MEMORANDUM

DATE: April 13, 2021

TO: Kari Parsons, PCD-Project Manager

FROM: Jeff Rice, PCD-Engineering
719-520-7877

SUBJECT: PUDSP-20-005 – Falcon Meadows at Bent Grass (with EGP)
Third Submittal

Engineering Division
Planning and Community Development (PCD)-Engineering reviews plans and reports to ensure general conformance with El Paso County standards and criteria. The project engineer is responsible for compliance with all applicable criteria, including other governmental regulations. Notwithstanding anything depicted in the 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 (LDC), the Engineering Criteria Manual (ECM), the Drainage Criteria Manual (DCM), and the Drainage Criteria Manual Volume 2 (DCM2). Any deviations from regulations and standards must be requested, and approved by the ECM Administrator, in writing. Any modifications necessary to meet overlooked criteria after-the-fact will be entirely the developer's responsibility to rectify.

The comments include unresolved previous comments and new comments resulting from the re-submittal in ***bold italic***. All previous comments that have been resolved have been noted or deleted. A written response to all comments and redlines is required for review of the re-submittal. Please arrange a meeting between the developer's team and County staff to review and discuss these comments and prepared revisions/responses prior to the next submittal. **Additional comments may be generated on items added or revised after the original comments.**

General/Letter of Intent – Resolved.

PUD/Preliminary Plan

1. See PUD/SP redlines. ***Partially resolved; see remaining redlines.***
   Response: Addressed redlines. Responses are shown on the attached redline plans.
2. **Resolved.**
3. Verify whether sight distance lines are needed in the corners of Lots 38, 39, 52, 183, and 253; show the easements if needed. **Address in a comment response letter.** ***Unresolved.***
   Response: Easements have been added at knuckle locations per county detail (Urban Low Volume Knuckle) to meet STD distance.
4. **Resolved.**
5. ***Resolved.***
6. Provide maintenance access roads for the main channel and the rear lot swales in accordance with DCM1 requirements. ***Resolved.*** Access to the swale areas needs to be included in the PBMP agreement and addressed in the O&M manual. ***Partially resolved; see O&M redlines.***

Response: Redlines in the O and M plan have been addressed. See attached redline responses.

7. through 9 – Resolved.
10. Note for final design: Reference the newly adopted ECM revisions applying to ADA design, draft version with resolution here: ECM Chapter 6: ftp://EPCDOT_FilesIn:EPC-PSD-DOTin@elpxfr.elpasoco.com:51171/Temp_PCD/ADA_ECM ***(It appears that some corners could have grade issues in meeting ADA standards.)***
    Response: Fine Grading will be addressed with Construction Drawings. Corners/intersections will be designed to be ADA compliant.

Transportation / Traffic Impact Study – Resolved.

MDDP

Response: MDDP is being addressed under a separate cover and will submitted individually to County staff.

(Review remains cursory due to the additional information required regarding downstream channel improvements.)

1. County maintenance and drainage fee reimbursement for constructed improvements will be dependent on Drainage Board approval of a DBPS addendum. It is recommended that an information package be assembled for initial Drainage Board consideration. The information package/addendum will be needed to reconcile DBPS costs/reimbursements and fee adjustments. Some information was provided in the MDDP; the process in the DCM needs to be followed for documentation (reference DCM Sections 1.7 and 3.3). Please discuss with PCD-Engineering staff.
2. See MDDP redlines. ***See updated/remaining redlines.***
    Response:
3. *Include the Pond WU HEC-HMS and Stage-storage-discharge pages from the FDR and the FDR developed drainage plan (for information) (unresolved) in the MDDP. The Proposed Drainage Plan in the MDDP should be updated to include current planning information (drainage tracts). Partially resolved; see updated redlines.* Unresolved. ***Include the stage-storage-discharge tables used for Pond WU and Meadows Pond #2 in the MDDP.***
    Response: Stage-storage-discharge information included for Pond WU and Meadows Pond 2 (UDFCD Detention spreadsheets for each pond configuration included in Appendix B-Hydrology following HMS Models).
4. Provide HEC-HMS modeling for the Pond WU inflows and outflows with the proposed development and outlet structure revisions. Resolved (model will be reviewed with the next MDDP submittal).
5. ***Resolved.***
6. Provide conceptual channel cross-sections and drop/check structure design (from the diversion channel confluence north of Bent Grass Meadows Drive to the existing improvements upstream of Woodmen Road) on the developed drainage plans. Provide a channel plan and profile. ***It is unclear what the proposed channel improvements are; if there are increased flows in the channel from the DBPS (~1,200 cfs vs ~910 cfs?) it seems that additional improvements may be needed. (If not, are the DBPS improvements proposed unchanged?) This issue needs to be addressed in more detail in the MDDP, along with proposed timing of these channel improvements.***
    Response: No changes to channel improvements from those shown conceptually in approved DBPS by Matrix. DBPS flows exiting Bent Grass development at JWT200 (confluence of channel reaches 202 and 204 into Reach 210) is 1200 cfs. Updated MDDP HMS model has a proposed flow 1041 cfs at JWT200. On site

channel improvements will be shown in corresponding Final Drainage Report for the filing which will contain the channel improvements.

7. Regarding construction phasing and responsibilities for the main West Tributary channel (RWT204 and RWT210) (which is reimbursable under the DBPS and can offset drainage fees):
    a. ***Resolved.***
    b. Concurrence or agreement between the owners on construction phasing and district maintenance until completion will be required. ***Unresolved; a formal agreement will be required; provide documentation from the subject owners and the district that all have no objections to an agreement.***

    Response: Since flows exiting Bent Grass property are less than the approved DBPS flows, channel improvements south of the property will be dealt with by individual property owners as each parcel develops and will be the responsibility of that owner/developer.

    c. ***Resolved.***
    d. ***Provide the cost estimate showing a total of ~$1,950,000 as in the cost-sharing table. Update if necessary.***

    Response: As each property owner/parcel will be responsible for channel improvements through their property, cost sharing table will not be needed at this time.

<u>Preliminary Drainage Report / Drainage Plans</u>

Note: this review ~~is~~ ***remains*** *cursory due to the need for additional information in the PDR.*

1. ~~Provide the MDDP for completion with this project.~~ Discuss the MDDP analysis and recommendations in the PDR, specifically in regard to impacts to the onsite and downstream channel, its capacity, DBPS-recommended improvements and necessary improvements. Unresolved. ***Unresolved (See MDDP comments #6 and 7 above).***
   Response: Flows exiting site in channel are less than those in the approved DBPS, channel improvements south of Bent Grass property will be handled by individual property owners if/when parcels develop.
2. See PDR/FDR redlines. ***Partially resolved; see remaining/updated redlines.***
   Response: See attached redlines with responses.
3. **Resolved.**
4. **Resolved.**
5. ***Resolved.***
6. Provide a statement that all proposed developed areas will be treated by the WQCV ponds or describe any areas that won't be and show those areas on a separate WQVV/MS4 plan. ***(see redlined plan)*** Unresolved – the statement was made but this is not reflected on the drainage plans. ***There is still a developed area proposed not to be treated; it does not appear that there is justification for this (see redlines).***
   Response: If swale is built at back of lots, there is not room for a swale and maintenance access and lots to grade appropriately. If swale is built, there would be no maintenance access to the swale.
7. Provide complete FSD design worksheets. Since the proposed south FSD pond will be treating already-developed areas (Bent Grass Meadows Drive), the pond outlet structure should also be designed and installed with pre-development site grading; provide complete design. **Partially resolved; provide complete design (with interim orifice plate *or orifice riser pipe* if desired) with the EGP GEC plans. The TSB can be within the pond in the interim *as long as the required drain times are met (provide calculations*).**
   Response: During the early grading/interim phase, the developed Bent Grass Meadows Drive will not be diverted to the interim (temporary) sediment basin,

which will become the final South Pond (water quality pond). The interim basin will only treat flows for Falcon Meadows Filing No. 2. The final water quality facility (South Pond) will treat flows from Bent Grass Meadows Drive. The temporary sediment basin at the eastern corner of BGMD and the south property line (as shown in Bent Grass Filing No. 2) will remain in place to treat BGMD treated flows until the final South Pond FSD is constructed. Calculations for the temporary sediment basin at BGMD has been provided. Outlet hole configuration will be confirmed with Falcon Meadows Filing No. 1 GEC Plan set, as if basin was 7built per Sed Basin detail SC-7, an additional outlet hole may need to be installed to ensure drain time.

8. Address spillway design and FSD pond freeboard. Show the 100-year water surface elevations in the ponds and the channel. **Partially resolved;**
    a. ***Resolved.***
    b. **The channel WSEs need to be shown. Provide a preliminary channel profile with the MDDP hydraulic modeling.** ***Unresolved.***

    Response: Preliminary profile of channel improvements through site have been added, which includes 100-year water surface.
9. **Resolved.**
10. **Resolved.**
11. Provide channel and swale cross-sections and drop/check structure design on the plan. Provide a channel plan and profile. **Unresolved.**
    Response: Preliminary profile of channel improvements through site have been added, which includes 100-year water surface. Drop structure detail from DBPS has been included in report. Final design of structures will be provided in future filing Final Drainage Report.

<u>Grading and Erosion Control Plan / Predevelopment Site Grading / SWMP</u>

1. ***through 3 - Resolved.***
4. Since the proposed south FSD pond will be treating already-developed areas (Bent Grass Meadows Drive), the pond outlet structure should also be installed and complete pond construction will be required prior to County acceptance of Bent Grass Meadows Drive; provide design details. **Unresolved.** ***(See PDR comment #7 above.)***
   Response: See response to PDR comment #7.

<u>Forms / Permits / Other</u>

1. See attached Final Engineering Checklist for required EGP approval documents.
2. Provide the signed Pre-Development Site Grading Acknowledgement form. **Unresolved.**
   Response: Signed Pre-Development Site Grading form has been provided.

