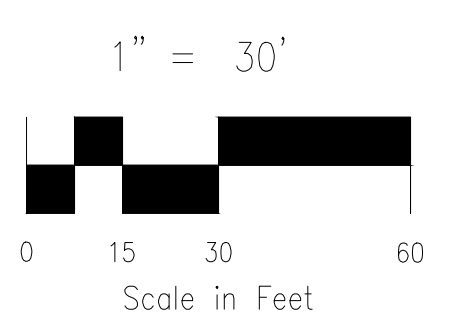
FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES  
FOR BURIED UTILITY INFORMATION  
48 HRS BEFORE YOU DIG  
CALL 1-800-922-1987

File: 0:\1600314-Crossroads Mixed Use\Drawings\GIS\GIS02.dwg Plotstamp: 2/21/2023 11:08 AM



### LEGEND

- PROP MAJ CONT
- PROP MIN CONT
- EXIST MAJ CONT
- EXIST MIN CONT
- EXISTING FLOW DIRECTION ARROW
- HIGH POINT
- LOW POINT
- PROPOSED SWALE
- EXISTING SWALE
- CUT/FILL LINE
- ADJACENT PROPERTY BOUNDARY
- STORM SEWER TO BE CONSTRUCTED W/ FIL. NO. 1
- SITE BOUNDARY
- SILT FENCE-INITIAL
- SEDIMENT BASIN TRIBUTARY AREA
- R.O.W./EASEMENT
- LOT LINE
- CONST BOUNDARY/LIMITS OF DISTURBANCE
- STORM SEWER LINE
- EX. UNDERGROUND ELECTRIC LINE
- EX. SANITARY SEWER LINE
- EX. WATER LINE
- EX. STORM SEWER LINE
- EX. FIBER OPTIC LINE
- LOT NUMBER
- EX. IRRIGATION VALVE
- EX. STORM INLET
- EX. GAS TEST NODE
- EX. TELEPHONE PEDESTAL
- EX. ELECTRIC VAULT
- EX. SANITARY MANHOLE
- EX. WATER VALVE
- EX. SANITARY MANHOLE
- EXISTING CONCRETE
- EMERGENCY OVERFLOW DIRECTION
- STRAW BALE DITCH CHECK - INTERIM
- VEHICLE TRACKING CONTROL-INITIAL
- TEMPORARY SEDIMENT BASIN-INITIAL
- INLET PROTECTION-INITIAL
- CONCRETE WASHOUT-INITIAL
- EX INLET PROTECTION
- EX SILT FENCE-INITIAL



**SEDIMENT BASIN TABLE**

SEDIMENT BASIN NO.	UPSTREAM DRAINAGE AREA AC.	BASIN WIDTH FT.	BASIN LENGTH FT.	ANTIC. MAX WATER HT FT.	REQ'D VOLUME C.F.	SPILLWAY LENGTH FT.	HOLE DIA. IN.	ROWS OF HOLES IN STANDPIPE
SB#1	1.3	21	42	3	8,968	3	13/16	1
SB#2	0.9	12.5	25	3	5,058	2	9/32	1
SB#3	0.3	12.5	25	3	5,058	2	9/32	1
SB#4	0.6	12.5	25	3	5,058	2	9/32	1

**ADDITIONAL NOTES:**

1. STAGING AREA TO BE DETERMINED BY CONTRACTOR IN THE FIELD. THE LOCATIONS SHALL BE DELINEATED ON THIS PLAN BY THE CONTRACTOR.
2. THE EROSION CONTROL DELINEATED ON THIS PLAN SHALL BE REGULARLY UPDATED BY THE CONTRACTOR.
3. THE CONTRACTOR SHALL OBTAIN A COPY OF THE GEOTECHNICAL ENGINEERING REPORT AND KEEP A COPY ONSITE DURING ALL EARTHWORK OPERATIONS.
4. THE CONTRACTOR SHALL PROVIDE SUFFICIENT BUFFER BETWEEN THE LIMITS OF DISTURBANCE AND AREAS IN WHICH NO GRADING SHALL OCCUR TO MAKE SUFFICIENT TIE IN BETWEEN THE PROPOSED GRADE AND EXISTING GRADE WHICH MAY NOT BE CLEARLY ILLUSTRATED ON THIS PLAN.
5. EXISTING VEGETATION CONSISTS OF SPARSE NATIVE GRASSES AND SHRUBS
6. AREA WITHIN LIMITS OF DISTURBED AREA BOUNDARY SHALL BE FILL AREA.

**NARRATIVE NOTES:**

1. LOCATION OF STOCKPILES SHALL BE DETERMINED BY CONTRACTOR. ALL STOCKPILES SHALL REMAIN WITHIN THE CONSTRUCTION BOUNDARIES AS INDICATED ON THE SITE MAP.
2. THE EXACT LOCATION FOR THE STABILIZED STAGING AREA, STORAGE EQUIPMENT AND TEMPORARY DISPOSAL AREAS SHALL BE DETERMINED IN THE FIELD BY THE CONTRACTOR. PLAN SHALL BE UPDATED BY CONTRACTOR UPON DETERMINATION OF EXACT LOCATION.
3. FINAL STABILIZATION SHALL BE COMPLETED AT THE END OF THE CONSTRUCTION ACTIVITIES. ALL AREAS DISTURBED WITHIN THE CONSTRUCTION BOUNDARY/LIMITS OF DISTURBANCE AREA SHALL BE RESEDED WITH NATIVE SEEDING.
4. NO PORTION OF THE PROPOSED CROSSROADS MIXED USE SITE LIES WITH A FEMA EFFECTIVE 100-YR FLOODPLAIN.
5. EROSION CONTROL BLANKET SHALL BE USED ON SLOPES GREATER THAN 4:1.

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

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

EL PASO COUNTY FILE NO. SF2129 CDR232

**CROSSROADS MIXED USE FILING NO. 1 UGD**

**GRADING & EROSION CONTROL PLAN**

PROJECT NO. 18-003 DATE: 02/20/2023

DESIGNED BY: GT SCALE: HORIZONTAL: 1" = 30' VERTICAL: N/A

DRAWN BY: GT SHEET 2 OF 5

CHECKED BY: VAS

212 N WABATCH AVE, STE 305  
COLORADO SPRINGS, CO 80903  
PHONE: 719.585.5485

**CIVIL CONSULTANTS, INC.**

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

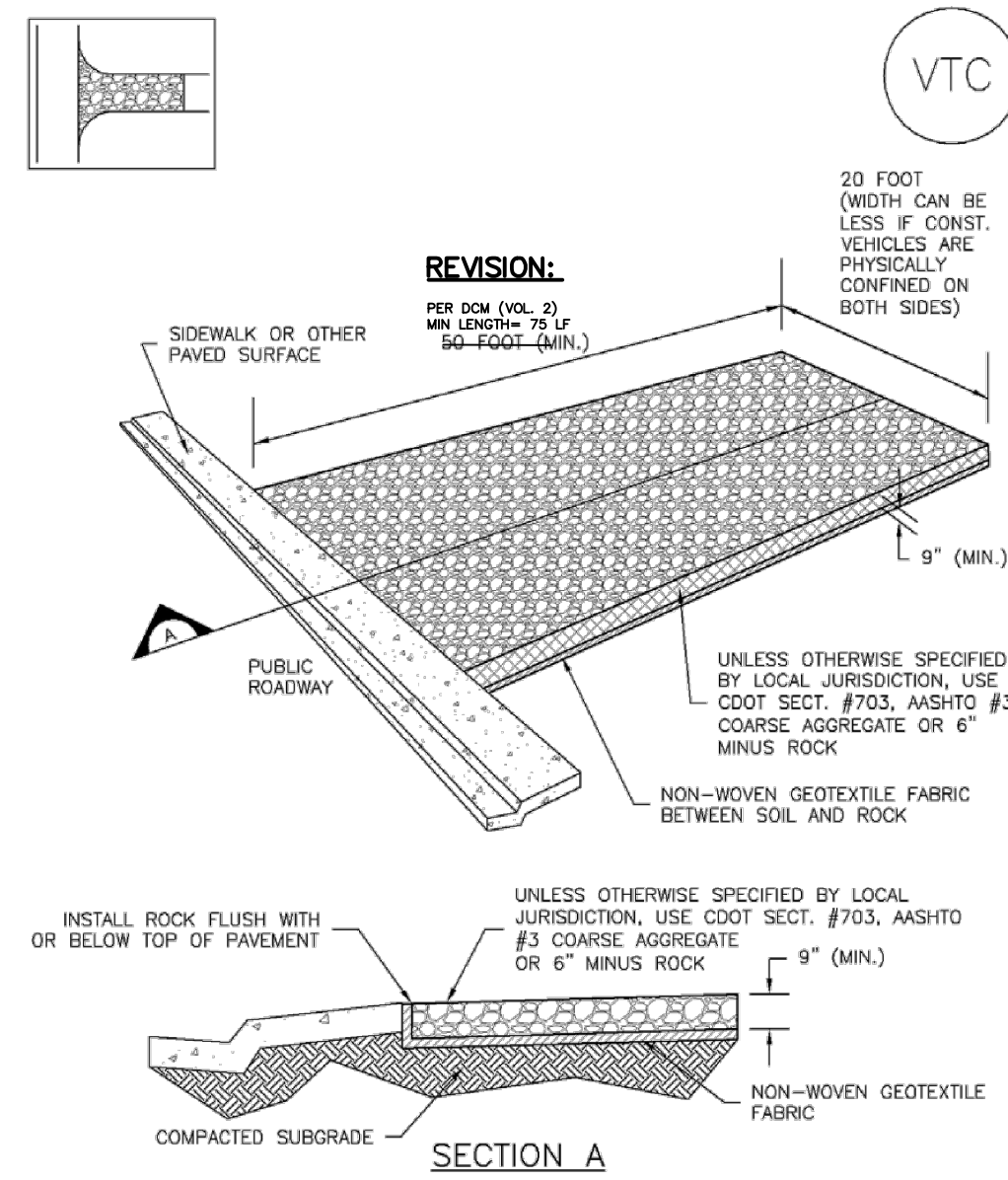
MICHEL A. SANCHEZ, COLORADO P.E. NO. 37160

NO.	DATE	BY	DESCRIPTION

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE OR LIABLE 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

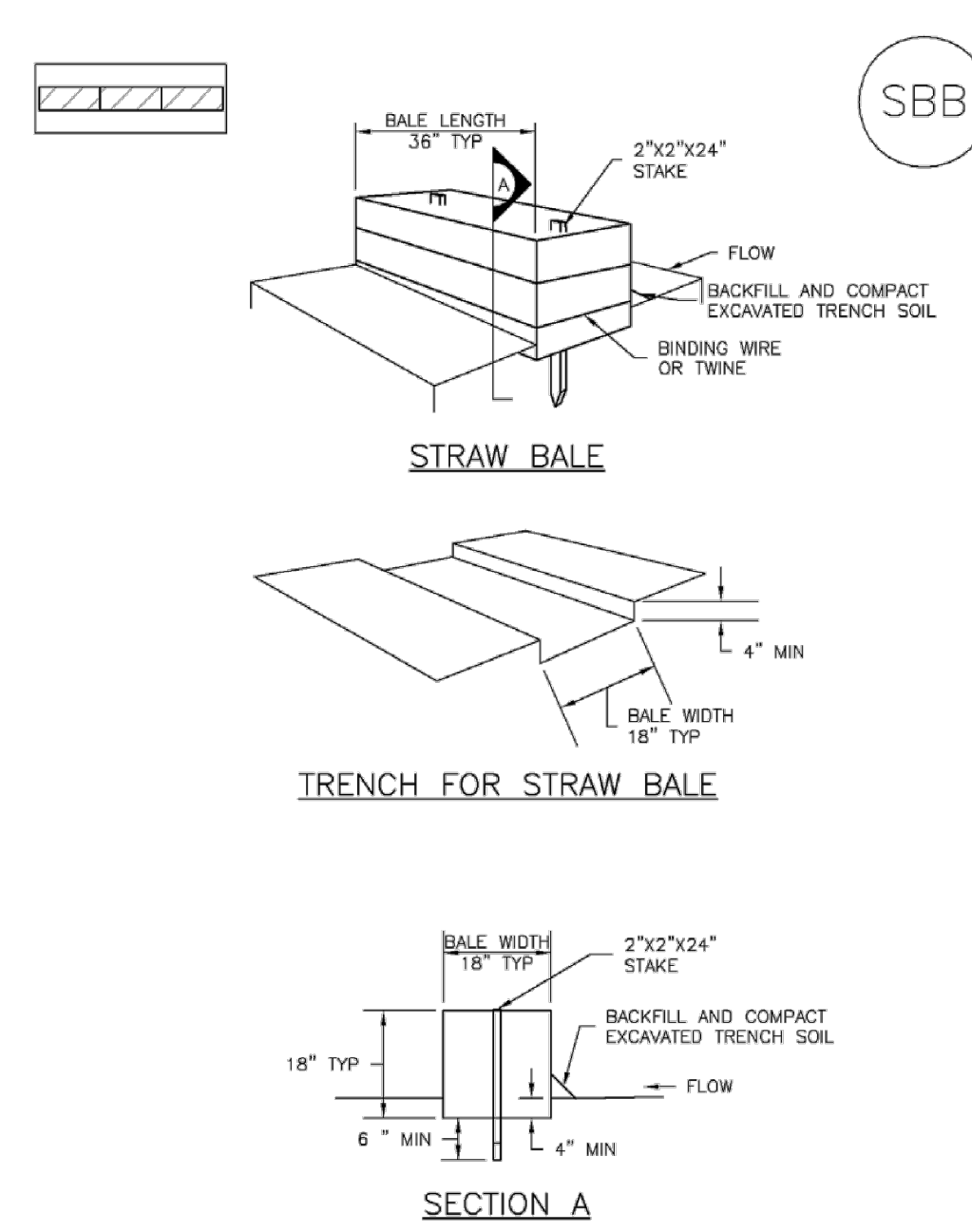
**Vehicle Tracking Control (VTC) SM-4**



VTC-1. AGGREGATE VEHICLE TRACKING CONTROL

November 2010 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 VTC-3

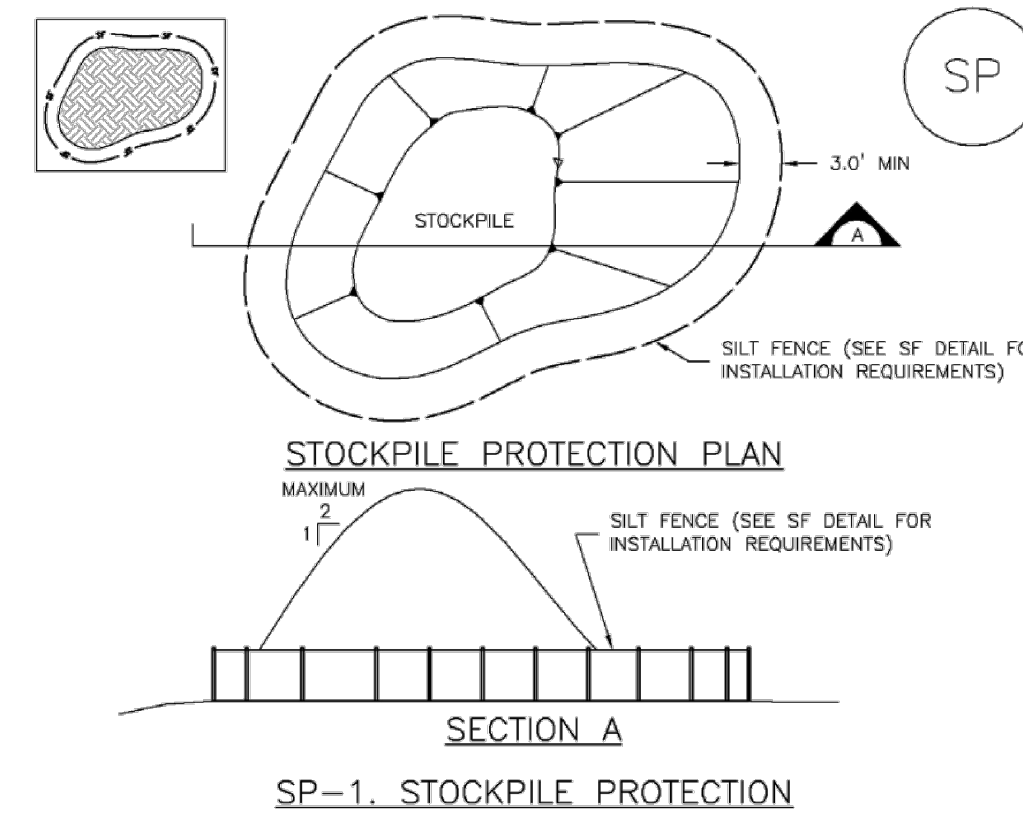
**SC-3 Straw Bale Barrier (SBB)**



SBB-1. STRAW BALE

SBB-2 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 November 2010

**Stockpile Management (SP) MM-2**



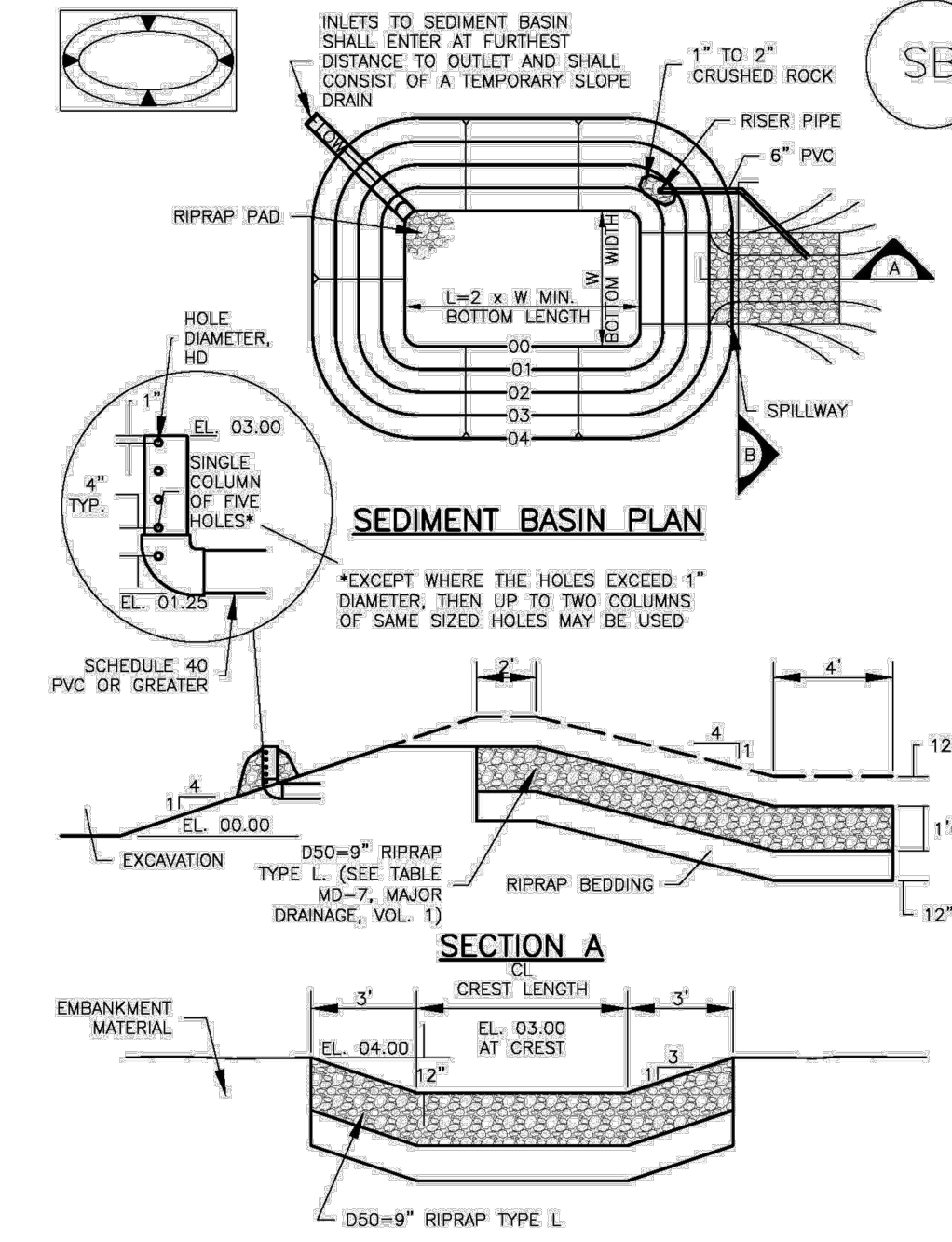
SP-1. STOCKPILE PROTECTION

**STOCKPILE PROTECTION INSTALLATION NOTES**

- SEE PLAN VIEW FOR:
  - LOCATION OF STOCKPILES.
  - TYPE OF STOCKPILE PROTECTION.
- INSTALL PERIMETER CONTROLS IN ACCORDANCE WITH THEIR RESPECTIVE DESIGN DETAILS. SILT FENCE IS SHOWN IN THE STOCKPILE PROTECTION DETAILS; HOWEVER, OTHER TYPES OF PERIMETER CONTROLS INCLUDING SEDIMENT CONTROL LOGS OR ROCK SOCKS MAY BE SUITABLE IN SOME CIRCUMSTANCES. CONSIDERATIONS FOR DETERMINING THE APPROPRIATE TYPE OF PERIMETER CONTROL FOR A STOCKPILE INCLUDE WHETHER THE STOCKPILE IS LOCATED ON A PERVIOUS OR IMPVIOUS SURFACE, THE RELATIVE HEIGHTS OF THE PERIMETER CONTROL AND STOCKPILE, THE ABILITY OF THE PERIMETER CONTROL TO CONTAIN THE STOCKPILE WITHOUT FAILING IN THE EVENT THAT MATERIAL FROM THE STOCKPILE SHIFTS OR SLUMPS AGAINST THE PERIMETER, AND OTHER FACTORS.
- STABILIZE THE STOCKPILE SURFACE WITH SURFACE ROUGHENING, TEMPORARY SEEDING AND MULCHING. EROSION CONTROL BLANKETS, OR SOIL BINDERS, SOILS STOCKPILED FOR AN EXTENDED PERIOD (TYPICALLY FOR MORE THAN 60 DAYS) SHOULD BE SEEDED AND MULCHED WITH A TEMPORARY GRASS COVER ONCE THE STOCKPILE IS PLACED (TYPICALLY WITHIN 14 DAYS). USE OF MULCH ONLY OR A SOIL BINDER IS ACCEPTABLE IF THE STOCKPILE WILL BE IN PLACE FOR A MORE LIMITED TIME PERIOD (TYPICALLY 30-60 DAYS).
- FOR TEMPORARY STOCKPILES ON THE INTERIOR PORTION OF A CONSTRUCTION SITE, WHERE OTHER DOWNGRADIENT CONTROLS, INCLUDING PERIMETER CONTROL, ARE IN PLACE, STOCKPILE PERIMETER CONTROLS MAY NOT BE REQUIRED.

November 2010 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 SP-3

**Sediment Basin (SB) SC-7**



August 2013 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 SB-5

**SC-7 Sediment Basin (SB)**

TABLE SB-1. SIZING INFORMATION FOR STANDARD SEDIMENT BASIN

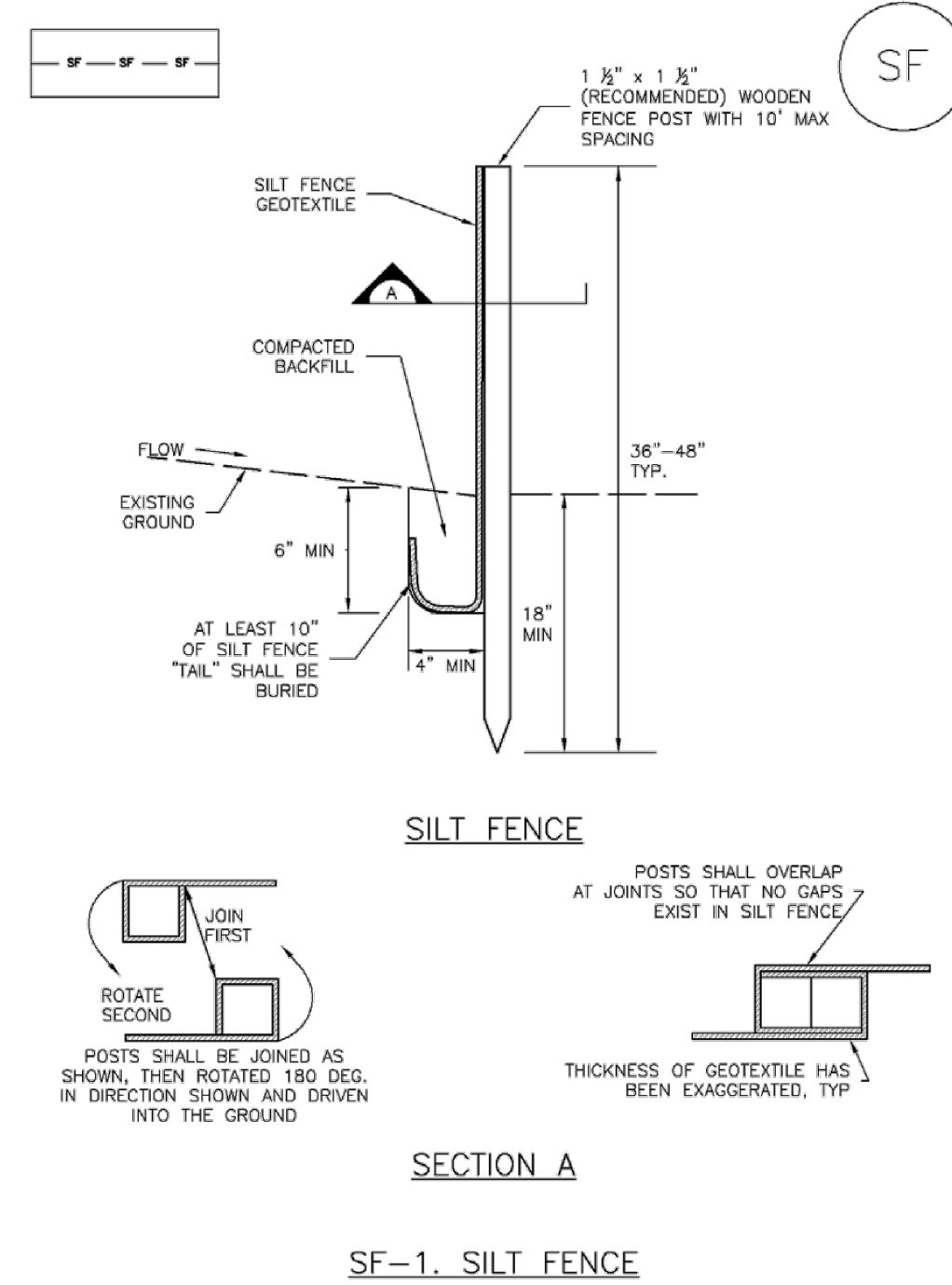
Upstream Drainage Area (rounded to nearest acre), (ac)	Basin Bottom Width (W), (ft)	Spillway Crest Length (CL), (ft)	Hole Diameter (HD), (in)
1	12 1/2	2	9 1/2
2	21	3	15 1/2
3	28	4	21
4	33 1/2	6	24
5	38 1/2	9	25 1/2
6	43	11	25 1/2
7	47 1/2	12	25 1/2
8	51	13	25 1/2
9	55	15	25 1/2
10	58 1/2	16	25 1/2
11	61	18	25 1/2
12	64	18	25 1/2
13	67 1/2	19	1 3/4
14	70 1/2	21	1 3/4
15	73 1/2	22	1 3/4

**SEDIMENT BASIN INSTALLATION NOTES**

- SEE PLAN VIEW FOR:
  - LOCATION OF SEDIMENT BASIN.
  - TYPE OF BASIN (STANDARD BASIN OR NONSTANDARD BASIN).
  - FOR STANDARD BASIN, BOTTOM WIDTH W, CREST LENGTH CL, AND HOLE DIAMETER, HD.
  - FOR NONSTANDARD BASIN, SEE CONSTRUCTION DRAWINGS FOR DESIGN OF BASIN INCLUDING RISER HEIGHT H, NUMBER OF COLUMNS N, HOLE DIAMETER HD AND PIPE DIAMETER D.
- FOR STANDARD BASIN, BOTTOM DIMENSION MAY BE MODIFIED AS LONG AS BOTTOM AREA IS NOT REDUCED.
- SEDIMENT BASINS SHALL BE INSTALLED PRIOR TO ANY OTHER LAND-DISTURBING ACTIVITY THAT RELIES ON BASINS AS A STORMWATER CONTROL.
- EMBANKMENT MATERIAL SHALL CONSIST OF SOIL FREE OF DEBRIS, ORGANIC MATERIAL, AND ROCKS OR CONCRETE GREATER THAN 3 INCHES AND SHALL HAVE A MINIMUM OF 15 PERCENT BY WEIGHT PASSING THE NO. 200 SIEVE.
- EMBANKMENT MATERIAL SHALL BE COMPACTED TO AT LEAST 95 PERCENT OF MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D698.
- PIPE SCH 40 OR GREATER SHALL BE USED.
- THE DETAILS SHOWN ON THESE SHEETS PERTAIN TO STANDARD SEDIMENT BASIN(S) FOR DRAINAGE AREAS LESS THAN 15 ACRES. SEE CONSTRUCTION DRAWINGS FOR EMBANKMENT, STORAGE VOLUME, SPILLWAY, OUTLET, AND OUTLET PROTECTION DETAILS FOR ANY SEDIMENT BASIN(S) THAT HAVE BEEN INDIVIDUALLY DESIGNED FOR DRAINAGE AREAS LARGER THAN 15 ACRES.

SB-6 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 August 2013

**Silt Fence (SF) SC-1**



SF-1. SILT FENCE

November 2010 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 SF-3

**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. The rooting depth of most native grasses in the semi-arid Denver metropolitan area is 6 to 18 inches. At a minimum, the upper 6 inches of topsoil should be stripped, stockpiled, and ultimately respread across areas that will be revegetated.

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. Other treatments can be used to adjust soil pH conditions when needed. Soil testing, which is typically inexpensive, should be completed to determine and optimize the types and amounts of amendments that are required.

If the disturbed ground surface is compacted, rip or rototill the surface prior to placing topsoil. If adding compost to the existing soil surface, rototilling 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.

Prior to seeding, the soil surface should be rough and the seedbed should be firm, but neither too loose nor compacted. The upper layer of soil should be in a condition suitable for seeding at the proper depth and conducive to plant growth. Seed-to-soil contact is the key to good germination.

**Seed Mix for Temporary Vegetation**

To provide temporary vegetative cover on disturbed areas which will not be paved, 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 mulch the planted areas. Annual grasses suitable for the Denver metropolitan area are listed in Table TS/PS-1. These are to be considered only as general recommendations when specific design guidance for a particular site is not available. Local governments typically specify seed mixes appropriate for their jurisdiction.

**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. In lieu of a specific recommendation, one of the perennial grass mixes appropriate for site conditions and growth season listed in Table TS/PS-2 can be used. The pure live seed (PLS) rates of application recommended in these tables are considered to be absolute minimum rates for seed applied using proper drill-seeding equipment.

If desired for wildlife habitat or landscape diversity, shrubs such as rubber rabbitbrush (*Chrysothamnus nauseosus*), fourwing saltbush (*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. In riparian zones, planting root stock of such species as American plum (*Prunus americana*), woods rose (*Rosa woodsii*), plains cottonwood (*Populus sargentii*), and willow (*Populus spp.*) may be considered. On non-topsoiled upland sites, a legume such as Ladak alfalfa at 1 pound PLS/acre can be included as a source of nitrogen for perennial grasses.

TS/PS-2 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. If the area is irrigated, seeding may occur in summer months, as well. See Table TS/PS-3 for appropriate seeding dates.

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

Species* (Common name)	Growth Season*	Pounds of Pure Live Seed (PLS)/acre	Planting Depth (inches)
1. Oats	Cool	35 - 50	1 - 2
2. Spring wheat	Cool	25 - 35	1 - 2
3. Spring barley	Cool	25 - 35	1 - 2
4. Annual ryegrass	Cool	10 - 15	1/2
5. Millet	Warm	3 - 15	1/2 - 3/4
6. Sudangrass	Warm	5-10	1/2 - 3/4
7. Sorghum	Warm	5-10	1/2 - 3/4
8. Winter wheat	Cool	20-35	1 - 2
9. Winter barley	Cool	20-35	1 - 2
10. Winter rye	Cool	20-35	1 - 2
11. Triticale	Cool	25-40	1 - 2

\* 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 mowed 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.

See Table TS/PS-3 for seeding dates. Irrigation, if consistently applied, may extend the use of cool season species during the summer months.

Seeding rates should be doubled if seed is broadcast, or increased by 50 percent if done using a Brillion Drill or by hydraulic seeding.

June 2012 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 TS/PS-3

**NOTE:**  
SEE URBAN DRAINAGE CRITERIA MANUAL (VOL. 3)  
FOR INSTALLATION AND MAINTENANCE (TYP)

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES  
FOR BURIED UTILITY INFORMATION  
**48 HRS BEFORE YOU DIG**  
CALL 1-800-922-1987

**CROSSROADS MIXED USE FILING NO. 1 UGD**  
**GRADING & EROSION CONTROL DETAILS**  
PROJECT NO. 18-003 DATE: 02/20/2023  
SCALE: HORIZONTAL: N/A VERTICAL: N/A  
DESIGNED BY: GT DRAWN BY: VAS CHECKED BY: VAS  
SHEET 3 OF 5  
**GR03**

212 N. WAHATCH AVE., STE 305  
COLORADO SPRINGS, CO 80903  
PHONE: 719.555.5485

**CIVIL CONSULTANTS, INC.**

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

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

NO. DATE: BY: DESCRIPTION: APPROV. BY: DATE:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE OR LIABLE 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

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

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

Common Name	Botanical Name	Growth Season*	Growth Form	Seeds/Pound	Pounds of PLS/Acre
<b>Alkali Soil Seed Mix</b>					
Alkali sacaton	<i>Sporobolus airoides</i>	Cool	Bunch	1,750,000	0.25
Basin wildrye	<i>Elymus cinereus</i>	Cool	Bunch	165,000	2.5
Sodar streambank wheatgrass	<i>Agropyron riparium 'Sodar'</i>	Cool	Sod	170,000	2.5
Jose tall wheatgrass	<i>Agropyron elongatum 'Jose'</i>	Cool	Bunch	79,000	7.0
Arriba western wheatgrass	<i>Agropyron smithii 'Arriba'</i>	Cool	Sod	110,000	5.5
<b>Total</b>					<b>17.75</b>
<b>Fertile Loamy Soil Seed Mix</b>					
Ephraim crested wheatgrass	<i>Agropyron cristatum 'Ephraim'</i>	Cool	Sod	175,000	2.0
Dural hard fescue	<i>Festuca ovina 'Irritacola'</i>	Cool	Bunch	565,000	1.0
Lincoln smooth brome	<i>Bromus inermis leys 'Lincoln'</i>	Cool	Sod	130,000	3.0
Sodar streambank wheatgrass	<i>Agropyron riparium 'Sodar'</i>	Cool	Sod	170,000	2.5
Arriba western wheatgrass	<i>Agropyron smithii 'Arriba'</i>	Cool	Sod	110,000	7.0
<b>Total</b>					<b>15.5</b>
<b>High Water Table Soil Seed Mix</b>					
Meadow foxtail	<i>Alopecurus pratensis</i>	Cool	Sod	900,000	0.5
Redtop	<i>Agrostis alba</i>	Warm	Open sod	5,000,000	0.25
Reed canarygrass	<i>Phalaris arundinacea</i>	Cool	Sod	68,000	0.5
Lincoln smooth brome	<i>Bromus inermis leys 'Lincoln'</i>	Cool	Sod	130,000	3.0
Pathfinder switchgrass	<i>Panicum virgatum 'Pathfinder'</i>	Warm	Sod	389,000	1.0
Alkar tall wheatgrass	<i>Agropyron elongatum 'Alkar'</i>	Cool	Bunch	79,000	5.5
<b>Total</b>					<b>10.75</b>
<b>Transition Turf Seed Mix*</b>					
Ruebens Canadian bluegrass	<i>Poa compressa 'Ruebens'</i>	Cool	Sod	2,500,000	0.5
Dural hard fescue	<i>Festuca ovina 'Irritacola'</i>	Cool	Bunch	565,000	1.0
Citation perennial ryegrass	<i>Lolium perenne 'Citation'</i>	Cool	Sod	247,000	3.0
Lincoln smooth brome	<i>Bromus inermis leys 'Lincoln'</i>	Cool	Sod	130,000	3.0
<b>Total</b>					<b>7.5</b>

TS/PS-4 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 June 2012

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

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

Common Name	Botanical Name	Growth Season*	Growth Form	Seeds/Pound	Pounds of PLS/Acre
<b>Sandy Soil Seed Mix</b>					
Blue grama	<i>Bouteloua gracilis</i>	Warm	Sod-forming bunchgrass	825,000	0.5
Camper little bluestem	<i>Schizachyrium scoparium 'Camper'</i>	Warm	Bunch	240,000	1.0
Prairie sandreed	<i>Calamovilfa longifolia</i>	Warm	Open sod	274,000	1.0
Sand dropseed	<i>Sporobolus cryptandrus</i>	Cool	Bunch	5,298,000	0.25
Vaughn sideoats grama	<i>Bouteloua curtipendula 'Vaughn'</i>	Warm	Sod	191,000	2.0
Arriba western wheatgrass	<i>Agropyron smithii 'Arriba'</i>	Cool	Sod	110,000	5.5
<b>Total</b>					<b>10.25</b>
<b>Heavy Clay, Rocky Foothill Seed Mix</b>					
Ephraim crested wheatgrass*	<i>Agropyron cristatum 'Ephraim'</i>	Cool	Sod	175,000	1.5
Oshe Intermediate wheatgrass	<i>Agropyron intermedium 'Oshe'</i>	Cool	Sod	115,000	5.5
Vaughn sideoats grama*	<i>Bouteloua curtipendula 'Vaughn'</i>	Warm	Sod	191,000	2.0
Lincoln smooth brome	<i>Bromus inermis leys 'Lincoln'</i>	Cool	Sod	130,000	3.0
Arriba western wheatgrass	<i>Agropyron smithii 'Arriba'</i>	Cool	Sod	110,000	5.5
<b>Total</b>					<b>17.5</b>

\* All of the above seeding mixes and rates are based on drill seeding followed by crimped straw mulch. These rates should be doubled if seed is broadcast and should be increased by 50 percent if the seeding is done using a Brillion Drill or is applied through hydraulic seeding. Hydraulic seeding may be substituted for drilling only where slopes are steeper than 3:1. If hydraulic seeding is used, hydraulic mulching should be done as a separate operation.  
 † See Table TS/PS-3 for seeding dates.  
 ‡ If site is to be irrigated, the transition turf seed rates should be doubled.  
 § Crested wheatgrass should not be used on slopes steeper than 6H to 1V.  
 ¶ Can substitute 0.5 lbs PLS of blue grama for the 2.0 lbs PLS of Vaughn sideoats grama.

June 2012 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 TS/PS-5

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

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

Seeding Dates	Annual Grasses (Numbers in table reference species in Table TS/PS-4)		Perennial Grasses	
	Warm	Cool	Warm	Cool
January 1–March 15			✓	✓
March 16–April 30	4	1,2,3	✓	✓
May 1–May 15	4		✓	
May 16–June 30	4,5,6,7			
July 1–July 15	5,6,7			
July 16–August 31				
September 1–September 30		8,9,10,11		
October 1–December 31			✓	✓

### 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. Reseed portions of the site that fail to germinate or remain bare after the first growing season.

Seeded 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.

TS/PS-6 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 June 2012

## Mulching (MU)

## EC-4

### Description

Mulching consists of evenly applying straw, hay, shredded wood mulch, rock, bark or compost to disturbed soils and securing the mulch by crimping, tackifiers, netting or other measures. Mulching helps reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff. Although often applied in conjunction with temporary or permanent seeding, it can also be used for temporary stabilization of areas that cannot be reseeded due to seasonal constraints.



Photograph MU-1. An area that was recently seeded, mulched, and crimped.

Mulch can be applied either using standard mechanical dry application methods or using hydromulching equipment that hydraulically applies a slurry of water, wood fiber mulch, and often a tackifier.

### Appropriate Uses

Use mulch in conjunction with seeding to help protect the seedbed and stabilize the soil. Mulch can also be used as a temporary cover on low to mild slopes to help temporarily stabilize disturbed areas where growing season constraints prevent effective reseeding. Disturbed areas should be properly mulched and tacked, or seeded, mulched and tacked promptly after final grade is reached (typically within no longer than 14 days) on portions of the site not otherwise permanently stabilized.

Standard dry mulching is encouraged in most jurisdictions; however, hydromulching may not be allowed in certain jurisdictions or may not be allowed near waterways.

Do not apply mulch during windy conditions.

### Design and Installation

Prior to mulching, surface-roughen areas by rolling with a crimping or punching type roller or by track walking. Track walking should only be used where other methods are impractical because track walking with heavy equipment typically compacts the soil.

A variety of mulches can be used effectively at construction sites. Consider the following:

Mulch	
Functions	
Erosion Control	Yes
Sediment Control	Moderate
Site/Material Management	No

June 2012 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 MU-1

## EC-4 Mulching (MU)

- Clean, weed-free and seed-free cereal grain straw should be applied evenly at a rate of 2 tons per acre and must be tacked or fastened by a method suitable for the condition of the site. Straw mulch must be anchored (and not merely placed) on the surface. This can be accomplished mechanically by crimping or with the aid of tackifiers or nets. Anchoring with a crimping implement is preferred, and is the recommended method for areas flatter than 3:1. Mechanical crimpers must be capable of tucking the long mulch fibers into the soil to a depth of 3 inches without cutting them. An agricultural disk, while not an ideal substitute, may work if the disk blades are dull or blunted and set vertically; however, the frame may have to be weighted to afford proper soil penetration.
- Grass hay may be used in place of straw; however, because hay is comprised of the entire plant including seed, mulching with hay may seed the site with non-native grass species which might in turn out-compete the native seed. Alternatively, native species of grass hay may be purchased, but can be difficult to find and are more expensive than straw. Purchasing and utilizing a certified weed-free straw is an easier and less costly mulching method. When using grass hay, follow the same guidelines as for straw (provided above).
- On small areas sheltered from the wind and heavy runoff, spraying a tackifier on the mulch is satisfactory for holding it in place. For steep slopes and special situations where greater control is needed, erosion control blankets anchored with stakes should be used instead of mulch.
- Hydraulic mulching consists of wood cellulose fibers mixed with water and a tackifying agent and should be applied at a rate of no less than 1,500 pounds per acre (1,425 lbs of fibers mixed with at least 75 lbs of tackifier) with a hydraulic mulcher. For steeper slopes, up to 2000 pounds per acre may be required for effective hydrosowing. Hydromulch typically requires up to 24 hours to dry; therefore, it should not be applied immediately prior to inclement weather. Application to roads, waterways and existing vegetation should be avoided.
- Erosion control mats, blankets, or nets are recommended to help stabilize steep slopes (generally 3:1 and steeper) and waterways. Depending on the product, these may be used alone or in conjunction with grass or straw mulch. Normally, use of these products will be restricted to relatively small areas. Biodegradable mats made of straw and jute, straw-coconut, coconut fiber, or excelsior can be used instead of mulch. (See the ECM/TRM BMP for more information.)
- Some tackifiers or binders may be used to anchor mulch. Check with the local jurisdiction for allowed tackifiers. Manufacturer's recommendations should be followed at all times. (See the Soil Binder BMP for more information on general types of tackifiers.)
- Rock can also be used as mulch. It provides protection of exposed soils to wind and water erosion and allows infiltration of precipitation. An aggregate base course can be spread on disturbed areas for temporary or permanent stabilization. The rock mulch layer should be thick enough to provide full coverage of exposed soil on the area it is applied.

### Maintenance and Removal

After mulching, the bare ground surface should not be more than 10 percent exposed. Reapply mulch, as needed, to cover bare areas.

MU-2 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 June 2012

## Chapter 12 Open Channels

By measuring "bankfull" characteristics within the Jimmy Camp Creek drainage basin, a 67 square-mile tributary to Fountain Creek, and applying regression methods, a relationship between drainage area and channel dimensions has been developed. Bankfull channel dimensions can be useful to determine the configuration of the "low-flow channel" within the main channel. This is the portion of the channel that is most active and most affected by changes in hydrology due to development. Even with effective detention facilities upstream of "natural" channel reaches, it is anticipated that increases in flow volumes and frequency will cause channels to become unstable. By stabilizing the low-flow portion of the channels, it is anticipated that more significant channel stabilization projects can be avoided, reducing the overall cost of drainage facilities.

Allowable velocities for unlined low-flow channels are shown in Table 12-3. Criteria for lined channels are provided in the Major Drainage Chapter of Volume 1 of the UDFCD Manual.

Table 12-3. Hydraulic Design Criteria for Natural Unlined Channels

Design Parameter	Erosive Soils or Poor Vegetation	Erosion Resistant Soils and Vegetation
Maximum Low-Flow Velocity (ft/sec)	3.5 ft/sec	5.0 ft/sec
Maximum 100-year Velocity (ft/sec)	5.0 ft/sec	7.0 ft/sec
Froude No., Low-flow	0.5	0.7
Froude No., 100-year	0.6	0.8
Maximum Tractive Force, 100-year	0.60 lb/sf	1.0 lb/sf

\* Velocities, Froude numbers and tractive force values listed are average values for the cross section.  
 † "Erosion resistant" soils are those with 30% or greater clay content. Soils with less than 30% clay content shall be considered "erosive soils."

Normally, a low-flow channel exhibits some meandering and sinuosity in natural channels. Stabilized channels should feature a meander pattern typical of natural channels. Side slopes for low-flow channel banks shall be no steeper than 4H:1V without adequate bank stabilization. Flatter slopes are encouraged and may provide improved vegetative cover, bank stability and access.

### 3.1.1.1 Low-Flow Channel Dimensions

Based on the Jimmy Camp Creek drainage basin channel analyses, the bankfull regression equation for design low-flow cross-sectional area is provided as Equation 12-1 below.

$$A_{low-flow} = 21.3 D^{0.34} \quad \text{Equation 12-1}$$

Where:

$$A_{low-flow} = \text{design low-flow cross-sectional area (ft}^2\text{)}$$

$$D = \text{tributary drainage basin area (mi}^2\text{)}$$

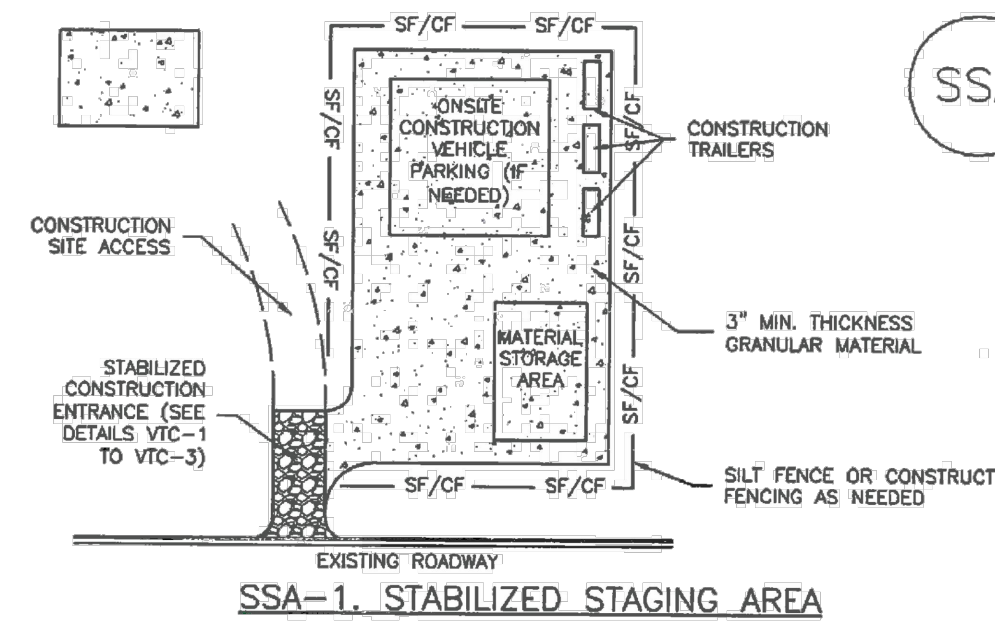
From the design low-flow cross-sectional area, the design low-flow width for any drainage basin is calculated by Equation 12-2a below.

$$W_{low-flow} = [(W_{bankfull}/D_{bankfull})_{reference} * A_{low-flow}]^{0.5} \quad \text{Equation 12-2a}$$

Where:

May 2014 City of Colorado Springs  
Drainage Criteria Manual, Volume 1 12-13

## Stabilized Staging Area (SSA) SM-6



SSA-1. STABILIZED STAGING AREA

### STABILIZED STAGING AREA INSTALLATION NOTES

- SEE PLAN VIEW FOR:
  - LOCATION OF STAGING AREA(S).
  - CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.
- STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.
- STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.
- THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.
- UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR #1 (MINUS) ROCK.
- ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

### STABILIZED STAGING AREA MAINTENANCE NOTES

- INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
- FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
- WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
- ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

November 2010 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 SSA-3

## 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.

- PRIOR TO START OF GRADING OPERATIONS, LOCATE AND SET THE SILT FENCE AND VEHICLE TRACKING CONTROL AS SHOWN ON THE EROSION CONTROL PLAN.
- THE SILT FENCE SHALL BE KEPT IN PLACE AND MAINTAINED UNTIL EROSION AND SEDIMENTATION POTENTIAL IS MITIGATED. REMOVAL OF SILT AND SEDIMENT COLLECTED BY THE SILT FENCES IS REQUIRED ONCE IT REACHES HALF THE HEIGHT OF THE SILT FENCES.
- 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 BMPs SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED.

### NOTE:

SEE URBAN DRAINAGE CRITERIA MANUAL (VOL. 3) FOR INSTALLATION AND MAINTENANCE (TP)



CROSSROADS MIXED USE FILING NO. 1 UGD  
 GRADING & EROSION CONTROL DETAILS  
 PROJECT NO. 18-003  
 SCALE: HORIZONTAL: N/A  
 VERTICAL: N/A  
 DATE: 02/20/2023  
 DESIGNED BY: GT  
 DRAWN BY: CT  
 CHECKED BY: VAS  
 SHEET 4 OF 5  
 GR04

212 N. WABASH AVE. STE 305  
 COLORADO SPRINGS, CO 80903  
 PHONE: 719.455.5485

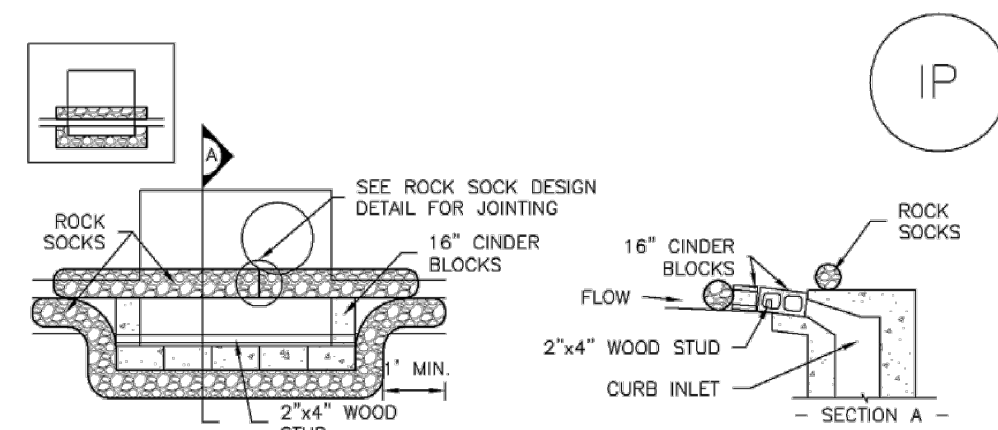


MIRQUEL A. SANCHEZ, COLORADO P.E. NO. 37160  
 FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

NO.	DATE	DESCRIPTION	BY	APPROVED BY

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 CAUTION

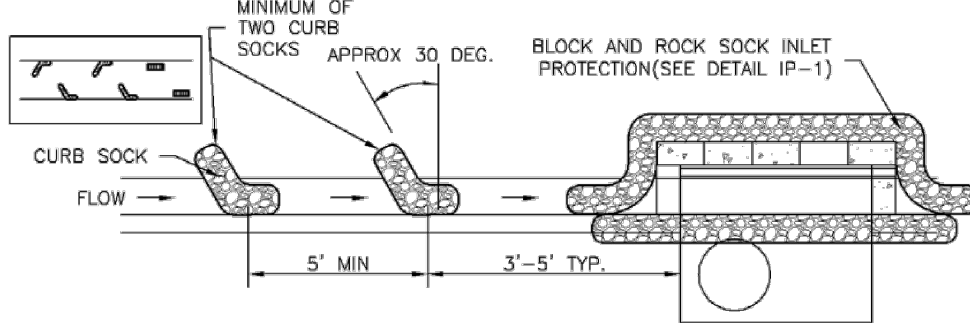
**SC-6 Inlet Protection (IP)**



**IP-1. BLOCK AND ROCK SOCK SUMP OR ON-GRADE INLET PROTECTION**

**BLOCK AND CURB SOCK INLET PROTECTION INSTALLATION NOTES**

- SEE ROCK SOCK DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.
- CONCRETE "CINDER" BLOCKS SHALL BE LAID ON THEIR SIDES AROUND THE INLET IN A SINGLE ROW, ABUTTING ONE ANOTHER WITH THE OPEN END FACING AWAY FROM THE CURB.
- GRAVEL BAGS SHALL BE PLACED AROUND CONCRETE BLOCKS, CLOSELY ABUTTING ONE ANOTHER AND JOINED TOGETHER IN ACCORDANCE WITH ROCK SOCK DESIGN DETAIL.



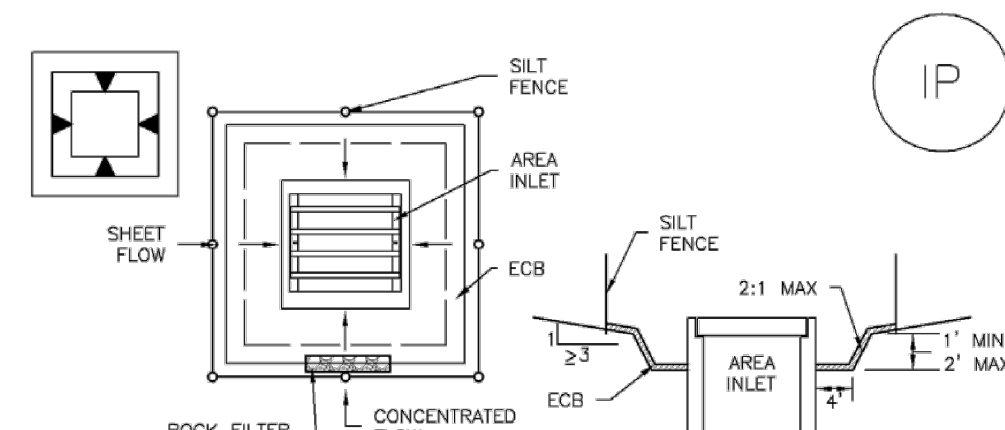
**IP-2. CURB ROCK SOCKS UPSTREAM OF INLET PROTECTION**

**CURB ROCK SOCK INLET PROTECTION INSTALLATION NOTES**

- SEE ROCK SOCK DESIGN DETAIL, INSTALLATION REQUIREMENTS.
- PLACEMENT OF THE SOCK SHALL BE APPROXIMATELY 30 DEGREES FROM PERPENDICULAR IN THE OPPOSITE DIRECTION OF FLOW.
- SOCKS ARE TO BE FLUSH WITH THE CURB AND SPACED A MINIMUM OF 5 FEET APART.
- AT LEAST TWO CURB SOCKS IN SERIES ARE REQUIRED UPSTREAM OF ON-GRADE INLETS.

IP-4 Urban Drainage and Flood Control District August 2013  
Urban Storm Drainage Criteria Manual Volume 3

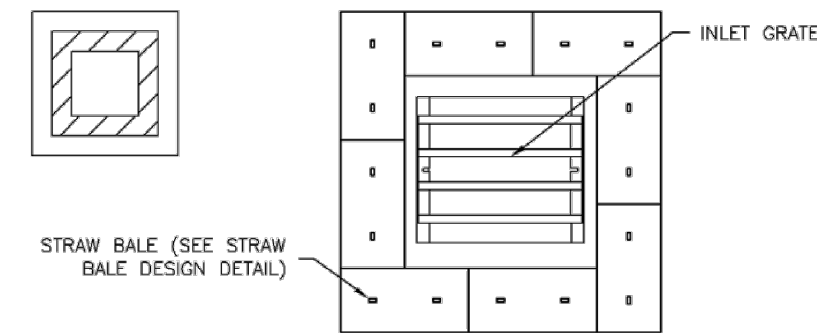
**SC-6 Inlet Protection (IP)**



**IP-5. OVEREXCAVATION INLET PROTECTION**

**OVEREXCAVATION INLET PROTECTION INSTALLATION NOTES**

- THIS FORM OF INLET PROTECTION IS PRIMARILY APPLICABLE FOR SITES THAT HAVE NOT YET REACHED FINAL GRADE AND SHOULD BE USED ONLY FOR INLETS WITH A RELATIVELY SMALL CONTRIBUTING DRAINAGE AREA.
- WHEN USING FOR CONCENTRATED FLOWS, SHAPE BASIN IN 2:1 RATIO WITH LENGTH ORIENTED TOWARDS DIRECTION OF FLOW.
- SEDIMENT MUST BE PERIODICALLY REMOVED FROM THE OVEREXCAVATED AREA.



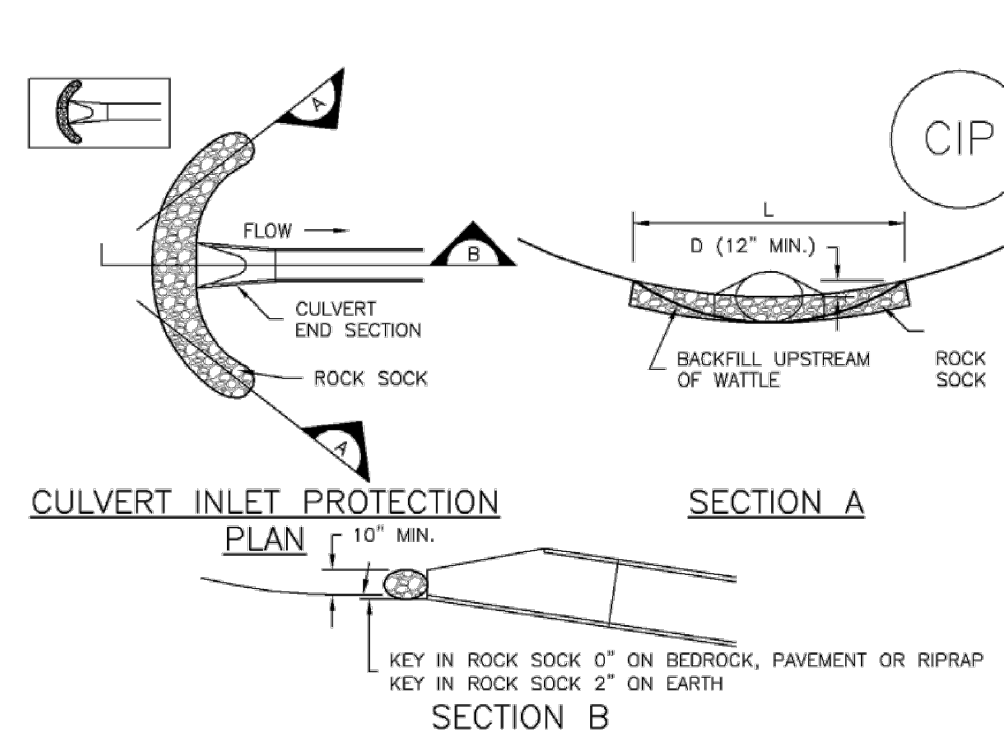
**IP-6. STRAW BALE FOR SUMP INLET PROTECTION**

**STRAW BALE BARRIER INLET PROTECTION INSTALLATION NOTES**

- SEE STRAW BALE DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.
- BALES SHALL BE PLACED IN A SINGLE ROW AROUND THE INLET WITH ENDS OF BALES TIGHTLY ABUTTING ONE ANOTHER.

IP-6 Urban Drainage and Flood Control District August 2013  
Urban Storm Drainage Criteria Manual Volume 3

**Inlet Protection (IP) SC-6**



**CIP-1. CULVERT INLET PROTECTION**

**CULVERT INLET PROTECTION INSTALLATION NOTES**

- SEE PLAN VIEW FOR: -LOCATION OF CULVERT INLET PROTECTION.
- SEE ROCK SOCK DESIGN DETAIL FOR ROCK GRADATION REQUIREMENTS AND JOINING DETAIL.

**CULVERT INLET PROTECTION MAINTENANCE NOTES**

- INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
  - FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
  - WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
  - SEDIMENT ACCUMULATED UPSTREAM OF THE CULVERT SHALL BE REMOVED WHEN THE SEDIMENT DEPTH IS  $\frac{1}{2}$  THE HEIGHT OF THE ROCK SOCK.
  - CULVERT INLET PROTECTION SHALL REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS PERMANENTLY STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.
- (DETAILS ADAPTED FROM AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)
- NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

August 2013 Urban Drainage and Flood Control District IP-7  
Urban Storm Drainage Criteria Manual Volume 3

**SC-6 Inlet Protection (IP)**

**GENERAL INLET PROTECTION INSTALLATION NOTES**

- SEE PLAN VIEW FOR: -LOCATION OF INLET PROTECTION. -TYPE OF INLET PROTECTION (IP-1, IP-2, IP-3, IP-4, IP-5, IP-6)
- INLET PROTECTION SHALL BE INSTALLED PROMPTLY AFTER INLET CONSTRUCTION OR PAVING IS COMPLETE (TYPICALLY WITHIN 48 HOURS). IF A RAINFALL/RUNOFF EVENT IS FORECAST, INSTALL INLET PROTECTION PRIOR TO ONSET OF EVENT.
- MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

**INLET PROTECTION MAINTENANCE NOTES**

- INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
  - FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
  - WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
  - SEDIMENT ACCUMULATED UPSTREAM OF INLET PROTECTION SHALL BE REMOVED AS NECESSARY TO MAINTAIN BMP EFFECTIVENESS, TYPICALLY WHEN STORAGE VOLUME REACHES 50% OF CAPACITY, A DEPTH OF 6" WHEN SILT FENCE IS USED, OR  $\frac{1}{4}$  OF THE HEIGHT FOR STRAW BALES.
  - INLET PROTECTION IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS PERMANENTLY STABILIZED, UNLESS THE LOCAL JURISDICTION APPROVES EARLIER REMOVAL OF INLET PROTECTION IN STREETS.
  - WHEN INLET PROTECTION AT AREA INLETS IS REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOP SOIL, SEEDED AND MULCHED, OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.
- (DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)
- NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.
- NOTE: THE DETAILS INCLUDED WITH THIS FACT SHEET SHOW COMMONLY USED, CONVENTIONAL METHODS OF INLET PROTECTION IN THE DENVER METROPOLITAN AREA. THERE ARE MANY PROPRIETARY INLET PROTECTION METHODS ON THE MARKET. UDFCD NEITHER ENDORSES NOR DISCOURAGES USE OF PROPRIETARY INLET PROTECTION; HOWEVER, IN THE EVENT PROPRIETARY METHODS ARE USED, THE APPROPRIATE DETAIL FROM THE MANUFACTURER MUST BE INCLUDED IN THE SWMP AND THE BMP MUST BE INSTALLED AND MAINTAINED AS SHOWN IN THE MANUFACTURER'S DETAILS.
- NOTE: SOME MUNICIPALITIES DISCOURAGE OR PROHIBIT THE USE OF STRAW BALES FOR INLET PROTECTION. CHECK WITH LOCAL JURISDICTION TO DETERMINE IF STRAW BALE INLET PROTECTION IS ACCEPTABLE.

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**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

Propriety inlet protection devices should be installed in accordance with manufacturer specifications. More information is provided below on selecting inlet protection for sump and on-grade locations.

**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. If the inlet protection height is greater than the curb elevation, particularly if the filter becomes clogged with sediment, runoff will not enter the inlet and may bypass it, possibly causing localized flooding, public safety issues, and downstream erosion and damage from bypassed flows.

Area inlets located in a sump setting can be protected through the use of silt fence, concrete block and rock socks (on paved surfaces), sediment control logs/straw wattles embedded in the adjacent soil and stacked around the area inlet (on pervious surfaces), over-excavation around the inlet, and proprietary products providing equivalent functions.

**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.

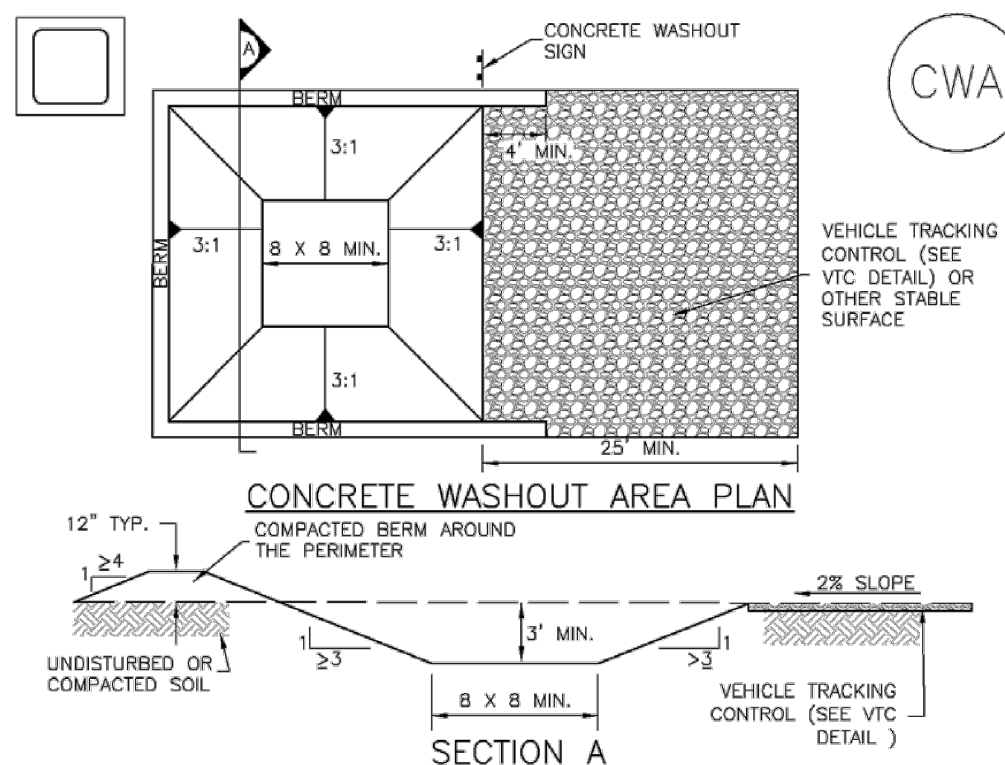
**Maintenance and Removal**

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. For example, silt fence that has not been properly trenched around the inlet can result in flows under the silt fence and directly into the inlet.
- Look for displaced BMPs that are no longer protecting the inlet. Displacement may occur following larger storm events that wash away or reposition the inlet protection. Traffic or equipment may also crush or displace the BMP.
- Monitor sediment accumulation upgradient of the inlet protection.

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**Concrete Washout Area (CWA) MM-1**



**CWA-1. CONCRETE WASHOUT AREA**

**CWA INSTALLATION NOTES**

- SEE PLAN VIEW FOR: -CWA INSTALLATION LOCATION.
- DO NOT LOCATE AN UNLINED CWA WITHIN 400' OF ANY NATURAL DRAINAGE PATHWAY OR WATERBODY. DO NOT LOCATE WITHIN 1,000' OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS INFEASIBLE, OR IF HIGHLY PERMEABLE SOILS EXIST ON SITE, THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (16 MIL MIN. THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE-GROUND STORAGE ARE SHOULD BE USED.
- THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.
- CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 6" BY 6" SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 3' DEEP.
- BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 1'.
- VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.
- SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
- USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

November 2010 Urban Drainage and Flood Control District CWA-3  
Urban Storm Drainage Criteria Manual Volume 3

**MM-1 Concrete Washout Area (CWA)**

**CWA MAINTENANCE NOTES**

- INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
  - FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
  - WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
  - THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE, CONCRETE MATERIALS, ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'.
  - CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.
  - THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.
  - WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.
- (DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND THE CITY OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD)
- NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

CWA-4 Urban Drainage and Flood Control District November 2010  
Urban Storm Drainage Criteria Manual Volume 3

**NOTE:**

SEE URBAN DRAINAGE CRITERIA MANUAL (VOL. 3) FOR INSTALLATION AND MAINTENANCE (TYP)



**CROSSROADS MIXED USE FILING NO. 1 UGD**

**GRADING & EROSION CONTROL DETAILS**

PROJECT NO. 18-003 DATE: 02/20/2023

SCALE: HORIZONTAL: N/A VERTICAL: N/A

DESIGNED BY: GT DRAWN BY: CT CHECKED BY: VAS

212 N. WAHATCH AVE., STE 305 COLORADO SPRINGS, CO 80903 PHONE: 719.555.5485

**CIVIL CONSULTANTS, INC.**

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

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

NO. DATE: BY: DESCRIPTION: APPROV. BY: DATE:

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE OR LIABLE 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.

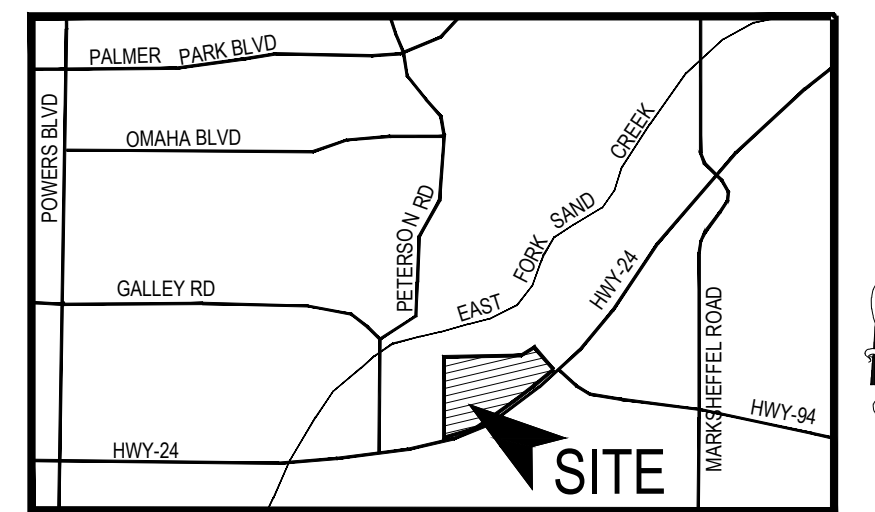
CAUTION

# CROSSROADS MIXED USE FILING NO. 1

## COUNTY OF EL PASO, STATE OF COLORADO STORM SEWER PLANS

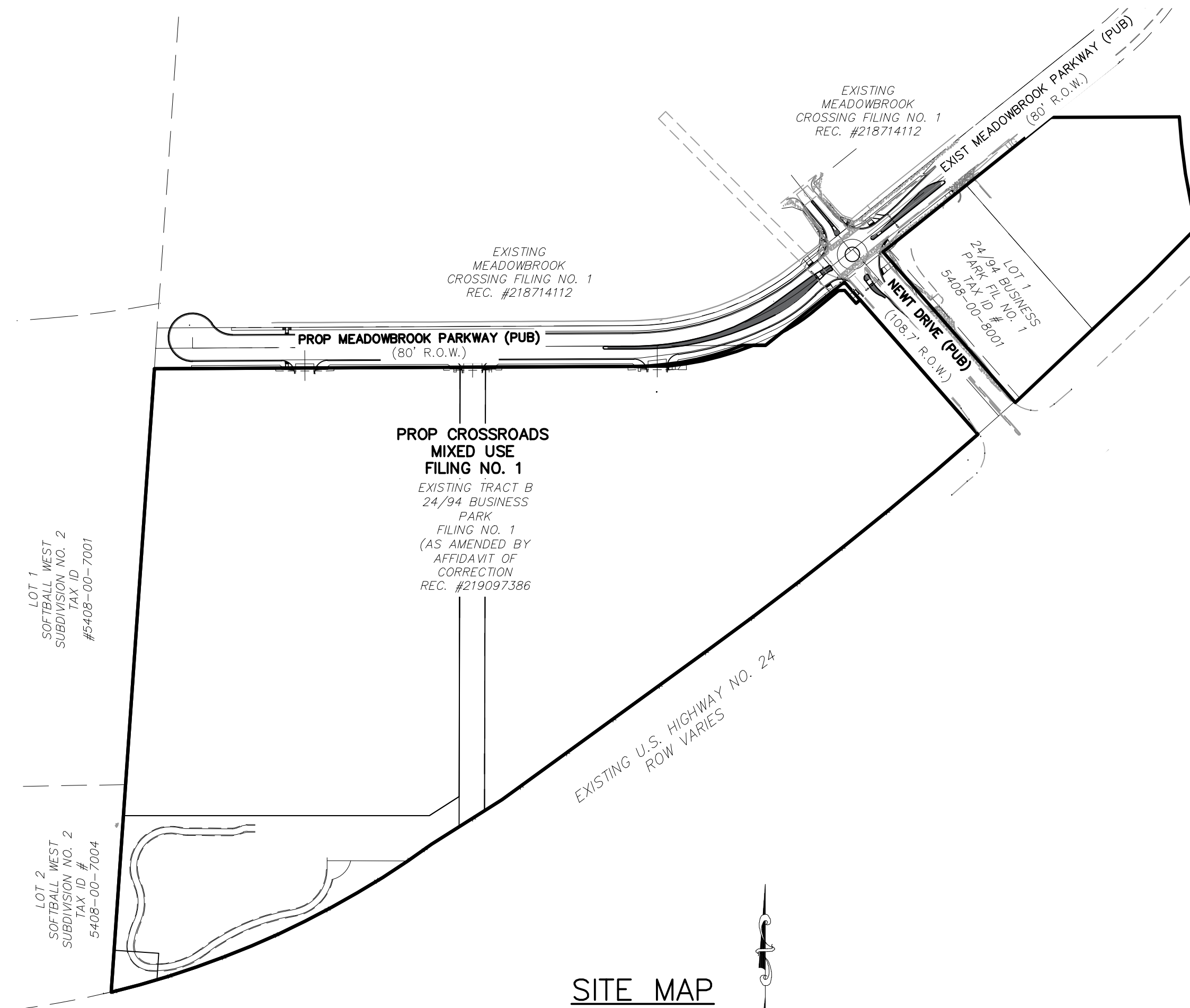
### UNDERGROUND DETENTION

MARCH 2023



VICINITY MAP

N.T.S.



SITE MAP

N.T.S.

### SHEET INDEX

- SHEET 1 TITLE SHEET
- SHEET 2 STORM SEWER PLANS & PROFILES
- SHEET 3 STORM SEWER PLANS & PROFILES
- SHEET 4 STORM SEWER PLANS & PROFILES
- SHEET 5 UGD OUTFALL STRUCTURE
- SHEET 6 STORM MANHOLE 4.1 AND 5.1 DETAILS
- SHEET 7 STORM DETAILS
- SHEET 8 STORM/OUTFALL DETAILS
- ADS MC-7200 STORMTECH CHAMBER SPECIFICATIONS
- ADS BAYSAVER BAYSEPARATOR SPECIFICATIONS

### GENERAL CONSTRUCTION NOTES:

1. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE EXISTENCE AND LOCATION OF ALL UNDERGROUND UTILITIES ALONG THE ROUTE OF THE WORK. THE OMISSION FROM OR THE INCLUSION OF UTILITY LOCATIONS ON THE PLANS IS NOT TO BE CONSIDERED AS THE NONEXISTENCE OF OR A DEFINITE LOCATION OF EXISTING UNDERGROUND UTILITIES.
2. THE CONTRACTOR WILL TAKE THE NECESSARY PRECAUTIONS TO PROTECT EXISTING UTILITIES FROM DAMAGE DUE TO THIS OPERATION. ANY DAMAGE TO THE UTILITIES WILL BE REPAIRED AT THE CONTRACTOR'S EXPENSE, AND ANY SERVICE DISRUPTION WILL BE SETTLED BY THE CONTRACTOR.
3. ADDITIONAL EROSION CONTROL STRUCTURES MAY BE REQUIRED AT THE TIME OF CONSTRUCTION.
4. ALL BACKFILL, SUB-BASE, AND/OR BASE COURSE (CLASS 6) MATERIAL SHALL BE COMPACTED PER THE SOILS ENGINEER'S RECOMMENDATIONS, AND APPROVED BY EL PASO COUNTY PCD.
5. ALL STATIONING IS CENTERLINE OF IMPROVEMENTS UNLESS OTHERWISE INDICATED. ALL ELEVATIONS ARE FLOW LINE UNLESS OTHERWISE INDICATED AS TOP BACK OF CURB (TBC), ASPHALT (ASP), OR TOP OF INLET OR BOX (TOB).
6. ALL DISTURBED PAVEMENT EDGES SHALL BE CUT TO NEAT LINES. REPAIR SHALL CONFORM TO EPC ECM APPENDIX K - 1.2C.
7. ALL INTERSECTION ACCESSES TO BE CONSTRUCTED WITH A 25 FOOT SIGHT VISIBILITY TRIANGLES IS REQUIRED AND THERE SHALL BE NO OBSTRUCTIONS GREATER THAN 18" VERTICAL IN THIS AREA.
8. ALL CULVERTS AND STORM DRAIN PIPES SHALL BE SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE (HDPE), REINFORCED CONCRETE PIPE (RCP). ALL CULVERTS SHALL BE PLACED COMPLETE WITH FLARED END SECTIONS. ADEQUACY OF MATERIAL THICKNESS FOR ANY CSP INSTALLED SHALL BE VERIFIED BY OWNER'S GEOTECHNICAL ENGINEER TO SUPPORT MINIMUM 50 YEAR DESIGN LIFE. CULVERTS MUST CONFORM TO EPC ECM SECTION 3.32 - CULVERTS.
9. ASPHALT THICKNESS AND BASE COURSE THICKNESS (COMPACTED) FOR ROADS SHALL BE PER DESIGN REPORT BY OWNER'S GEOTECHNICAL ENGINEER. OWNER'S GEOTECHNICAL ENGINEER TO BE ON SITE AT THE TIME OF ROAD CONSTRUCTION TO EVALUATE SOIL CONDITIONS AND DETERMINE IF ADDITIONAL MEASURES ARE NECESSARY TO ASSURE STABILITY OF THE NEW ROADS. PAVEMENT DESIGN SHALL BE APPROVED BY EL PASO COUNTY PCD PRIOR TO CONSTRUCTION.

### STANDARD NOTES FOR EL PASO COUNTY CONSTRUCTION PLANS

1. 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.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR THE NOTIFICATION AND FIELD NOTIFICATION 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 (UNCC).
3. 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 TIMES, INCLUDING THE FOLLOWING:
  - a. EL PASO COUNTY ENGINEERING CRITERIA MANUAL (ECM)
  - b. CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL, VOLUMES 1 AND 2
  - c. COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION
  - d. CDOT M & S STANDARDS.
4. 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 FROM REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING. ANY MODIFICATIONS NECESSARY TO MEET CRITERIA AFTER-THE-FACT WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.
5. IT IS THE DESIGN ENGINEER'S RESPONSIBILITY TO ACCURATELY SHOW EXISTING CONDITIONS, BOTH ON-SITE AND OFF-SITE, ON THE CONSTRUCTION PLANS. ANY MODIFICATIONS NECESSARY DUE TO CONFLICTS, OMISSIONS, OR CHANGED CONDITIONS WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.
6. CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT - INSPECTIONS, PRIOR TO STARTING CONSTRUCTION.
7. IT IS THE CONTRACTOR'S 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 STORMWATER QUALITY CONTROL PERMIT (ESQCP), REGIONAL BUILDING FLOODPLAIN DEVELOPMENT PERMIT, U.S. ARMY CORPS OF ENGINEERS-ISSUED 401 AND/OR 404 PERMITS, AND COUNTY AND STATE FUGITIVE DUST PERMITS.
8. CONTRACTOR SHALL NOT DEVIATE FROM THE PLANS WITHOUT FIRST OBTAINING WRITTEN APPROVAL FROM THE DESIGN ENGINEER AND PCD. CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER IMMEDIATELY UPON DISCOVERY OF ANY ERRORS OR INCONSISTENCIES.
9. ALL STORM DRAIN PIPE SHALL BE CLASS III RCP UNLESS OTHERWISE NOTED AND APPROVED BY PCD.
10. CONTRACTOR SHALL COORDINATE GEOTECHNICAL TESTING PER ECM STANDARDS. PAVEMENT DESIGN SHALL BE APPROVED BY EL PASO COUNTY PCD PRIOR TO PLACEMENT OF CURB AND GUTTER AND PAVEMENT.
11. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE AT APPROVED CONSTRUCTION ACCESS POINTS.
12. SIGHT VISIBILITY TRIANGLES AS IDENTIFIED IN THE PLANS SHALL BE PROVIDED AT ALL INTERSECTIONS. OBSTRUCTIONS GREATER THAN 18 INCHES ABOVE FLOWLINE ARE NOT ALLOWED WITHIN SIGHT TRIANGLES.
13. SIGNING AND STRIPING SHALL COMPLY WITH EL PASO COUNTY DEPARTMENT OF PUBLIC WORKS AND MUTCD CRITERIA.
14. CONTRACTOR SHALL OBTAIN ANY PERMITS REQUIRED BY EL PASO COUNTY DEPARTMENT OF PUBLIC WORKS, INCLUDING WORK WITHIN THE RIGHT-OF-WAY AND SPECIAL TRANSPORT PERMITS.
15. THE LIMITS OF CONSTRUCTION SHALL REMAIN WITHIN THE PROPERTY LINE UNLESS NOTED. THE OWNER/DEVELOPER SHALL OBTAIN WRITTEN PERMISSION AND EASEMENTS, WHERE REQUIRED, FROM ADJOINING PROPERTY OWNER(S) PRIOR TO ANY OFF-SITE DISTURBANCE, GRADING, OR CONSTRUCTION.

### BASIS OF BEARINGS

A PORTION OF THE EASTERLY LINE OF "SOFTBALL WEST SUBDIVISION NO. 2" RECORDED IN PLAT BOOK T-3 AT PAGE 112 OF THE RECORDS OF EL PASO COUNTY, COLORADO, BEING MONUMENTED ON THE SOUTH WITH A NO. 4 REBAR, FROM WHICH A NO. 5 REBAR WITH BLUE PLASTIC CAP STAMPED "RAMPART PLS 32820" BEARS N03°58'20"E A DISTANCE OF 1,170.16 FEET.

### BENCHMARK

1. NATIONAL GEODETIC VERTICAL DATUM OF 1929, MONUMENT R76 SET IN TOP OF CONCRETE MONUMENT ELEVATION = 6286.32'
2. NATIONAL GEODETIC VERTICAL DATUM OF 1929, FOUND #5 REBAR AND ORANGE CAP PLS 32820 ELEVATION = 6325.50'

### AGENCIES:

- OWNER/DEVELOPER: COLORADO SPRINGS EQUITIES LLC  
90 S. CASCADE AVE., SUITE 1500  
COLORADO SPRINGS, CO 80903  
DANNY MIENTKA (719) 448-4034
- CIVIL ENGINEER: M & S CIVIL CONSULTANTS, INC.  
212 N. WAHSATCH, SUITE 305  
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  
GILBERT LAFORCE, 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: CHEROKEE METROPOLITAN DISTRICT  
6250 PALMER PARK BOULEVARD  
COLORADO SPRINGS, CO 80915-1721  
JEFF MUNGER (719) 597-5080
- FIRE DISTRICT: CIMARRON HILLS FIRE DEPARTMENT  
1835 TUSKEGEE PLACE  
COLORADO SPRINGS, CO 80915  
(719) 591-0960
- GAS DEPARTMENT: COLORADO SPRINGS UTILITIES  
7710 DURANT DR.  
COLORADO SPRINGS, CO 80947  
TIM WENDT (719) 668-3556
- ELECTRIC DEPARTMENT: COLORADO SPRINGS UTILITIES  
7710 DURANT DR.  
COLORADO SPRINGS, CO 80947  
TIM WENDT (719) 668-3556
- COMMUNICATIONS: QWEST COMMUNICATIONS  
(U.N.C.C. LOCATORS) (800) 922-1987  
AT&T (LOCATORS) (719) 635-3674

### DESIGN ENGINEER'S STATEMENT

THESE DETAILED PLANS AND SPECIFICATIONS WERE PREPARED UNDER MY DIRECTION AND SUPERVISION. SAID PLANS AND SPECIFICATIONS HAVE BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE COUNTY FOR DETAILED ROADWAY, DRAINAGE, GRADING AND EROSION CONTROL PLANS AND SPECIFICATIONS, AND SAID PLANS AND SPECIFICATIONS ARE IN CONFORMITY WITH APPLICABLE MASTER DRAINAGE PLANS AND MASTER TRANSPORTATION PLANS. SAID PLANS AND SPECIFICATIONS MEET THE PURPOSES FOR WHICH THE PARTICULAR ROADWAY AND DRAINAGE FACILITIES ARE DESIGNED AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARATION OF THESE DETAILED PLANS AND SPECIFICATIONS.

VIRGIL A. SANCHEZ, COLORADO P.E. #37160  
FOR AND ON BEHALF OF M & S CIVIL CONSULTANTS, INC.

### OWNER/DEVELOPER'S STATEMENT:

I, THE OWNER/DEVELOPER HAVE READ AND WILL COMPLY WITH THE REQUIREMENTS IN THESE DETAILED PLANS AND SPECIFICATIONS.

DANNY MIENTKA (MANAGER) \_\_\_\_\_ DATE \_\_\_\_\_  
COLORADO SPRINGS EQUITIES LLC

### 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 MANUAL, VOLUMES 1 AND 2, AND ENGINEERING CRITERIA MANUAL AS AMENDED.

IN ACCORDANCE WITH ECM SECTION 1.12, THESE CONSTRUCTION DOCUMENTS WILL BE VALID FOR CONSTRUCTION FOR A PERIOD OF 2 YEARS FROM THE DATE SIGNED BY THE EL PASO COUNTY ENGINEER. IF CONSTRUCTION HAS NOT STARTED WITHIN THOSE 2 YEARS, THE PLANS WILL NEED TO BE RESUBMITTED FOR APPROVAL, INCLUDING PAYMENT OF REVIEW FEES AT THE PLANNING AND COMMUNITY DEVELOPMENT DIRECTORS DISCRETION.