3. FAE: (Not reviewed with this submittal) Include all necessary pre-development construction, including the FSD pond outlet structure and channel in Section 1 (move the channel items to Section 1 if applicable). ***Provide a cost for the pond certification. Values will be verified on the next review.***
   Response: Cost for pond certification added to form.

4. **Note: resubmittal of the utility CDs was not found.** ***(still not found)***
   Response: Approved utility plans have been included in submittal package.

5. ***The PDB/BMP Agreement submitted was for Bent Grass Residential Filing 2; update it for Falcon Meadows at Bent Grass.***

Response: PDB/BMP Applicability form was updated to Falcon Meadows at Bent Grass.

6. ***Provide the MS4 form and SDI worksheet for the interim south pond.***
   Response: MS4 form and SDI for the interim south pond has been included.

Engineering Final Submittal Checklist for Electronic Submittals	
Check Box	**Item: Report/Form**
☐☐	**MDDP and** Drainage Report (signed)
☐	PBMP Applicability Form
☒	Traffic Impact Study (signed)
☐☐	Grading & Erosion Control Plan **and checklist** (signed)
☐☐	~~**Channel** Construction Plans (signed) **(If channel construction will be done with EGP)**~~ **Utility CDs if utilities are proposed with EGP**
☐	Deviation/PUD Modification Request (signed)
☐	MS4 Post Construction Form and SDI worksheet
☐	~~Proof of embankment/pond submittal to State Engineer~~
☐	ESQCP (signed)
☐	* Financial Assurance Estimate, SIA (signed)
☐	* Pond/BMP Maint. Agreement and Easement (signed)
☐	* Operation & Maintenance Manual
☐	~~AutoCAD base drawing (submitted to DPW)~~
☐	Pre-Development Site Grading Acknowledgement and Right of Access Form (signed)
☐	Other: Offsite Easements, Other Permits (FEMA LOMR, USACE, Floodplain…), Conditions of Approval, Street light license agreement, etc.
Pre-Construction Checklist:	
☐	Driveway/Access Permit (Temporary access permits to be obtained from EPC DPW)
☐	Work Within the ROW Permit (DPW or CDOT)
☐☐	* Stormwater Management Plan (SWMP) **and checklist** Submit to PCD-Inspections 2 weeks prior to precon.
☐	* Colorado Discharge Permit (COR:_____)
☐	* County Construction Activity Permit
☐	* CDPHE APEN – (if over 25 ac. or 6 mos.)
☐	* Financial Surety (Letter of Credit/Bond/Collateral/Check)
☐	Construction Permit Fee: *Early Grading or Standalone Grading* $ **(Verify fees with Inspections Supervisor at time of scheduling)**
☐	Other:_____

* - required items to obtain an ESQCP

Permit Fee and Collateral must be separate checks

Post Construction Submittal Checklist: (ECM 5.10.6)	
☐	As-Built Drawings
☐	Pond Certification Letter
☐	Acceptance Letter for wet utilities

- ☐ = Need final / signed version
- ☒ = complete, in file
- ☐ = PCD Staff to provide
- ☐ = Undetermined at this time
- ☐ = Need later

FALCON MEADOWS AT BENT GRASS

A PARCEL OF LAND, BEING A PORTION OF THE WEST HALF OF SECTION 1, T.13S., R.65W., OF THE 6TH P.M.,

COLORADO SPRINGS, EL PASO COUNTY, STATE OF COLORADO

PUD PRELIMINARY PLAN

GENERAL PROVISIONS:

A. Authority. This PUD is authorized by Chapter 4 of the El Paso County Land Development Code, adopted pursuant to the Colorado Planned Unit Development Act of 1972, as amended.

B. Applicability. The provisions of this PUD shall run with the land. The landowners, their successors, heirs, or assigns shall be bound by this Development Plan, as amended and approved by the Planning and Community Development Director or Board of County Commissioners.

C. Adoption. The adoption of this development plan shall evidence the findings and decisions of the El Paso County Board of County Commissioners that this Development Plan for Falcon Meadows at Bent Grass is in general conformity with the El Paso County Master Plan, El Paso County Policy Plan and applicable Small Area Plan; is authorized under the provision of the El Paso County Land Development Code; and that the El Paso County Land Development Code and this development plan complies with the Colorado Planned Unit Development Act of 1972, as amended.

D. Relationship to County Regulations. The provisions of this Development Plan shall prevail and govern the development of Falcon Meadows at Bent Grass, provided, however, that where the provisions of this Development Plan do not address a particular subject, the relevant provisions of the El Paso County Land Development Code in effect at the time of the PUD plan approval (or owner acknowledge the PUD changes with the Code), or any other applicable resolutions or regulations of El Paso County, shall be applicable.

E. Enforcement. To further the mutual interest of the residents, occupants, and owners of the PUD and of the public in the preservation of the integrity of this development plan, the provisions of this plan relating to the use of land and the location of common open space shall run in favor of El Paso County and shall be enforceable at law or in equity by the County without limitation on any power or regulation otherwise granted by law.

F. Conflict. Where there is more than one provision within the development plan that covers the same subject matter, the provision which is most restrictive or imposes higher standards or requirements shall govern.

G. Maximum Level of Development. The total number of dwellings or the total commercial, business, or industrial intensity shown on the development plan for development within the specified planning areas is the maximum development requested for platting or construction (plus any approved density transfers). The actual number of dwellings or level of development may be less due to subdivision or Site Development Plan requirements, land carrying capacity, or other requirements of the Board of County Commissioners.

H. Project Tracking. At the time of any final plat application, the applicant shall provide a summary of the development, to date, to Planning and Community Development, in order to assure maximum development limits are not exceeded.

I. Overall Project Standards. The standard zoning requirements of El Paso County Land Development Code, as amended, including off-street parking, landscaping, site development, accessory and temporary uses, and use by special review and variance processes shall apply to this PUD, except as modified below.

DEVELOPMENT GUIDELINES:

A. Project Description: Falcon Meadows at Bent Grass is a planned residential community on 67.012 acres of land located on the North and South side of Bent Grass Meadows Blvd. The project is planned as a single family detached community with a range of lot sizes and contiguous common open space throughout.

USES	NOTES
PRINCIPAL USES	
DWELLINGS - SINGLE FAMILY DETACHED	
OPEN SPACE, PARKS, AND TRAILS	
RECREATION AMENITIES	SUCH AS TRAILS, WALKS, PARKS, FEILDS & COURTS, ACTIVE & PASSIVE RECREATION
FAMILY CARE HOME, CHILD CARE CENTER, OR GROUP HOME	THESE USES ARE CONTROLLED BY STATE LAW AND RULES AND REGULATIONS, AND ARE EITHER ALLOWED OR SPECIAL USES DEPENDING ON THE SPECIFIC FACILITY TYPE AND NUMBER OF RESIDENTS/ENROLLMENTS
UTILITIES, DETENTION PONDS	TO INCLUDE DETENTION FACILITIES AND ASSOCIATED ACCESS ROADS AND UTILITY LINES
ACCESSORY USES	
ANIMAL KEEPING	UP TO 4 PETS (DOGS, CATS, OR OTHER DOMESTICATED ANIMALS ARE PERMITTED). THE KEEPING OF BEES, HENS, CHICKENS, OR PIGEONS IS NOT ALLOWED.
RESIDENTIAL HOME OCCUPATION	SUBJECT TO USE-SPECIFIC DEVELOPMENT STANDARDS SET OUT IN CHAPTER 5.2.29 OF THE LAND DEVELOPMENT CODE.
SOLAR ENERGY SYSTEMS	FOR PERSONAL USE ONLY
ANTENNAS, RADIO FACILITIES, AND SATELLITE DISHES	
MAILBOXES	
BED & BREAKFAST	
STORAGE SHEDS	
TEMPORARY USES	
MODEL HOME / SUBDIVISION SALES OFFICE	
CONSTRUCTION EQUIPMENT STORAGE AND FIELD OFFICE	ONLY WHEN ASSOCIATED WITH A PERMITTED USE
YARD OR GARAGE SALES	
SPECIAL USES	
FAMILY CARE HOME, CHILD CARE CENTER, OR GROUP HOME	THESE USES ARE CONTROLLED BY STATE LAW AND RULES AND REGULATIONS, AND ARE EITHER ALLOWED OR SPECIAL USES DEPENDING ON THE SPECIFIC FACILITY TYPE AND NUMBER OF RESIDENTS/ENROLLMENTS
CMRS FACILITY - STEALTH	
ACCESSORY STRUCTURES	
ACCESSORY STRUCTURES.	ANY STRUCTURES EXCEEDING 200 SF AND REQUIRING A BUILDING PERMIT ARE NOT PERMITTED.
NOTES:	
1. ALL PERMITTED PRINCIPAL AND ACCESSORY STRUCTURES ARE SUBJECT TO THE DEVELOPMENT STANDARD OF FALCON MEADOWS AT BENT GRASS	
2. PERMITTED ACCESSORY USES ARE SUBJECT TO THE USE-SPECIFIC DEVELOPMENT STANDARD SET OUT IN CHAPTER 5.1.7 OF THE EL PASO COUNTY LAND DEVELOPMENT CODE (AS AMENDED).	
3. PERMITTED TEMPORARY USES ARE SUBJECT TO THE USE-SPECIFIC DEVELOPMENT STANDARD SET OUT IN CHAPTER 5.2.1 OF THE EL PASO COUNTY LAND DEVELOPMENT CODE (AS AMENDED).	
4. PERMITTED SPECIAL USES ARE SUBJECT TO THE USE-SPECIFIC DEVELOPMENT STANDARD SET OUT IN CHAPTER 5.2.2 OF THE EL PASO COUNTY LAND DEVELOPMENT CODE (AS AMENDED).	