JOSHUA PALMER, P.E. \_\_\_\_\_ DATE \_\_\_\_\_  
COUNTY ENGINEER / ECM ADMINISTRATOR

EL PASO COUNTY FILE NO. SF CDR232

CROSS ROAD MIXED USE FILING NO.1		TITLE SHEET	
PROJECT NO. 18-003		DATE: 03-20-23	
DESIGNED BY: GT		HORIZONTAL: N/A	
DRAWN BY: TAU		VERTICAL: N/A	
CHECKED BY: VAS		SHEET 1 OF 9	
ST01			

**CIVIL CONSULTANTS, INC.**

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

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

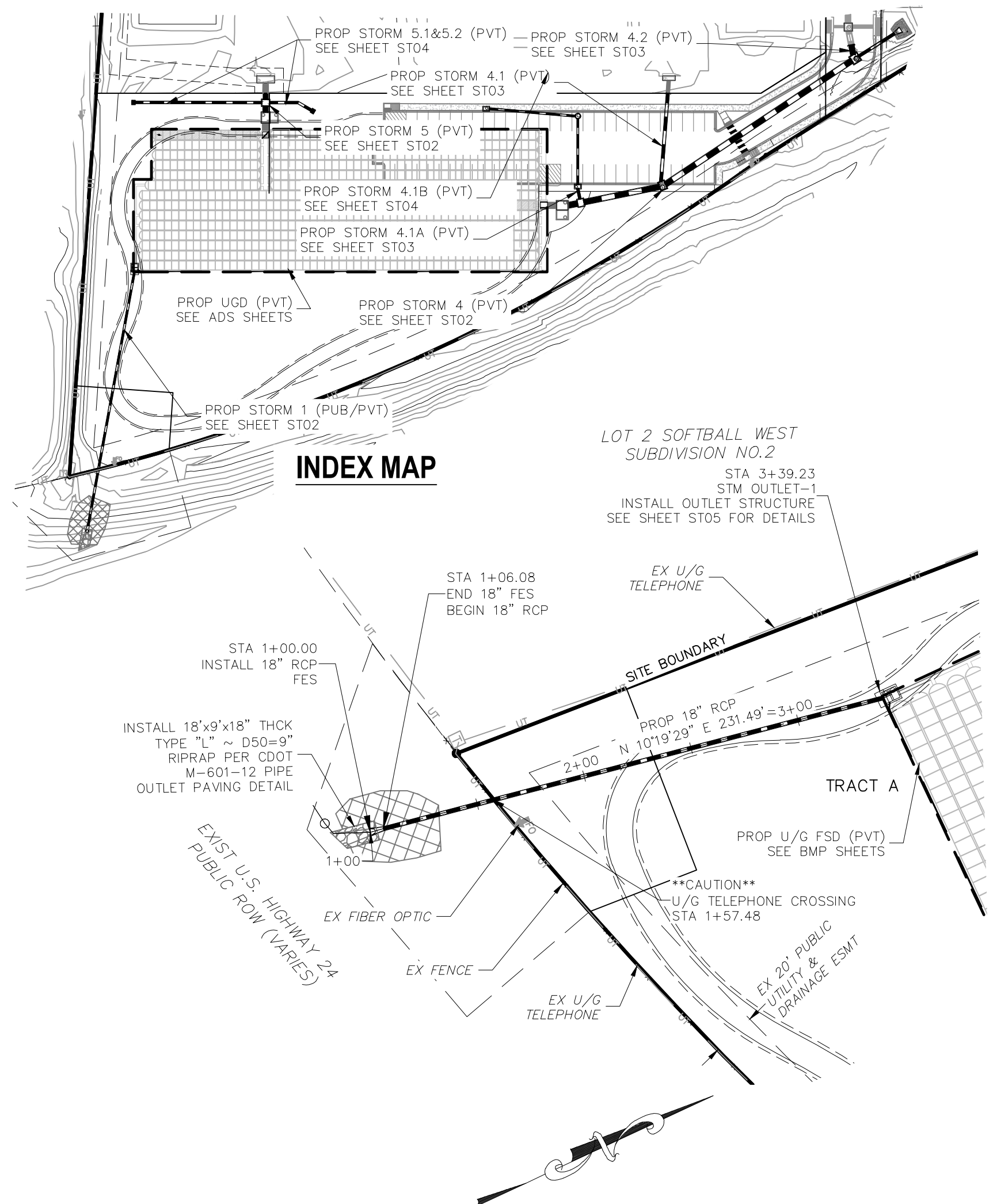
NO. \_\_\_\_\_ DATE: \_\_\_\_\_

BY: \_\_\_\_\_ DESCRIPTION: \_\_\_\_\_

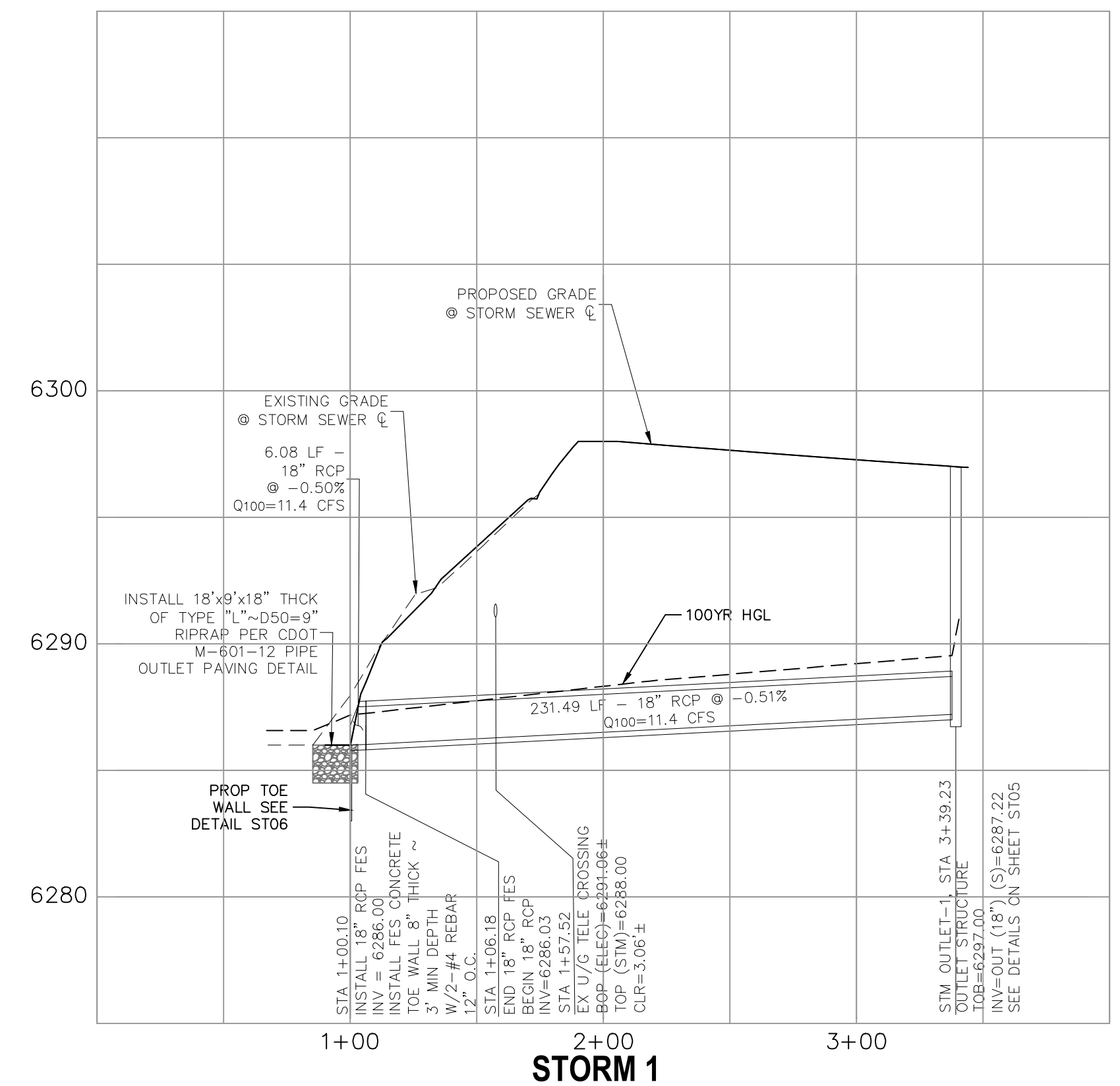
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CAUTION

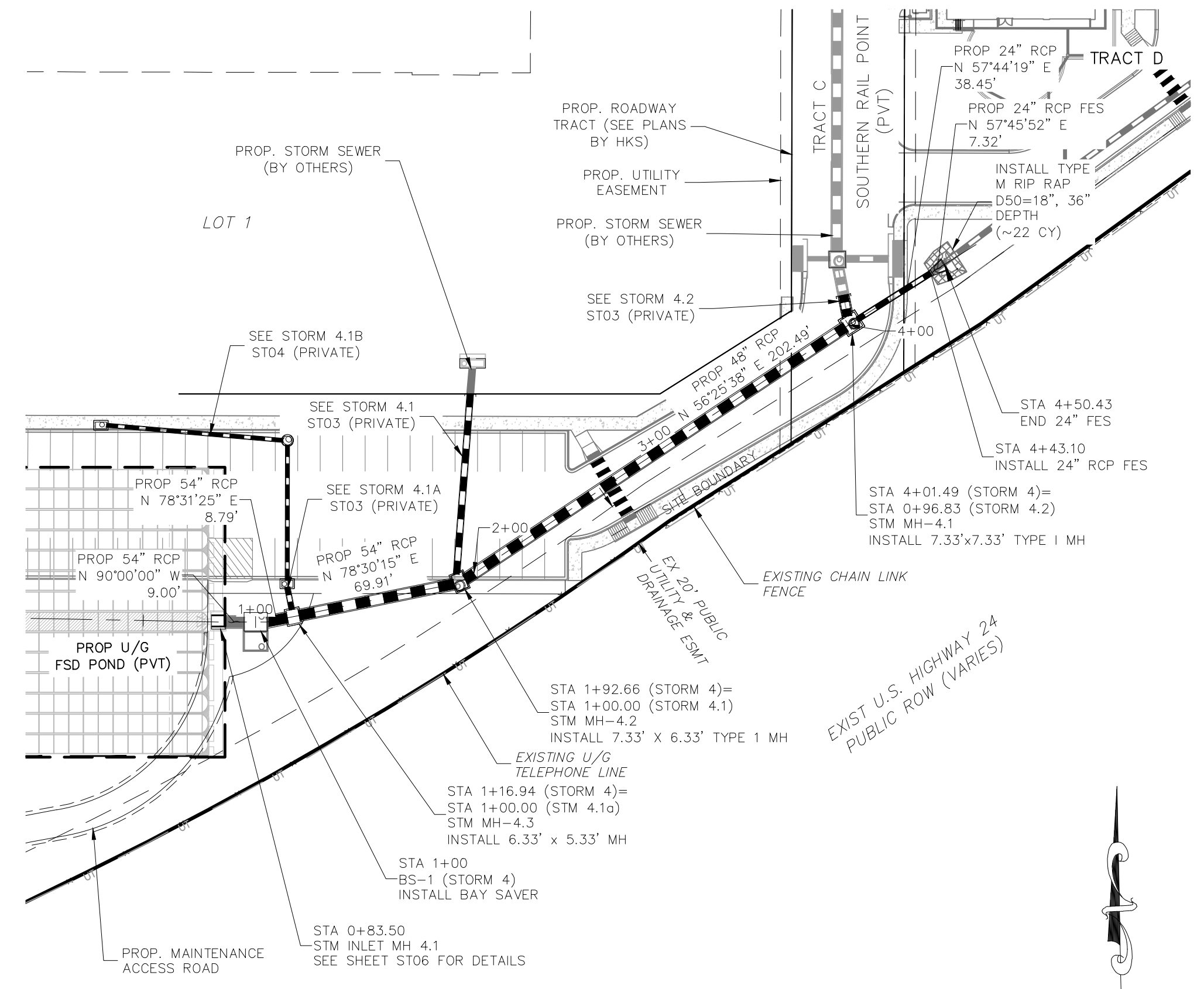




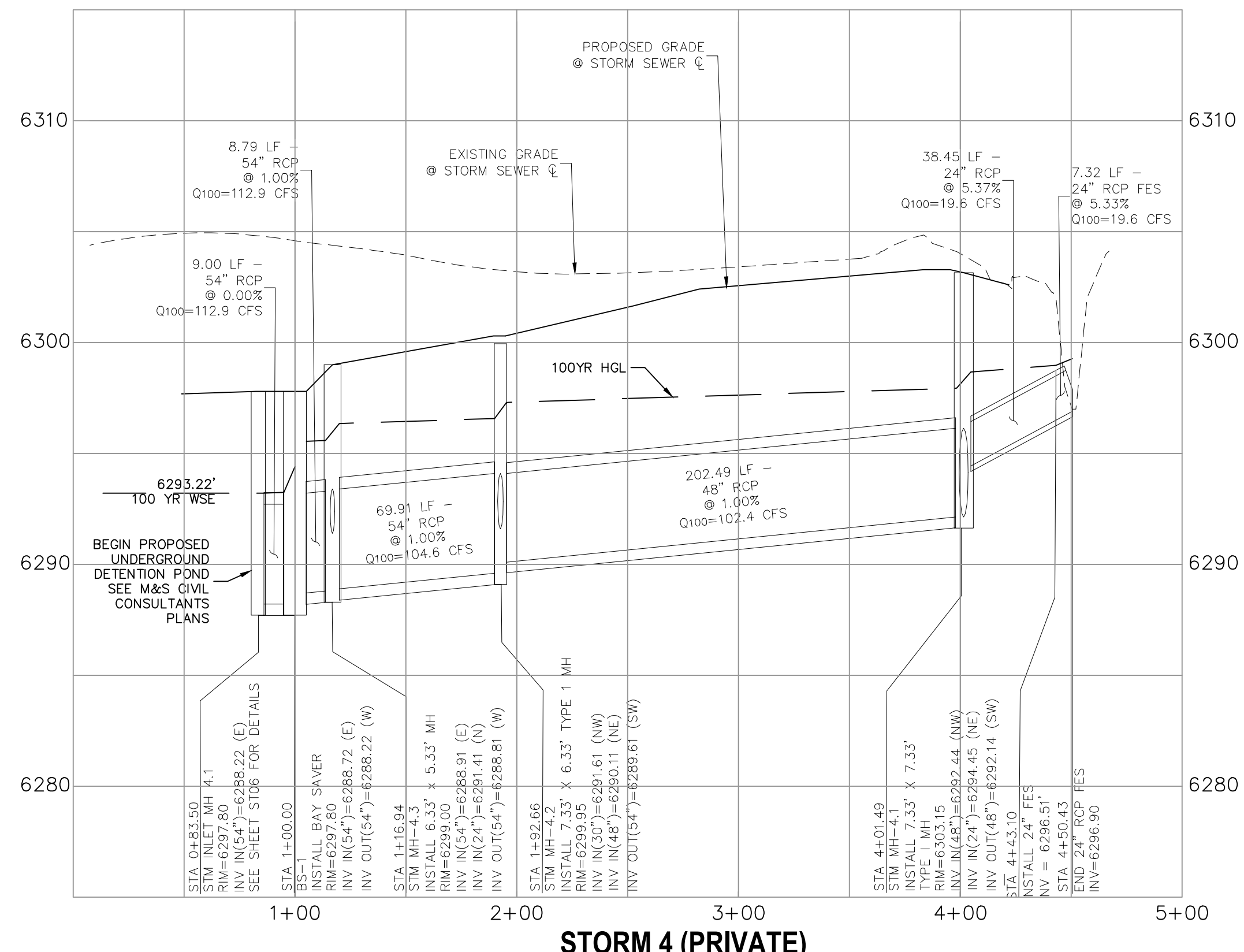
**STORM 1 UNDERGROUND DETENTION OUTFALL**  
**STA 1+00.10 TO STA 3+39.23**  
**(PUBLIC/PRIVATE)**



**STORM 1**



**STORM 4 (PRIVATE)**  
**STA 0+83.50.00 TO STA 4+50.43**



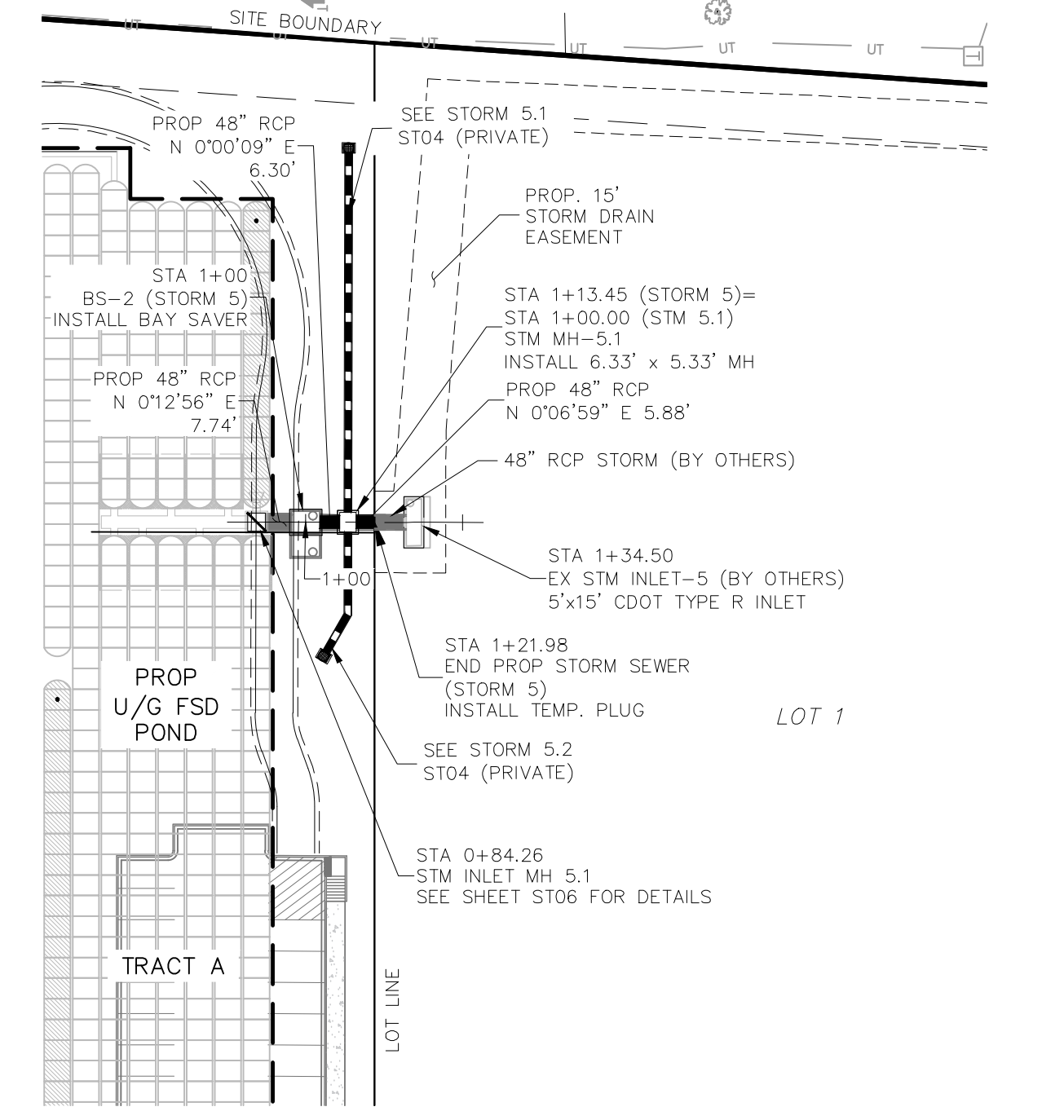
**STORM 4 (PRIVATE)**

**NOTE:**

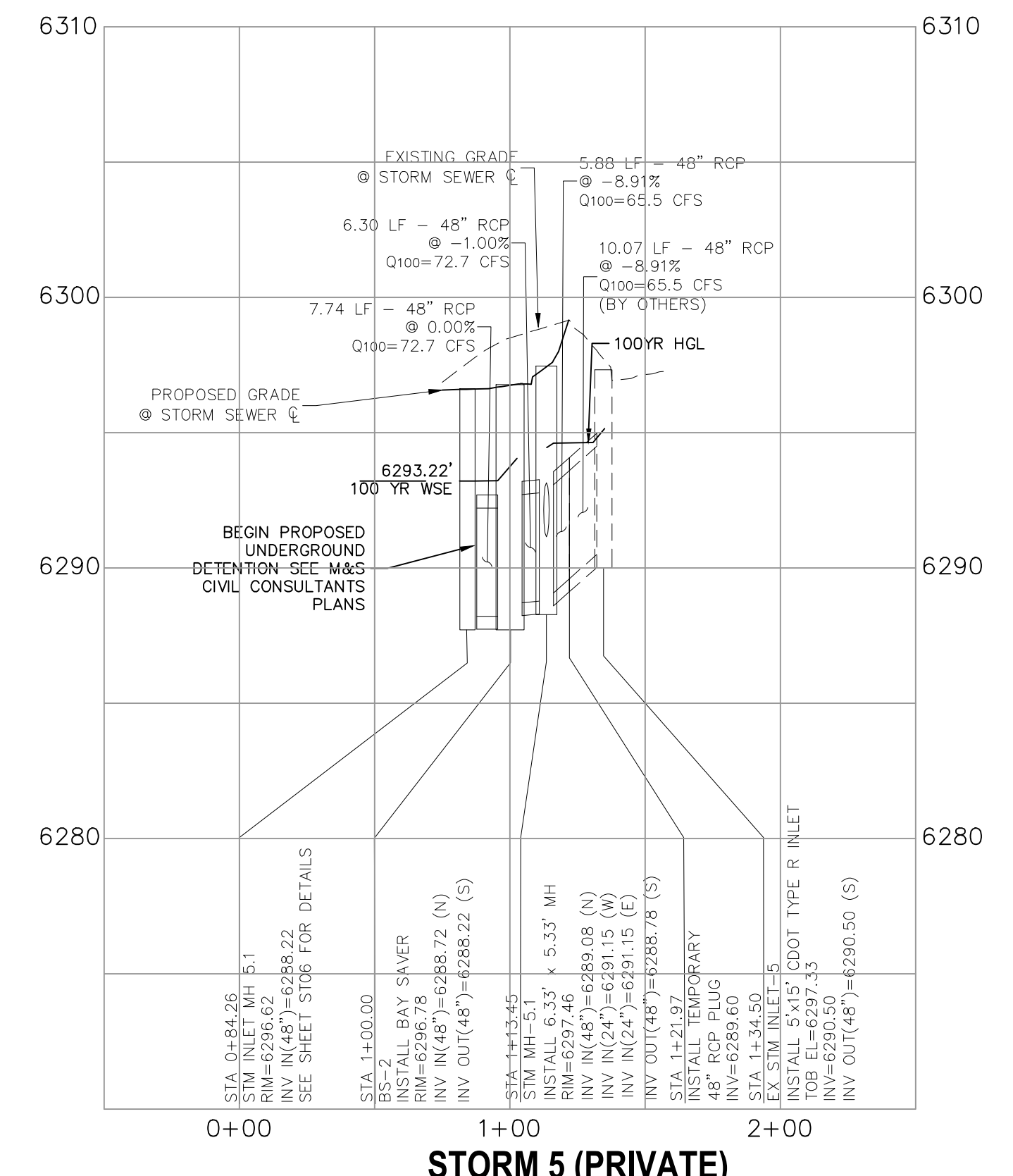
- 1.) GRATED INLET TO BE REPLACED WITH CURB FACE INLET AT TIME OF MEADOWBROOK PARKWAY EXTENSION
- 2.) ALL PRIVATE STORM SEWER CONSTRUCTED WITH THESE PLANS TO BE MAINTAINED BY THE CROSSROADS METROPOLITAN DISTRICT NO. 1

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

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



**STORM 5 (PRIVATE)**  
**STA 0+84.26 TO STA 1+34.50**



**STORM 5 (PRIVATE)**

**CROSS ROAD MIXED USE FILING NO. 1**

**STORM SEWER PLANS**

PROJECT NO. 18-003 DATE: 03-20-23

SCALE: HORIZONTAL: 1"=50' VERTICAL: 1"=5'

DESIGNED BY: GT DRAWN BY: TAU CHECKED BY: VAS

210 N. WABATCH AVE, STE 305  
 COLORADO SPRINGS, CO 80903  
 PHONE: 719.555.5465

**M&S CIVIL CONSULTANTS, INC.**

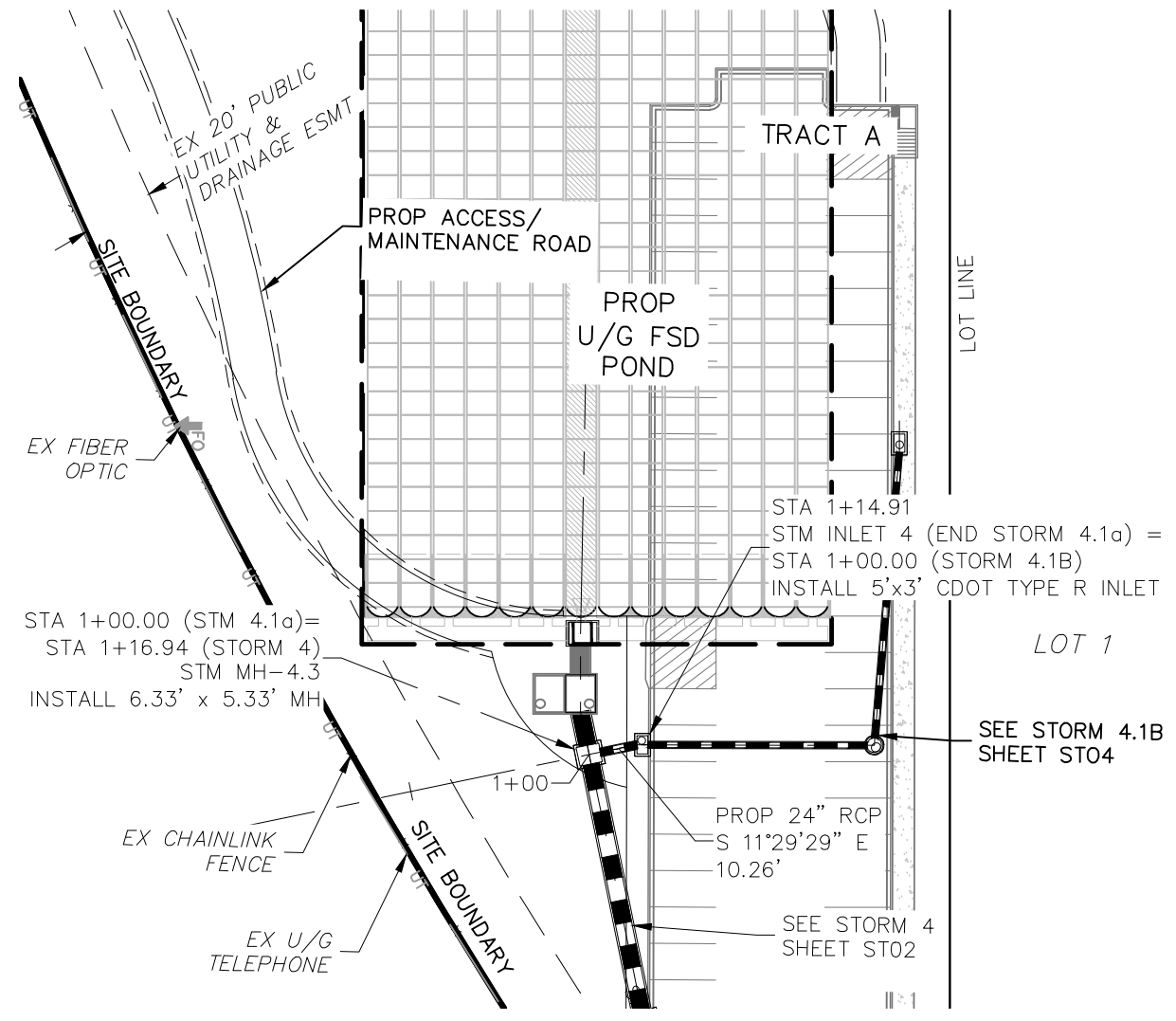
FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

VIRGIL A. SANCHEZ, COLORADO, P.E. NO. 371160

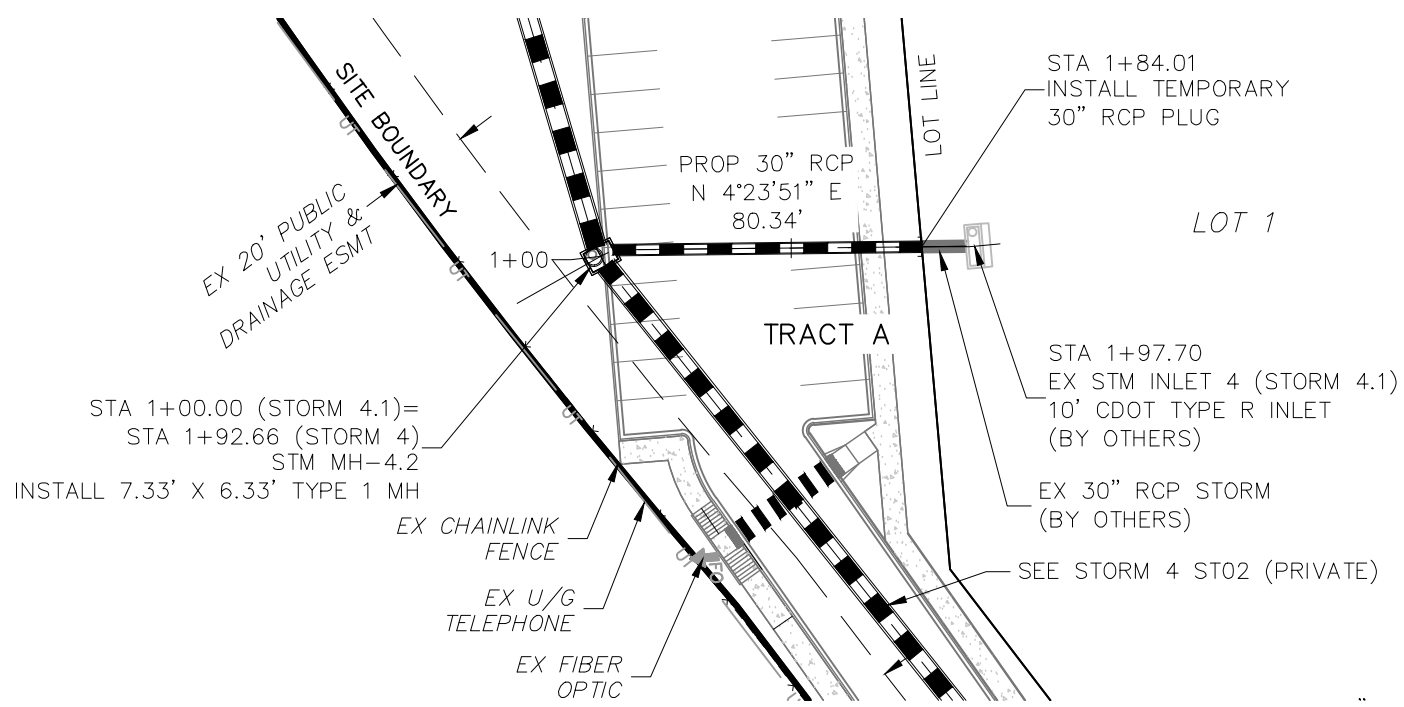
REV. NO.	DATE	BY	DESCRIPTION

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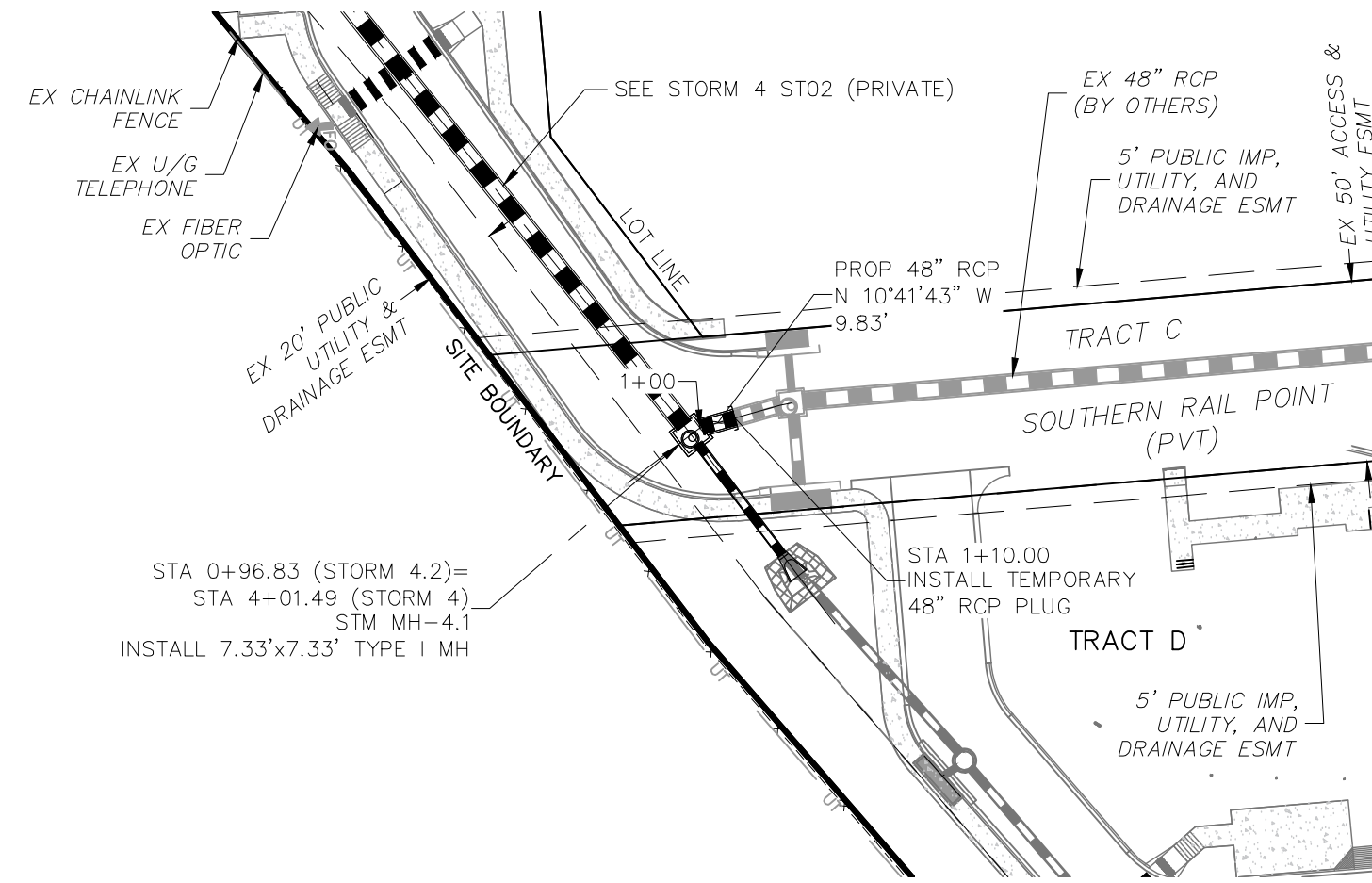
**CAUTION**



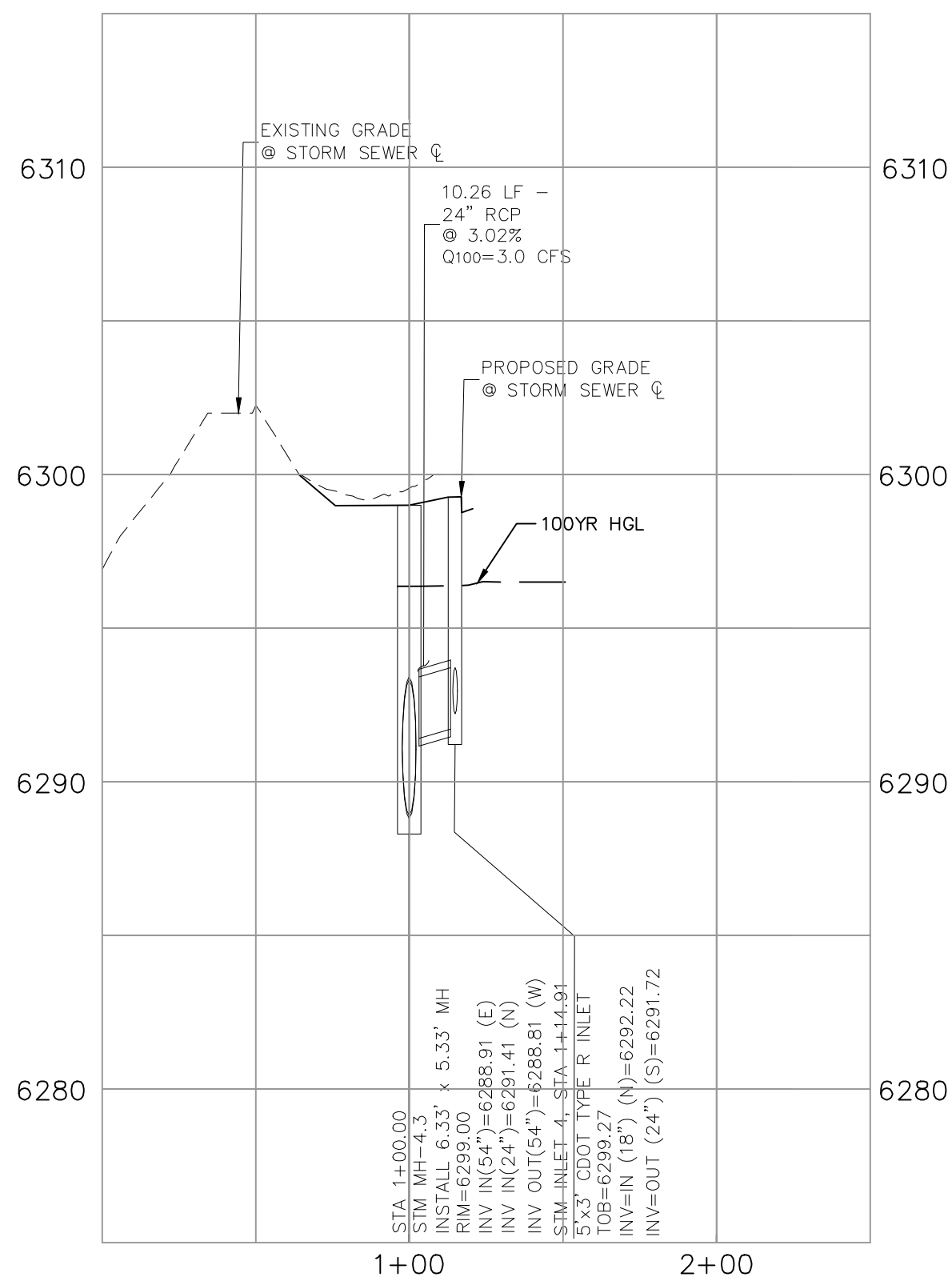
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STA 1+00.00 TO STA 1+14.91



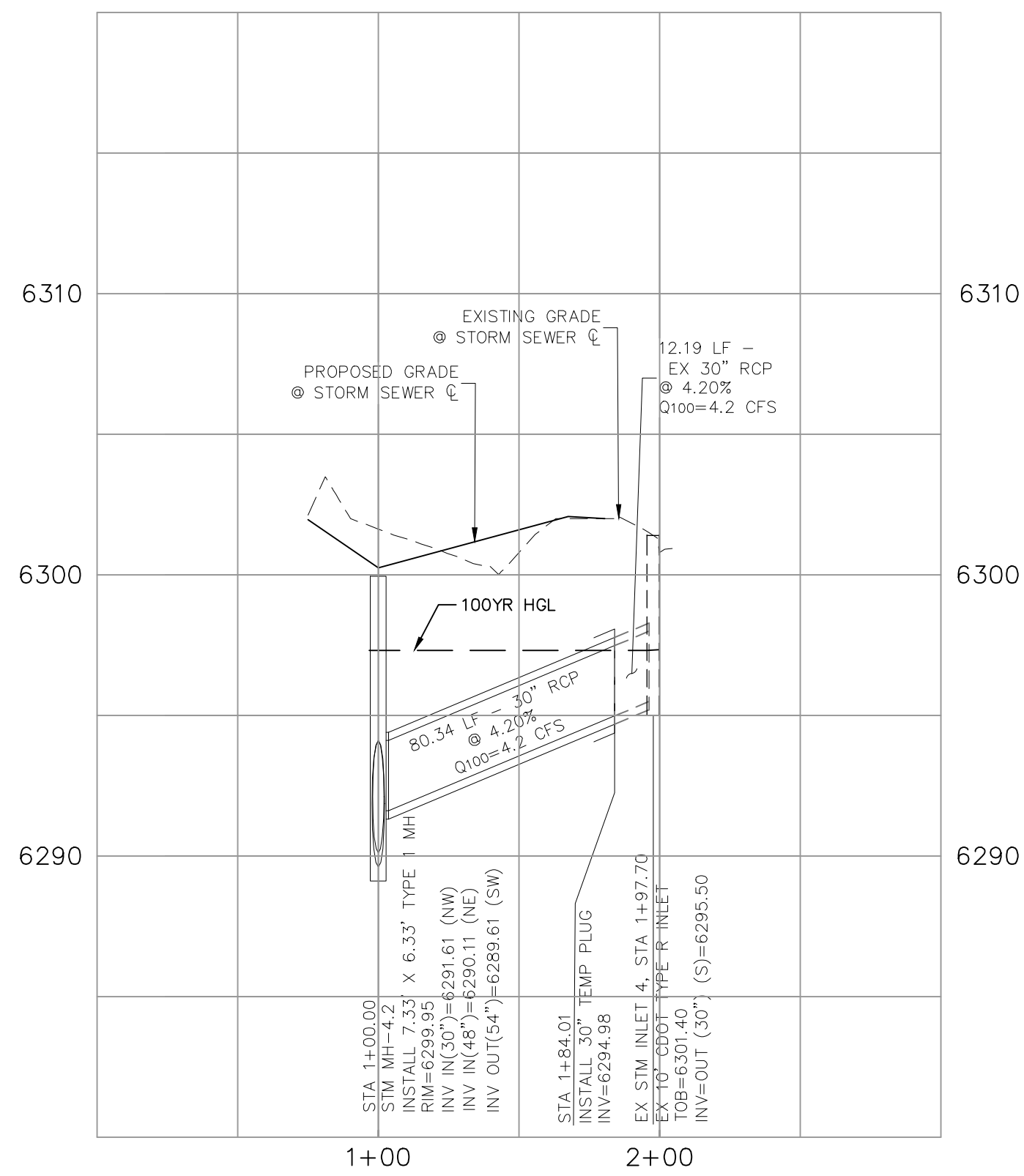
**STORM 4.1 (PRIVATE)**  
STA 1+00.00 TO STA 1+97.69



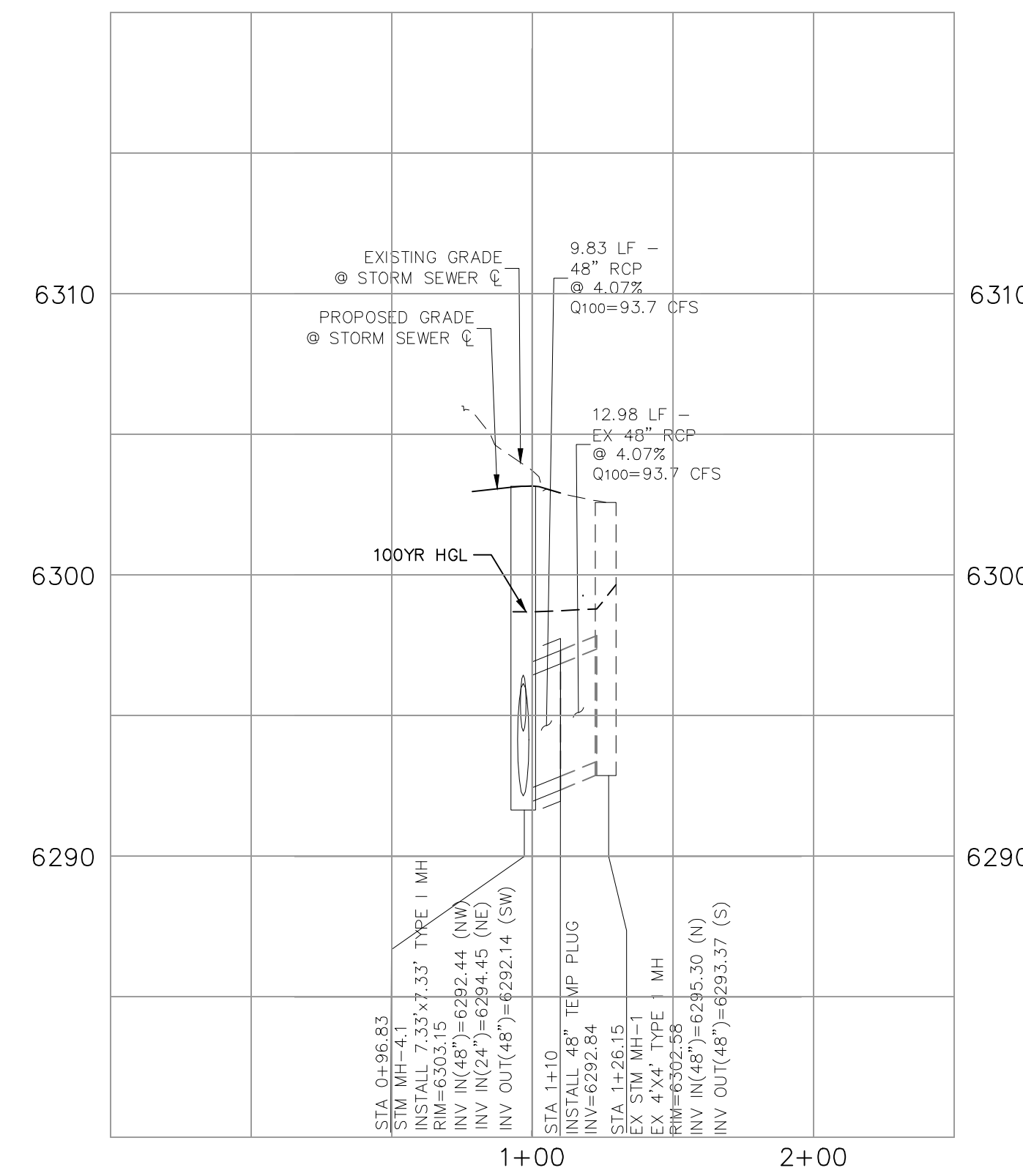
**STORM 4.2 (PRIVATE)**  
STA 1+00.00 TO STA 1+10.00



**STORM 4.1A (PRIVATE)**



**STORM 4.1 (PRIVATE)**



**STORM 4.2 (PRIVATE)**

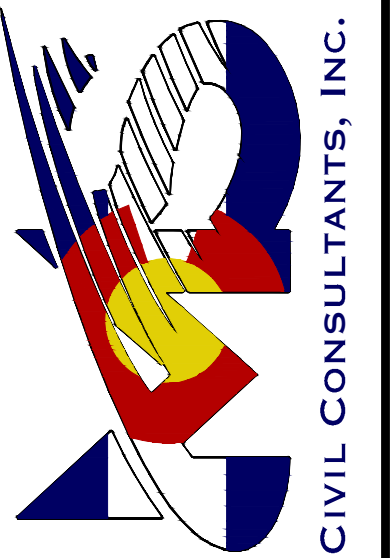
**NOTE:**

ALL PRIVATE STORM SEWER CONSTRUCTED WITH THESE PLANS TO BE MAINTAINED BY THE CROSSROADS METROPOLITAN DISTRICT NO. 1

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES  
FOR BURIED UTILITY INFORMATION 48 HRS BEFORE YOU DIG CALL 1-800-922-1987

CROSS ROAD MIXED USE FILING NO. 1  
STORM SEWER PLANS  
PROJECT NO. 18-003  
SCALE: HORIZONTAL: 1"=50' VERTICAL: 1"=5'  
DESIGNED BY: GT  
DRAWN BY: TAU  
CHECKED BY: VAS  
DATE: 03-20-23  
SHEET 3 OF 9  
ST03

212 N. WABATCH AVE, STE 305  
COLORADO SPRINGS, CO 80903  
PHONE: 719.955.5465



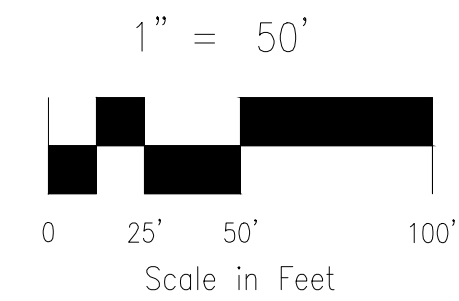
FOR AND ON BEHALF OF  
MKS CIVIL CONSULTANTS, INC.

VIRGIL A. SANCHEZ, COLORADO, P.E. NO. 371160

NO.	DATE	BY	DESCRIPTION	APPR'D. BY	DATE

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARE OF THESE PLANS.

CAUTION





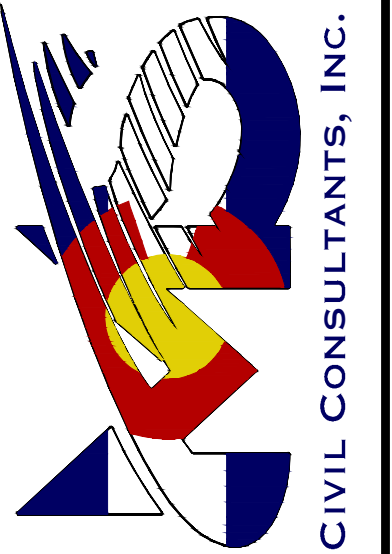
**NOTE:**

ALL PRIVATE STORM SEWER CONSTRUCTED WITH THESE PLANS TO BE MAINTAINED BY THE CROSSROADS METROPOLITAN DISTRICT NO. 1

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES  
 FOR BURIED UTILITY INFORMATION 48 HRS BEFORE YOU DIG  
 CALL 1-800-922-1987

CROSS ROAD MIXED USE FILING NO.1  
 STORM SEWER PLANS  
 PROJECT NO. 18-003  
 SCALE: HORIZONTAL: 1"=50' VERTICAL: 1"=5'  
 DATE: 03-20-23  
 DESIGNED BY: GT  
 DRAWN BY: TAU  
 CHECKED BY: VAS  
 SHEET 4 OF 9  
 ST04

212 N. WABATCH AVE., STE 305  
 COLORADO SPRINGS, CO 80903  
 PHONE: 719.555.5465



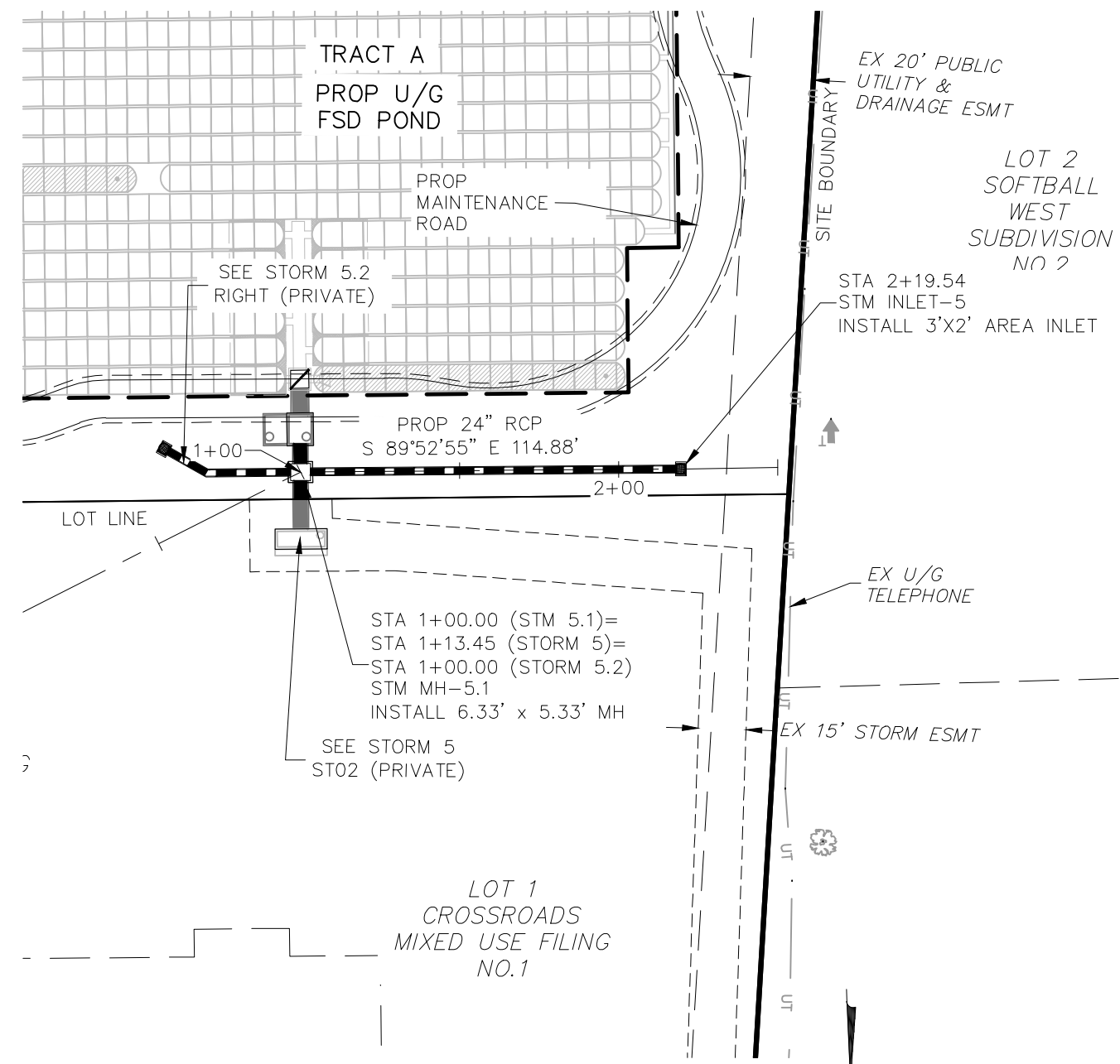
FOR AND ON BEHALF OF WKS CIVIL CONSULTANTS, INC.

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

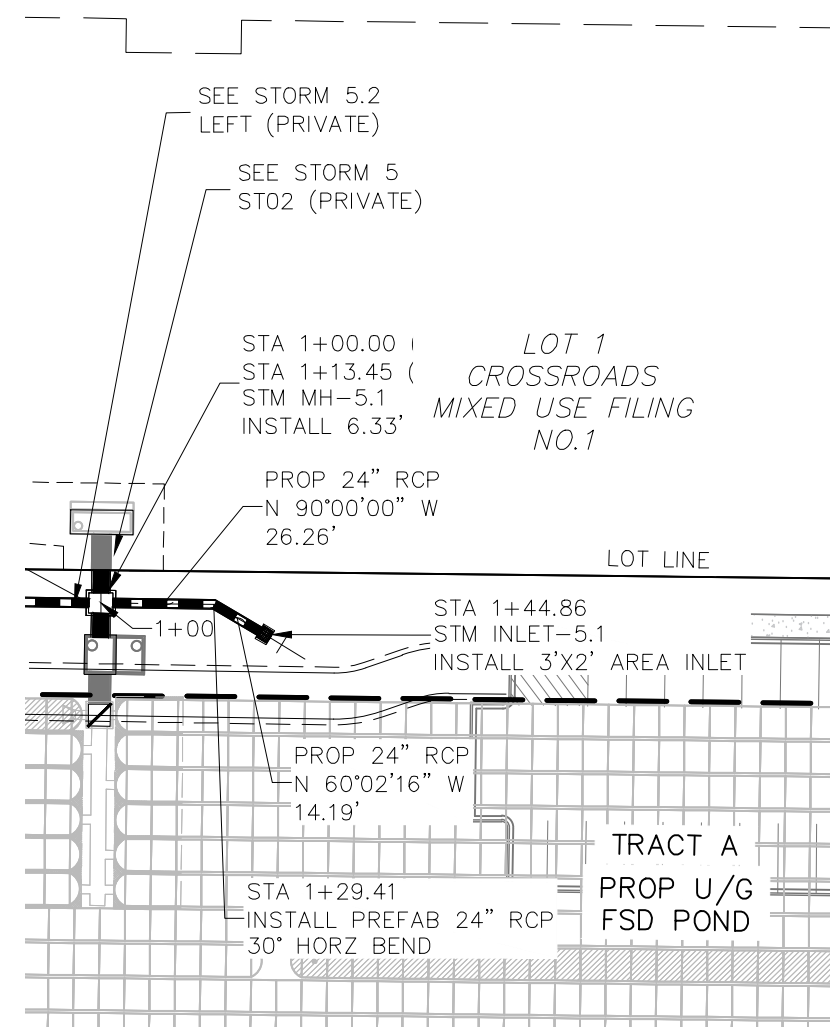
NO.	DATE	BY	DESCRIPTION	APPR'D. BY	DATE

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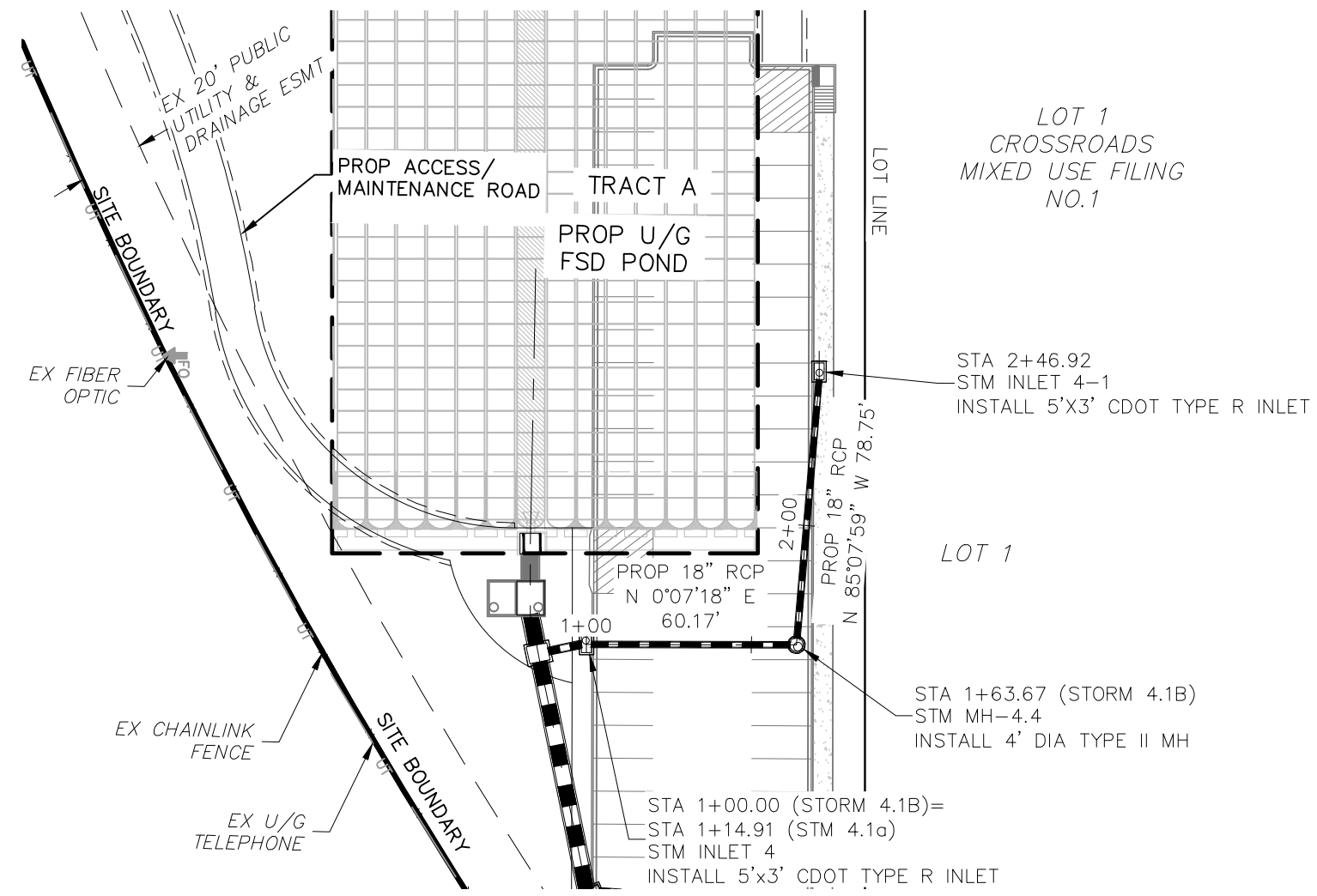
CAUTION



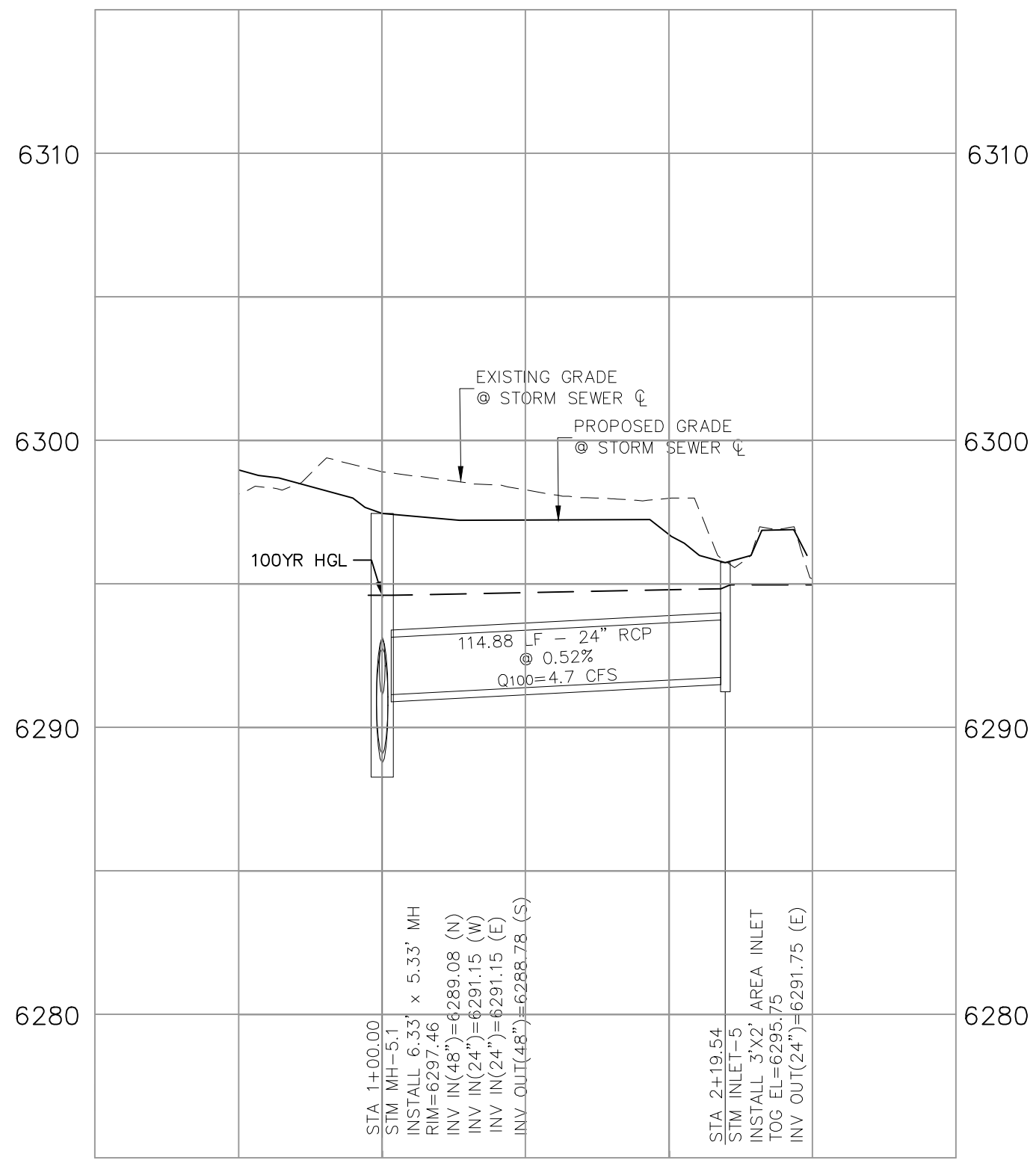
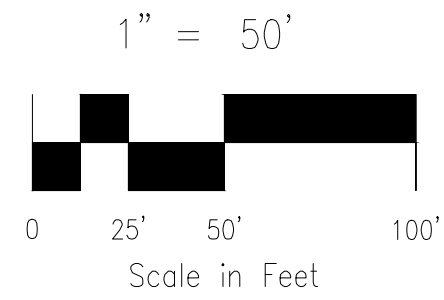
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**STA 1+00.00 TO STA 2+19.54**



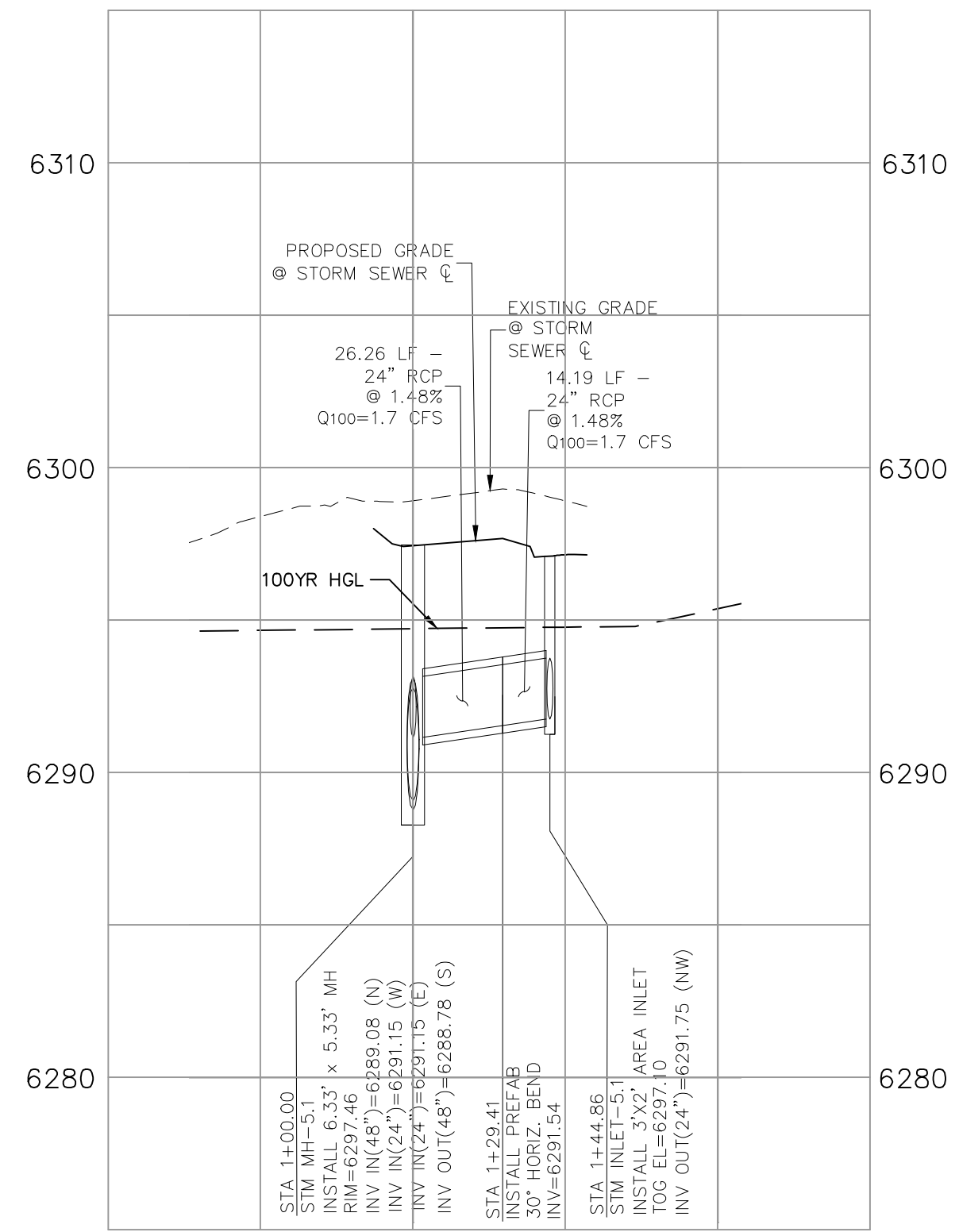
**STORM 5.2 (PRIVATE)**  
**STA 1+00.00 TO STA 2+74.22**



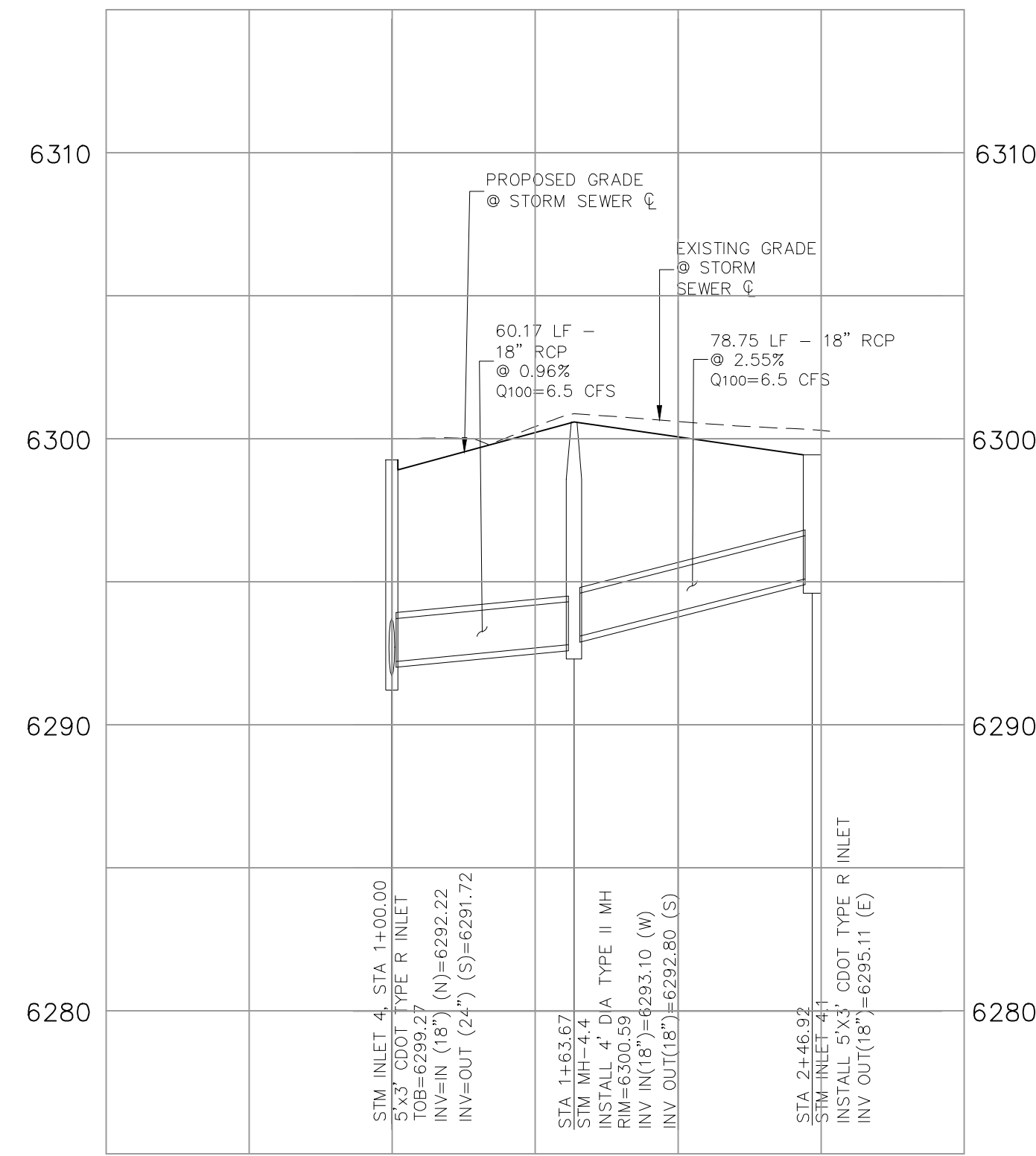
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**STA 1+00.00 TO STA 2+46.92**



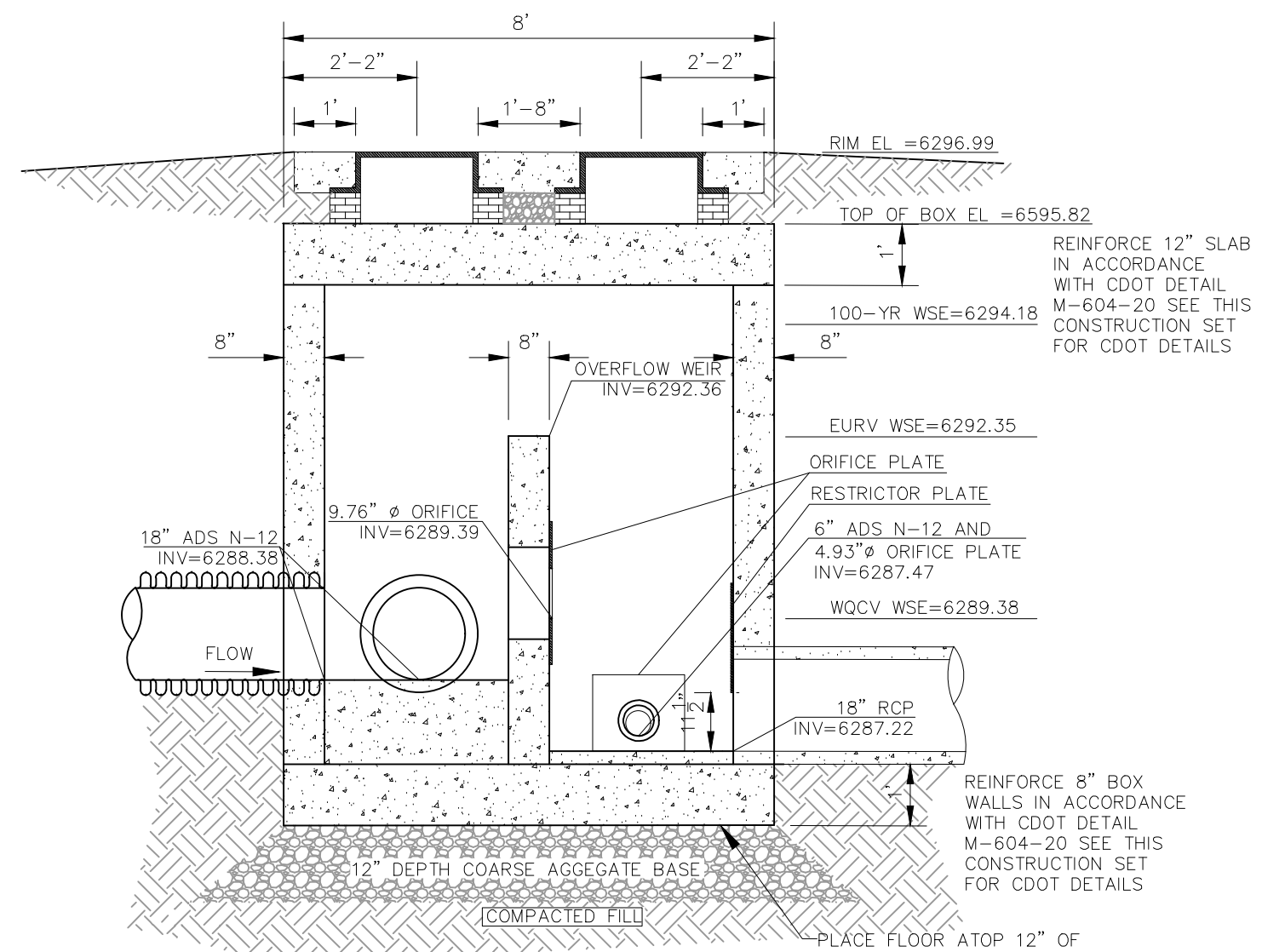
**STORM 5.1 (PRIVATE)**



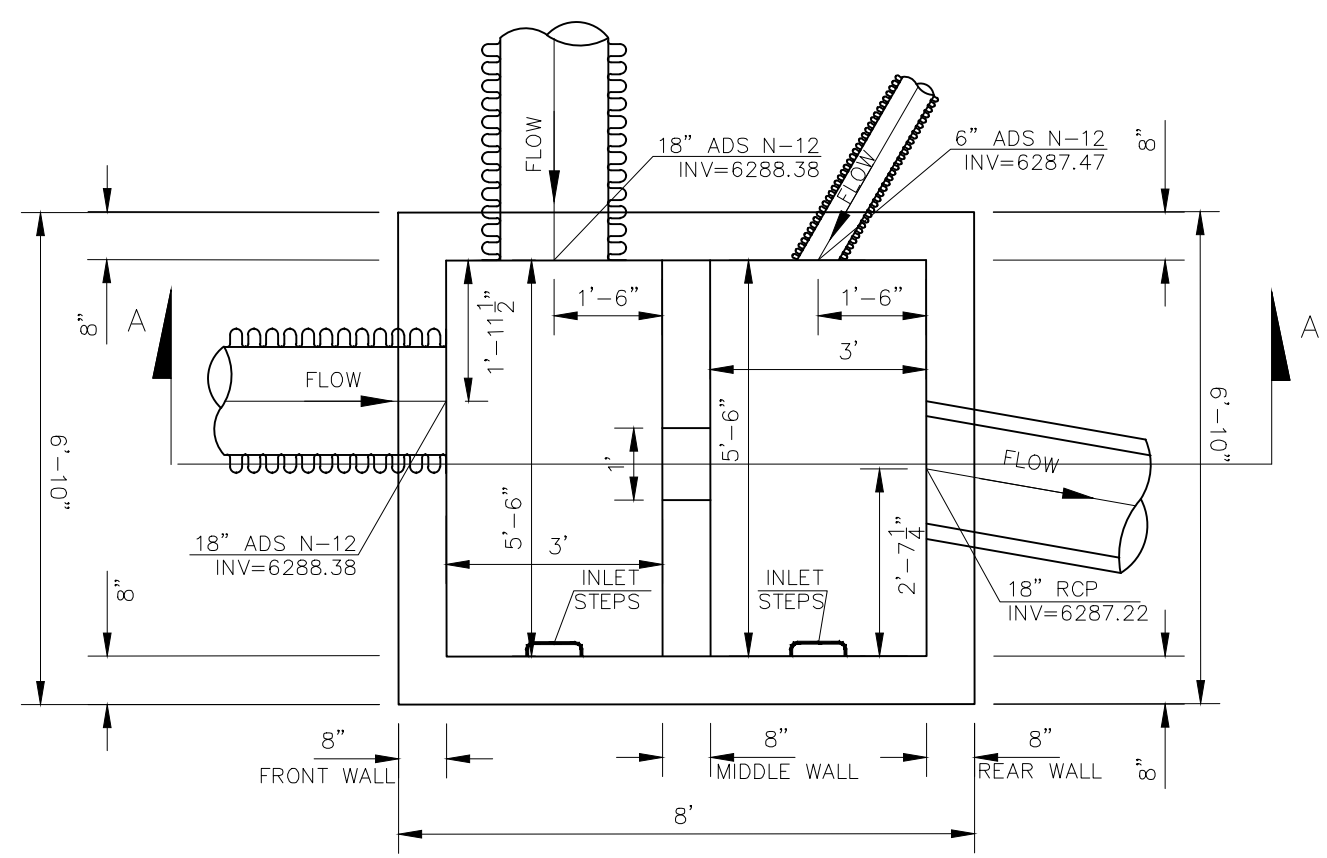
**STORM 5.2 (PRIVATE)**



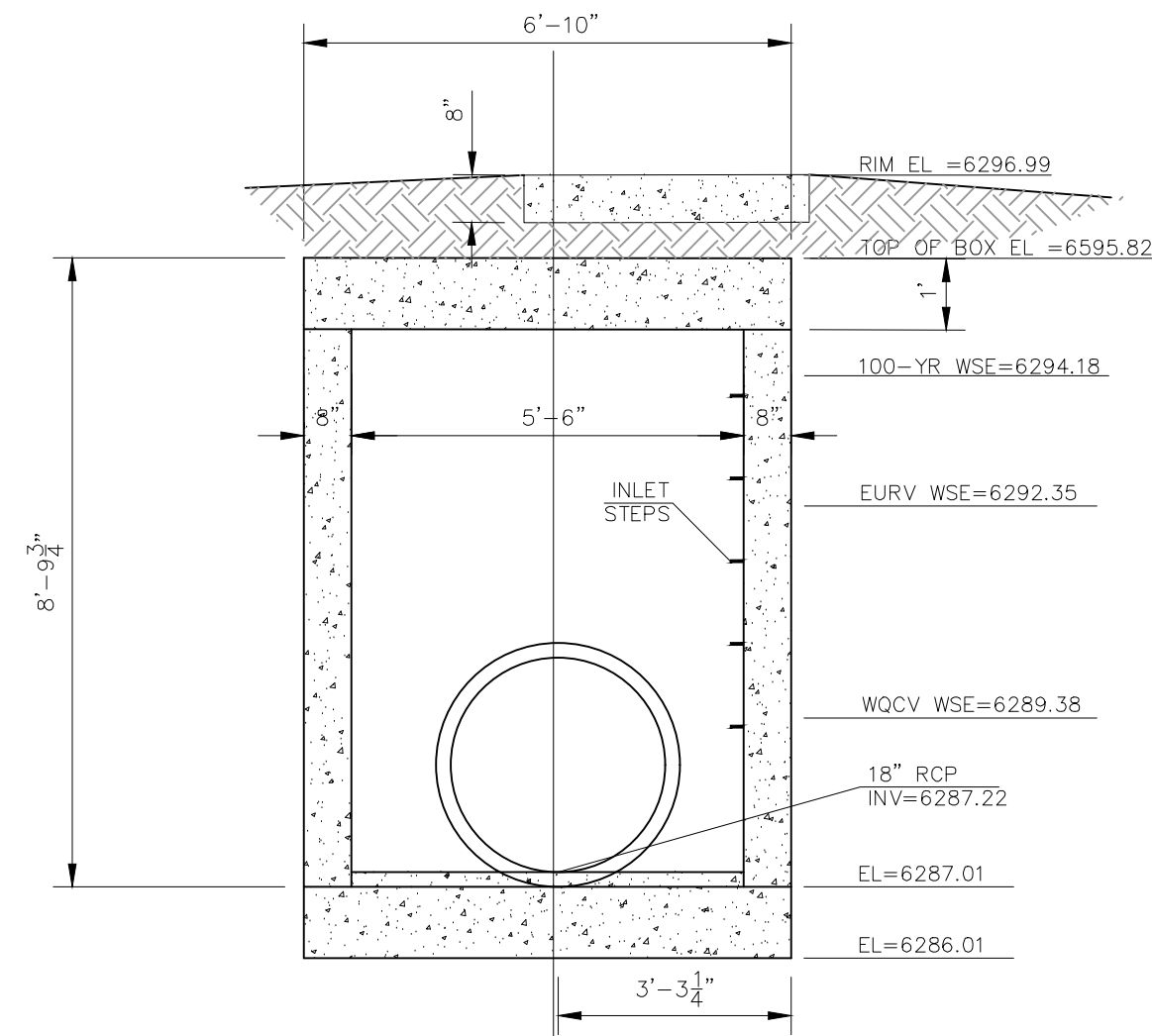
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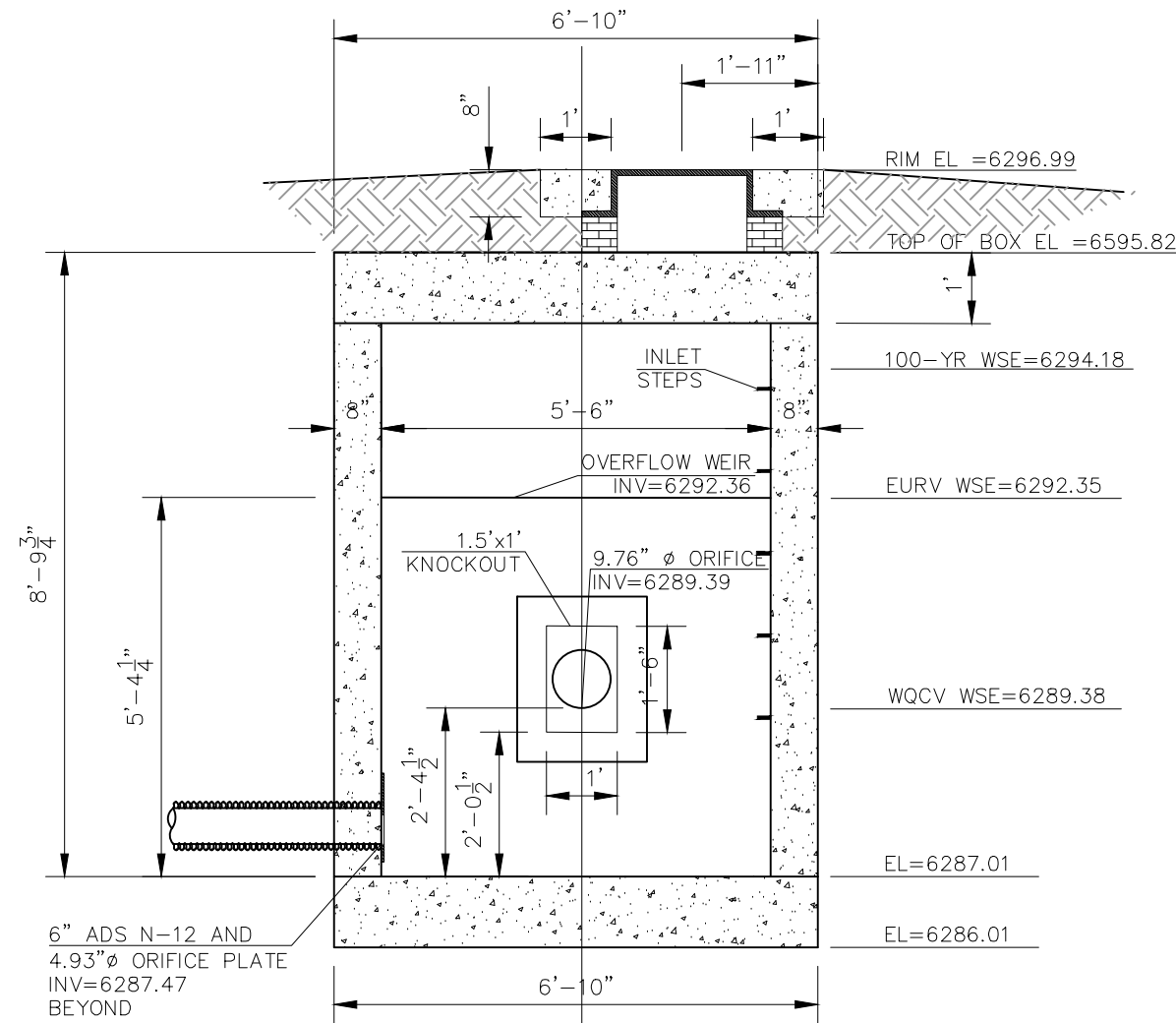
**SECTION A-A**  
SCALE: 3/8" = 1'



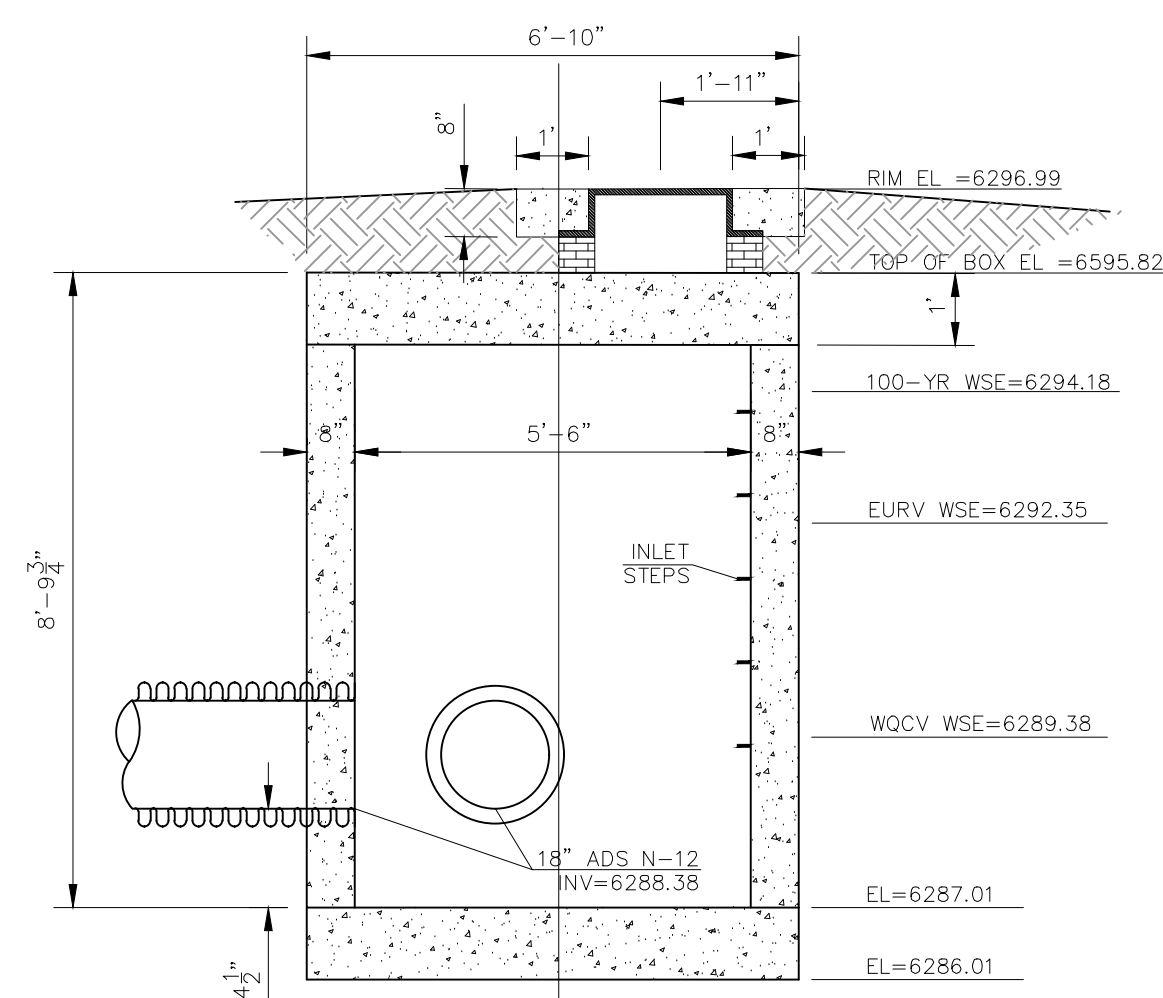
**TRACT A POND 1 OUTLET STRUCTURE**  
SCALE: 3/8" = 1'