B. Signs. Signs shall be permitted to identify entryways to the Falcon Meadows at Bent Grass community. The maximum size of the Community Entryway Sign shall be 100 square feet with a maximum height of (6) feet. Sign size shall be measured by drawing the smallest rectangle around the text of the sign. For double sided signs, only one sign face shall contribute to the maximum size.

C. Development Standards.
1. Maximum building height: thirty-five (35) feet
2. Maximum Lot Coverage: 40%
3. Setback minimums:
   Front: 20' Minimum
   Side: 5' Minimum (15' for corner lots)
   Rear: 7' Minimum
4. Minimum Lot Width: 35' at garage setback.
5. Minimum Lot Size: 2,800 SF
6. No projections into the tracts owned and maintained by the Bent Grass Metropolitan District will be permitted.

D. Streets. Streets within the Falcon Meadows at Bent Grass subdivision provide general vehicular circulation throughout the development. All Streets shall be paved. Sidewalks will be provided as illustrated on this plan and as required by the LDC and ECM.

E. Access Limitation: There shall be no direct vehicular access to Bent Grass Meadows Drive from any lot or tract except at these locations for maintenance purposes only: Drainage channel access on the North side of Bent Grass Meadows Drive via Tract L, and on the South side via Tract G.

F. Sight Distance Triangles: No landscaping may obstruct sight distance triangles or pedestrian facilities per Engineering Criteria Manual Reference 2.3.6.G.2 & 2.5.2.H. respectively. The minimum horizontal clearance for sidewalks around utilities structures, furniture, and other encroachments shall be 4 feet or greater to provide safe conditions for pedestrians and bicyclists per the Engineering Criteria Manual.

LEGAL DESCRIPTION

NORTH PARCEL

A PARCEL OF LAND, BEING A PORTION OF THE WEST HALF OF SECTION 1, T.13S., R.65W., OF THE 6TH P.M., COLORADO SPRINGS, EL PASO COUNTY, STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:
BASIS OF BEARING:
THE WEST LINE OF THE SOUTHWEST QUARTER OF SECTION 1, TOWNSHIP 13 SOUTH, RANGE 65 WEST OF THE 6TH PRINCIPLE MERIDIAN AND IS CONSIDERED TO BEAR N00°13'46"W:
COMMENCING AT THE SOUTHWEST QUARTER CORNER OF SAID SECTION 1; THENCE N00°13'46"E ALONG THE WEST LINE OF SAID SECTION 1, A DISTANCE OF 2429.82 FEET TO A POINT ALONG SAID WEST LINE, ALSO BEING TO the POINT OF BEGINNING:
Thence N89°46'14"E, a distance of 493.96 feet TO A POINT ON THE NORTHWESTERLY LINE OF A PARCEL OF LAND DESCRIBED AT RECEPTION NUMBER 209061972;
THENCE ALONG SAID NORTHWESTERLY LINE FOUR (4) COURSES:
1. Thence N23°44'26"E, a distance of 247.83 feet TO A POINT OF CURVATURE;
2. Thence along said curve to the right, having a radius of 605.00 feet, a central angle of 65°45'46", a distance of 694.40 feet, a chord bearing of N56°37'18"E with a chord distance of 656.91 feet;
3. Thence N89°30'12"E, a distance of 448.12 feet TO A POINT OF CURVATURE;
4. Thence along said curve to the left, having a radius of 525.00 feet, a central angle of 09°25'11", a distance of 86.31 feet, a chord bearing of N84°47'37"E with a chord distance of 86.21 feet;

Thence N07°58'52"W, a distance of 126.91 feet;
Thence N07°51'55"E, a distance of 62.94 feet;
Thence N01°11'11"W, a distance of 107.15 feet;
Thence N88°48'49"E, a distance of 14.56 feet;
Thence N65°21'22"E, a distance of 4.05 feet;
Thence N09°11'31"W, a distance of 158.90 feet TO A POINT OF NON-TANGENT CURVATURE;
Thence along said curve to the left, having a radius of 175.00 feet, a central angle of 16°15'39", a distance of 49.67 feet, a chord bearing of N72°40'39"E with a chord distance of 49.50 feet;
Thence N84°32'49"E, a distance of 36.42 feet;
Thence N00°30'24"W, a distance of 446.99 feet TO A POINT ON THE SOUTH LINE OF THE MEADOWS filing no. 4, recorded at reception no. 200135677;
Thence with the said south line, S89°36'34"W, a distance of 1740.37 feet to the north 1/16 corner of SAID section 1, township 13 south, range 65 west;
thence WITH THE WEST LINE OF SAID SECTION 1 S00°14'14"E, a distance of 1316.12 feet to the WEST QUARTER CORNER OF SAID section 1, township 13 south, range 65 west;
Thence with the WEST LINE OF SAID SECTION 1 S00°13'46"E, a distance of 205.35 feet to the POINT OF BEGINNING.
Parcel contains 1,991,949 square feet or 45.729 acres, more or less.

SOUTH PARCEL

A PARCEL OF LAND, BEING A PORTION OF THE WEST HALF OF SECTION 1, T.13S., R.65W., OF THE 6TH P.M., COLORADO SPRINGS, EL PASO COUNTY, STATE OF COLORADO, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:
BASIS OF BEARING:
THE WEST LINE OF THE SOUTHWEST QUARTER OF SECTION 1, TOWNSHIP 13 SOUTH, RANGE 65 WEST OF THE 6TH PRINCIPLE MERIDIAN AND IS CONSIDERED TO BEAR N00°13'46"W:
COMMENCING AT THE SOUTHWEST QUARTER CORNER OF SAID SECTION 1; THENCE N00°13'46"E ALONG THE WEST LINE OF SAID SECTION 1, A DISTANCE OF 1928.67 FEET TO A POINT ALONG SAID WEST LINE, ALSO BEING THE SOUTHWEST CORNER OF A PARCEL OF LAND DESCRIBED AT RECEPTION NUMBER 21303554; THENCE WITH THE SOUTH LINE OF SAID PROPERTY DESCRIBED AT RECEPTION NUMBER 21303554, N89°47'22"E A DISTANCE OF 499.98 FEET TO A PONT ON THE EASTERLY line of a property described by quitclaim deed, recorded at reception no. 209061972 THE POINT OF BEGINNING:
THENCE ALONG SAID EASTERLY AND THE SOUTHERLY LINE SAID RECEPTION no. 209061972 THE FOLLOWING FIVE (5) COURSES:
1. Thence N00°13'46"W, a distance of 206.50 feet TO A POINT OF CURVATURE;
2. Thence along said curve to the right, having a radius of 525.00 feet, a central angle of 23°58'12", a distance of 219.64 feet, a chord bearing of N11°45'20"E with a chord distance of 218.04 feet;
3. Thence N23°44'26"E, a distance of 301.49 feet TO A POINT OF CURVATURE;
4. Thence along said curve to the right, having a radius of 525.00 feet, a central angle of 65°45'45", a distance of 602.57 feet, a chord bearing of N56°37'18"E with a chord distance of 570.04 feet;
5. Thence N89°30'12"E, a distance of 358.96 feet;

Thence S04°50'58"W, a distance of 80.18 feet;
Thence S03°12'36"E, a distance of 153.39 feet;
Thence S03°42'06"E, a distance of 84.68 feet;
Thence S12°32'06"E, a distance of 80.14 feet;
Thence S12°59'08"E, a distance of 75.20 feet;
Thence S77°46'36"W, a distance of 30.12 feet;
Thence S17°37'13"E, a distance of 160.63 feet TO A POINT OF CURVATURE;
Thence along said curve to the RIGHt, having a radius of 1840.12 feet, a central angle of 08°44'32", a distance of 280.77 feet, a chord bearing of S10°08'34"E with a chord distance of 280.50 feet;
Thence S04°52'53"E, a distance of 8.49 feet;
Thence S00°13'15"E, a distance of 95.50 feet;
Thence S89°47'22"W, a distance of 1111.19 feet to the Point of Beginning.

Parcel contains 927,083 square feet or 21.283 acres, more or less.

For an overall total of 67.012 acres, more or less.

County Certification
This PUD Preliminary Plan request has been reviewed and found to be complete and in accordance with the El Paso County Land Development Code, as amended, this _____ day of _____ 20___ and is hereby approved.

Director, Planning & Community Development Date

Clerk and Recorder Certification
State of Colorado)
)ss.
El Paso County)

I hereby certify that this Plan was filed in my office on this _____*(day)* of _____(*month*), 20___ at _____ o'clock a.m./p.m. and was recorded per Reception No. _____.

El Paso County Clerk and Recorder

Better Land LLC
Name of Landowner

Landowner's Signature, notarized

Ownership Certification
I/we _____ a (*Notary Public*) duly qualified, insured, or licensed by the State of Colorado, do hereby certify that I/we have examined the title of all lands depicted and described hereon and that title to such land is owner in fee simple by _____ at the time of this application.

Notarized signature

OR Name of Attorney and registration number

Challenger Communities LLC
Name of Landowner

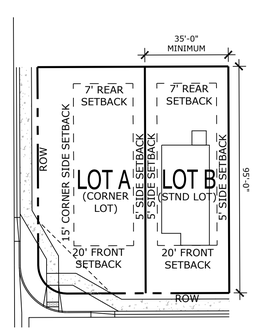
Landowner's Signature, notarized

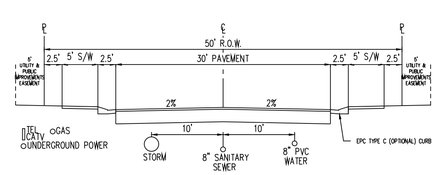
Ownership Certification
I/we _____ a (*Notary Public*) duly qualified, insured, or licensed by the State of Colorado, do hereby certify that I/we have examined the title of all lands depicted and described hereon and that title to such land is owner in fee simple by _____ at the time of this application.