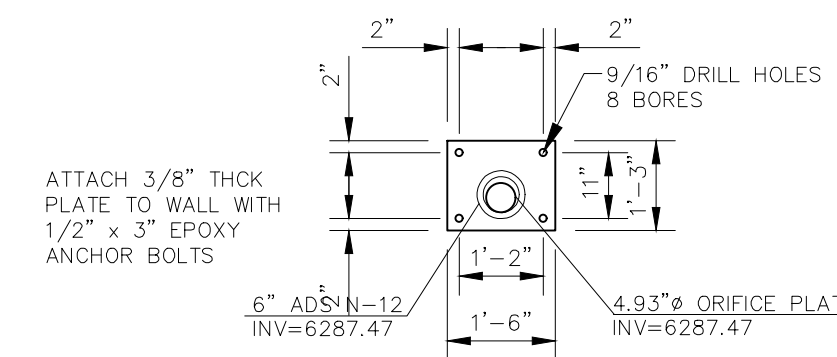
**REAR WALL**  
SCALE: 3/8" = 1'



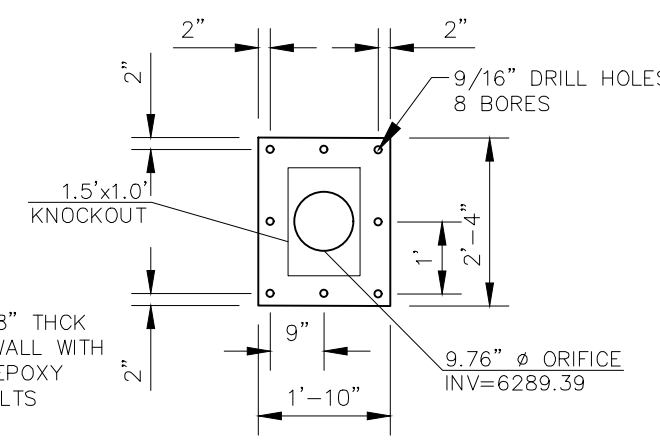
**MIDDLE WALL**  
SCALE: 3/8" = 1'



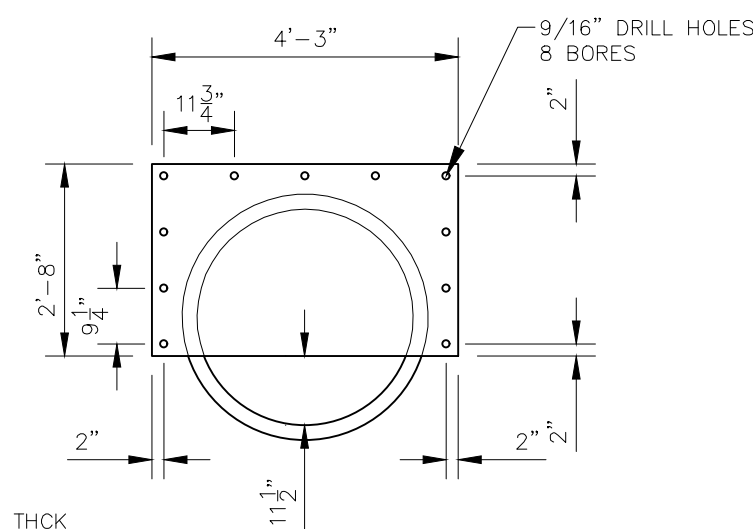
**FRONT WALL**  
SCALE: 3/8" = 1'



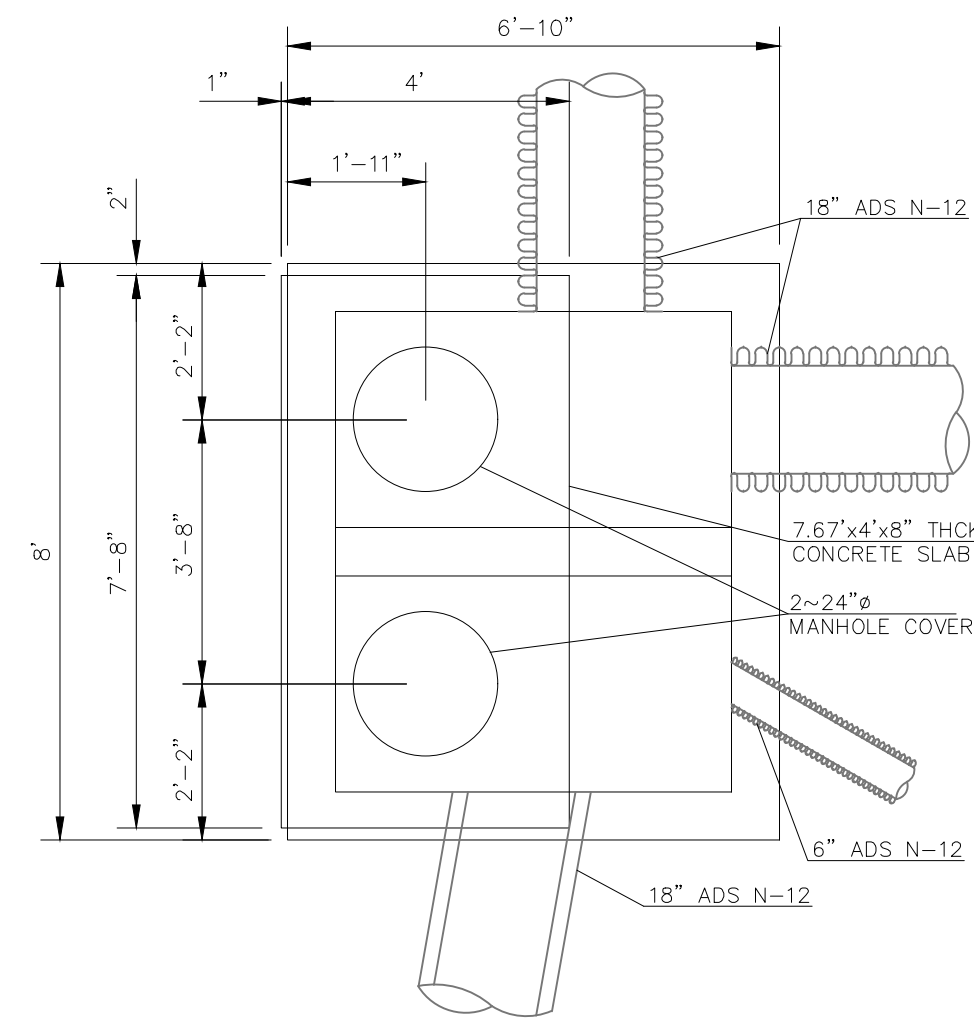
**ORIFICE PLATE ON 6" UNDERDRAIN**  
SCALE: 3/8" = 1'



**ORIFICE PLATE ON 1.5x1.0' KNOCKOUT**  
SCALE: 3/8" = 1'

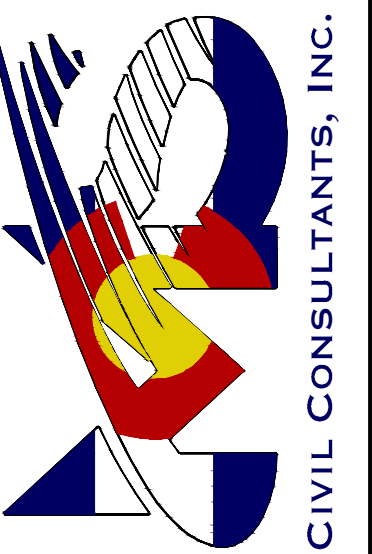
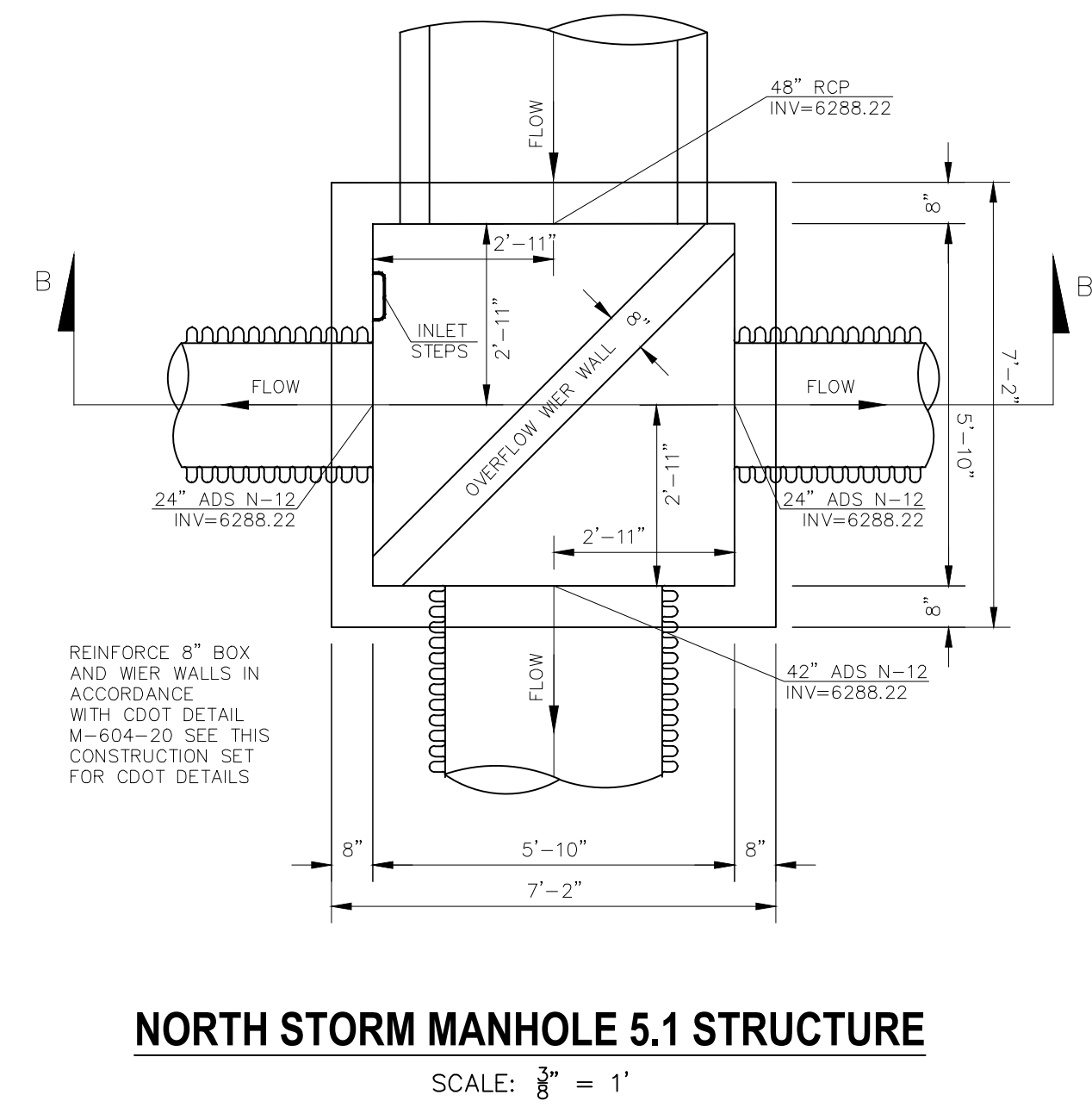
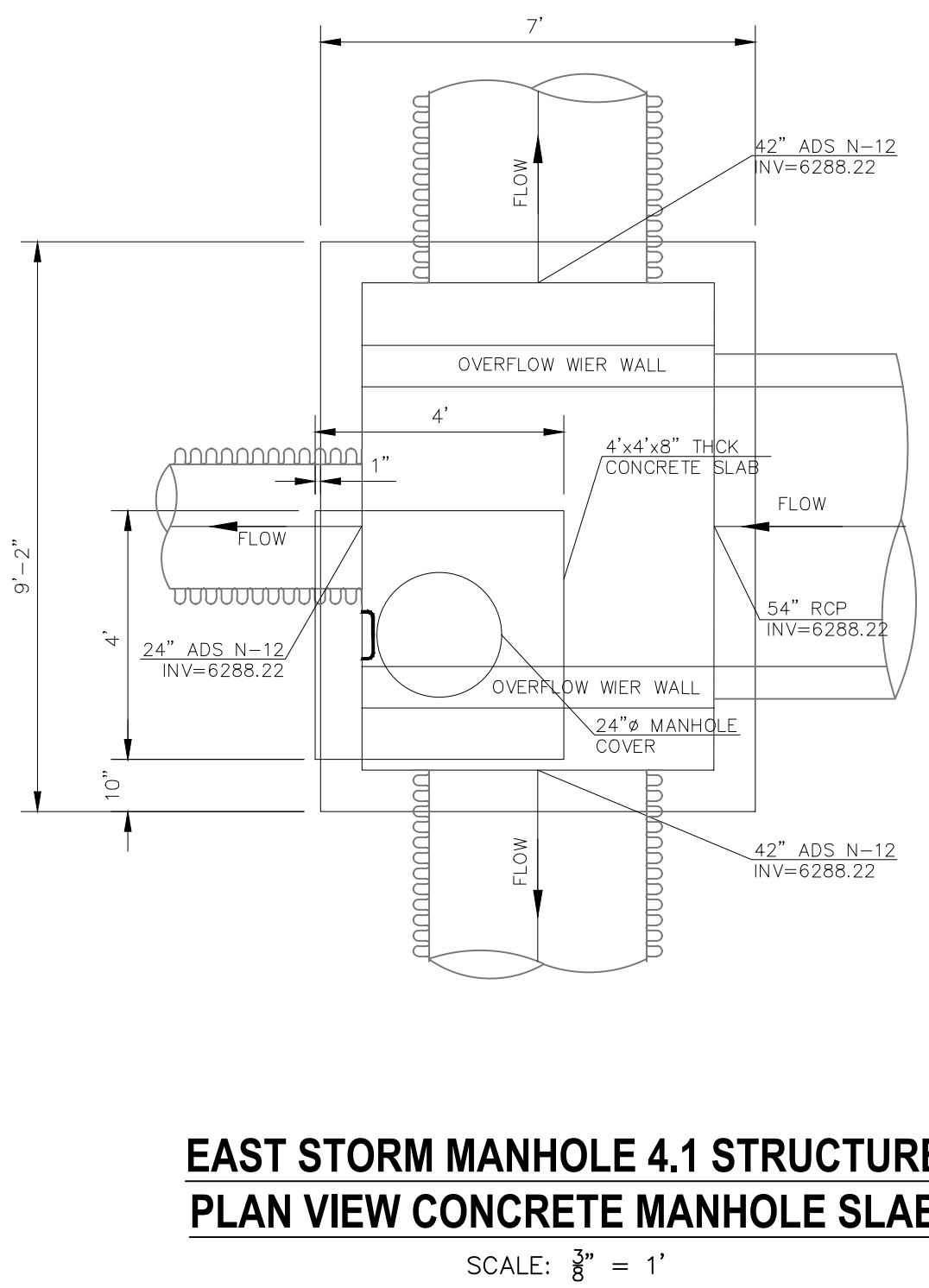
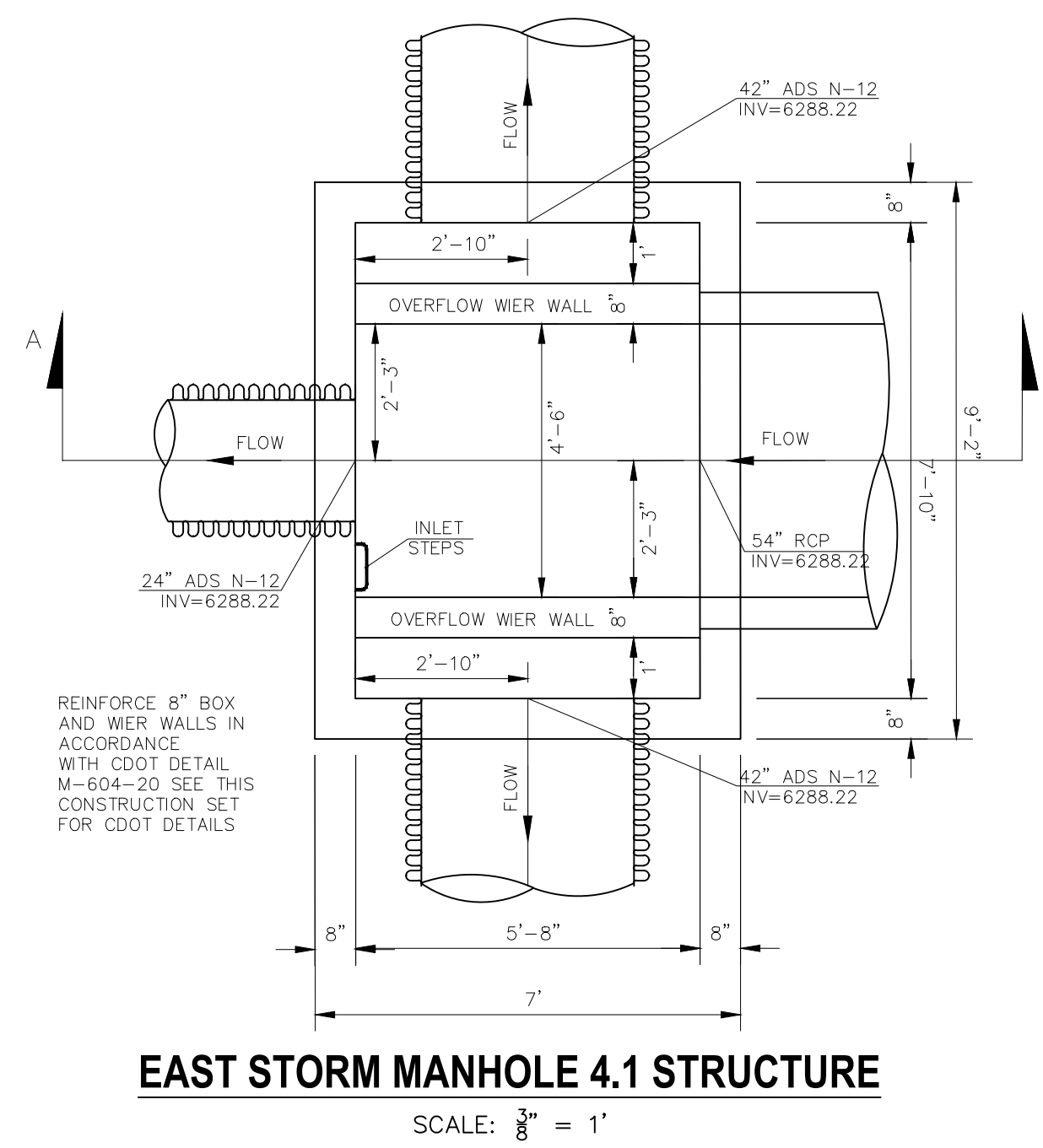
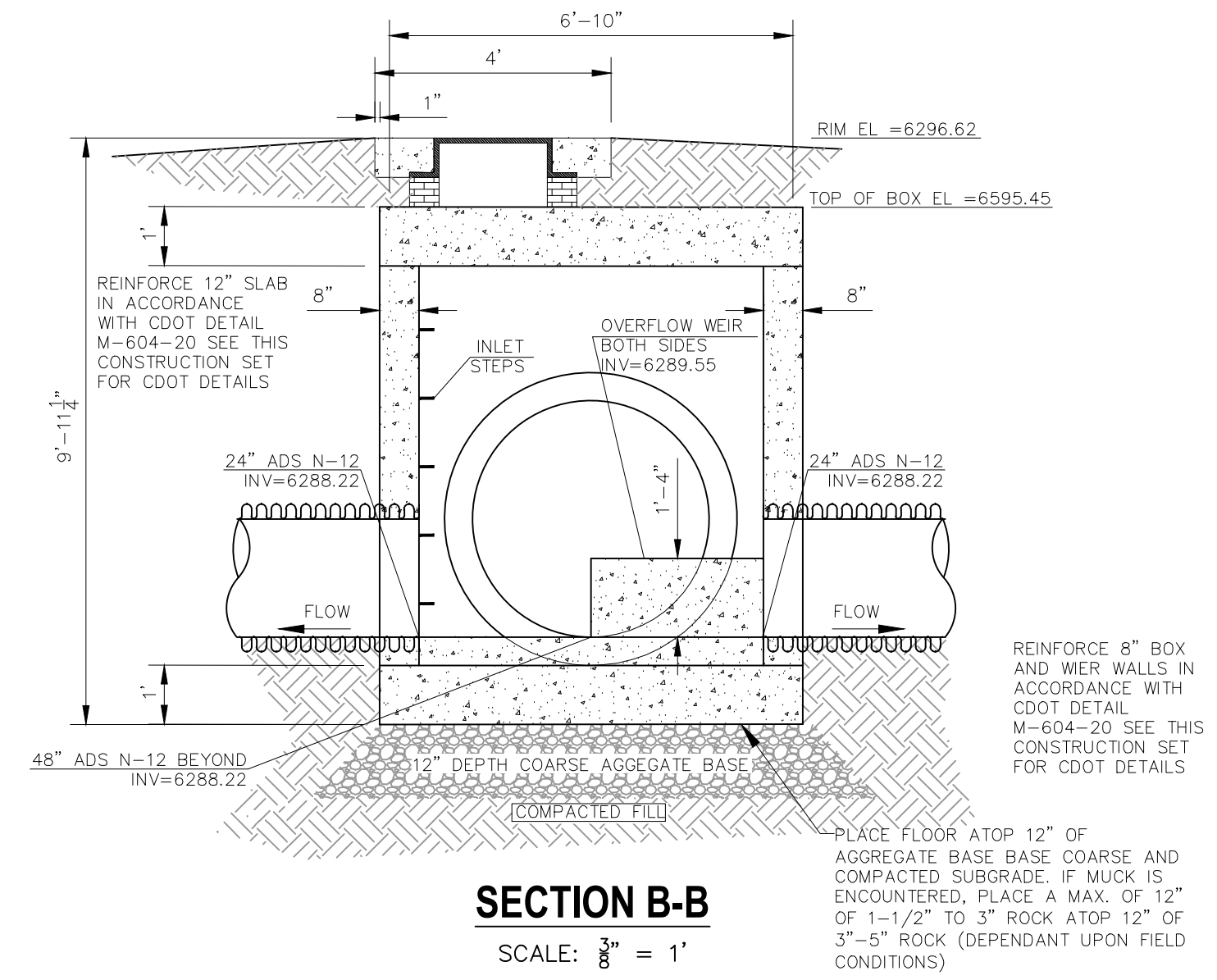
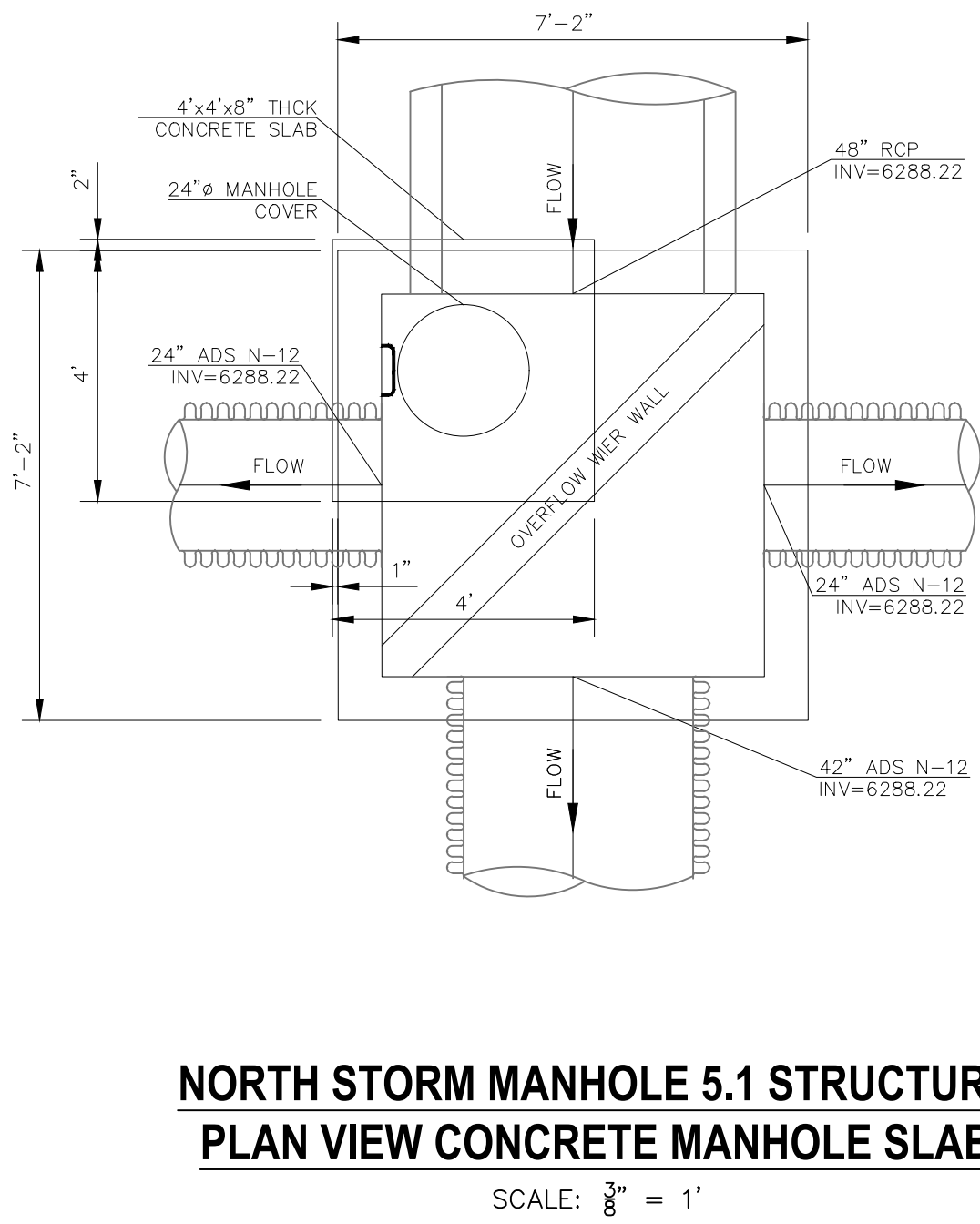
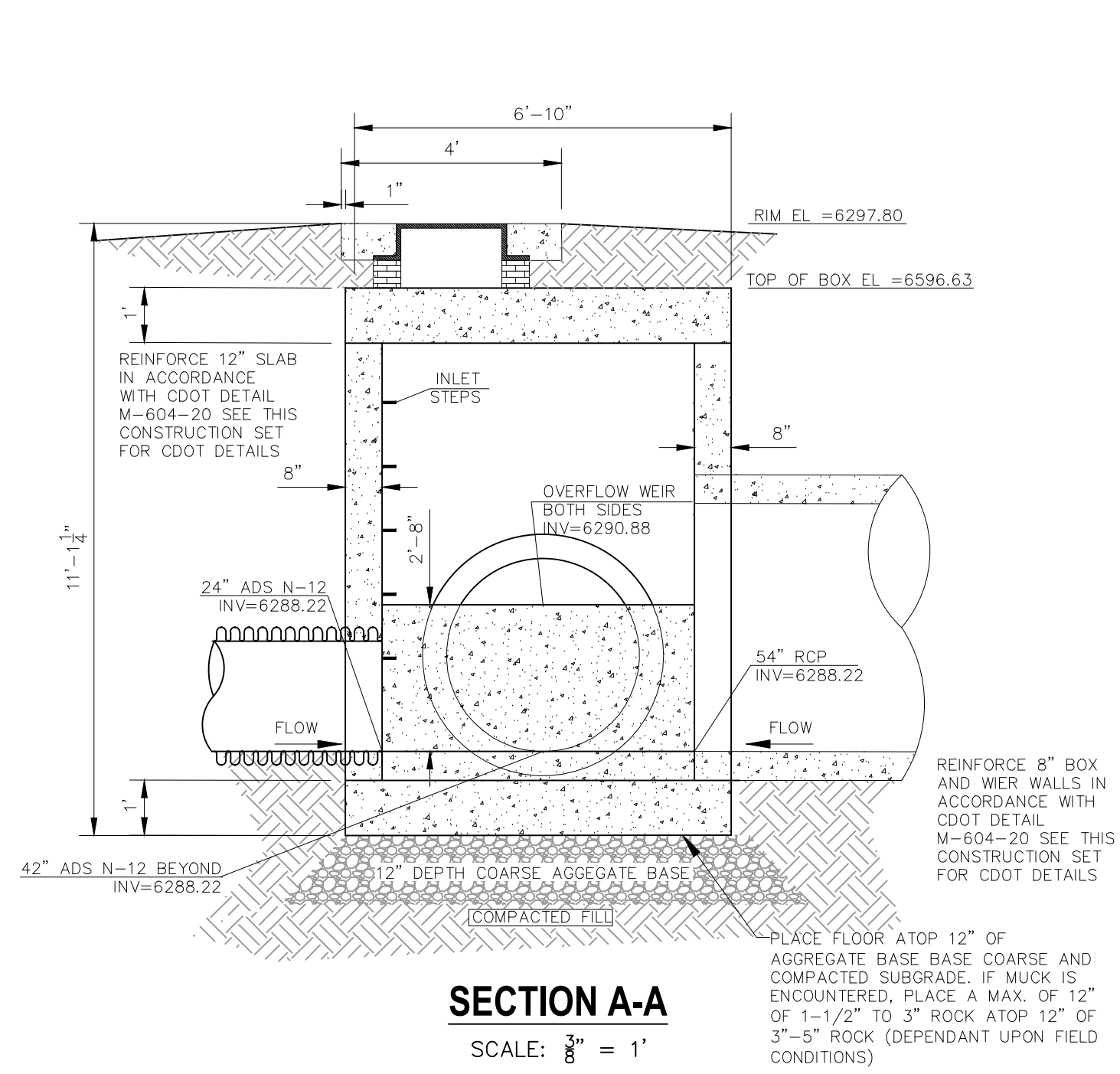


**RESTRICTOR PLATE**  
SCALE: 3/8" = 1'



**TRACT A POND 1 OUTLET STRUCTURE PLAN VIEW CONCRETE MANHOLE SLAB**  
SCALE: 3/8" = 1'

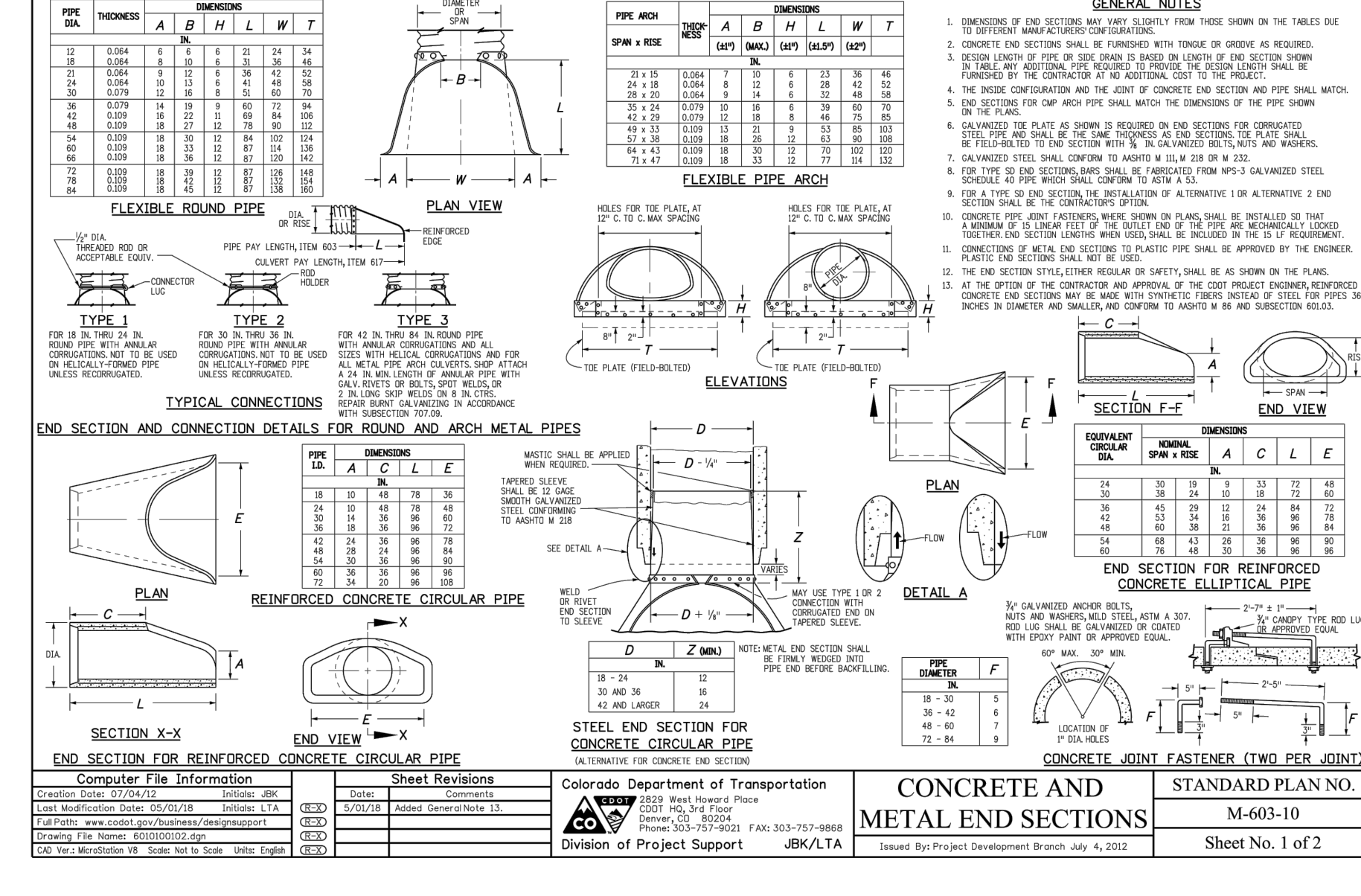
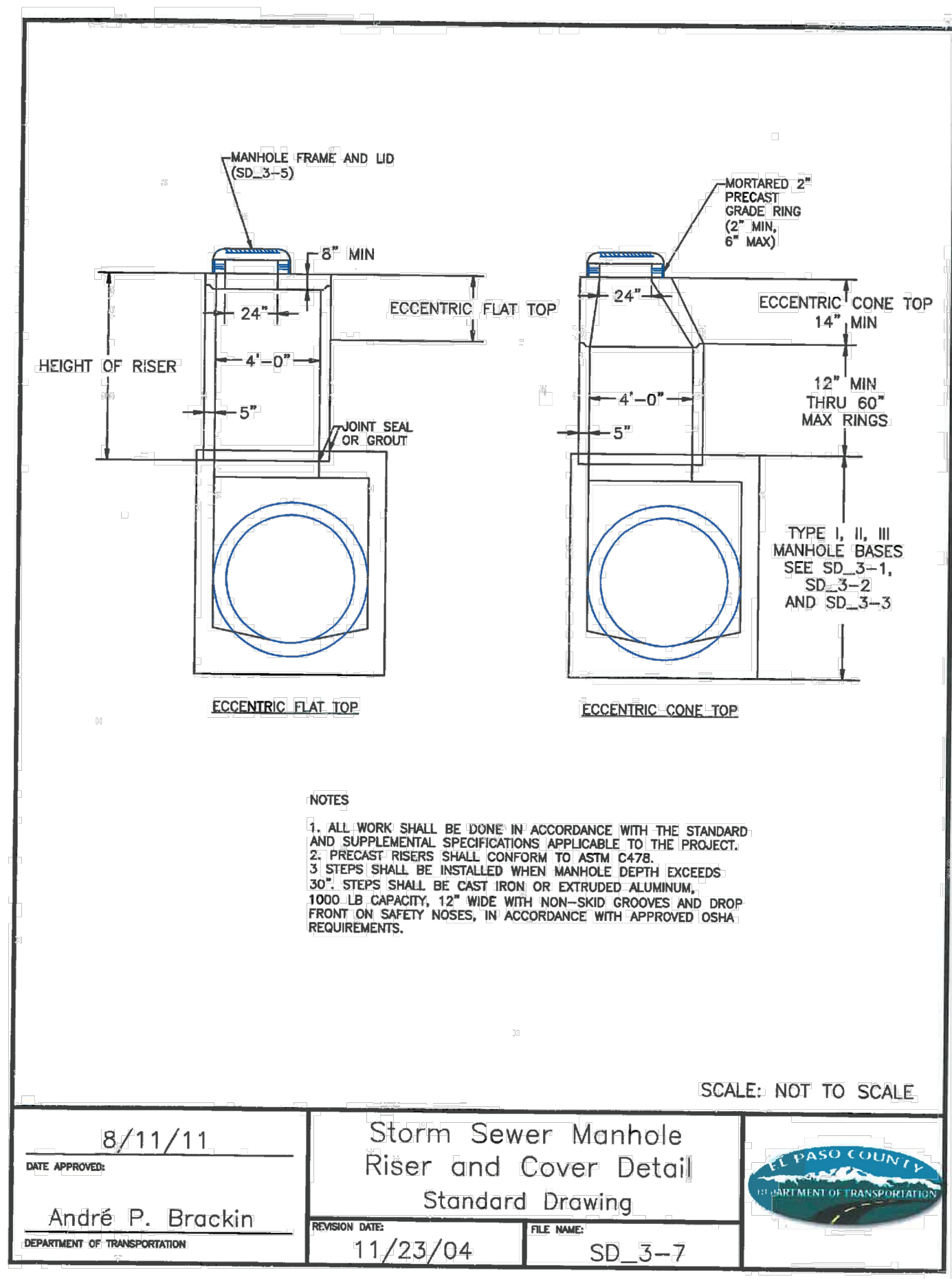
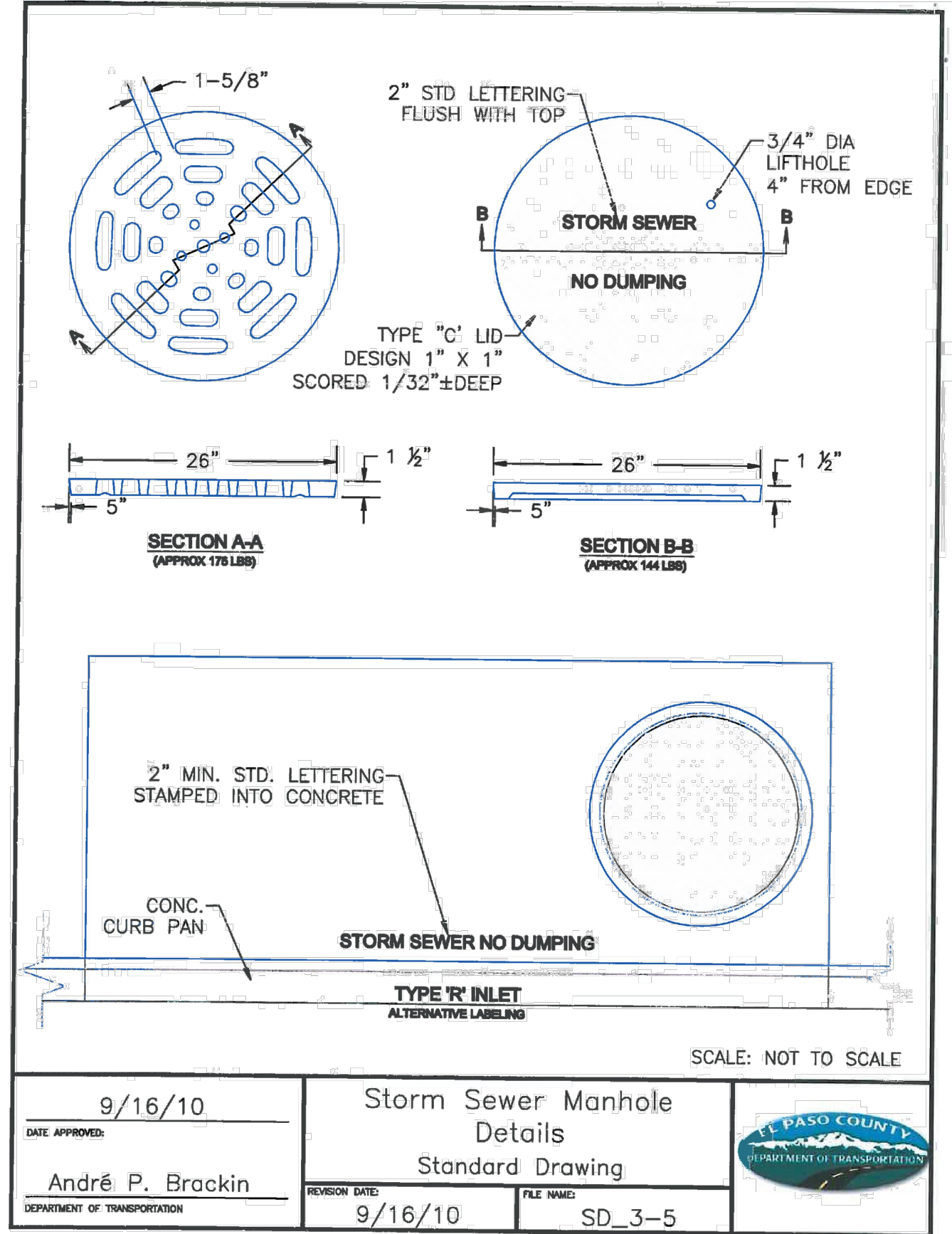
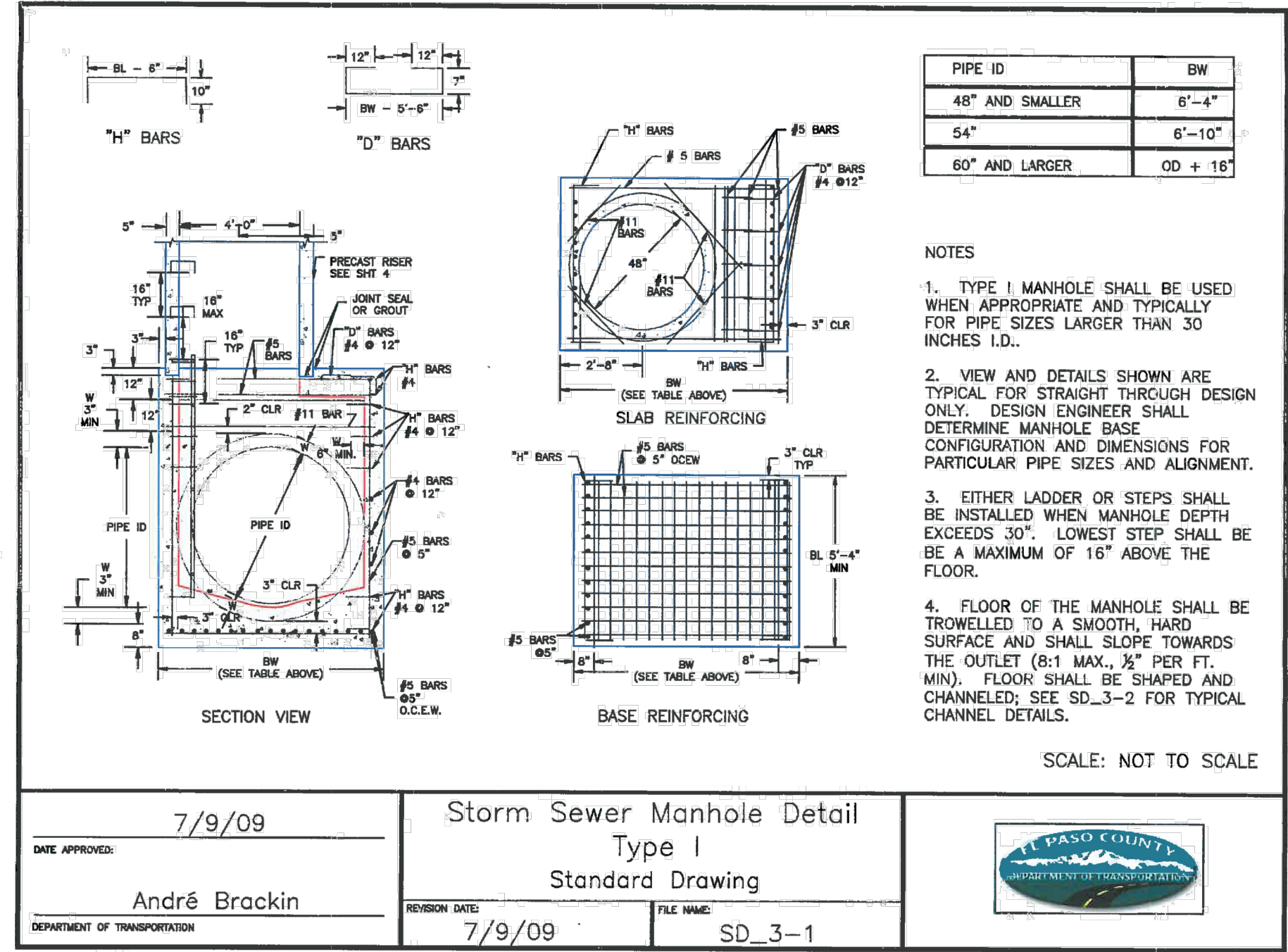
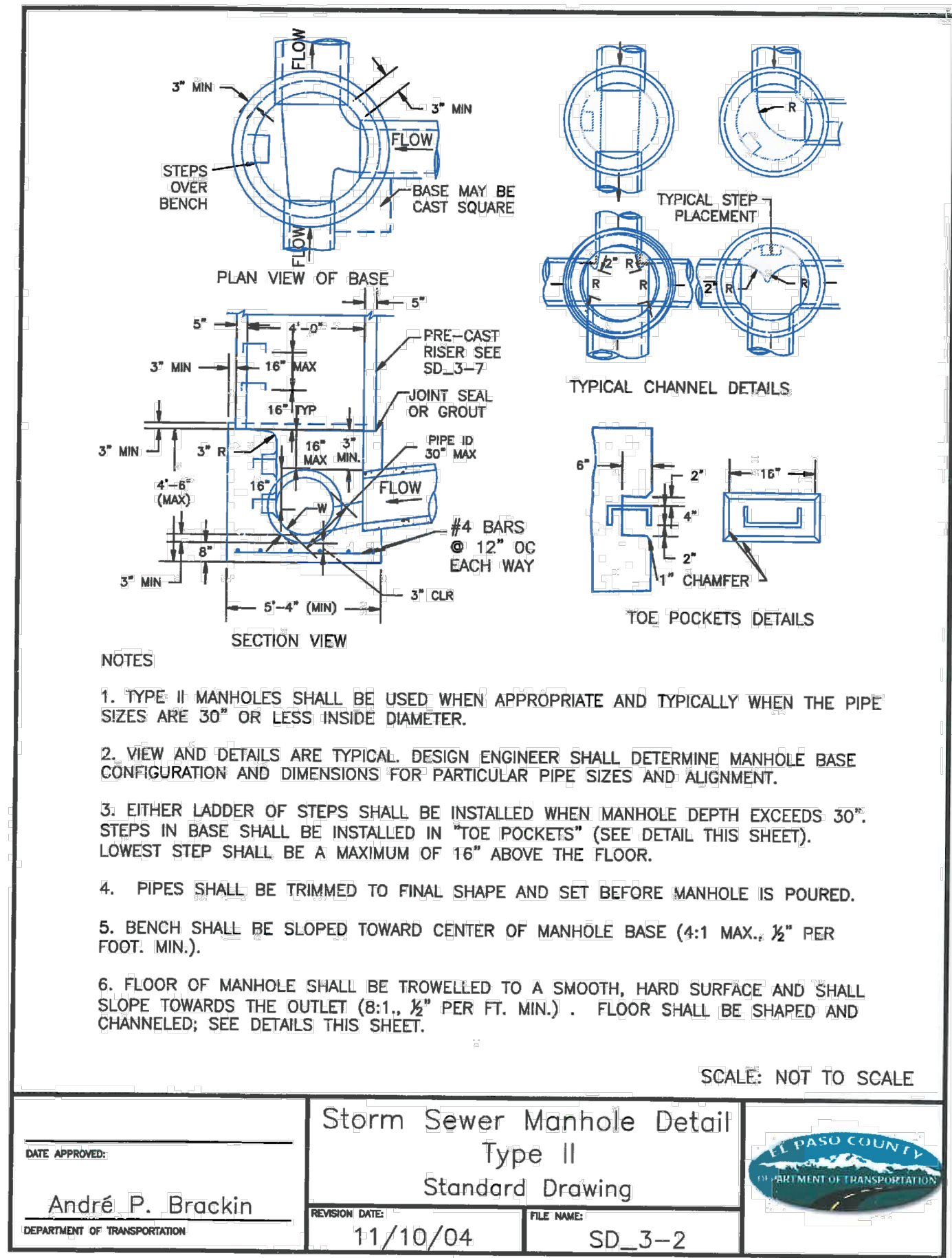
<b>CROSS ROAD MIXED USE FILING NO.1</b>		<b>OUTLET STRUCTURE/STORM PLANS</b>		DATE: 03-20-23	SHEET 5 OF 9	ST05
PROJECT NO. 18-003		SCALE: HORIZONTAL: 1"=50' VERTICAL: 1"=5'		DESIGNED BY: GT		TAU
212 N. WABATCH AVE, STE 305 COLORADO SPRINGS, CO 80903 PHONE: 719.555.5465		DRAWN BY: TAU		CHECKED BY: VAS		
<p style="text-align: center;"><b>WKS CIVIL CONSULTANTS, INC.</b></p>						
<p style="text-align: center;">FOR AND ON BEHALF OF WKS CIVIL CONSULTANTS, INC.</p>						
<p style="text-align: center;">VIRGIL A. SANCHEZ, COLORADO, P.E. NO. 371160</p>						
NO.	DATE	BY	DESCRIPTION	APPR'D. BY	DATE	
<p style="text-align: center;">THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARE OF THESE PLANS.</p>						
<p style="text-align: center;"><b>CAUTION</b></p>						



NO.	DATE	BY	DESCRIPTION

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CAUTION



**STORM SEWER GENERAL NOTES**

- ALL STATIONING IS ALONG STORM SEWER CENTERLINE UNLESS OTHERWISE INDICATED. ALL ELEVATIONS ARE INVERT UNLESS OTHERWISE INDICATED.
- ALL STORM SEWER BENDS, MANHOLES, AND WYES SHOWN ON THE PLANS SHALL BE PREFABRICATED. HORIZONTAL AND VERTICAL BENDS ARE INDICATED ON THE PLANS.
- ALL CONNECTIONS BETWEEN DISSIMILAR MATERIALS (I.E. HP STORM PIPE AND CONCRETE STRUCTURES), SHALL BE WATER TIGHT. REFER TO ADS WATERSTOP STRUCTURE CONNECTION DETAILS (SEE THIS CONSTRUCTION SET) FOR ADDITIONAL INFORMATION.
- THE CONTRACTOR SHOULD ATTEMPT TO LIMIT CONSTRUCTION TRAFFIC ATOP THE PROPOSED STORM SEWER INSTALLATION. AS PER THE MANUFACTURER'S RECOMMENDATIONS THE CONTRACTOR SHALL PROVIDE A MIN OF 12" OF COVER AT ALL TIMES ATOP THE BACKFILLED STORM SEWER TO TOP OF THE FINISHED GROUND OR BOTTOM OF FLEXIBLE PAVEMENT SURFACE TO PROTECT THE PIPE FROM H-25 VEHICULAR TRAFFIC. A MINIMUM OF 36" SHOULD BE PROVIDED TO PROTECT THE STORM SEWER FROM 30 T TO 60 T TRAFFIC AND MINIMUM OF 72" FOR TRAFFIC UP TO 78 T AXLE LOADS. FINAL GRADING SHOWN ON THE PLANS WILL PROHIBIT VEHICULAR TRAFFIC TO LOADS LESS THE H-25.
- REFER TO THE DETAIL IN THIS CONSTRUCTION SET FOR PIPE TRENCH DETAILS AND PIPE SPECIFICATION.

**STRUCTURAL CONCRETE NOTES:**

- ALL CONSTRUCTION INVOLVING THE PLACEMENT OF STRUCTURAL CONCRETE SHALL BE COMPLETED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, AND AS SUPPLEMENTED BY THE COLORADO DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROADWAY AND BRIDGE CONSTRUCTION.
- STEEL REINFORCING SHALL BE GRADE 60 FOR ALL REINFORCING STEEL GREATER THAN #4. SPLICING, LAP SPLICING SHALL BE MINIMUM IN THE FOLLOWING TABLE UNLESS OTHERWISE SPECIFIED:  

BAR SIZE	#4	#5	#6	#7	#8
SPLICE LENGTH	1'-9"	2'-2"	2'-7"	3'-4"	4'-3"

 ALL REINFORCING SHALL HAVE A 2-INCH MINIMUM COVER UNLESS OTHERWISE SPECIFIED.
- CAST-IN-PLACE CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f<sub>c</sub>) OF 4,000 PSI AT 28 DAYS. ALL CONCRETE PLACED AGAINST SOIL SHALL BE TYPE II PORTLAND CEMENT. ALL EXPOSED CORNERS SHALL BE FORMED WITH A 3/4" CHAMFER UNLESS OTHERWISE SPECIFIED.
- EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M-213.
- BACKFILL AGAINST STRUCTURES SHALL NOT COMMENCE UNTIL ALL SUPPORTING DIAPHRAGMS ARE IN PLACE AND CONCRETE HAS OBTAINED ITS FULL SEVEN DAY STRENGTH. BACKFILL SHALL BE PLACED EQUALLY ON EACH SIDE OF RETAINING WALL STRUCTURES AND CUTOFF WALLS UNTIL THE FINAL GRADE IS REACHED.
- FOOTING EXCAVATIONS SHALL BE EXAMINED BY THE GEOTECHNICAL ENGINEER WITH A 24-HOUR MINIMUM NOTIFICATION FOR SOIL AND/OR CONCRETE TESTING. PLACEMENT OF CONCRETE IN THE ABSENCE OF TESTING SHALL BE COMPLETED AT THE SOLE RISK OF THE CONTRACTOR.
- PRIOR TO THE PLACEMENT OF CONCRETE IN AREAS WHERE SOIL IS PRESENT, THE SOIL SHALL BE SCARIFIED TO A MINIMUM DEPTH OF 6-INCHES. THE MOISTURE CONTENT SHALL BE ADJUSTED TO WITHIN PLUS OR MINUS 2 PERCENT OF THE OPTIMUM MOISTURE CONTENT AND RECOMPACTED TO AT LEAST 95 PERCENT RELATIVE COMPACTION (AASHTO-T-180).

ABBREVIATIONS  
 EC -- EPOXY COATED O.F. -- OUTSIDE FACE E.F. -- EACH FACE E.W. -- EACH WAY I.F. -- INSIDE FACE N.F. -- NEAR FACE  
 T.O.C. -- TOP OF CONCRETE B.O.C. -- BOTTOM OF CONCRETE CONT. -- CONTINUOUS



**CROSS ROAD MIXED USE FILING NO. 1**

**STORM SEWER DETAILS**

PROJECT NO. 18-003  
 DATE: 03-20-23  
 SCALE: HORIZONTAL: NA VERTICAL: NA  
 DESIGNED BY: GT  
 DRAWN BY: TAU  
 CHECKED BY: VAS

ST07  
 SHEET 7 OF 9

2120 N. WARATCH AVE. STE 305  
 COLORADO SPRINGS CO 80903  
 PHONE: 719.955.5468

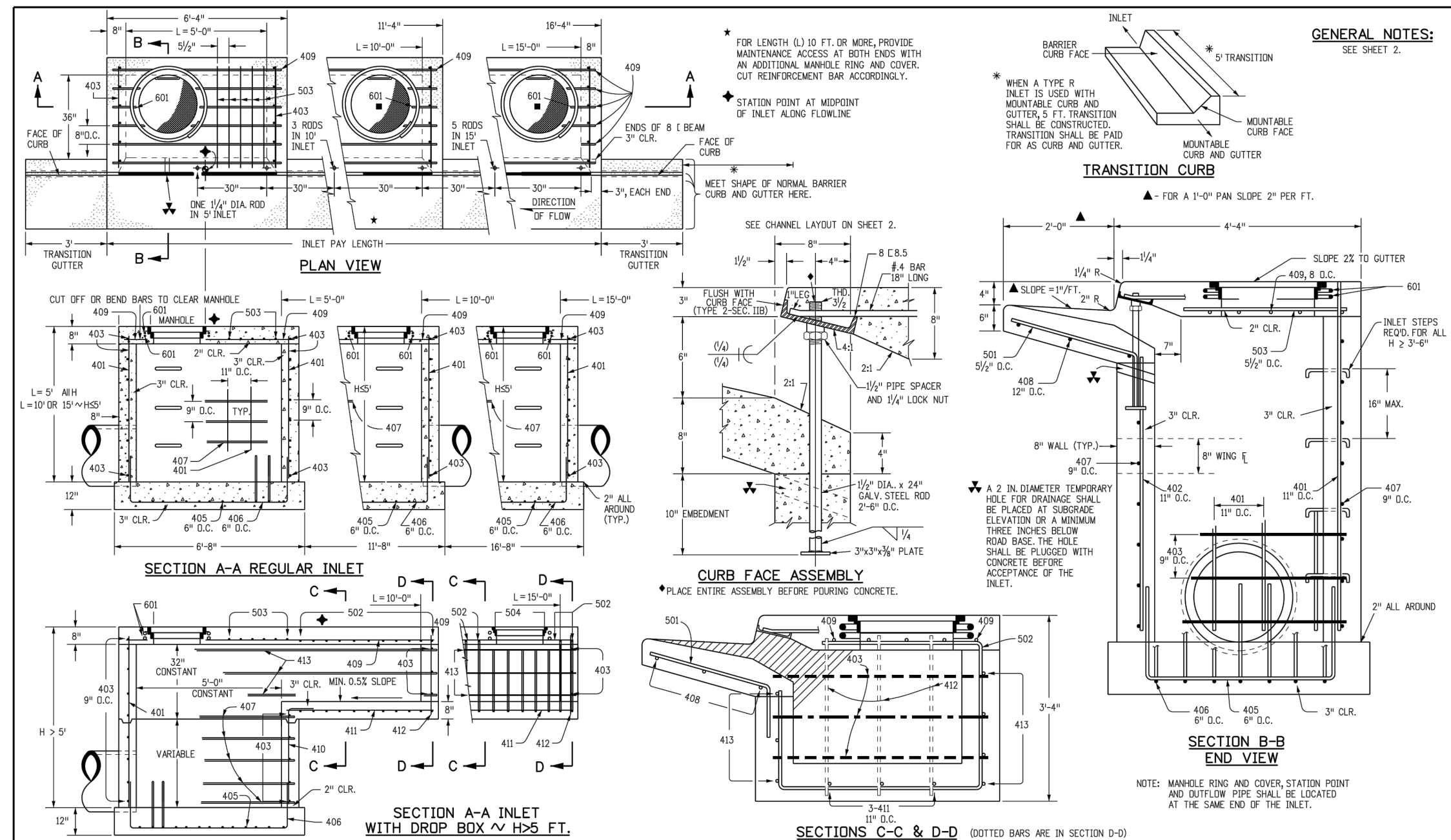
**CIVIL CONSULTANTS, INC.**

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 371160

FOR AND ON BEHALF OF  
 CIVIL CONSULTANTS, INC.

NO.	DATE	DESCRIPTION	APPROVED BY

CAUTION



<b>Computer File Information</b> Creation Date: 07/24/12 Initials: DD Last Modification Date: 07/24/12 Initials: LTA Full Path: \\www.coloradodot.org\business\designsupport Drawing File Name: 6040120102.dgn CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	<b>Sheet Revisions</b> Date: _____ Comments: _____ Date: _____ Comments: _____	<b>Colorado Department of Transportation</b> 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9820 Fax: (303) 757-9820	<b>CURB INLET TYPE R</b> STANDARD PLAN NO. M-604-12 Sheet No. 1 of 2
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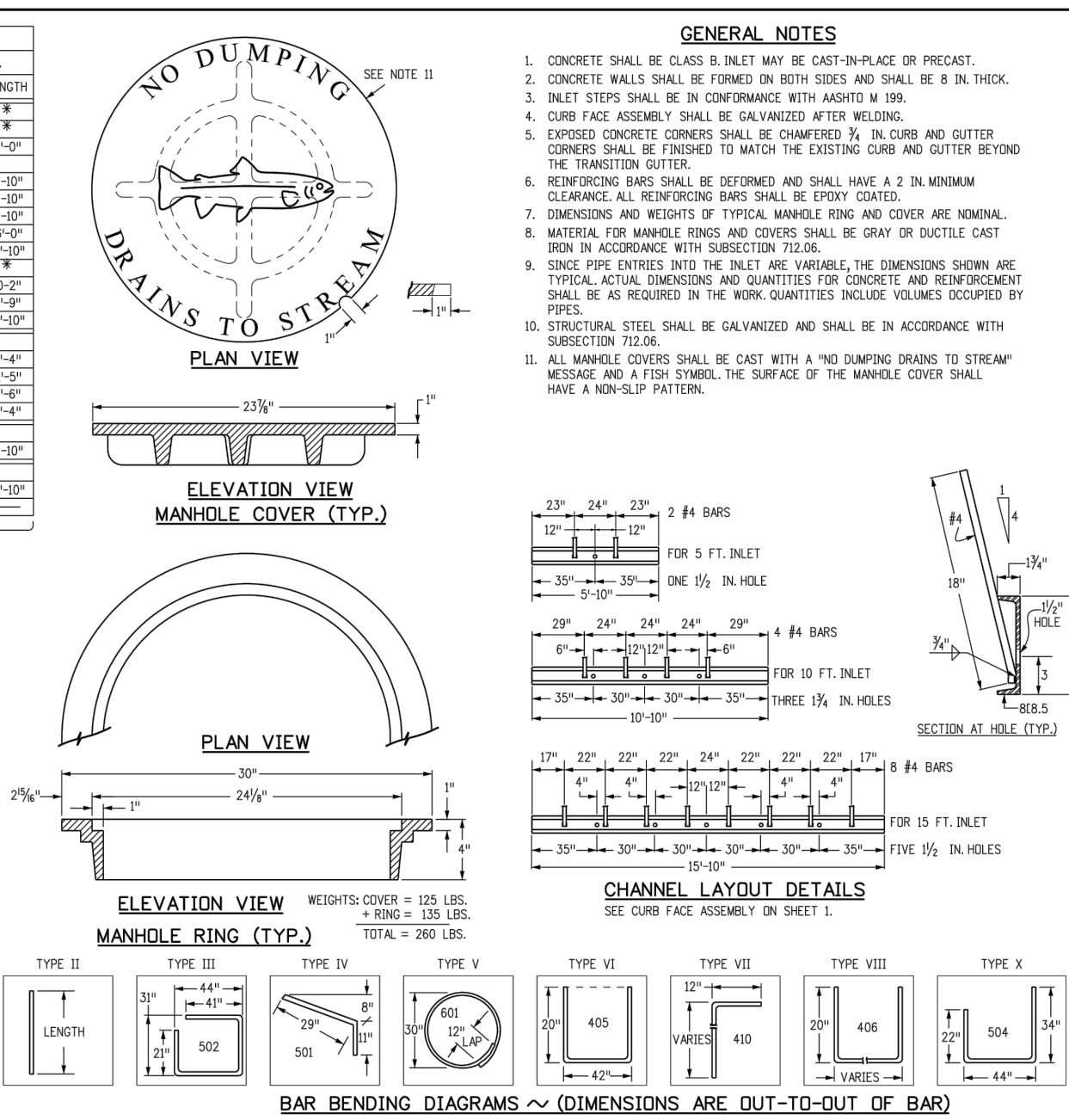
MARK	BAR # OR SIZE	D.C. SPACING	TYPE	INLETS H ≤ 5 FT.			INLETS H > 5 FT.		
				L = 5 FT.	L = 10 FT.	L = 15 FT.	L = 10 FT.	L = 15 FT.	L = 15 FT.
401	4	#4	II	15	21	28	11	17	23
402	4	#4	II	7	13	18	7	11	15
403	4	#4	II	#	4'-0"	#	4'-0"	#	4'-0"

**TABLE ONE ~ BAR LIST FOR CURB INLETS, TYPE "R"**

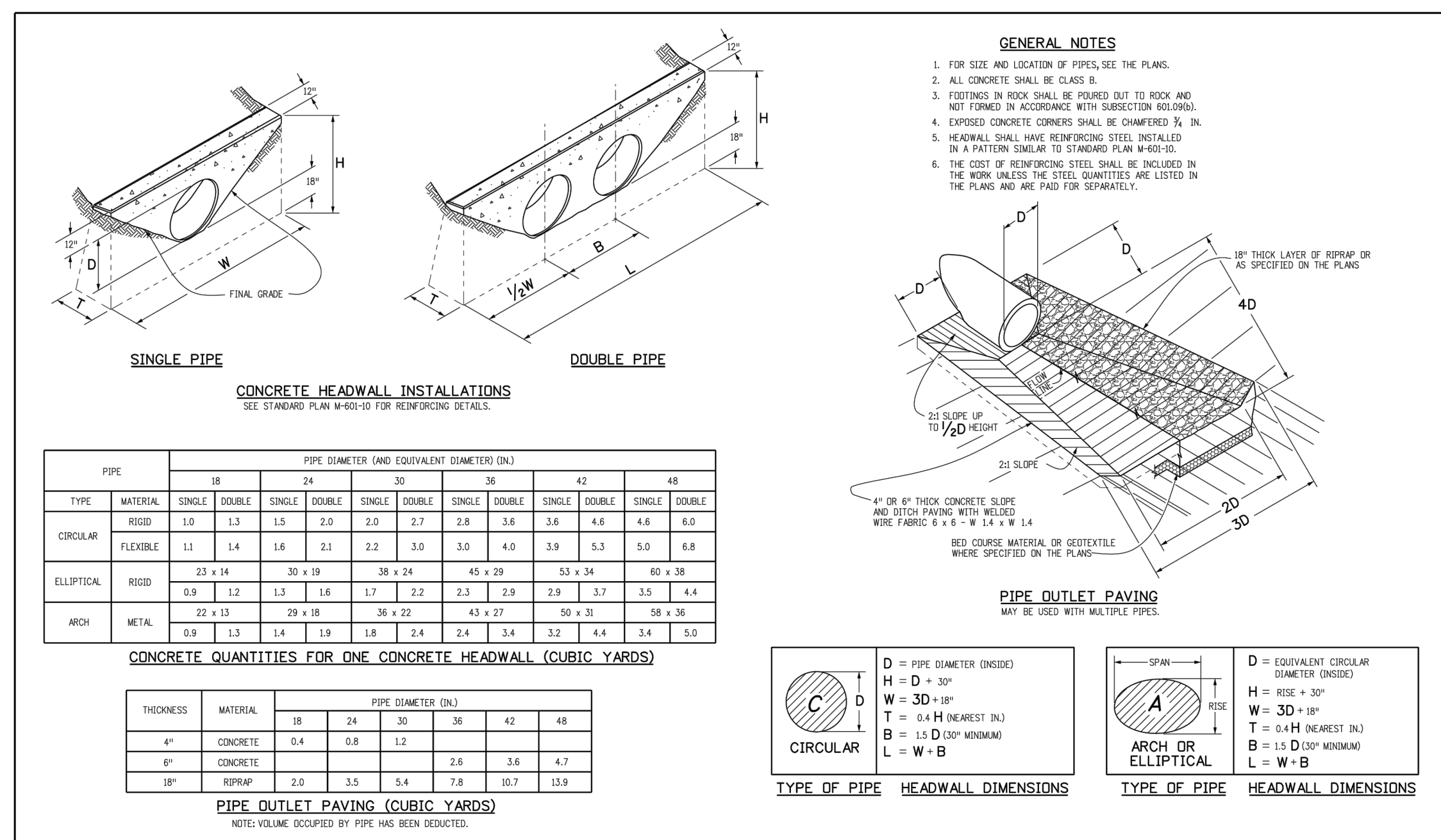
"H"	LENGTH	NO. REQD.		L = 5 FT.	L = 10 FT.	L = 15 FT.
		REGULAR	DROP BOX			
3'-0"	2'-8"	10	7	3.2	2.85	5.3
3'-6"	3'-2"	10	7	3.4	3.0	5.7
4'-0"	3'-8"	12	9	3.7	3.26	6.0
4'-6"	4'-2"	12	9	3.8	3.54	6.4
5'-0"	4'-8"	14	11	4.1	3.84	6.7
5'-6"	5'-2"	16	13	4.4	4.15	7.0
6'-0"	5'-8"	18	15	4.6	4.47	7.3
6'-6"	6'-2"	18	15	4.8	4.80	7.6
7'-0"	6'-8"	20	17	5.0	5.13	7.9
7'-6"	7'-2"	20	17	5.2	5.47	8.2
8'-0"	7'-8"	22	19	5.5	5.81	8.5
8'-6"	8'-2"	24	21	5.7	6.15	8.7
9'-0"	8'-8"	24	21	6.0	6.49	9.0
9'-6"	9'-2"	26	23	6.2	6.83	9.2
10'-0"	9'-8"	28	25	6.4	7.17	9.4
10'-6"	10'-2"	28	25	6.7	7.51	9.7
11'-0"	10'-8"	30	27	6.9	7.85	9.9

**TABLE TWO ~ BARS AND QUANTITIES VARIABLE WITH "H"**

NO. REQD.	NO. REQD.	NO. REQD.	NO. REQD.	NO. REQD.
403	407	403	407	403



<b>Computer File Information</b> Creation Date: 07/24/12 Initials: DD Last Modification Date: 07/24/12 Initials: LTA Full Path: \\www.coloradodot.org\business\designsupport Drawing File Name: 6040120202.dgn CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	<b>Sheet Revisions</b> Date: _____ Comments: _____ Date: _____ Comments: _____	<b>Colorado Department of Transportation</b> 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9820 Fax: (303) 757-9820	<b>CURB INLET TYPE R</b> STANDARD PLAN NO. M-604-12 Sheet No. 2 of 2
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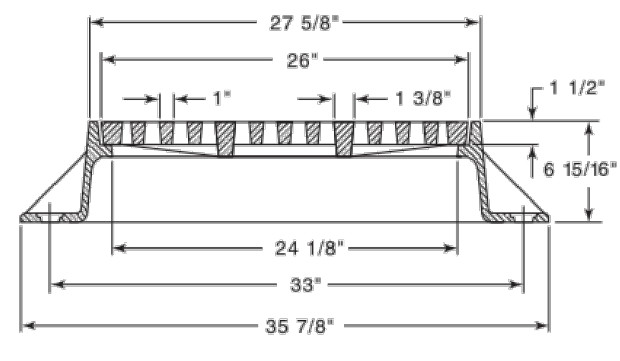


<b>Computer File Information</b> Creation Date: 07/24/12 Initials: DD Last Modification Date: 07/24/12 Initials: LTA Full Path: \\www.coloradodot.org\business\designsupport Drawing File Name: 6010120102.dgn CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	<b>Sheet Revisions</b> Date: _____ Comments: _____ Date: _____ Comments: _____	<b>Colorado Department of Transportation</b> 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9820 Fax: (303) 757-9820	<b>HEADWALLS AND PIPE OUTLET PAVING</b> STANDARD PLAN NO. M-601-12 Sheet No. 1 of 1
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**R-2501 Inlet Frame, Grate**

**Heavy Duty**

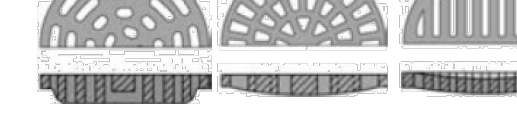
CATALOG NUMBER	GRATE TYPE	SQ. FT. OPEN	WEIR PERMETER LINEAL FEET
R-2501	G	1.1	8.8
R-2501	A	1.1	8.8
R-2501	C	1.2	8.8
R-2501	F	1.4	8.8



Furnished with four 1" anchor holes on 33" diameter bolt circle.

Standard Grates (shown): Type G

Alternate Grates:



Available Lid: R-1642

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

**CROSS ROAD MIXED USE FILING NO. 1**

**STORM SEWER DETAILS**

PROJECT NO. 18-003

DATE: 03-20-23

SCALE: HORIZONTAL: NA VERTICAL: NA

DESIGNED BY: GT DRAWN BY: TAU CHECKED BY: VAS

SHEET 8 OF 9

ST08

212 N. WABATCH AVE, STE 305  
COLORADO SPRINGS, CO 80903  
PHONE: 719.555.5465

**CIVIL CONSULTANTS, INC.**

VIRGIL A. SANCHEZ, COLORADO P.E. NO. 371160

FOR AND ON BEHALF OF CIVIL CONSULTANTS, INC.

REVISIONS: NO. DATE: BY: DESCRIPTION: APPROVED BY: DATE:

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CAUTION

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

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

CROSS ROAD MIXED USE FILING NO. 1

OUTFALL STRUCTURE/STORM SEWER DETAILS


PROJECT NO. 18-003 DATE: 03-20-23

SCALE: HORIZONTAL: NA VERTICAL: NA

DESIGNED BY: GT DRAWN BY: TAU CHECKED BY: VAS

SHEET 9 OF 9 ST09

212 N. WABATCH AVE, STE 305  
COLORADO SPRINGS, CO 80903  
PHONE: 719.955.5465



CIVIL CONSULTANTS, INC.

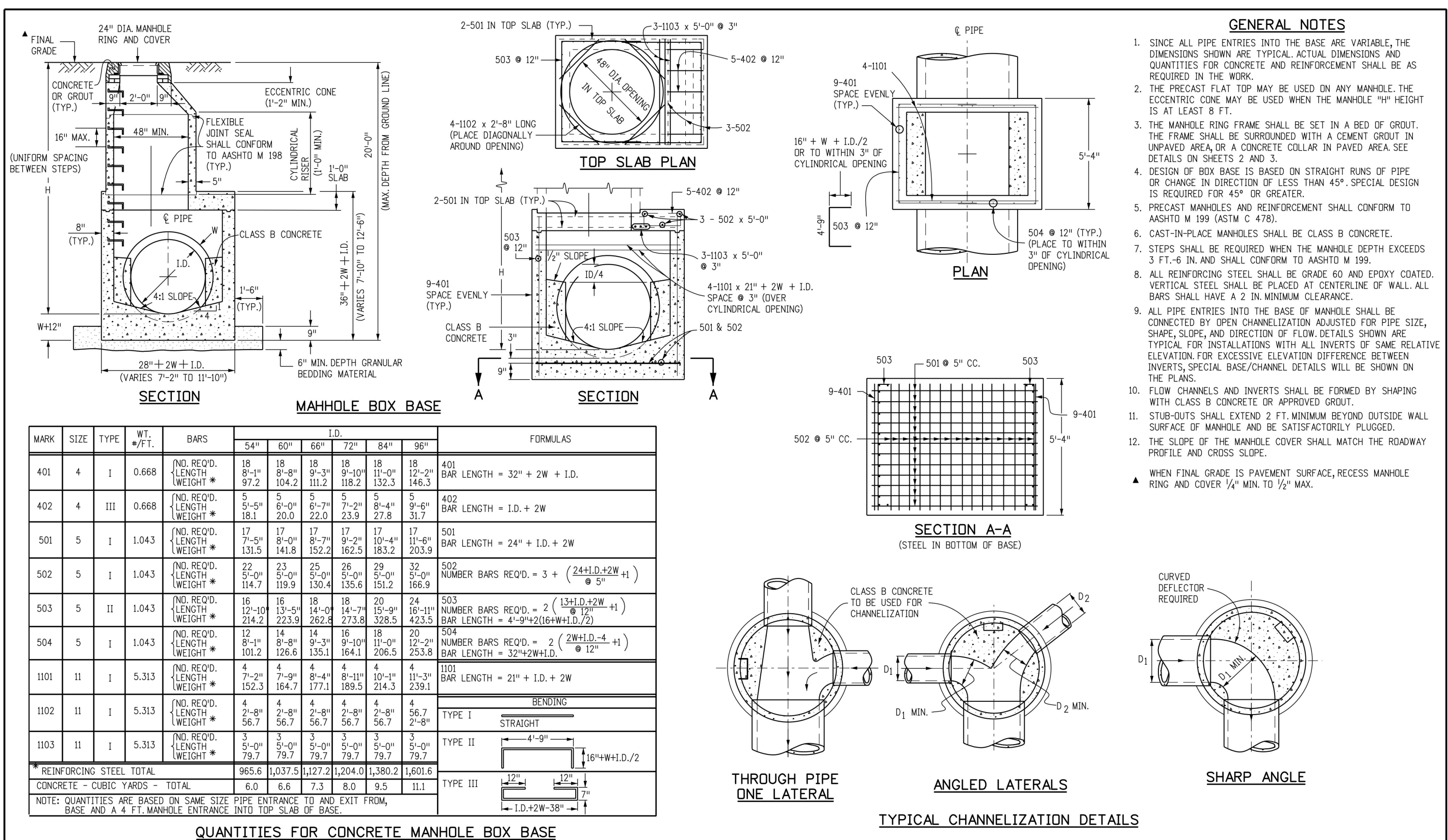
VIRGIL A. SANCHEZ, COLORADO, P.E. NO. 371160

FOR AND ON BEHALF OF  
MKS CIVIL CONSULTANTS, INC.

REV. NO.	DATE	BY	DESCRIPTION

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARE OF THESE PLANS.

CAUTION



**GENERAL NOTES**

- SINCE ALL PIPE ENTRIES INTO THE BASE ARE VARIABLE, THE DIMENSIONS SHOWN ARE TYPICAL. ACTUAL DIMENSIONS AND QUANTITIES FOR CONCRETE AND REINFORCEMENT SHALL BE AS REQUIRED IN THE WORK.
- THE PRECAST FLAT TOP MAY BE USED IN ANY MANHOLE. THE ECCENTRIC CONE MAY BE USED WHEN THE MANHOLE "H" HEIGHT IS AT LEAST 8 FT.
- THE MANHOLE RING FRAME SHALL BE SET IN A BED OF GROUT. THE FRAME SHALL BE SURROUNDED WITH A CEMENT GROUT IN UNPAVED AREA, OR A CONCRETE COLLAR IN PAVED AREA. SEE DETAILS ON SHEETS 2 AND 3.
- DESIGN OF BOX BASE IS BASED ON STRAIGHT RUNS OF PIPE OR CHANGE IN DIRECTION OF LESS THAN 45°. SPECIAL DESIGN IS REQUIRED FOR 45° OR GREATER.
- PRECAST MANHOLES AND REINFORCEMENT SHALL CONFORM TO AASHTO M 199 (ASTM C 478).
- CAST-IN-PLACE MANHOLES SHALL BE CLASS B CONCRETE.
- STEPS SHALL BE REQUIRED WHEN THE MANHOLE DEPTH EXCEEDS 3 FT. 6 IN. AND SHALL CONFORM TO AASHTO M 199.
- ALL REINFORCING STEEL SHALL BE GRADE 60 AND EPOXY COATED. VERTICAL STEEL SHALL BE PLACED AT CENTERLINE OF WALL. ALL BARS SHALL HAVE A 2 IN. MINIMUM CLEARANCE.
- ALL PIPE ENTRIES INTO THE BASE OF MANHOLE SHALL BE CONNECTED BY OPEN CHANNELIZATION ADJUSTED FOR PIPE SIZE, SHAPE, SLOPE, AND DIRECTION OF FLOW. DETAILS SHOWN ARE TYPICAL FOR INSTALLATIONS WITH ALL INVERTS OF SAME RELATIVE ELEVATION. FOR EXCESSIVE ELEVATION DIFFERENCE BETWEEN INVERTS, SPECIAL BASE/CHANNEL DETAILS WILL BE SHOWN ON THE PLANS.
- FLOW CHANNELS AND INVERTS SHALL BE FORMED BY SHAPING WITH CLASS B CONCRETE OR APPROVED GROUT.
- STUB-OUTS SHALL EXTEND 2 FT. MINIMUM BEYOND OUTSIDE WALL SURFACE OF MANHOLE AND BE SATISFACTORILY PLUGGED.
- THE SLOPE OF THE MANHOLE COVER SHALL MATCH THE ROADWAY PROFILE AND CROSS SLOPE.

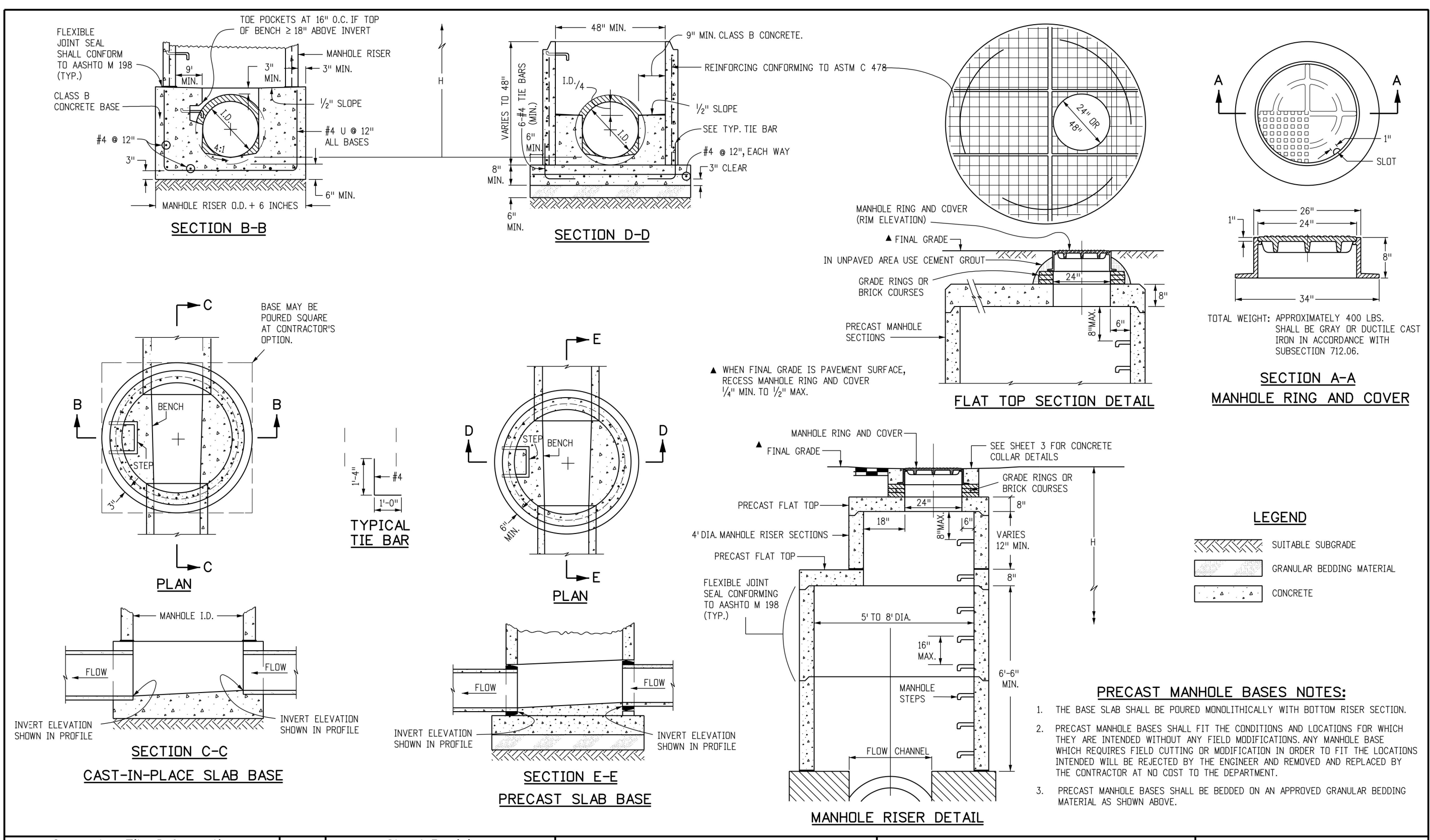
▲ WHEN FINAL GRADE IS PAVEMENT SURFACE, RECESS MANHOLE RING AND COVER 1/4" MIN. TO 1/2" MAX.

**QUANTITIES FOR CONCRETE MANHOLE BOX BASE**

MARK	SIZE	TYPE	WT. #/FT.	FORMULAS
401	4	I	0.668	401 BAR LENGTH = 32" + 2W + 1.0.
402	4	III	0.668	402 BAR LENGTH = I.D. + 2W
501	5	I	1.043	501 BAR LENGTH = 24" + I.D. + 2W
502	5	I	1.043	502 NUMBER BARS REQ'D. = 3 + (24(I.D.+2W) / 5)
503	5	II	1.043	503 NUMBER BARS REQ'D. = 2 (13(I.D.+2W) / 5)
504	5	I	1.043	504 NUMBER BARS REQ'D. = 2 (2W(I.D.+1) / 12)
1101	11	I	5.313	1101 BAR LENGTH = 21" + I.D. + 2W
1102	11	I	5.313	TYPE I STRAIGHT
1103	11	I	5.313	TYPE II BENDING
* REINFORCING STEEL TOTAL				1,601.6
CONCRETE - CUBIC YARDS - TOTAL				1,601.6

NOTE: QUANTITIES ARE BASED ON SAME SIZE PIPE ENTRANCE TO AND EXIT FROM, BASE AND A 4 FT. MANHOLE ENTRANCE INTO TOP SLAB OF BASE.

Computer File Information		Sheet Revisions		Colorado Department of Transportation		STANDARD PLAN NO.	
Creation Date: 07/31/19	Designer Initials: JBK	Date:	Comments:	2829 West Howard Place	CDOT HO, 3rd Floor	M-604-20	
Last Modification Date: 07/31/19	Detailer Initials: LTA			Denver, CO 80204	Phone: 303-757-9021 FAX: 303-757-9868	Standard Sheet No. 1 of 3	
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English		Project Development Branch	JBK	Project Sheet Number:	



**PRECAST MANHOLE BASES NOTES:**

- THE BASE SLAB SHALL BE POURED MONOLITHICALLY WITH BOTTOM RISER SECTION.
- PRECAST MANHOLE BASES SHALL FIT THE CONDITIONS AND LOCATIONS FOR WHICH THEY ARE INTENDED WITHOUT ANY FIELD MODIFICATIONS. ANY MANHOLE BASE WHICH REQUIRES FIELD CUTTING OR MODIFICATION IN ORDER TO FIT THE LOCATIONS INTENDED WILL BE REJECTED BY THE ENGINEER AND REMOVED AND REPLACED BY THE CONTRACTOR AT NO COST TO THE DEPARTMENT.
- PRECAST MANHOLE BASES SHALL BE BEDDED ON AN APPROVED GRANULAR BEDDING MATERIAL AS SHOWN ABOVE.