Notarized signature

OR Name of Attorney and registration number

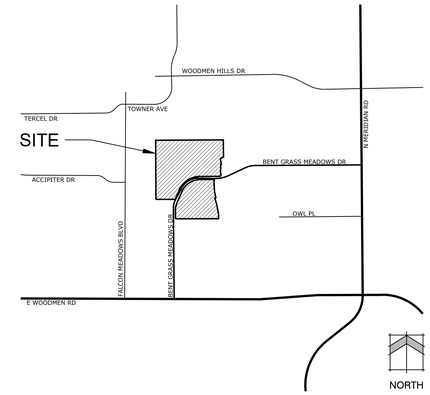
LOT TYPICAL:





TYPICAL STREET SECTION - URBAN LOCAL ROADWAY
N.T.S.

VICINITY MAP



NOT TO SCALE

SITE DATA

OWNER:	Better Land LLC. 8605 Explorer Dr. Ste 250 Colorado Springs, CO 80920	Civil Engineers: Galloway 1155 Kelly Johnson Blvd, Suite 305 Colorado Springs, CO 80920
APPLICANT:	NES Inc. 619 N Cascade Ave., Ste 200 Colorado Springs, CO 80903	
Tax ID Number:	5301000019, 5301201061, 5301201063, 5301204005, 5301000023	
Area:	67.012 acres	
Current Zoning:	PUD	
Current Land Use:	Vacant	
Proposed Land Use:	Single Family Detached Residential	
Number of Lots:	267	
Gross Density:	3.98 DU/AC	
R.O.W.	454,244 SF (10.428 acres)	
Open Space Area:	980,544 SF (22.51 acres)	
Total Lot Area:	1,484,266 SF (34.074 acres)	
Setbacks/Buffers:		
Bent Grass Meadows Drive:	10' Landscape Setback	
Northern Boundary:	50' Setback	
Western Boundary:	35' Setback	
Open Space Required =	(10% of 2,919,032 sf = 291,903 sf)	
Open Space Provided =	968,945 SF (33.19%) (Tracts A, B, C, E, F, G, H, I, J, K, L, M, O, P, Q)	
25% min. usable open space required (25% of 968,945) = 242,236 sf		
usable open space provided (Tracts A, B, C, E, F, I, J, K, L, M, O, Q) = 571,860 SF (59%)		

GENERAL NOTES

1. Facilities and common area landscape will be maintained by the Bent Grass Metropolitan District.
2. The following lots have been found to be impacted by geologic hazards. Mitigation measures and a map of the hazard area can be found in the report Soils & Geology Study by Rocky Mountain Group dated December 10, 2020 in file (PUDSP20-005) available at the El Paso County Planning and Community Development Department: Potentially Seasonally High Groundwater: 140-146, 195-202, 115-118. The builder has agreed to restrict construction to non-basement foundation types in area where groundwater is anticipated to be shallower than 14 feet below ground surface (Lots 1-91, 105-108, 133-146, 195-213, and 22-266 as presented on the Engineering and Geology Map, Figure 10), unless performance of a groundwater monitoring program at some future date indicates that the lots are suitable for basement construction.
3. The parties responsible for this plan have familiarized themselves with all current accessibility criteria and specifications and the proposed plan reflects all site elements required by the applicable ADA design standards and guidelines as published by the united states department of justice. Approval of this plan by El Paso County does not assure compliance with the ADA or any regulations or guidelines enacted or promulgated under or with respect to such laws. It is the responsibility of the developer/home builder to ensure ADA accessibility during construction of the public and private sidewalks.
4. Access Limitation: There shall be no direct lot access on Bent Grass Meadows Drive.
5. Floodplain:No structures or fences are permitted within designated "Floodplain" or "Park and Open Space" areas. This property is located within a designated FEMA Floodplain as determined by the Flood Insurance Rate Map, Community Map Number 08041C0553G, effective date December 7, 2018.
6. Easements: Unless otherwise indicated, all side, front, and rear lot lines are hereby platted on either side with a 5 foot public utility and drainage easement unless otherwise indicated. All exterior subdivision boundaries are hereby platted with a 7 foot public utility and drainage easement. The sole responsibility for maintenance of these easements is hereby vested with the individual property owners.
7. NOTICE: This property may be adversely impacted by noise, dust, fumes, and light pollution caused by adjacent industrial properties and activities. The buyer should research and be aware of this potentiality and the ramifications thereof.
8. The trails and fencing along the Northern boundary will be installed by the developer.

SHEET INDEX

PUDSP-20-005

Land Planning
Landscape Architecture
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NES
N.E.S. Inc.
619 N. Cascade Avenue, Suite 200
Colorado Springs, CO 80903
Tel. 719.471.0073
Fax 719.471.0267
www.nescolorado.com

PLANNERS · LANDSCAPE ARCHITECT

IN ASSOCIATION WITH

FALCON MEADOWS AT BENT GRASS

PUD PRELIMINARY PLAN

PROJECT INFO

DATE: 8/4/2020
PROJECT MGR: E. GANAWAY
PREPARED BY: B.SWENSON

SEAL

ISSUE INFO

DATE:	BY:	DESCRIPTION:
12/22/2020	JBS	PER COUNTY COMMENTS
01/29/2021	JBS	PER COUNTY COMMENTS
03/12/2021	JBS	PER COUNTY COMMENTS

ISSUE REVISION

SHEET TITLE

COVER

SHEET NUMBER

1

1 OF 12

PUD FILE #

ADJACENT OWNERS

#	TSN	Name	Number	Street	Suite	City	State	Zip
1	5301000016	RANDALL DEYOUNG	10925	E. HWY 24		PEYTON	CO	80831
2	5301002005	FALCON STORAGE PARTNERS	4615	NORTHPARK DR		COLORADO SPRINGS	CO	80918-3857
3	5301000018	FALCON STORAGE PARTNERS	4615	NORTHPARK DR		COLORADO SPRINGS	CO	80918-3857
4	5302001009	STERLING TRUST	7880	FALCON MEADOW BLVD		PEYTON	CO	80831-7023
5	5302001008	HARPER, JEREMY, & NICOLE JUHL	4975	FALCON MEADOW BLVD		PEYTON	CO	80831-7044
6	5302001007	CASEY & STEPHANIE JACKSON	8025	FALCON MEADOW BLVD		PEYTON	CO	80831-7017
7	5302001006	WILLIAM & SHERRI WATSON	8115	FALCON MEADOW BLVD		PEYTON	CO	80831-7008
8	5302001005	THOMAS & SALLY MILLER	8155	FALCON MEADOW BLVD		PEYTON	CO	80831-7008
9	5302001004	GAIL NORDSTROM	8225	FALCON MEADOW BLVD		PEYTON	CO	80831-7008
10	5301005033	MICHAEL & JANET FRIEND	8225	TOWNER AVE		PEYTON	CO	80831-6958
11	5301005034	RANDALL & LINDA HULSEY	8285	TOWNER AVE		PEYTON	CO	80831-6958
12	5301005035	GLENDA SOUTHARD	4950	BUCKAROO DR		COLORADO SPRINGS	CO	80918-5256
13	5301005042	JOSEPH & CAMI DEBISE	8530	VELVET ANTLER WAY		PEYTON	CO	80831-6972
14	5301005043	WILLIAM & MARIAN PARRISH	8510	VELVET ANTLER WAY		PEYTON	CO	80131-6972
15	5301000021	CHALLENGER COMMUNITIES LLC	8605	EXPLORER DR	250	COLORADO SPRINGS	CO	80920-1013
16	5301000037	CHALLENGER COMMUNITIES LLC	8605	EXPLORER DR	250	COLORADO SPRINGS	CO	80920-1013

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ISSUE REVISION

SHEET TITLE

OVERALL SITE PLAN/ ADJACENT PROPERTY OWNERS

SHEET NUMBER

2

2 OF 12

PLAN FILE #

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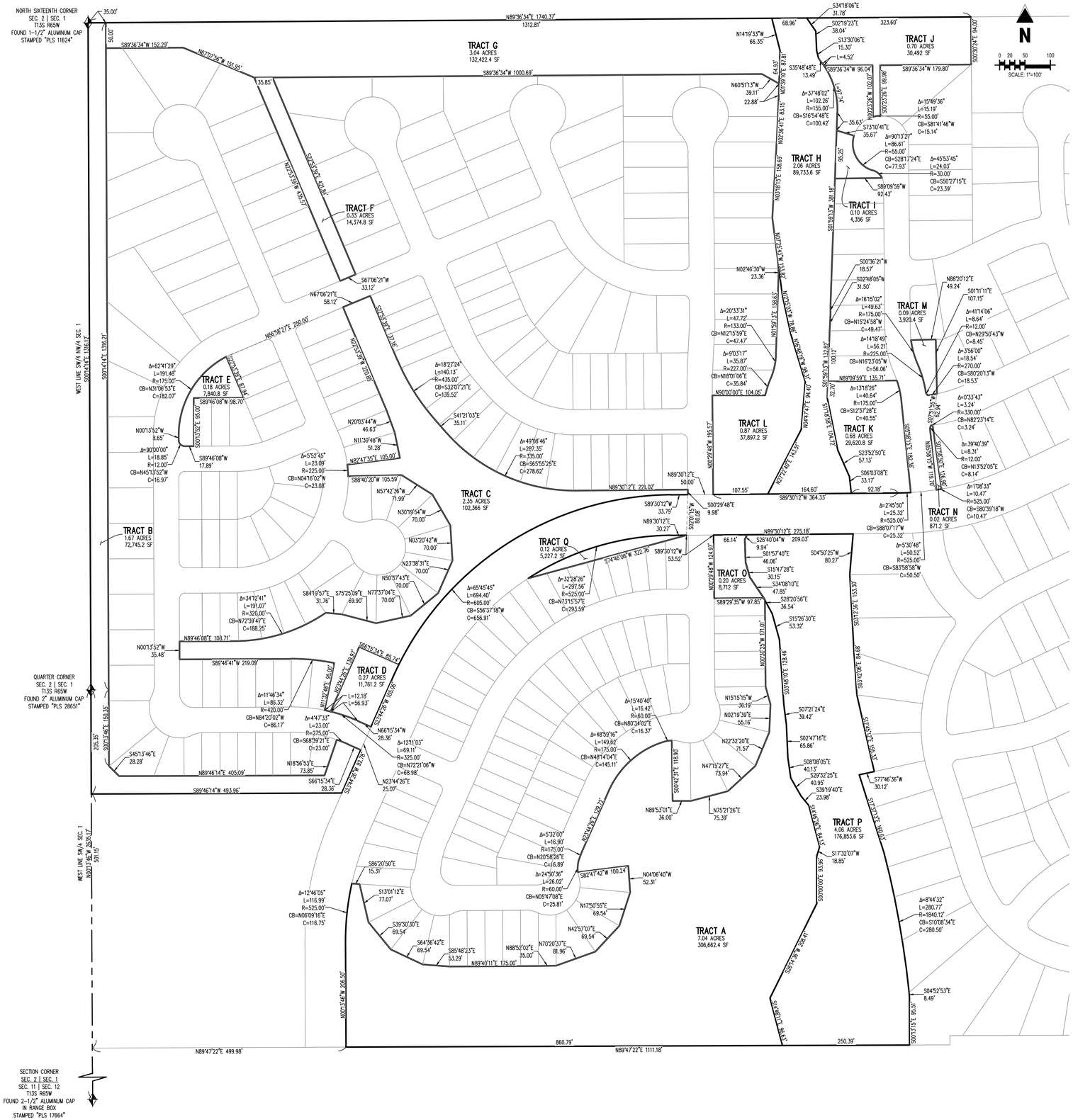

TRACT TABLE

TRACT	SIZE	USE	OWNERSHIP	MAINTENANCE
A	306,662.4 SF	Open space, public access, public utilities, drainage, trail, park,	Bent Grass Metropolitan District	Bent Grass Metropolitan District
B	72,745.2 SF	Open space, public access, public utilities, drainage	Bent Grass Metropolitan District	Bent Grass Metropolitan District
C	102,366 SF	Open space, public access, public utilities, drainage, trail	Bent Grass Metropolitan District	Bent Grass Metropolitan District
D	11,761.2 SF	Well Site, associated district water/waste water improvements.	Bent Grass Metropolitan District	Bent Grass Metropolitan District
E	7,840.4 SF	Open space, public access, public utilities, drainage, trail	Bent Grass Metropolitan District	Bent Grass Metropolitan District
F	14,374.8 SF	Open space, public access, public utilities, drainage, drainage channel access road	Bent Grass Metropolitan District	Bent Grass Metropolitan District
G	132,422.4 SF	Open space, public access, public utilities, drainage, trail	Bent Grass Metropolitan District	Bent Grass Metropolitan District
H	89,733.6 SF	Open space, public access, public utilities, Falcon W. Trib Channel	Bent Grass Metropolitan District (To Transfer to El Paso County)	Bent Grass Metropolitan District (To Transfer to El Paso County)
I	4,356 SF	Open space, public access, drainage	Bent Grass Metropolitan District	Bent Grass Metropolitan District
J	30,492 SF	Open space, public access, public utilities, drainage	Bent Grass Metropolitan District	Bent Grass Metropolitan District
K	29,620.8 SF	Open space, public access, public utilities, drainage	Bent Grass Metropolitan District	Bent Grass Metropolitan District
L	37,897.2 SF	Open space, public access, public utilities, drainage, trail	Bent Grass Metropolitan District	Bent Grass Metropolitan District
M	3,920.4 SF	Open space, public access, public utilities, drainage	Bent Grass Metropolitan District	Bent Grass Metropolitan District
N	871.2 SF	Open space, public access, public utilities, drainage	Bent Grass Metropolitan District	Bent Grass Metropolitan District
O	8,712 SF	Open space, public access, public utilities, drainage	Bent Grass Metropolitan District	Bent Grass Metropolitan District
P	176,853.6 SF	Open space, public access, public utilities, drainage, Falcon W. Trib Channel	Bent Grass Metropolitan District (To Transfer to El Paso County)	Bent Grass Metropolitan District (To Transfer to El Paso County)
Q	5,227.2 SF	Open space, public access, public utilities, drainage, sight visibility	Bent Grass Metropolitan District	Bent Grass Metropolitan District

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CHALLENGER HOMES

PUD PRELIMINARY PLAN
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNITIES, LLC

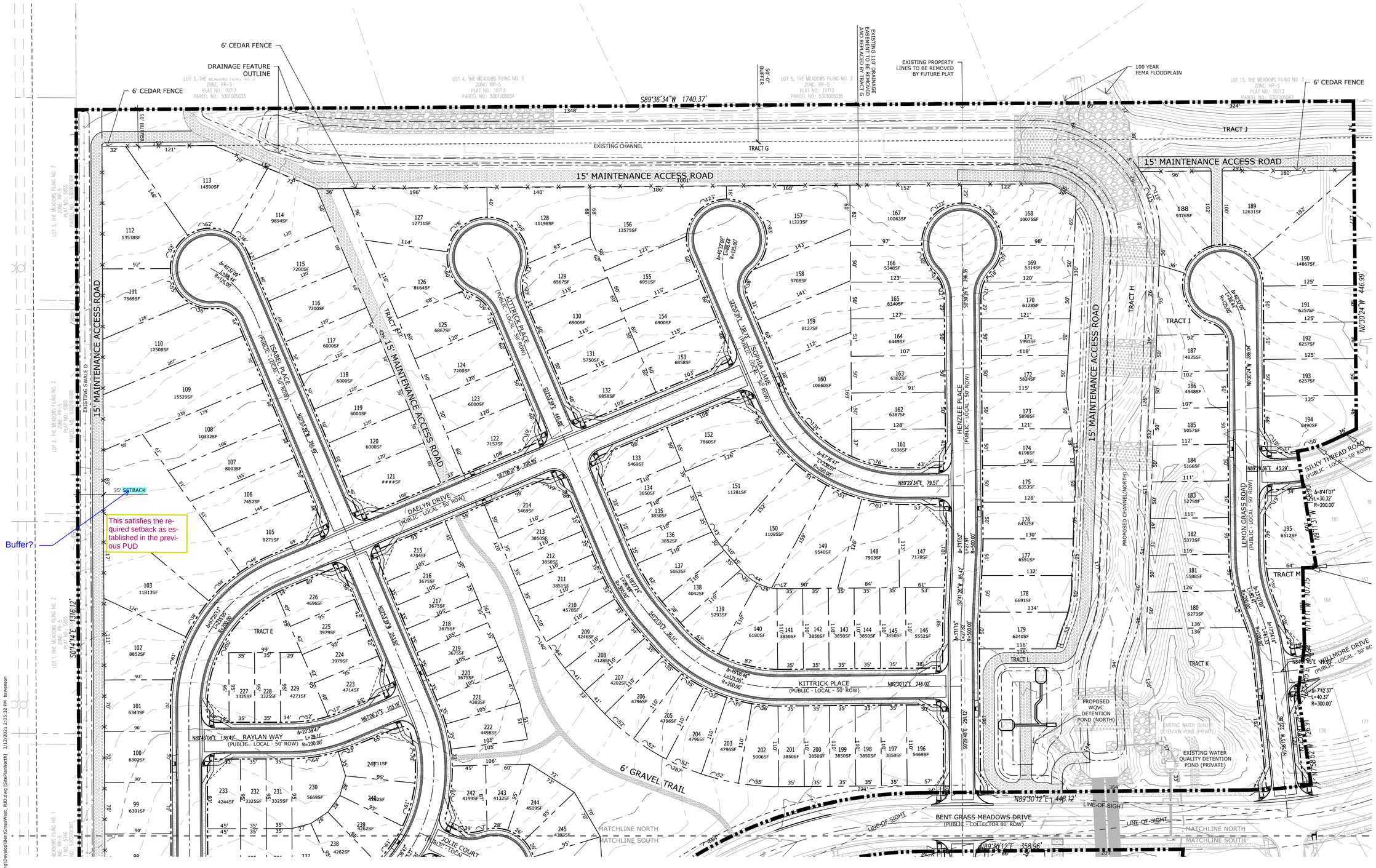
BENT GRASS MEADOWS DRIVE & MERDIAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	03/11/21

TRACT PLAN

C2.0



NORTH

0 30 60 120

SCALE: 1" = 60'

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PLANNERS · LANDSCAPE ARCHITECTS

IN ASSOCIATION WITH

FALCON MEADOWS AT BENT GRASS

PUD PRELIMINARY PLAN

PROJECT INFO

DATE: 8/4/2020
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PREPARED BY: B.SWENSON

SEAL

ISSUE INFO

DATE:	BY:	DESCRIPTION:
12/22/2020	JBS	PER COUNTY COMMENTS
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03/12/2021	JBS	PER COUNTY COMMENTS