**LEGEND**

- SUITABLE SUBGRADE
- GRANULAR BEDDING MATERIAL
- CONCRETE

Computer File Information		Sheet Revisions		Colorado Department of Transportation		STANDARD PLAN NO.	
Creation Date: 07/31/19	Designer Initials: JBK	Date:	Comments:	2829 West Howard Place	CDOT HO, 3rd Floor	M-604-20	
Last Modification Date: 07/31/19	Detailer Initials: LTA			Denver, CO 80204	Phone: 303-757-9021 FAX: 303-757-9868	Standard Sheet No. 2 of 3	
CAD Ver.: MicroStation V8	Scale: Not to Scale	Units: English		Project Development Branch	JBK	Project Sheet Number:	

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	JEROME MAGSINO 303-349-7555 JEROME.MAGSINO@ADSPIPE.COM
ADS SALES REP:	AARON ZEE 303-548-3479 AARON.ZEE@ADSPIPE.COM
PROJECT NO:	S295850



# CROSSROADS MIXED USE FILING NO. 1

## COLORADO SPRINGS, CO

### MC-7200 STORMTECH CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH MC-7200.
- CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
  - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
  - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
  - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

**IMPORTANT - THIS PROJECT REQUIRES COMPACTION OF EMBEDMENT STONE AND REQUIREMENTS FOR STONE HARDNESS AND SHAPE WHICH ARE NOT SPECIFIED IN OTHER STORMTECH DOCUMENTS. CONTRACTORS MUST FOLLOW THE SPECIAL PROVISIONS IN THIS PLAN SET.**

### IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-7200 CHAMBER SYSTEM

- STORMTECH MC-7200 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
- STORMTECH MC-7200 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
- CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
  - STONESHOOTER LOCATED OFF THE CHAMBER BED.
  - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
  - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
- THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
- JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
- MAINTAIN MINIMUM - 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
- INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
- EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
- STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 12" (300 mm) BETWEEN ADJACENT CHAMBER ROWS.
- STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
- THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
- ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

### NOTES FOR CONSTRUCTION EQUIPMENT

- STORMTECH MC-7200 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
- THE USE OF EQUIPMENT OVER MC-7200 CHAMBERS IS LIMITED:
  - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
  - NO RUBBER Tired LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
  - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
- FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

**USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.**

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

**CONCEPTUAL LAYOUT**

731	STORMTECH MC-7200 CHAMBERS
44	STORMTECH MC-7200 END CAPS
12	STONE ABOVE (in)
36	STONE BELOW (in)
40	% STONE VOID
<b>206,903</b>	<b>INSTALLED SYSTEM VOLUME (CF) ABOVE ELEVATION 6287.47 (PERIMETER STONE INCLUDED)</b>
47670	SYSTEM AREA (ft <sup>2</sup> )
1006	SYSTEM PERIMETER (ft)

**CONCEPTUAL ELEVATIONS**

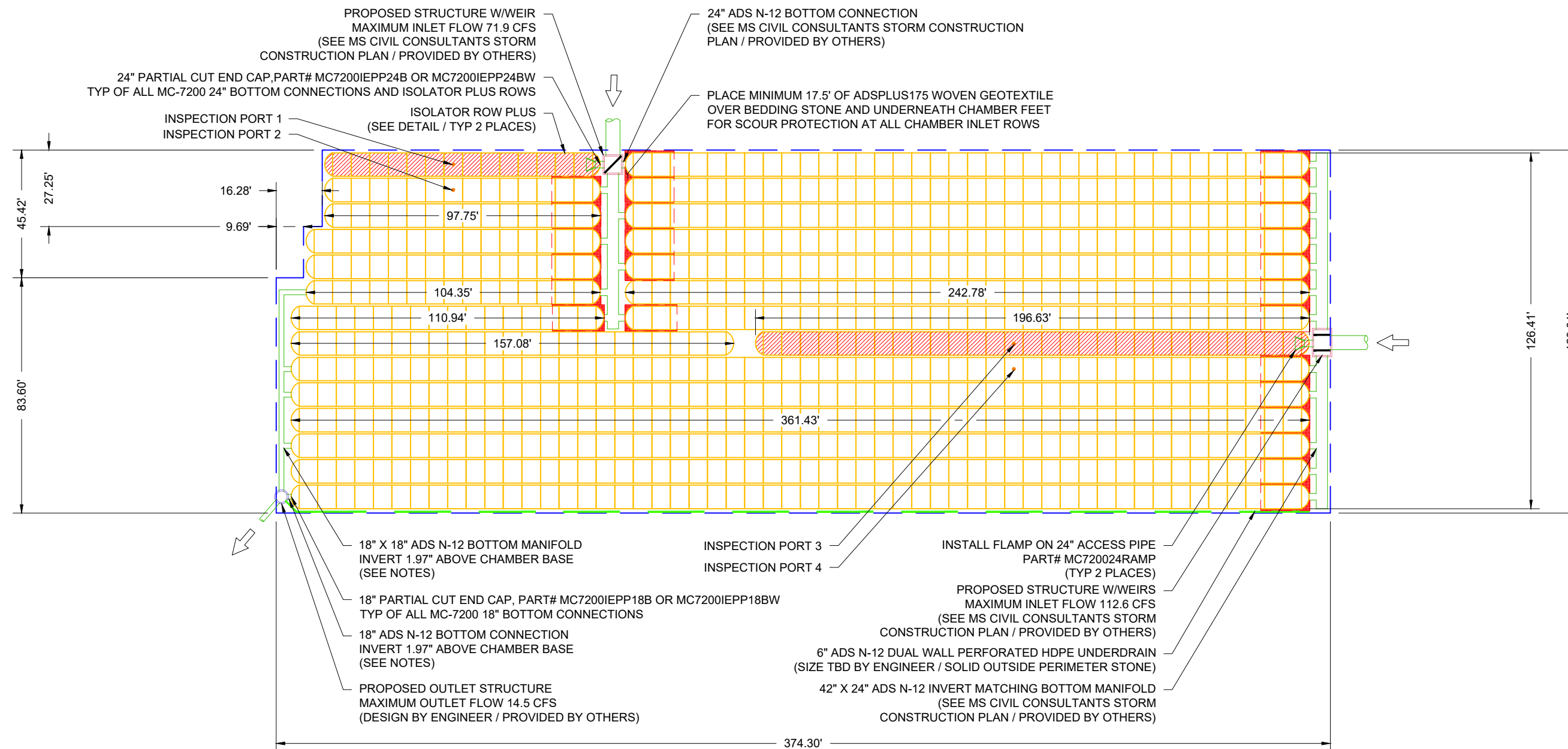
6300.52±	MAXIMUM GRADE PER ENGINEER'S PLAN
6297.72	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC)
6297.22	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC)
6297.22	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT)
6297.22	MINIMUM ALLOWABLE GRADE (TOP OF RIGID PAVEMENT)
6296.22	TOP OF STONE
6295.22	TOP OF MC-7200 CHAMBER
6290.41	42" X 24" MANIFOLD INVERT
6290.41	24" ISOLATOR ROW PLUS CONNECTION INVERT
6290.41	24" BOTTOM CONNECTION
6290.38	18" BOTTOM MANIFOLD / CONNECTION INVERT
6290.22	BOTTOM OF MC-7200 CHAMBER
6289.47	UNDERDRAIN INVERT
6287.22	BOTTOM OF STONE

**NOTES**

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECHNICAL NOTE 6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

**TIER 1 DEEP COVER SPECIAL PROVISIONS**

- INSTALLATION REQUIREMENTS SHALL BE AS SPECIFIED IN THE STORMTECH DESIGN MANUALS AND CONSTRUCTION GUIDES EXCEPT AS MODIFIED IN THESE SPECIAL PROVISIONS.
- ATTENTION IS CALLED TO "TABLE 1 - ACCEPTABLE FILL MATERIALS" IN THE STORMTECH CONSTRUCTION GUIDE AND ALL OTHER APPEARANCES OF THE "ACCEPTABLE FILL MATERIALS TABLE. FOR AREAS OF THE SYSTEM WITH COVER ABOVE 7 FEET (2.1 m) FOR THE MC-4500/MC-7200 AND ABOVE 8 FEET (2.4 m) FOR THE MC-3500, EMBEDMENT STONE SHALL BE COMPACTED WITH 1-3 PASSES OF A WALK BEHIND VIBRATORY PLATE COMPACTOR OR JUMPING JACK IN 12-18" (300-450 mm) LIFTS.
- STONE SHALL BE CLEAN, CRUSHED, AND ANGULAR AND SHALL CONFORM TO THE SPECIFICATIONS DESIGNATED IN THE ACCEPTABLE FILL MATERIALS TABLE.
- STONE SHALL BE HARD AND DURABLE. IT IS THE ENGINEER'S OR CONTRACTOR'S RESPONSIBILITY TO SELECT HARD AND DURABLE STONE. STORMTECH CONSIDERS AN LA ABRASION VALUE OF LESS THAN OR EQUAL TO 30 TO BE HARD STONE.
- FOUNDATION STONE SHALL BE MECHANICALLY COMPACTED WITH A VIBRATORY ROLLER OR VIBRATORY PLATE IN 6" (152 mm) LIFTS.
- EMBEDMENT STONE MUST BE DUMPED IN PLACE BY A STONE SHOOTER OR CONVEYOR OR EXCAVATOR.
- INSPECTION DURING THE INSTALLATION BY THE ENGINEER, OWNER OR OTHER REPRESENTATIVE IS RECOMMENDED. THE INSPECTION SHALL INCLUDE OBSERVATIONS OF THE CHAMBER SYMMETRY DURING BACKFILLING TO ENSURE THE CONTRACTOR'S METHODS ARE NOT CAUSING UNACCEPTABLE DISTORTION OF THE CHAMBERS.
- AN ADS FIELD TECHNICIAN WILL CONDUCT A PRE-CONSTRUCTION MEETING TO TRAIN REPRESENTATIVES INSTALLING THE CHAMBERS AND THOSE WHO MAY BE PERFORMING INSTALLATION INSPECTIONS.



CROSSROADS MIXED USE  
 FILING NO. 1  
 COLORADO SPRINGS, CO  
 DATE: 05-05-22  
 DRAWN: TSG  
 PROJECT #: S295850  
 CHECKED: CTS

DATE	DESCRIPTION
03/17/23	MWH REVISED PER COMMENTS, TIER 1
12-18-22	RKC JKL UPDATED ELEVATIONS
12/13/22	BMW JPR ELEVATION AND LAYOUT ADJUSTMENTS
	DRWN CHKD

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80'  
 40'  
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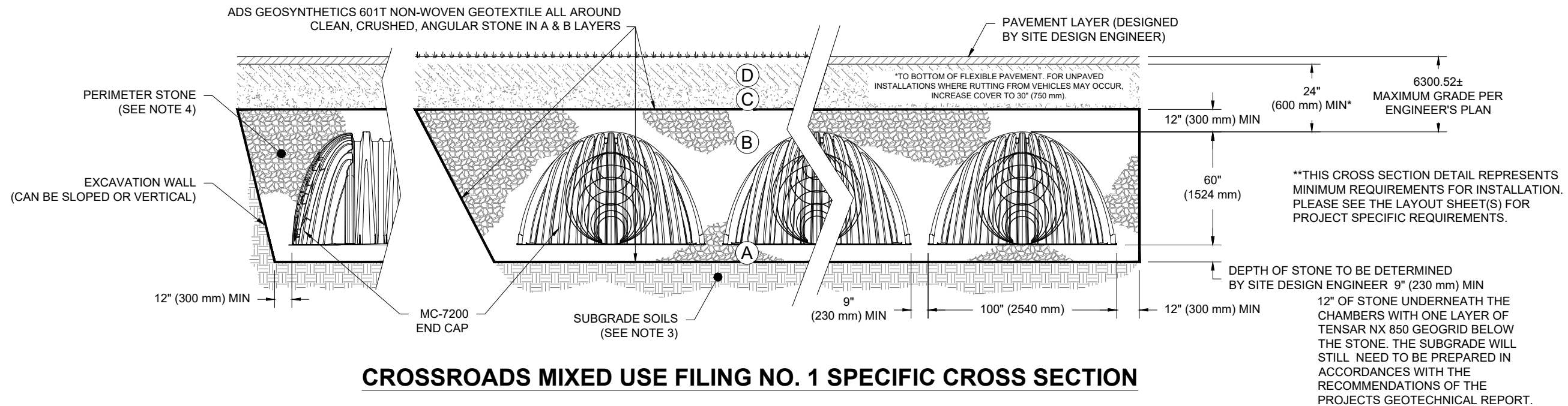
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.



## ACCEPTABLE FILL MATERIALS: STORMTECH MC-7200 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	<b>FINAL FILL:</b> FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	<b>INITIAL FILL:</b> FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE.  MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 <sup>1</sup> A-1, A-2-4, A-3  OR AASHTO M43 <sup>1</sup> 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	<b>EMBEDMENT STONE:</b> FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 <sup>1</sup> 3, 4	<b>COMPACTION REQUIRED. SEE SPECIAL REQUIREMENTS ON LAYOUT PAGE.</b>
A	<b>FOUNDATION STONE:</b> FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 <sup>1</sup> 3, 4	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. <sup>2,3</sup>

- PLEASE NOTE:
- THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
  - STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
  - WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
  - ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



### NOTES:

- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
- MC-7200 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
- PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 500 LBS/FT/%. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

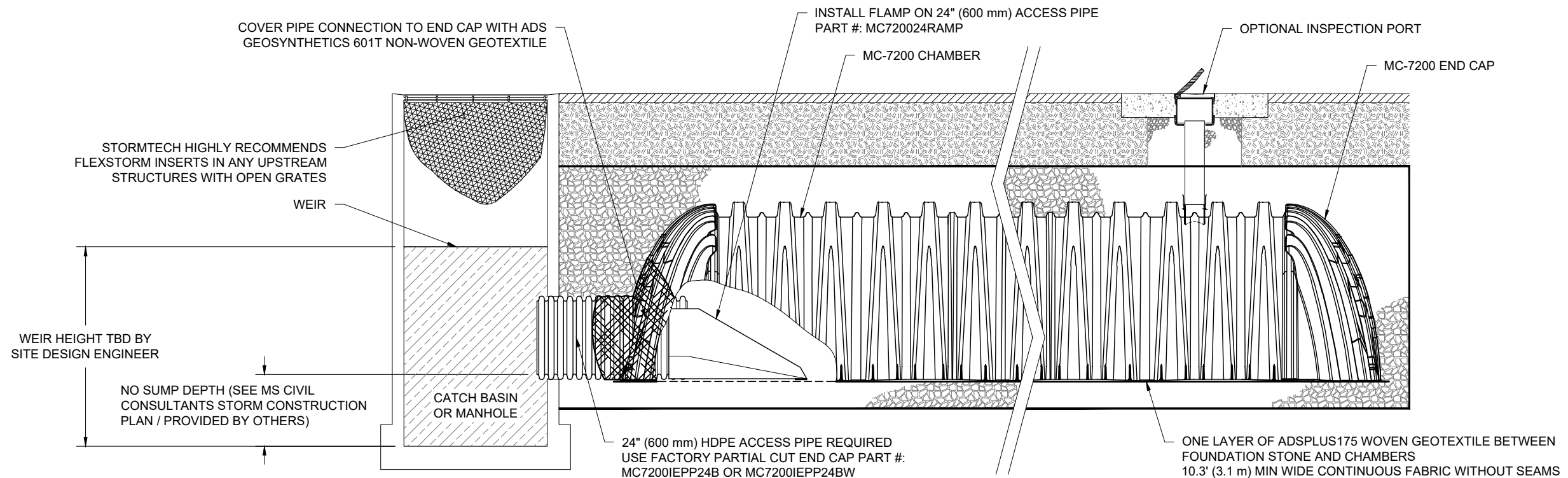
**CROSSROADS MIXED USE**  
 FILING NO. 1  
 COLORADO SPRINGS, CO  
 DATE: 05-05-22  
 DRAWN: TSG  
 PROJECT #: S295850  
 CHECKED: CTS

03/17/23	MWH	REVISED PER COMMENTS, TIER 1
12-18-22	RKC	JKL UPDATED ELEVATIONS
12/13/22	BMW	JPR ELEVATION AND LAYOUT ADJUSTMENTS
	DRWN	CHKD
		DESCRIPTION

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 Chamber System  
 888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD  
 HILLIARD, OH 43026  
**ADS.**

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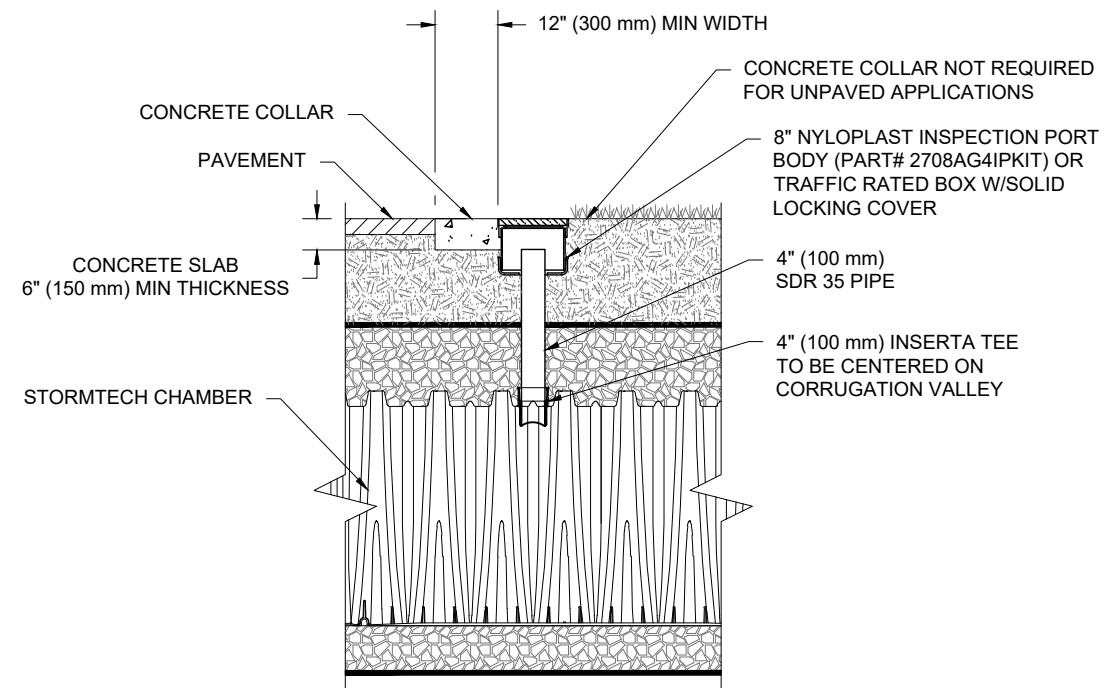
**MC-7200 ISOLATOR ROW PLUS DETAIL**  
NTS

**INSPECTION & MAINTENANCE**

- STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
    - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
    - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
    - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
    - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
    - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
  - B. ALL ISOLATOR PLUS ROWS
    - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
    - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
      - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
      - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
    - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
  - B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
  - C. VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

**NOTES**

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTE:  
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.

**4\"/>NTS**

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DATE	DRWN	CHKD	DESCRIPTION
03/17/23	MWH	MWH	REVISED PER COMMENTS, TIER 1
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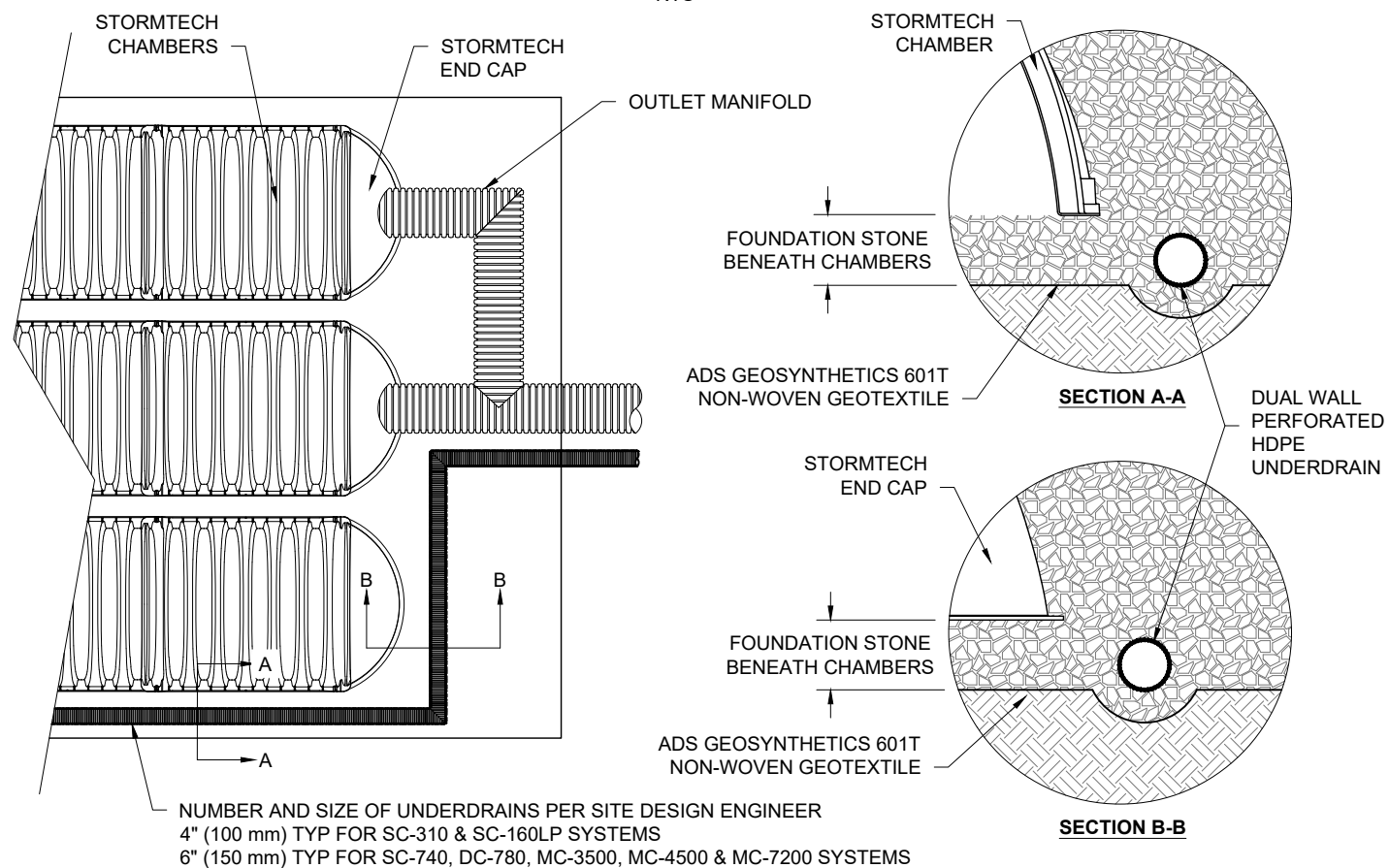
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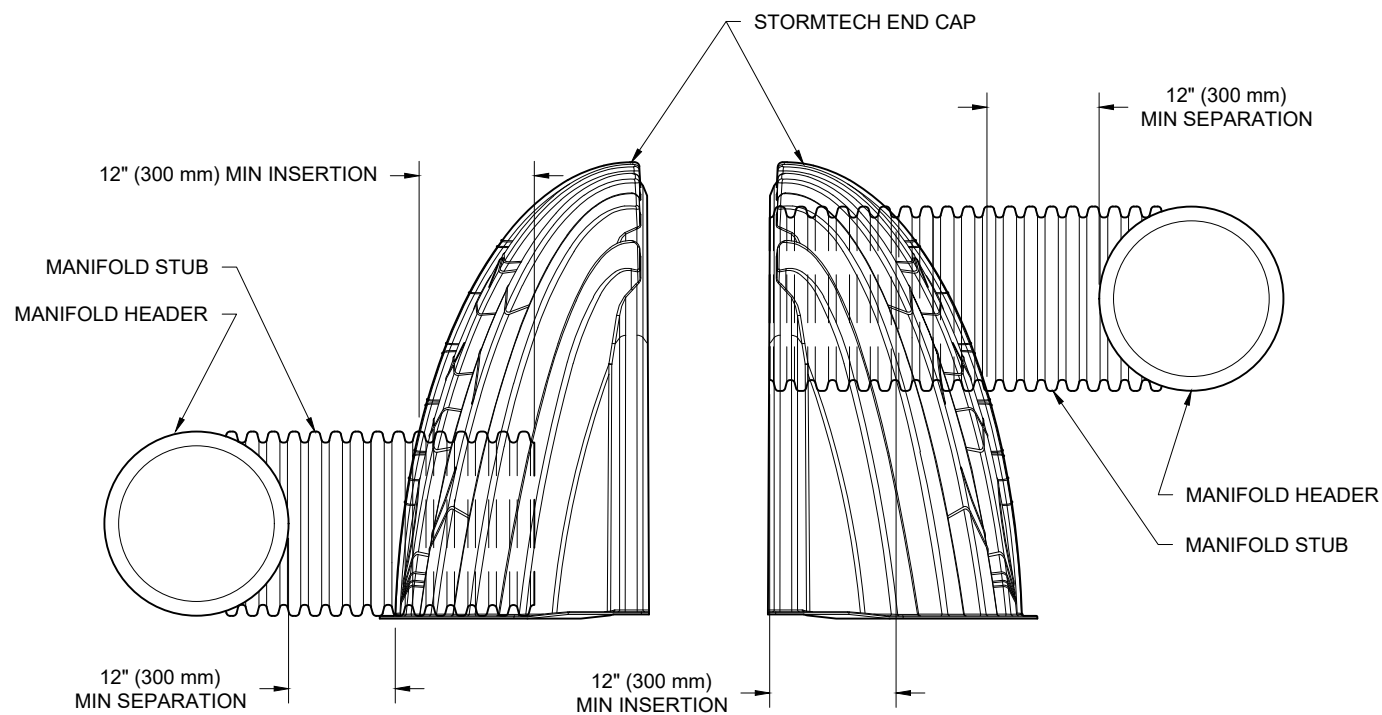
**UNDERDRAIN DETAIL**

NTS



**MC-SERIES END CAP INSERTION DETAIL**

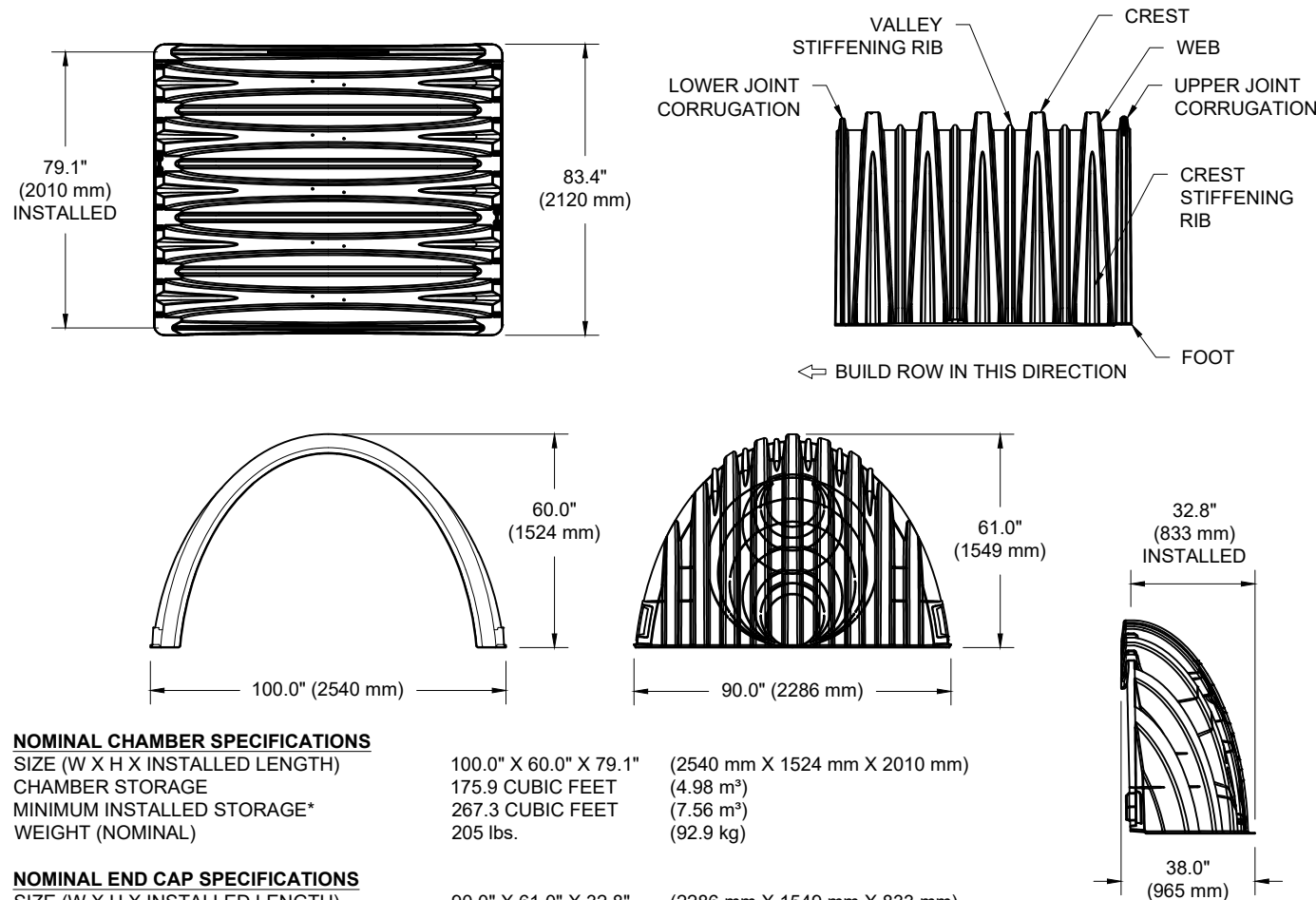
NTS



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

**MC-7200 TECHNICAL SPECIFICATION**

NTS



**NOMINAL CHAMBER SPECIFICATIONS**

SIZE (W X H X INSTALLED LENGTH)	100.0" X 60.0" X 79.1"	(2540 mm X 1524 mm X 2010 mm)
CHAMBER STORAGE	175.9 CUBIC FEET	(4.98 m <sup>3</sup> )
MINIMUM INSTALLED STORAGE*	267.3 CUBIC FEET	(7.56 m <sup>3</sup> )
WEIGHT (NOMINAL)	205 lbs.	(92.9 kg)

**NOMINAL END CAP SPECIFICATIONS**

SIZE (W X H X INSTALLED LENGTH)	90.0" X 61.0" X 32.8"	(2286 mm X 1549 mm X 833 mm)
END CAP STORAGE	39.5 CUBIC FEET	(1.12 m <sup>3</sup> )
MINIMUM INSTALLED STORAGE*	115.3 CUBIC FEET	(3.26 m <sup>3</sup> )
WEIGHT (NOMINAL)	90 lbs.	(40.8 kg)

\*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"  
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"  
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC7200IEPP06T	6" (150 mm)	42.54" (1081 mm)	---
MC7200IEPP06B	---	---	0.86" (22 mm)
MC7200IEPP08T	8" (200 mm)	40.50" (1029 mm)	---
MC7200IEPP08B	---	---	1.01" (26 mm)
MC7200IEPP10T	10" (250 mm)	38.37" (975 mm)	---
MC7200IEPP10B	---	---	1.33" (34 mm)
MC7200IEPP12T	12" (300 mm)	35.69" (907 mm)	---
MC7200IEPP12B	---	---	1.55" (39 mm)
MC7200IEPP15T	15" (375 mm)	32.72" (831 mm)	---
MC7200IEPP15B	---	---	1.70" (43 mm)
MC7200IEPP18T	---	29.36" (746 mm)	---
MC7200IEPP18TW	18" (450 mm)	---	---
MC7200IEPP18B	---	---	1.97" (50 mm)
MC7200IEPP18BW	---	---	---
MC7200IEPP24T	---	23.05" (585 mm)	---
MC7200IEPP24TW	24" (600 mm)	---	---
MC7200IEPP24B	---	---	2.26" (57 mm)
MC7200IEPP24BW	---	---	---
MC7200IEPP30BW	30" (750 mm)	---	2.95" (75 mm)
MC7200IEPP36BW	36" (900 mm)	---	3.25" (83 mm)
MC7200IEPP42BW	42" (1050 mm)	---	3.55" (90 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL

CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-7200 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

CROSSROADS MIXED USE

FILING NO. 1

COLORADO SPRINGS, CO

DATE: 05-05-22

REVISIONS: TSG

PROJECT #: S295850

CHECKED: CTS

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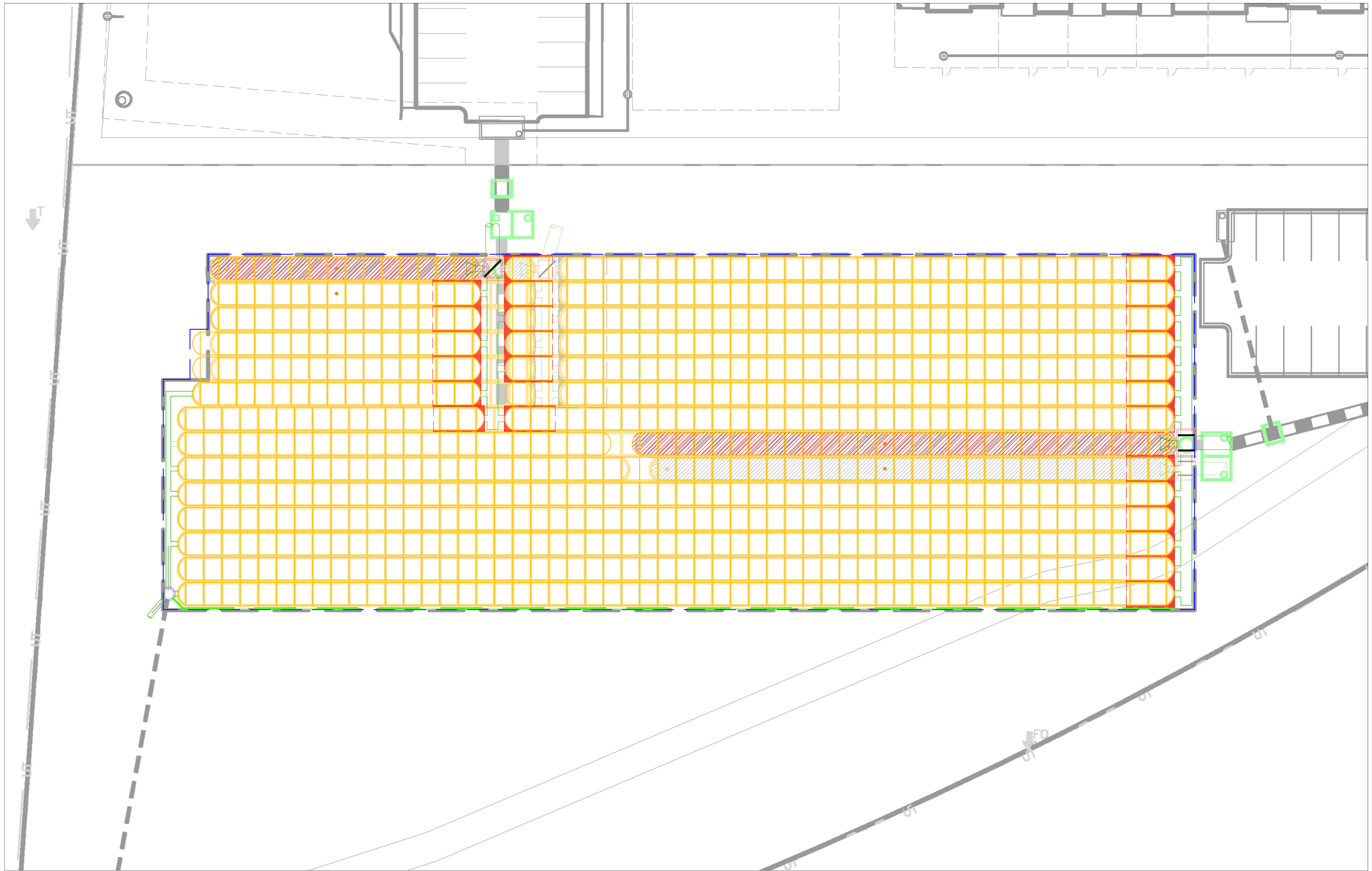
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PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER:	JEROME MAGSINO 303-349-7555 JEROME.MAGSINO@ADSPIPE.COM
ADS SALES REP:	AARON ZEE ---- AARON.ZEE@ADSPIPE.COM
PROJECT NO:	S295850



# CROSSROADS MIXED USE FILING NO. 1

## COLORADO SPRINGS, CO

### BAYSAVER BAYSEPARATOR SPECIFICATIONS

#### MATERIALS AND DESIGN

- A. CONCRETE STRUCTURES SHALL BE DESIGNED FOR H-20 TRAFFIC LOADING AND APPLICABLE SOIL LOADS OR AS OTHERWISE DETERMINED BY A LICENSED PROFESSIONAL ENGINEER. THE MATERIALS AND STRUCTURAL DESIGN OF THE DEVICES SHALL BE PER ASTM C857 AND ASTM C858.
  1. THE MINIMUM COMPRESSIVE STRENGTH OF THE CONCRETE IN THE MANHOLE BASE, RISER, AND TOP SECTIONS SHALL BE 4000 PSI.
  2. THE MINIMUM WALL THICKNESS SHALL BE ONE TWELFTH OF THE INTERNAL DIAMETER OF THE RISER OF LARGEST CONE DIAMETER.
  3. CEMENT SHALL CONFORM TO THE REQUIREMENTS FOR PORTLAND CEMENT OF SPECIFICATION C150.
  4. AGGREGATES SHALL CONFORM TO SPECIFICATION C33, EXCEPT THAT THE REQUIREMENT FOR GRADATION SHALL NOT APPLY.
  5. REINFORCEMENT SHALL CONSIST OF WIRE CONFORMING TO SPECIFICATION A82 OR SPECIFICATION A496, OF WIRE FABRIC CONFORMING TO SPECIFICATION A185 OR SPECIFICATION A497, OR OF BARS OF GRADE 40 STEEL CONFORMING TO SPECIFICATION A615/A615M.
  6. THE ACCESS COVER SHALL BE DESIGNED FOR HS20-44 TRAFFIC LOADING AND SHALL PROVIDE A MINIMUM 30 INCH CLEAR OPENING.
  7. ALL JOINTS SHALL BE WATERPROOF WITH WRAPPED GASKETS OR SEALED WITH A MASTIC TREATMENT.
  8. ANY GROUT USED WITHIN THE SYSTEM SHALL MEET THE ASTM C 1107 "STANDARD SPECIFICATION FOR PACKAGED DRY, HYDRAULIC-CEMENT GROUT (NON-SHRINK)". GRADES A, B AND C AT A POURABLE AND PLASTIC CONSISTENCY AT 70°F. CRD C 621 "CORPS OF ENGINEERS SPECIFICATION FOR NON-SHRINK GROUT."
  9. STORAGE MANHOLE CONNECTOR PIPES SHALL BE EQUIPPED WITH A SEAL GASKET THAT MEETS OR EXCEEDS MATERIAL SPECIFICATIONS OF ASTM C-923 OR OTHER LOCALLY APPROVED METHODS.
- B. THE SEPARATOR STRUCTURE SHALL BE SUBSTANTIALLY CONSTRUCTED OF HDPE OR EQUIVALENT CORROSION RESISTANT MATERIAL MEETING ASTM D330, ASTM F412, AND ASTM C-425.
- C. PIPES WITHIN THE UNIT, (I.E., TEE PIPES, CONNECTOR PIPES AND DOWN PIPES) SHALL BE CONSTRUCTED OF AT LEAST SDR 32.5 HDPE PIPE OF STANDARD ASTM F412.
- D. PIPE AND FITTING MATERIAL SHALL BE HIGH DENSITY POLYETHYLENE MEETING ASTM D330 MINIMUM CELL CLASSIFICATION 335400C FOR 24-INCH THROUGH 60-INCH DIAMETERS. THE 24- THROUGH 60-INCH PIPE MATERIAL SHALL BE SLOW CRACK RESISTANT HDPE MATERIAL, EVALUATED USING THE SINGLE POINT NOTCHED CONSTANT TENSILE LOAD (SP-NCTL) TEST.

#### PERFORMANCE

- A. THE STORMWATER TREATMENT UNIT SHALL BE AN ONLINE UNIT CAPABLE OF CONVEYING 100% OF THE DESIGN PEAK FLOW.
- B. THE BAYSEPARATOR UNIT SHALL BE DESIGNED TO REMOVE AT LEAST 80% OF THE SUSPENDED SOLIDS LOAD ON AN ANNUAL AGGREGATE REMOVAL BASIS. SAID REMOVAL SHALL BE BASED ON FULL-SCALE THIRD PARTY TESTING USING F-95 MEDIA GRADATION (MANUFACTURED BY US SILICA) OR EQUIVALENT. SAID FULL SCALE TESTING SHALL HAVE INCLUDED SEDIMENT CAPTURE BASED ON ACTUAL TOTAL MASS COLLECTED BY THE STORMWATER TREATMENT UNIT(S).
- C. THE STORMWATER TREATMENT UNIT SHALL CONSIST OF ONE (1) PREFABRICATED SEPARATOR STRUCTURE, ONE (1) ONLINE COARSE SEDIMENT CAPTURE STRUCTURE, AND ONE (1) OFFLINE SEDIMENT AND FLOATABLE CAPTURE STRUCTURE. THE SEPARATOR STRUCTURE SHALL BE SUBSTANTIALLY CONSTRUCTED OF HDPE OR EQUIVALENT CORROSION RESISTANT MATERIAL. THE OFFLINE SEDIMENT STORAGE STRUCTURE MUST PROVIDE FOR OFFLINE SEDIMENT STORAGE OF SEDIMENTS AND FLOATABLES THAT ARE ISOLATED FROM HIGH INTENSITY STORMS.
- D. THE STORMWATER TREATMENT UNIT(S) HEAD LOSS AT THE PEAK DESIGN FLOW RATE SHALL NOT EXCEED THE HEAD LOSS SPECIFIED BY THE ENGINEER.
- E. THE UNIT SHALL BE DESIGNED TO REMOVE SEDIMENT PARTICLES AS WELL AS FLOATING OILS AND DEBRIS.

#### MANUFACTURER

- A. THE STORMWATER TREATMENT UNIT(S) SHALL BE OF A BASIC DESIGN THAT HAS BEEN INSTALLED AND USED SUCCESSFULLY FOR A MINIMUM OF 5 YEARS.
- B. EACH STORMWATER TREATMENT SYSTEM SHALL BE A BAYSEPARATOR SYSTEM AS MANUFACTURED BY BAYSAVER, LLC, 1030 DEER HOLLOW DR., MOUNT AIRY, MD 21771, PHONE (301) 829-6470, FAX (301) 829-3747, TOLL FREE 1-800-229-7283 (1-800-BAYSAVER), EMAIL [INFO@BAYSAVER.COM](mailto:INFO@BAYSAVER.COM) PROTECTED UNDER US PATENT NUMBER 5746911

### BAYSEPARATOR MAINTENANCE

BAYSEPARATOR SYSTEMS MUST BE INSPECTED AND MAINTAINED PERIODICALLY. INSPECTION IS MADE BY CHECKING THE DEPTH OF SEDIMENT IN EACH MANHOLE WITH A GRADE STICK OR SIMILAR DEVICE. MAINTENANCE IS REQUIRED WHEN THE SEDIMENT DEPTH IN EITHER MANHOLE EXCEEDS 2 FEET. MINIMUM INSPECTION IS RECOMMENDED TWICE A YEAR TO MAINTAIN OPERATION AND FUNCTION OF BAYSAVER.