ISSUE REVISION

SHEET TITLE

SITE PLAN NORTH

SHEET NUMBER

4

4 OF 12

PLAN FILE #

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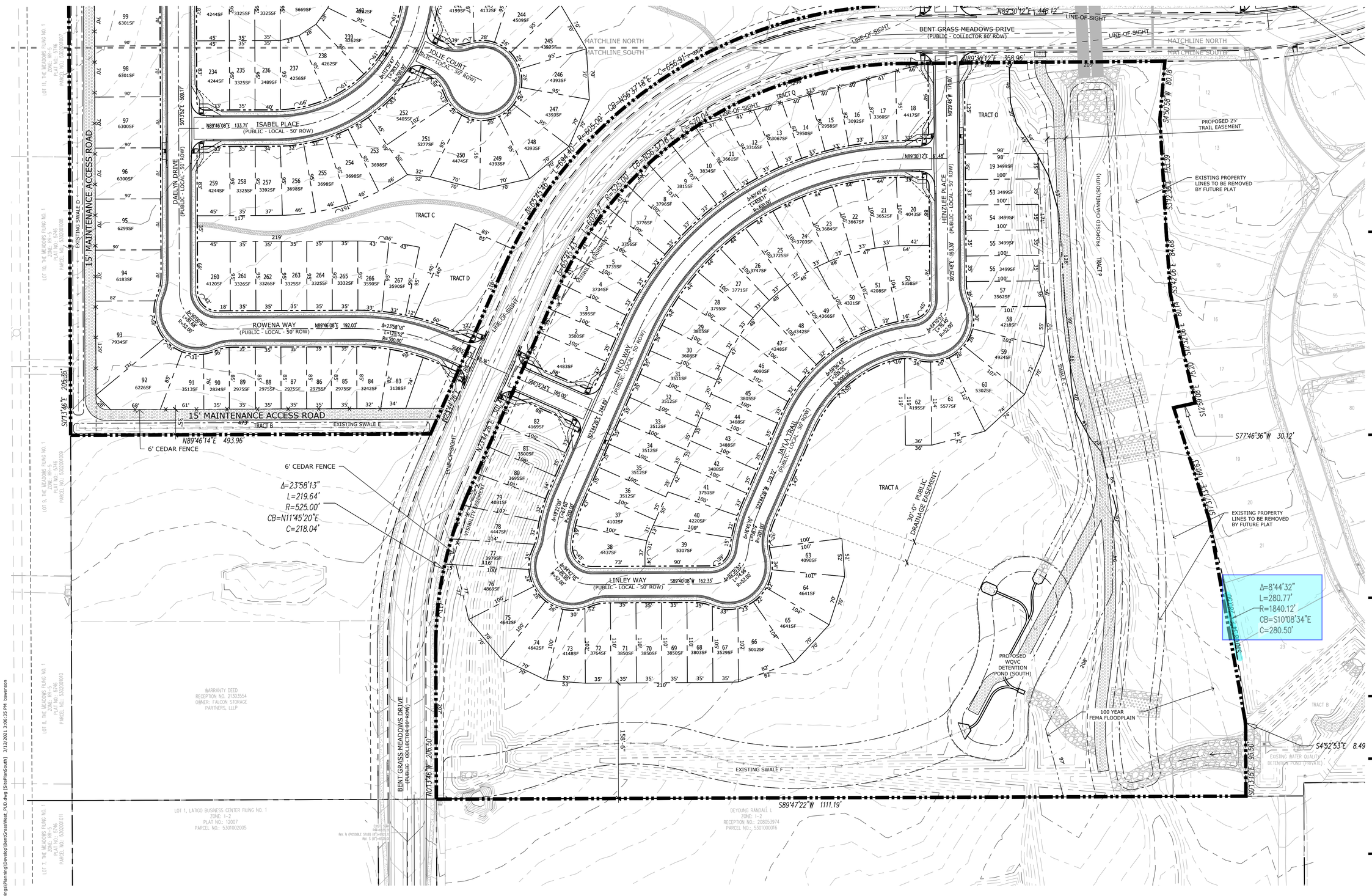

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01/29/2021	JBS	PER COUNTY COMMENTS
03/12/2021	JBS	PER COUNTY COMMENTS

ISSUE REVISION

SHEET TITLE

SITE PLAN SOUTH

SHEET NUMBER

5

5 OF 12

PLAN FILE #

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NOTE

1. ADD 6900 TO ALL SPOT ELEVATIONS

BASIS OF BEARINGS

ALL BEARINGS ARE GRID BEARINGS OF THE COLORADO STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM 1983. THE BEARING OF THE LINE BETWEEN THE SOUTHWEST CORNER OF SECTION 1, T13S, R65W AND THE WEST QUARTER CORNER SECTION 1, T13S, R65W IS N00°13'46"W AND MONUMENTED AS SHOWN.

BENCHMARK

THE SOUTHWESTERLY CORNER OF LOT 1 WOODMEN HILLS FILING NO. 4, MONUMENTED BY A YELLOW PLASTIC SURVEYORS CAP ON A NO. 4 REBAR LS# 24954 ELEVATION = 6947.67

CAUTION – NOTICE TO CONTRACTOR

1. ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE FIELD LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
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811 Know what's **below.** **Call** before you dig.

N

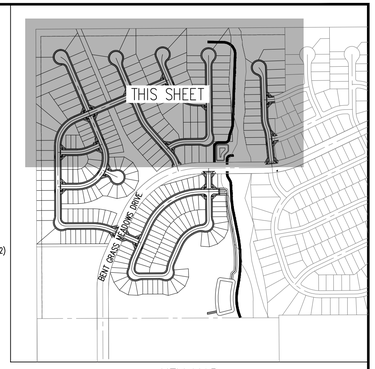
SCALE: 1"=60'

LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE TO BE REMOVED
- PROPOSED PROPERTY LINE
- PROPOSED RIGHT OF WAY LINE
- EXISTING LOT LINE
- PROPOSED LOT LINE
- EXISTING 100-YEAR FLOODPLAIN
- PROPOSED SWALE W/ FLOW DIRECTION
- EXISTING SWALE W/ FLOW DIRECTION
- PROPOSED DRAINAGE FEATURE OUTLINE
- EXISTING DRAINAGE FEATURE OUTLINE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- EXISTING SUBDIVISION BUFFER
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED CONTOUR
- PROPOSED CONTOUR
- EXISTING STORM DRAIN PIPE
- PROPOSED STORM DRAIN PIPE
- PROPOSED CONCRETE PAVING
- PROPOSED CDOT CLASS 6 GRAVEL
- PROPOSED RIP RAP
- PROPOSED GROUTED BOULDERS
- EXISTING CONCRETE PAVING
- EXISTING CDOT CLASS 6 GRAVEL
- EXISTING RIP RAP
- EXISTING GROUTED BOULDERS
- 113 PROPOSED LOT #
- 161 EXISTING LOT # (BENT GRASS FILING NO. 2)
- PROPOSED ADA RAMP
- 55.00 HP SPOT ELEVATION – HIGH POINT
- 55.00 LP SPOT ELEVATION – LOW POINT
- 55.00 FG SPOT ELEVATION – FINISH GRADE
- 2.00% EXISTING SLOPE (PERCENT)
- 4:1 EXISTING SLOPE (RISE:RUN)
- 2.00% PROPOSED SLOPE (PERCENT)
- 4:1 PROPOSED SLOPE (RISE:RUN)

All Curb & Gutter turned on

Show all curb and gutter



KEY MAP
SCALE: 1"=500'

MATCHLINE SHEET C2.2

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PRELIMINARY
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CHALLENGER HOMES

PUD PRELIMINARY PLAN
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNTIES, LLC

BENT GRASS MEADOWS DRIVE & MERDIAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

A swale is needed to convey flow to the WQ pond

Swale was provided as far north as possible to drain to proposed pond. Swale & maintenance access both do not fit along the channel. See comment letter for further explanation.

Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	02/09/2021

PRELIMINARY GRADING PLAN

C2.1

NOTE

1. ADD 6900 TO ALL SPOT ELEVATIONS

BASIS OF BEARINGS

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BENCHMARK

THE SOUTHWESTERLY CORNER OF LOT 1 WOODMEN HILLS FILING NO. 4, MONUMENTED BY A YELLOW PLASTIC SURVEYORS CAP ON A NO. 4 REBAR LS# 24954 ELEVATION = 6947.67

CAUTION – NOTICE TO CONTRACTOR

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811 Know what's **below.** **Call** before you dig.

N

0 10 30 60
SCALE: 1"=60'

LEGEND

EXISTING PROPERTY LINE	EXISTING STORM DRAIN PIPE
EXISTING PROPERTY LINE TO BE REMOVED	PROPOSED STORM DRAIN PIPE
PROPOSED PROPERTY LINE	PROPOSED CONCRETE PAVING
PROPOSED RIGHT OF WAY LINE	PROPOSED CDOT CLASS 6 GRAVEL
EXISTING LOT LINE	PROPOSED RIP RAP
PROPOSED LOT LINE	PROPOSED GROUTED BOULDERS
100YR EXISTING 100-YEAR FLOODPLAIN	EXISTING CONCRETE PAVING
PROPOSED SWALE W/ FLOW DIRECTION	EXISTING CDOT CLASS 6 GRAVEL
EXISTING SWALE W/ FLOW DIRECTION	EXISTING RIP RAP
PROPOSED DRAINAGE FEATURE OUTLINE	EXISTING GROUTED BOULDERS
EXISTING DRAINAGE FEATURE OUTLINE	113 PROPOSED LOT #
EXISTING EASEMENT	161 EXISTING LOT # (BENT GRASS FILING NO. 2)
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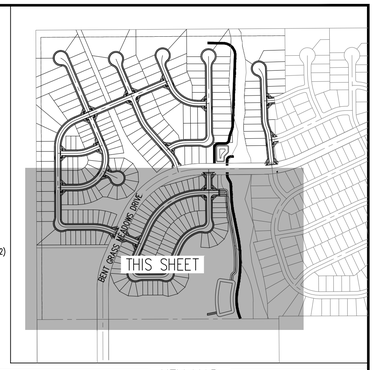
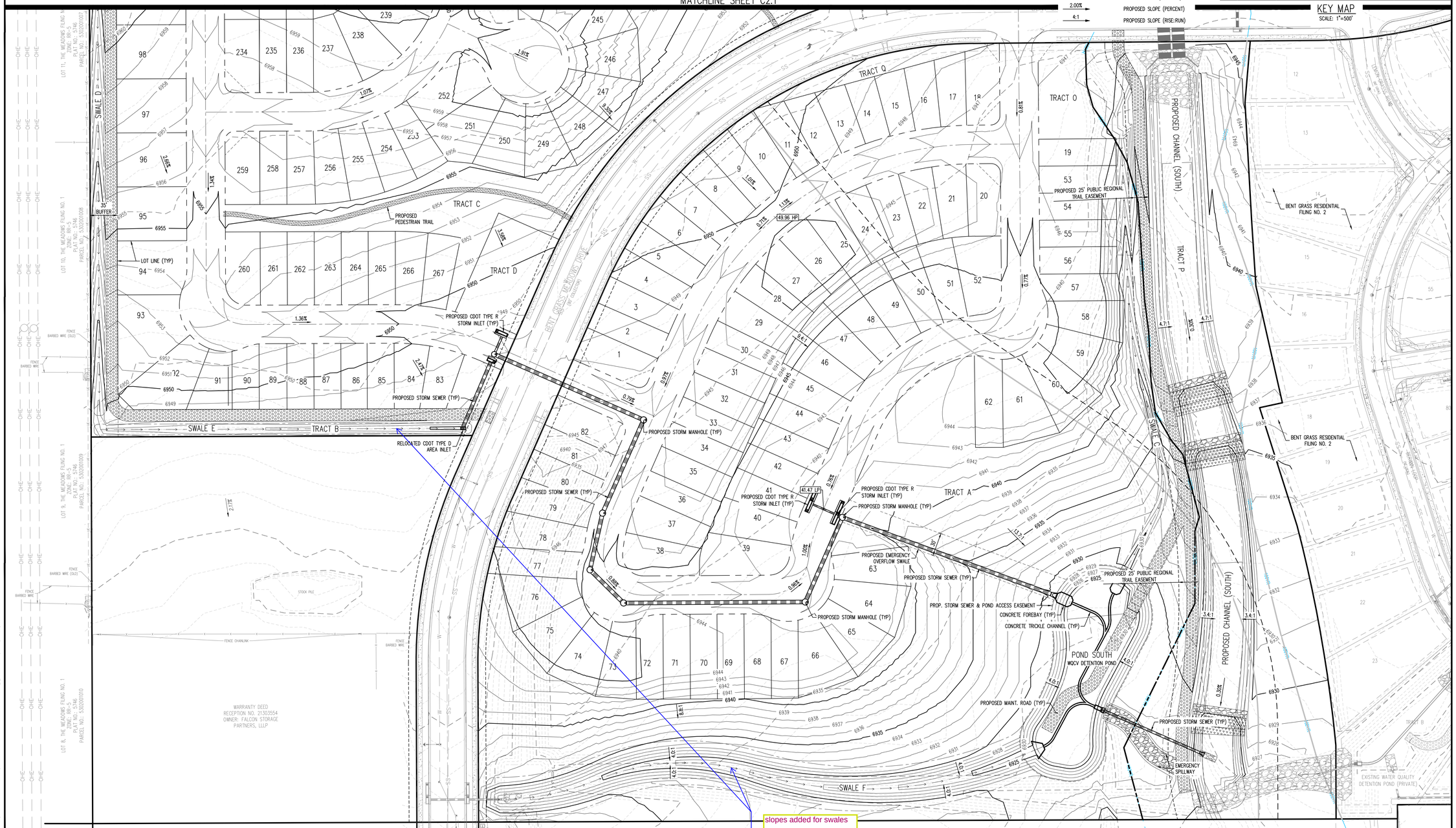
6940 EXISTING MAJOR CONTOUR	55.00 LP SPOT ELEVATION – LOW POINT
6941 EXISTING MINOR CONTOUR	55.00 FG SPOT ELEVATION – FINISH GRADE
6940 PROPOSED MAJOR CONTOUR	2.00% EXISTING SLOPE (PERCENT)
6939 PROPOSED MINOR CONTOUR	4:1 EXISTING SLOPE (RISE:RUN)
	2.00% PROPOSED SLOPE (PERCENT)
	4:1 PROPOSED SLOPE (RISE:RUN)



KEY MAP
SCALE: 1"=500'

MATCHLINE SHEET C2.1



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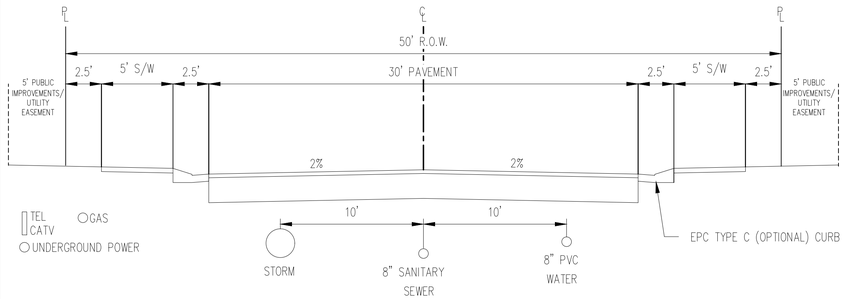
#	Date	Issue / Description	Init.

Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	02/09/2021

PRELIMINARY GRADING PLAN

C2.2



TYPICAL STREET SECTION – URBAN LOCAL ROADWAY
N.T.S.

BASIS OF BEARINGS

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BENCHMARK

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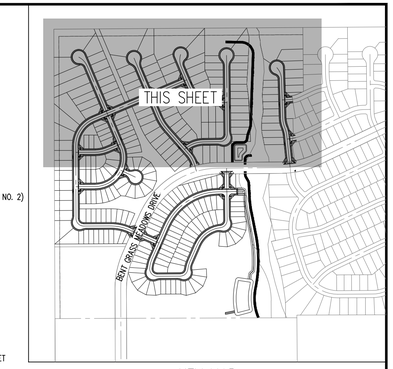
811 Know what's **below.** **Call** before you dig.

N

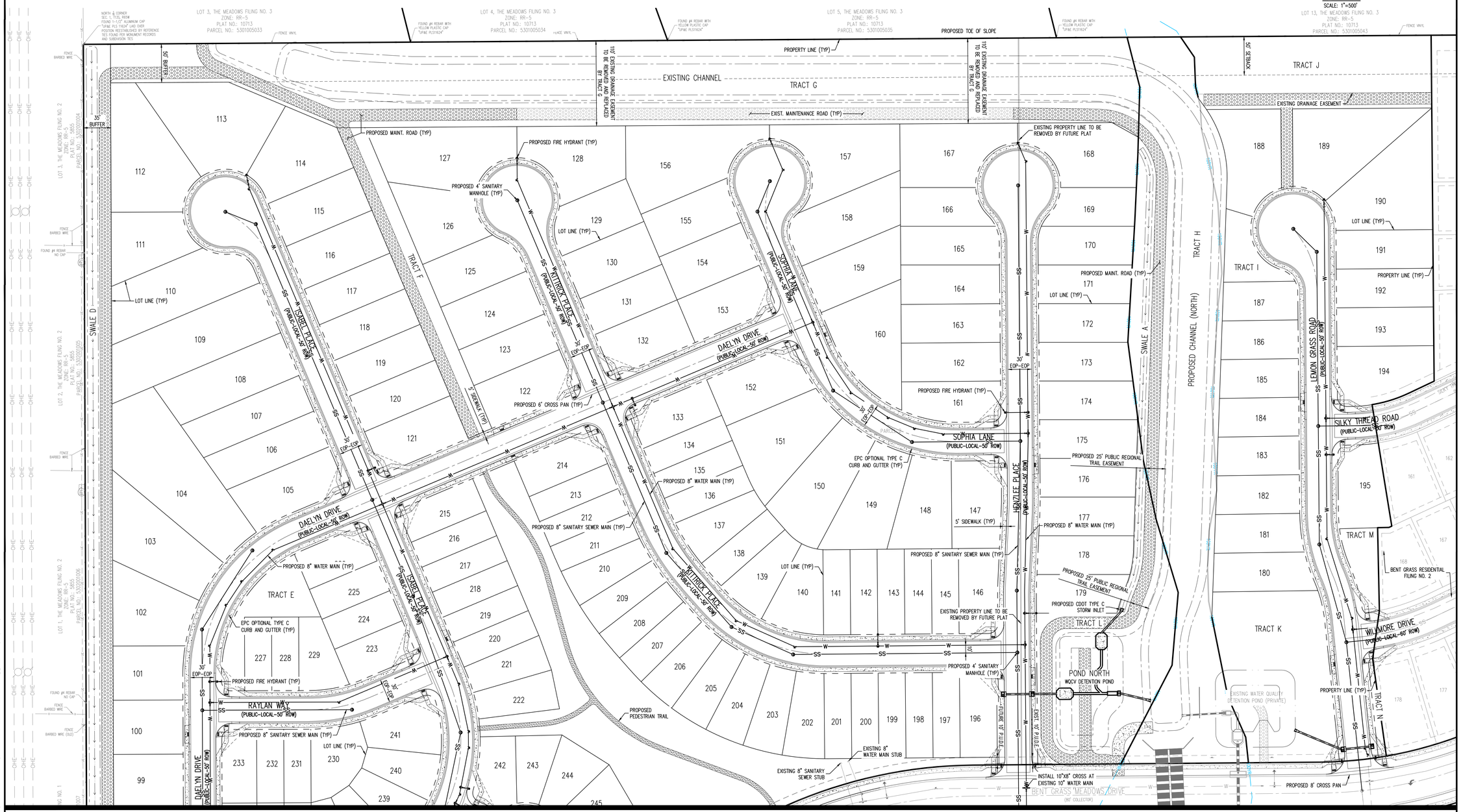
0 10 30 60
SCALE: 1"=60'