MAINTENANCE CONSISTS OF THE FOLLOWING:

#### A. STORAGE MANHOLE

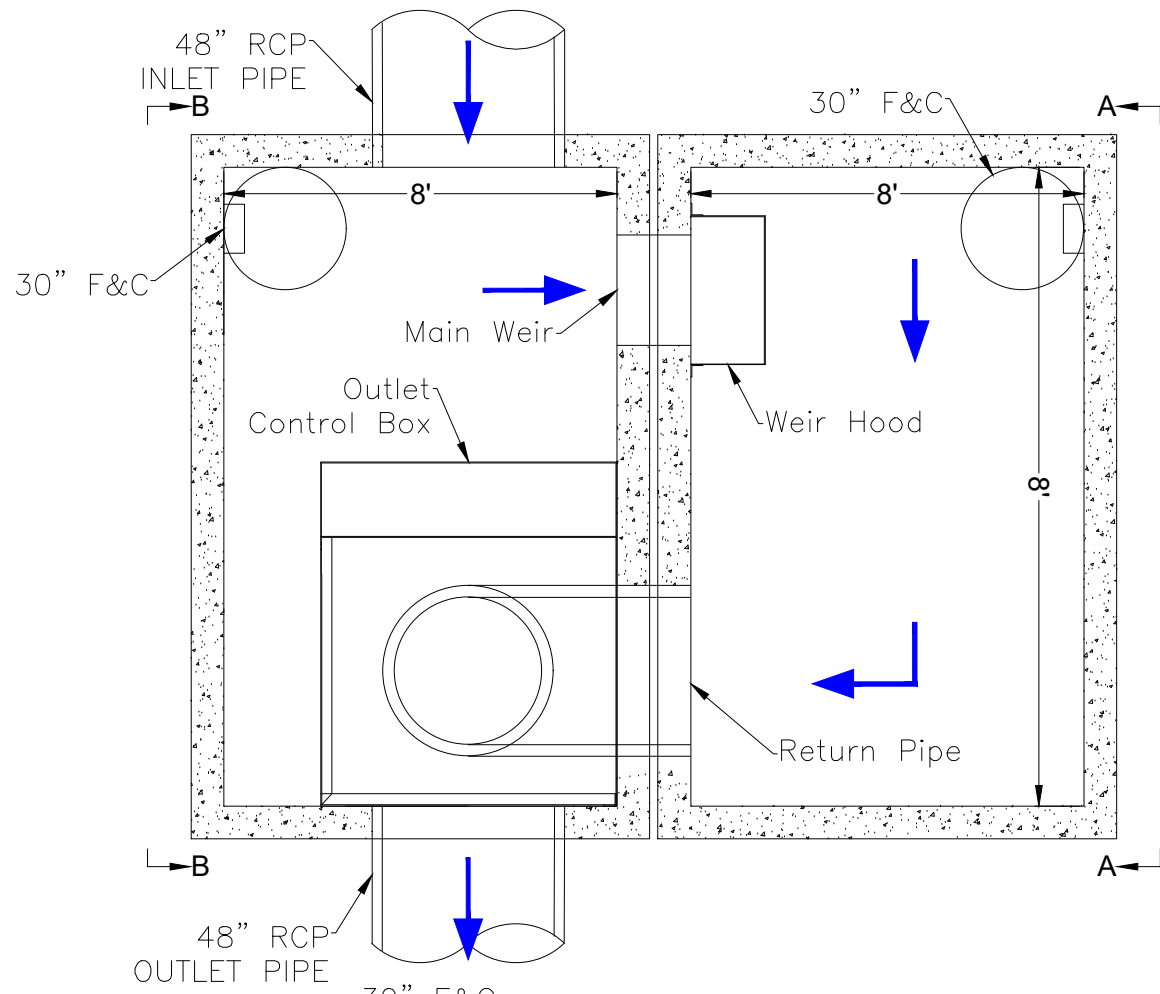
1. REMOVE THE ENTIRE VOLUME OF THE CONTAMINATED WATER BY VACUUM TRUCK.
2. CLEAN THE MANHOLE WALLS AND FLUSH OUT THE MANHOLE USING A HIGH PRESSURE HOSE AND REMOVE FLUSHING WATER BY VACUUM TRUCK. MAKE CERTAIN MANHOLE IS CLEAN.

#### B. PRIMARY MANHOLE

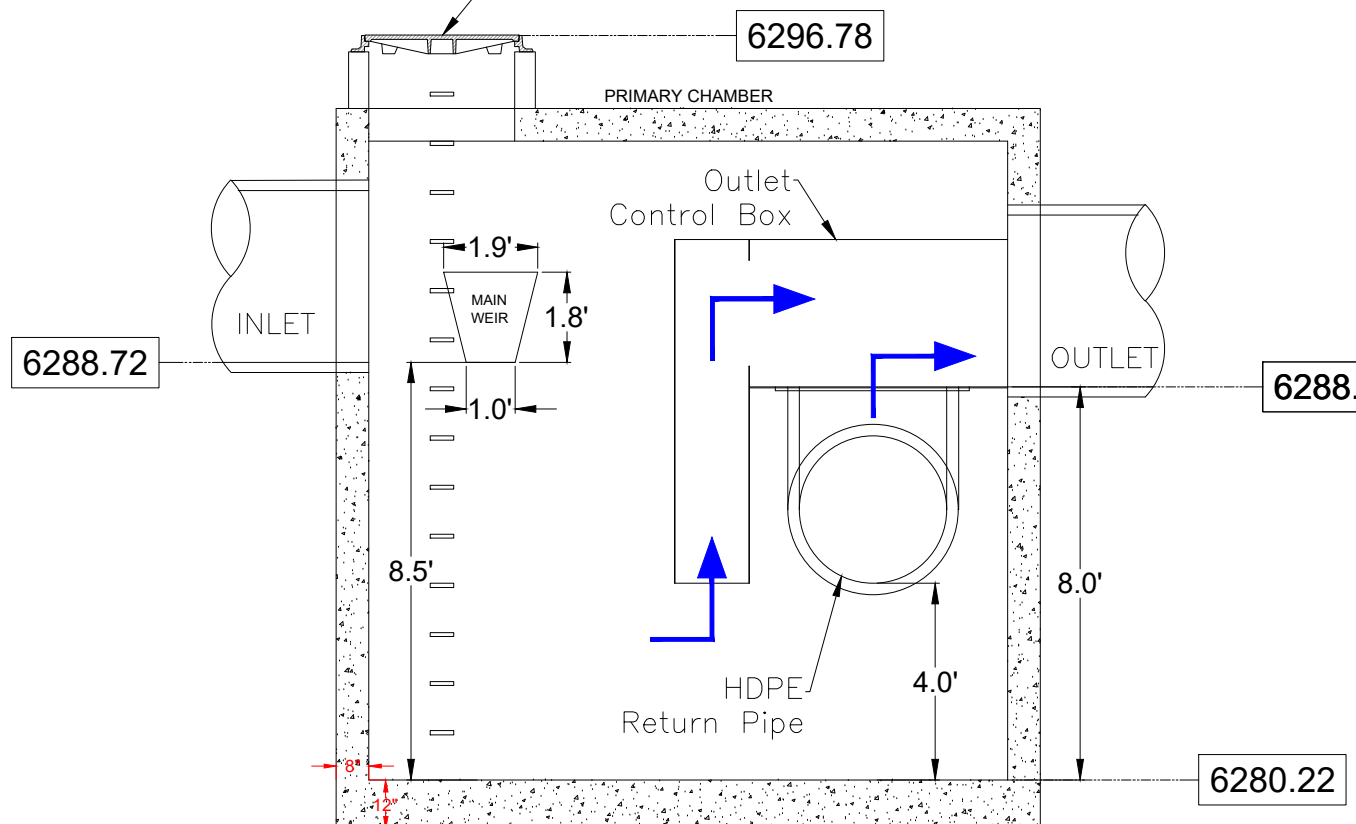
1. USING A SUBMERSIBLE PUMP, PUMP THE CLEAN WATER FROM THE CENTER OF THE MANHOLE DIRECTLY INTO THE EMPTY STORAGE MANHOLE UNTIL THE WATER LEVEL FALLS TO 1 FOOT ABOVE THE SEDIMENT LAYER.
2. REMOVE THE SETTLED SEDIMENT AND REMAINING WATER BY VACUUM TRUCK.
3. CLEAN THE MANHOLE WALLS AND FLUSH OUT THE MANHOLE USING A HIGH PRESSURE HOSE AND REMOVE FLUSHING WATER BY VACUUM TRUCK. MAKE CERTAIN MANHOLE IS CLEAN.
4. CONTAMINATED MATERIAL REMOVED FROM THE MANHOLES MUST BE DISPOSED OF RESPONSIBLY AND LEGALLY BY THE OPERATOR OF THE VACUUM TRUCK.

### BAYSEPARATOR INSTALLATION NOTES

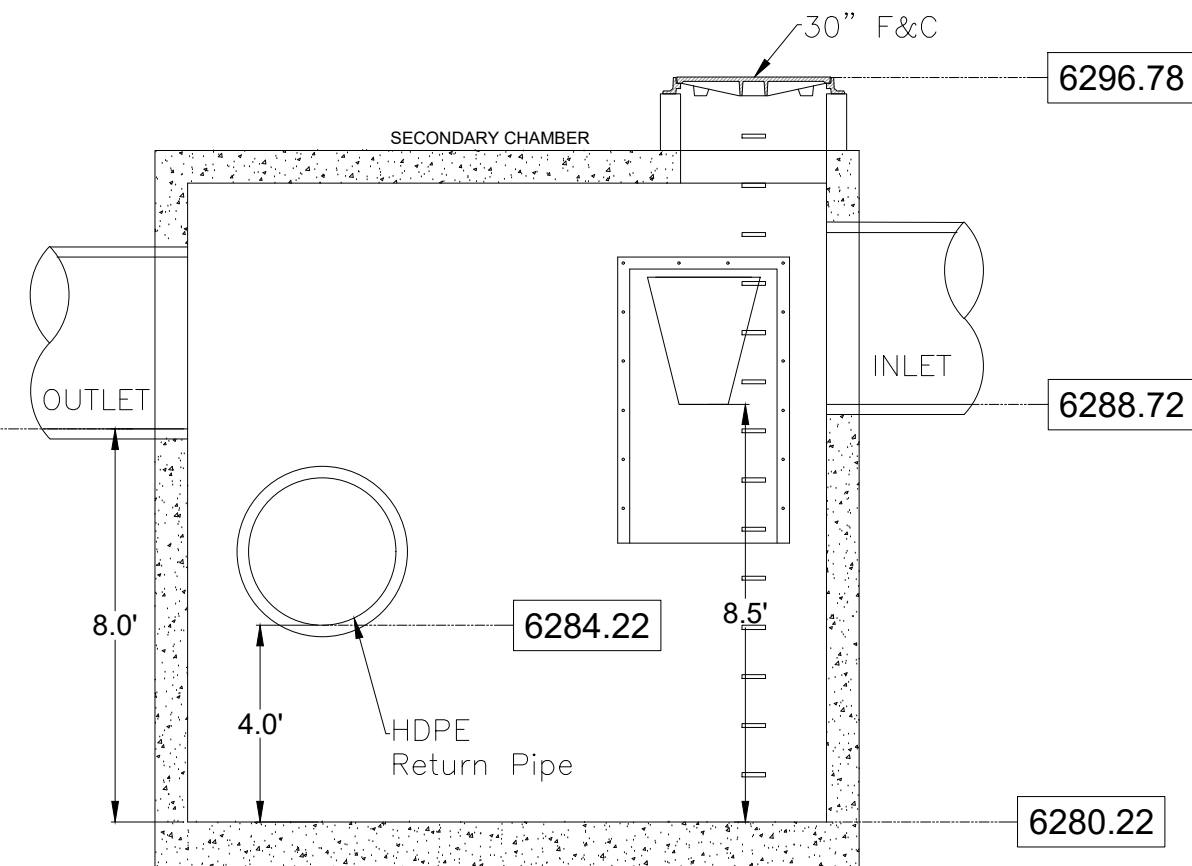
1. EXCAVATION MUST PROVIDE ADEQUATE SPACE TO CONNECT INLET AND OUTLET PIPES TO STORAGE MANHOLE AND BAYSEPARATOR UNIT. INSTALL PRECAST DROP STRUCTURES ON SOLID GROUND AS VERIFIED BY A GEOTECHNICAL ENGINEER.
2. VERIFY THE SUBGRADE ELEVATION AGAINST THE MANHOLE DIMENSIONS AND CONNECTING STORM DRAIN INVERTS.
3. MAKING SURE THE BASES ARE LEVEL AND THE STORAGE MANHOLE OPENINGS ARE ALIGNED WITH THE SEPARATOR UNIT, INSTALL PRIMARY AND STORAGE MANHOLES. INSTALL WATERTIGHT GASKETS ON BASE UNITS AND COAT WITH LUBRICATING GREASE (IF REQUIRED). INSTALL ADDITIONAL MANHOLE SECTIONS AS REQUIRED. SEAL LIFT HOLES WITH NON-SHRINK GROUT.
4. BACKFILL BASE SECTIONS OF MANHOLES TO INVERT OF STORAGE MANHOLE CONNECTING PIPES. USING APPROVED BACKFILL MATERIAL, BACKFILL AND COMPACT IN 8 INCH LIFTS. BACKFILL AND COMPACTION SHOULD BE MONITORED BY A GEOTECHNICAL ENGINEER.
5. INSTALL BAYSEPARATOR UNIT AND CONNECTING PIPES. SEAL ALL CONNECTING JOINTS AND INSTALL SEPARATOR HDPE REDUCER/ADAPTER. CUT EXCESS LENGTH OFF CONNECTING PIPES INSIDE STORAGE MANHOLE.
6. BACKFILL SEPARATOR UNIT AND MANHOLES. AREAS NOT ACCESSIBLE TO COMPACTION EQUIPMENT MUST BE BACKFILLED WITH #57, #7, OR PEA GRAVEL.
7. INSTALL AND SET MANHOLE COVER GRADE ADJUSTMENT RINGS AS NECESSARY.
8. INSTALL AND SET MANHOLE FRAME AND COVER UNITS.



SYSTEM BS-2	NORTHSIDE
WQ FLOW RATE (CFS)	11.9
PEAK FLOW RATE (CFS)	71.9
INLET PIPE	48" RCP
INLET INVERT	6288.72
OUTLET PIPE	48" RCP
OUTLET INVERT	6288.22
RIM ELEVATION	6296.78
WIDTH (FT)	8'
LENGTH (FT)	8'
INSIDE HEIGHT (FT)	16'



SECTION B-B



SECTION A-A

CROSSROADS MIXED USE FILING NO. 1

COLORADO SPRINGS, CO

DATE: 12/21/22

PROJECT #: S295850

DRAWN: PR

CHECKED: PR

DATE	DRWN	CHKD	DESCRIPTION
03/17/23	PR	PR	REVISED FLOW RATES AND ADDED DETAILS PER CITY'S COMMENTS.
1/4/23	PR	PR	REVISED SIZING, PIPE SIZES & ELEVATIONS.

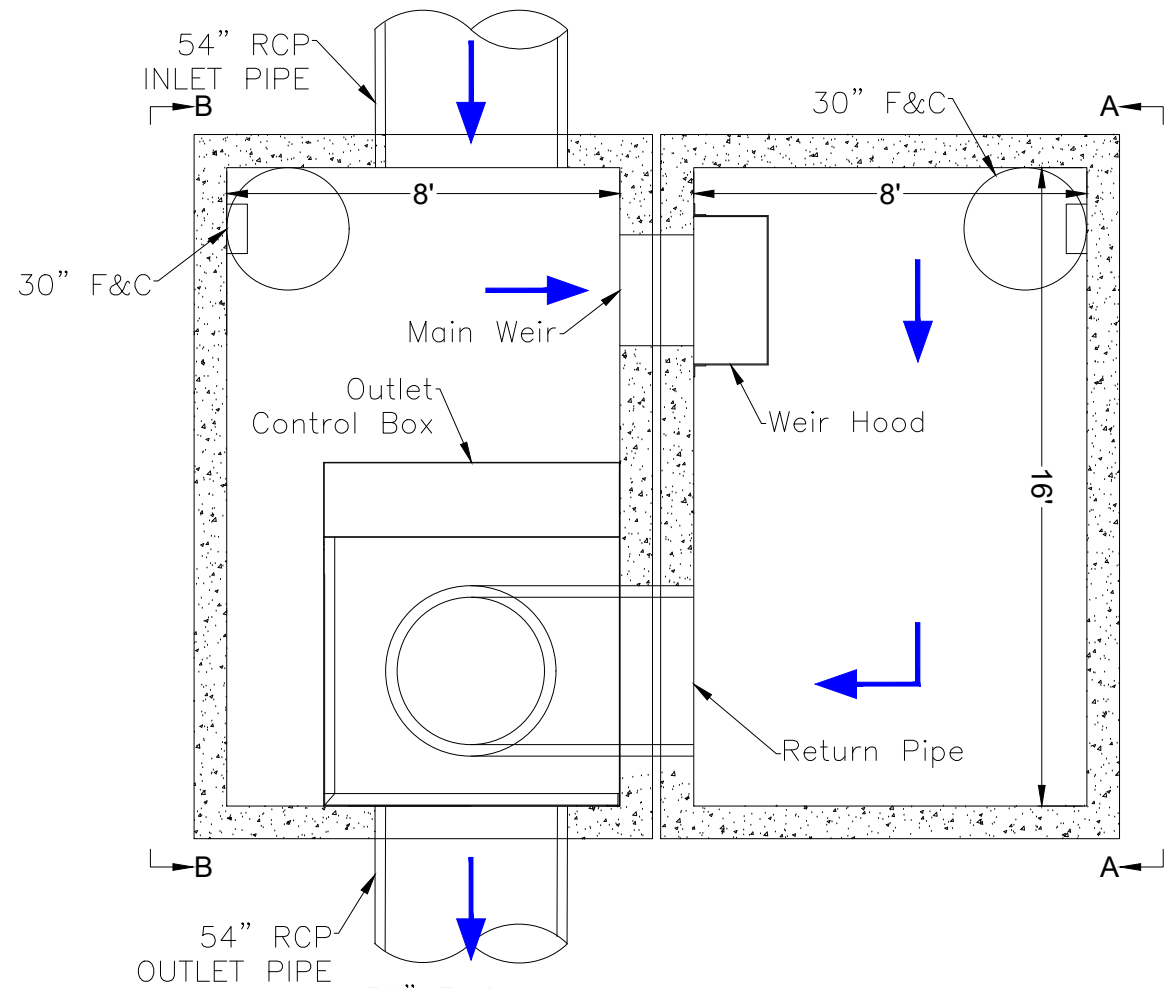
**BaySeparator**  
Stormwater Treatment System

4640 TRUJEMAN BLVD  
HILLIARD, OH 43026

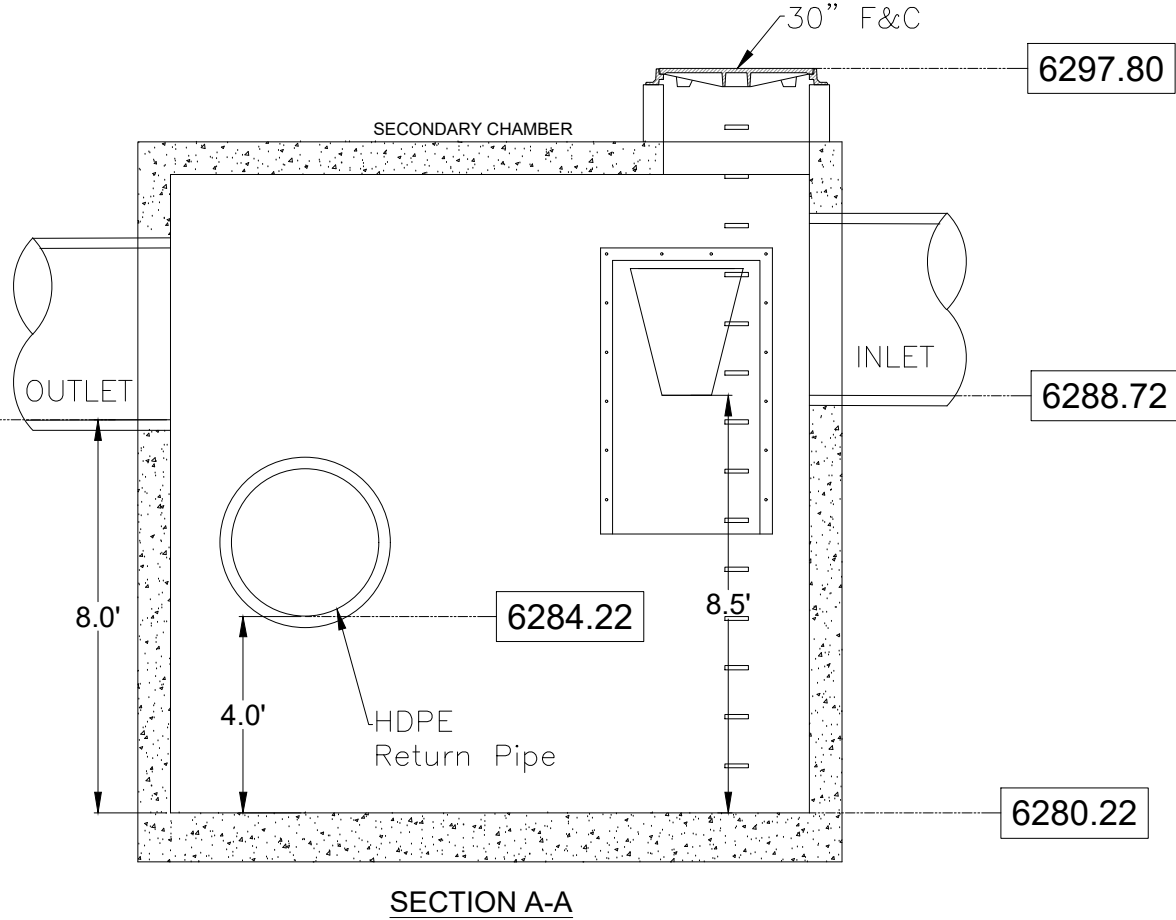
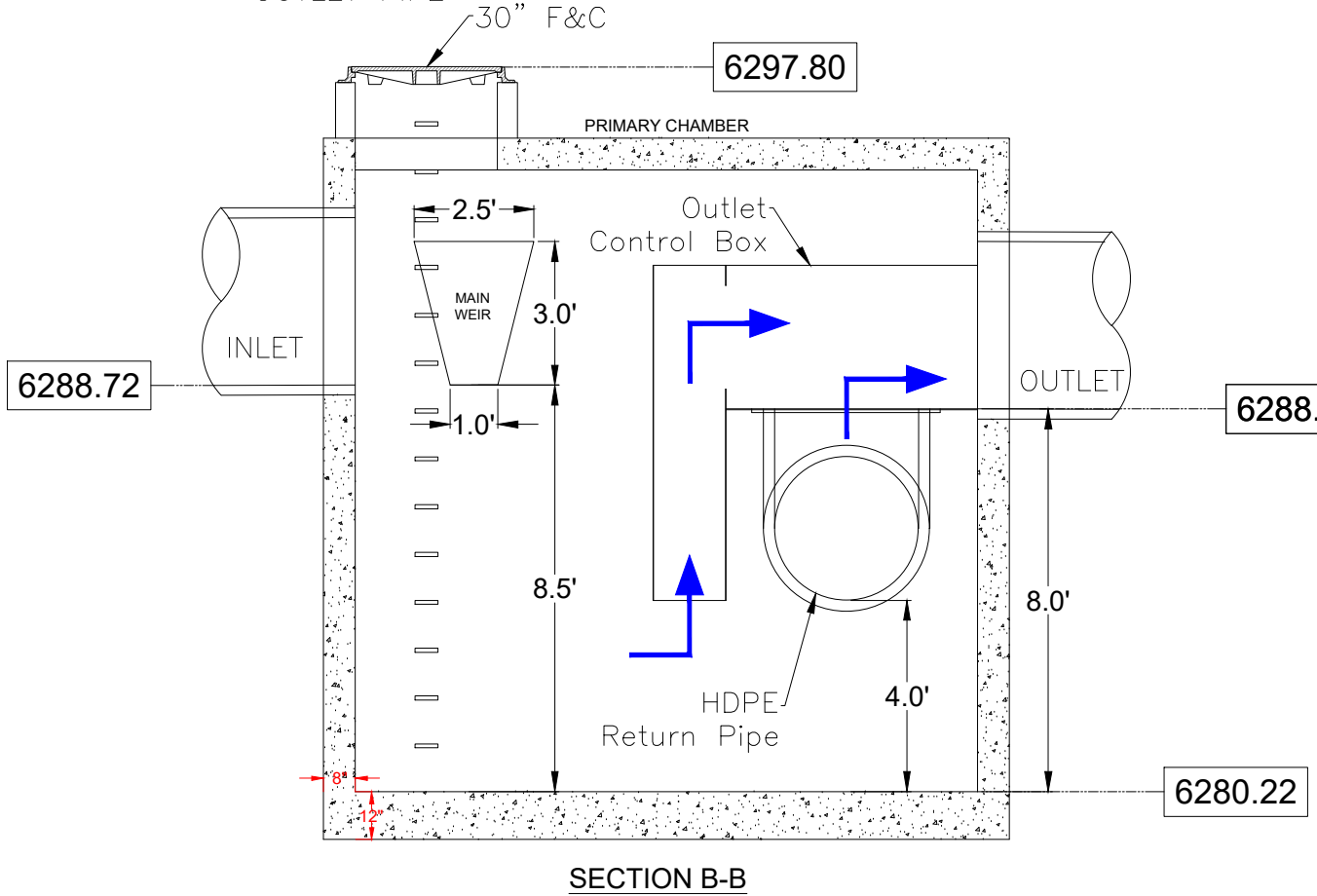
**ADS.**

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SYSTEM BS-1	EASTSIDE
WQ FLOW RATE (CFS)	25.4
PEAK FLOW RATE (CFS)	112.6
INLET PIPE	54" RCP
INLET INVERT	6288.72
OUTLET PIPE	54" RCP
OUTLET INVERT	6288.22
RIM ELEVATION	6297.80
WIDTH (FT)	8'
LENGTH (FT)	16'
INSIDE HEIGHT (FT)	16'



CROSSROADS MIXED USE FILING NO. 1  
 COLORADO SPRINGS, CO  
 DATE: 12/21/22 DRAWN: PR  
 PROJECT #: S295850 CHECKED: PR

REVISED FLOW RATES AND ADDED DETAILS PER CITY'S COMMENTS.	REVISOR	DATE	DESCRIPTION
	PR	03/17/23	
	PR	1/4/23	
	DRWN		CHKD

**BaySeparator**  
 Stormwater Treatment System

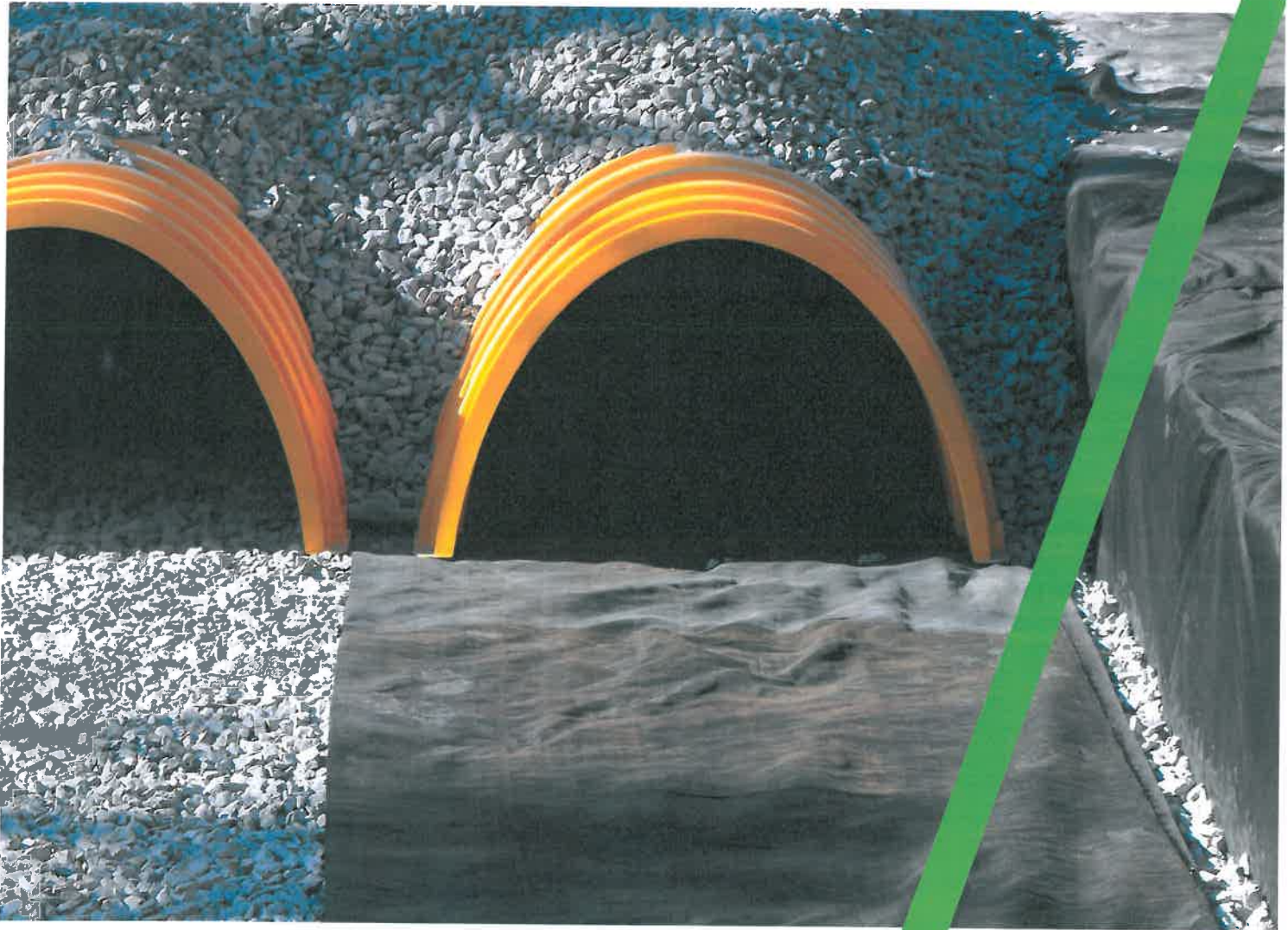
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# Isolator<sup>®</sup> Row

## O&M Manual

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# The Isolator® Row

## Introduction

An important component of any Stormwater Pollution Prevention Plan is inspection and maintenance. The StormTech Isolator Row is a technique to inexpensively enhance Total Suspended Solids (TSS) and Total Phosphorus (TP) removal with easy access for inspection and maintenance.

## The Isolator Row

The Isolator Row is a row of StormTech chambers, either SC-160, SC-310, SC-310-3, SC-740, DC-780, MC-3500 or MC-7200 models, that is surrounded with filter fabric and connected to a closely located manhole for easy access. The fabric-wrapped chambers provide for sediment settling and filtration as stormwater rises in the Isolator Row and passes through the filter fabric. The open bottom chambers and perforated sidewalls (SC-310, SC-310-3 and SC-740 models) allow stormwater to flow both vertically and horizontally out of the chambers. Sediments are captured in the Isolator Row protecting the adjacent stone and chambers storage areas from sediment accumulation.

ADS geotextile fabric is placed between the stone and the Isolator Row chambers. The woven geotextile provides a media for stormwater filtration, a durable surface for maintenance, prevents scour of the underlying stone and remains intact during high pressure jetting. A non-woven fabric is placed over the chambers to provide a filter media for flows passing through the chamber's sidewall. The non-woven fabric is not required over the SC-160, DC-780, MC-3500 or MC-7200 models as these chambers do not have perforated side walls.

The Isolator Row is designed to capture the "first flush" runoff and offers the versatility to be sized on a volume basis or a flow-rate basis. An upstream manhole provides access to the Isolator Row and includes a high/low concept such that stormwater flow rates or volumes that exceed the capacity of the Isolator Row bypass through a manifold to the other chambers. This is achieved with an elevated bypass manifold or a high-flow weir. This creates a differential between the Isolator Row row of chambers and the manifold to the rest of the system, thus allowing for settlement time in the Isolator Row. After Stormwater flows through the Isolator Row and into the rest of the chamber system it is either exfiltrated into the soils below or passed at a controlled rate through an outlet manifold and outlet control structure.

The Isolator Row may be part of a treatment train system. The treatment train design and pretreatment device selection by the design engineer is often driven by regulatory requirements. Whether pretreatment is used or not, StormTech recommend using the Isolator Row to minimize maintenance requirements and maintenance costs.

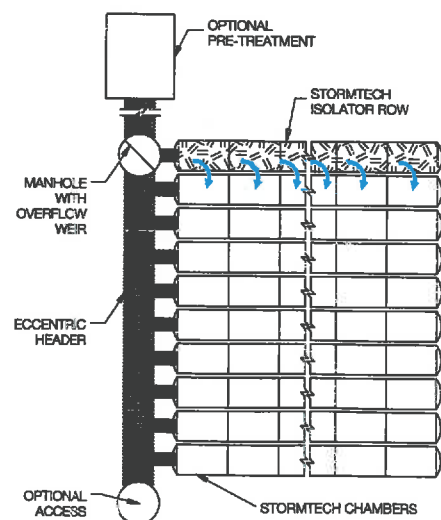
**Note:** See the StormTech Design Manual for detailed information on designing inlets for a StormTech system, including the Isolator Row.



Looking down the Isolator Row from the manhole opening, woven geotextile fabric is shown between the chamber and stone base.



StormTech Isolator Row with Overflow Spillway (not to scale)



# Isolator Row Inspection/Maintenance

## Inspection

The frequency of inspection and maintenance varies by location. A routine inspection schedule needs to be established for each individual location based upon site specific variables. The type of land use (i.e. industrial, commercial, residential), anticipated pollutant load, percent imperviousness, climate, etc. all play a critical role in determining the **actual frequency of inspection and maintenance practices.**

At a minimum, StormTech recommends annual inspections. Initially, the Isolator Row should be inspected every 6 months for the first year of operation. For subsequent years, the inspection should be adjusted based upon previous observation of sediment deposition.

The Isolator Row incorporates a combination of standard manhole(s) and strategically located inspection ports (as needed). The inspection ports allow for easy access to the system from the surface, eliminating the need to perform a confined space entry for inspection purposes.

If upon visual inspection it is found that sediment has accumulated, a stadia rod should be inserted to determine the depth of sediment. When the average depth of sediment exceeds 3 inches throughout the length of the Isolator Row, clean-out should be performed.

## Maintenance

The Isolator Row was designed to reduce the cost of periodic maintenance. By "isolating" sediments to just one row, costs are dramatically reduced by eliminating the need to clean out each row of the entire storage bed. If inspection indicates the potential need for maintenance, access is provided

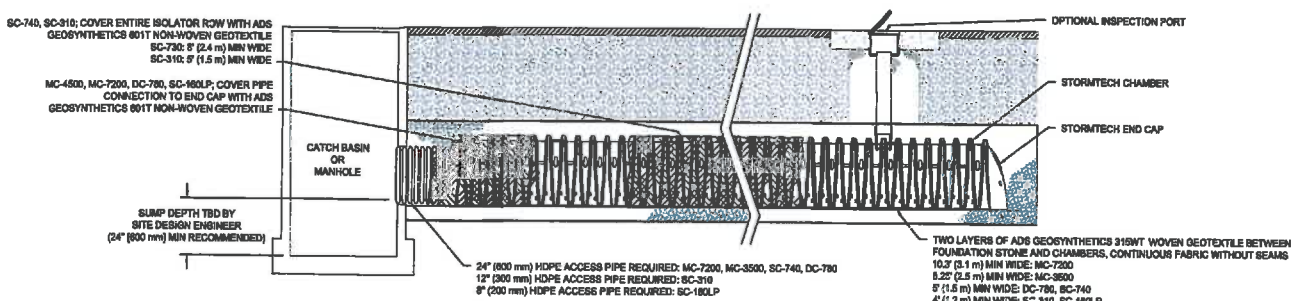
via a manhole(s) located on the end(s) of the row for cleanout. If entry into the manhole is required, please follow local and OSHA rules for a confined space entries.

Maintenance is accomplished with the JetVac process. The JetVac process utilizes a high pressure water nozzle to propel itself down the Isolator Row while scouring and suspending sediments. As the nozzle is retrieved, the captured pollutants are flushed back into the manhole for vacuuming. Most sewer and pipe maintenance companies have vacuum/JetVac combination vehicles. Selection of an appropriate JetVac nozzle will improve maintenance efficiency. Fixed nozzles designed for culverts or large diameter pipe cleaning are preferable. Rear facing jets with an effective spread of at least 45° are best. JetVac reels can vary in length. For ease of maintenance, ADS recommends Isolator Row lengths up to 200" (61 m). **The JetVac process shall only be performed on StormTech Isolator Rows that have AASHTO class 1 woven geotextile (as specified by StormTech) over their angular base stone.**



## StormTech Isolator Row (not to scale)

**Note:** Non-woven fabric is only required over the inlet pipe connection into the end cap for SC-160LP, DC-780, MC-3500 and MC-7200 chamber models and is not required over the entire Isolator Row.



# Isolator Row Step By Step Maintenance Procedures

## Step 1

Inspect Isolator Row for sediment.

- A) Inspection ports (if present)
  - i. Remove lid from floor box frame
  - ii. Remove cap from inspection riser
  - iii. Using a flashlight and stadia rod, measure depth of sediment and record results on maintenance log.
  - iv. If sediment is at or above 3 inch depth, proceed to Step 2. If not, proceed to Step 3.
- B) All Isolator Row
  - i. Remove cover from manhole at upstream end of Isolator Row
  - ii. Using a flashlight, inspect down Isolator Row through outlet pipe
    - 1. Mirrors on poles or cameras may be used to avoid a confined space entry
    - 2. Follow OSHA regulations for confined space entry if entering manhole
  - iii. If sediment is at or above the lower row of sidewall holes (approximately 3 inches), proceed to Step 2. If not, proceed to Step 3.

## Step 2

Clean out Isolator Row using the JetVac process.

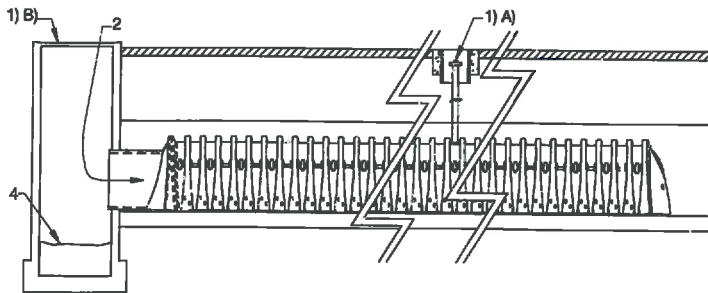
- A) A fixed floor cleaning nozzle with rear facing nozzle spread of 45 inches or more is preferable
- B) Apply multiple passes of JetVac until backflush water is clean
- C) Vacuum manhole sump as required

## Step 3

Replace all caps, lids and covers, record observations and actions.

## Step 4

Inspect & clean catch basins and manholes upstream of the StormTech system.



## Sample Maintenance Log

Date	Stadia Rod Readings		Sedi-ment Depth (1)-(2)	Observations/Actions	Inspector
	Fixed point to chamber bottom (1)	Fixed point to top of sediment (2)			
3/16/11	6.3 ft	none		New installation. Fixed point is CI frame at grade	DJM
9/24/11		6.2	0.1 ft	Some grit felt	SM
6/20/13		5.8	0.5 ft	Mucky feel, debris visible in manhole and in Isolator Row, maintenance due	NV
7/7/13	6.3 ft		0	System jetted and vacuumed	DJM

adspipe.com  
800-821-6710

# BaySeparator™ Stormwater Treatment System

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# Preventing Pollution in Water

Clean water is essential to quality of life. BaySaver Technologies is 100% committed to minimizing pollution in stormwater which helps protect our water resources. By collaborating with the regulatory and engineering community to develop products and processes, BaySaver continually develops state of the art stormwater filters and particle separators. Our filters and separators effectively remove pollutants such as hydrocarbons, trash, sediments, metals, total phosphorous, dissolved phosphorous and dissolved nitrogen.

The BaySeparator™ system removes greater than 80% pollution relying on density differences and gravity to remove suspended solids and floatables (hydrocarbons, floating debris, etc.) from stormwater runoff. The BaySeparator is a unique high density polyethylene device that routes the stormwater between two different manholes for optimal removal efficiency. Pollutants are trapped inside the precast structure until they are removed by routine maintenance.



## Design

The BaySeparator is available in five (5) standard sizes and is also customizable for larger flows:

Model	Max. Treatment Rate cfs (cms)	Max. Hydraulic Rate cfs (cms)	Manhole Diameter in (mm)	Manhole Depth ft (m)
½ K	1.1 (0.03)	8.5 (0.24)	48 (1200)	6 (1.8)
1 K	2.4 (0.07)	10 (0.28)	48 (1200)	8 (2.4)
3 K	7.8 (0.22)	30 (0.85)	60 (1500)	8 (2.4)
5 K	11.1 (0.31)	50 (1.42)	72 (1825)	8 (2.4)
10 K	21.8 (0.62)	100 (2.83)	120 (3050)	8 (2.4)
XK	Custom	Custom	Custom	Custom

Sizing can be accomplished based on flow, annual aggregate removal, or local design regulations. The stand-alone separator is designed to remove 80% of the TSS on an annual aggregate removal basis.

## Installation

- Units are kept in stock and can be delivered within a week of ordering
- Unit arrives to job site ready for easy installation
- Unit is grouted into the primary manhole
- Standard boots or approved seals are used where connecting pipes join storage manhole
- Unit should be backfilled with Class I, II or III material



# System Operation: Three Flow Paths

## Low Flows:

- All low flow rates are treated in the offline storage manhole.
- Coarse sediments settle in the primary manhole undisturbed.
- Finer sediments and floatables are conveyed through the BaySeparator into the storage manhole
- Contaminants in the storage manhole are trapped offline.

## Maximum Treatment Rate:

- The primary manhole separates pollutants during low-flow events and high-flow events.
- Treated flow in the primary manhole flows up through the Tee Pipes.

## Maximum Hydraulic Rate:

- The BaySeparator has an internal bypass.
- Peak Design flows are directed over the bypass plate.
- The BaySeparator isolates contaminants by storing them offline.
- Risk of re-suspending contaminants is effectively eliminated.

## Maintenance:

- Maintenance is a simple procedure performed using a vacuum truck or similiar equipment.
- Reduced disposal costs.
- Each manhole has unobstructed access to capture pollutants.



# BaySeparator Specification

## Materials & Design

- Concrete structures shall be designed for H-20 traffic loading and applicable soil loads or as otherwise determined by a licensed Professional Engineer. The materials and structural design of the devices shall be per ASTM C857 and ASTM C858.
- The separator structure shall be substantially constructed of HDPE or equivalent corrosion resistant material meeting ASTM F2306, ASTM D330, ASTM F412 and ASTM C425.
- Smooth wall pipes within the unit (i.e., tee pipes, connector pipes and down pipes) shall be constructed of at least SDR 32.5 HDPE pipe of standard ASTM F412.
- Pipe and fitting material shall be high-density polyethylene meeting ASTM D330 minimum cell classification 335400C for 24-inch through 60-inch (600-1500 mm) diameters.
- The reducer/adaptor to the mainline shall be installed with an exterior joining coupler. The joint coupler shall be Mar Mac® coupler or an approved equal and shall be installed according to the manufacturer's recommendations.
- The connector pipes shall be connected with the down pipes using Fernco® flexible couplings that have been manufactured to conform to ASTM C425.

## Performance

- The stormwater treatment unit shall be an online unit capable of conveying 100% of the design peak flow.
- The BaySeparator unit shall be designed to remove at least 80% of the suspended solids on an annual aggregate removal basis. Said removal shall be based on full-scale third party testing using F-95 media gradation (manufactured by US Silica™) or equivalent. Said full scale testing shall have included sediment capture based on actual total mass collected by the Stormwater Treatment Unit.
- The stormwater treatment unit shall consist of one (1) pre-fabricated separator structure, one (1) online coarse sediment capture and bypass structure and one (1) offline sediment and floateable capture structure. The separator structure shall be substantially constructed of HDPE or equivalent corrosion resistant material. The offline sediment structure must provide for offline sediment storage of sediments and floatables that are isolated from high intensity storms.
- The stormwater treatment unit(s) head loss at the Peak Design Flow Rate shall not exceed the head loss specified by the engineer.
- The unit shall be designed to remove sediment particles as well as floating oils and debris.

## Installation

Installation of the Stormwater Treatment Unit(s) shall be performed per manufacturer's installation instructions. Such instructions can be obtained by calling 800-229-7283 or online at [adspipe.com](http://adspipe.com).