LEGEND

EXISTING PROPERTY LINE	PROPOSED STORM DRAIN PIPE
EXISTING PROPERTY LINE TO BE REMOVED	PROPOSED WATER LINE
PROPOSED PROPERTY LINE	PROPOSED SANITARY SEWER LINE
PROPOSED RIGHT OF WAY LINE	PROPOSED CONCRETE PAVING
EXISTING LOT LINE	PROPOSED CDOT CLASS 6 GRAVEL
PROPOSED LOT LINE	EXISTING CONCRETE PAVING
EXISTING 100-YEAR FLOODPLAIN	EXISTING CDOT CLASS 6 GRAVEL
PROPOSED SWALE W/ FLOW DIRECTION	113 PROPOSED LOT #
EXISTING SWALE W/ FLOW DIRECTION	161 EXISTING LOT # (BENT GRASS FILING NO. 2)
PROPOSED DRAINAGE FEATURE OUTLINE	PROPOSED ADA RAMP
EXISTING DRAINAGE FEATURE OUTLINE	PROPOSED FIRE HYDRANT
EXISTING EASEMENT	PROPOSED GATE VALVE
PROPOSED EASEMENT	PROPOSED REDUCER
EXISTING SUBDIVISION BUFFER	PROPOSED WATER BEND/TEE
EXISTING STORM DRAIN PIPE	PROPOSED SANITARY MANHOLE
EXISTING WATER LINE	PROPOSED FES
EXISTING SANITARY SEWER LINE	PROPOSED STORM MANHOLE
EXISTING OVERHEAD ELECTRIC LINE	PROPOSED CDOT TYPE R STORM INLET
EXISTING UNDERGROUND ELECTRIC LINE	



KEY MAP
SCALE: 1"=500'



MATCHLINE SHEET C3.2

Galloway
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

CHALLENGER HOMES

PUD PRELIMINARY PLAN
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNITIES, LLC

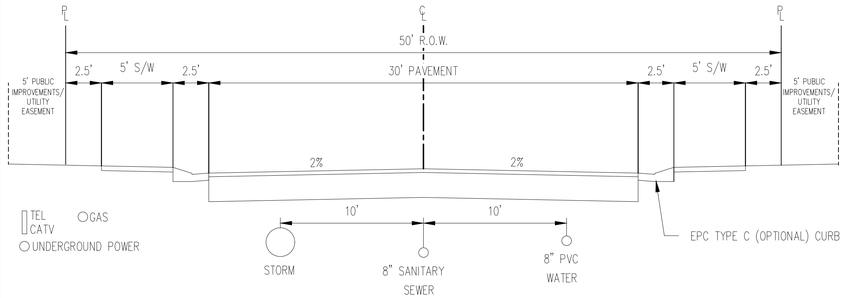
BENT GRASS MEADOWS DRIVE & MERIDIAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	02/09/2021

PRELIMINARY UTILITY PLAN

C3.1
Sheet 8 of 12



TYPICAL STREET SECTION – URBAN LOCAL ROADWAY
N.T.S.

BASIS OF BEARINGS

ALL BEARINGS ARE GRID BEARINGS OF THE COLORADO STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM 1983. THE BEARING OF THE LINE BETWEEN THE SOUTHWEST CORNER OF SECTION 1, T13S, R65W AND THE WEST QUARTER CORNER SECTION 1, T13S, R65W IS N00°13'46"W AND MONUMENTED AS SHOWN.

BENCHMARK

THE SOUTHWESTERLY CORNER OF LOT 1 WOODMEN HILLS FILING NO. 4, MONUMENTED BY A YELLOW PLASTIC SURVEYORS CAP ON A NO. 4 REBAR LS# 24954 ELEVATION = 6947.67

CAUTION – NOTICE TO CONTRACTOR

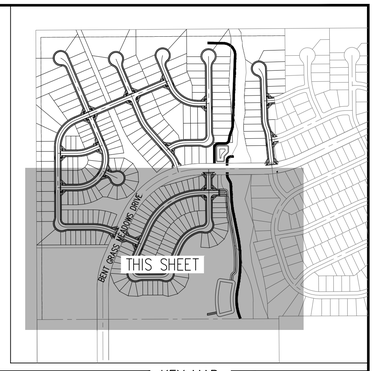
1. ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE FIELD LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POTHOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

811 Know what's below. Call before you dig.

N
0 10 30 60
SCALE: 1"=60'

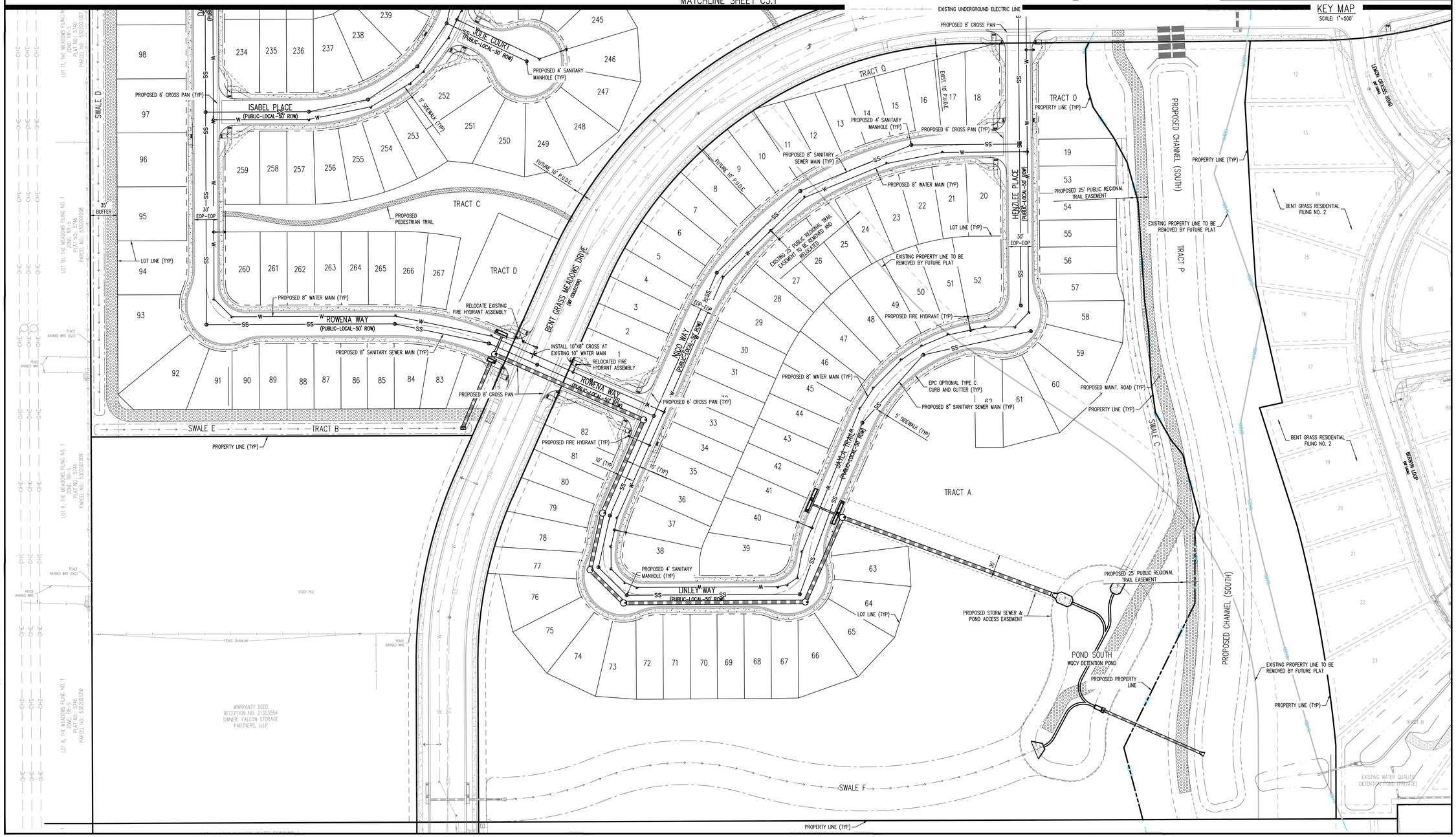
LEGEND

- EXISTING PROPERTY LINE
- EXISTING PROPERTY LINE TO BE REMOVED
- PROPOSED PROPERTY LINE
- PROPOSED RIGHT OF WAY LINE
- EXISTING LOT LINE
- PROPOSED LOT LINE
- EXISTING 100-YEAR FLOODPLAIN
- PROPOSED SWALE W/ FLOW DIRECTION
- EXISTING SWALE W/ FLOW DIRECTION
- PROPOSED DRAINAGE FEATURE OUTLINE
- EXISTING DRAINAGE FEATURE OUTLINE
- EXISTING EASEMENT
- PROPOSED EASEMENT
- EXISTING SUBDIVISION BUFFER
- EXISTING STORM DRAIN PIPE
- EXISTING WATER LINE
- EXISTING SANITARY SEWER LINE
- EXISTING OVERHEAD ELECTRIC LINE
- EXISTING UNDERGROUND ELECTRIC LINE
- PROPOSED STORM DRAIN PIPE
- PROPOSED WATER LINE
- PROPOSED SANITARY SEWER LINE
- PROPOSED CONCRETE PAVING
- PROPOSED CDOT CLASS 6 GRAVEL
- EXISTING CONCRETE PAVING
- EXISTING CDOT CLASS 6 GRAVEL
- PROPOSED LOT #
- PROPOSED ADA RAMP
- PROPOSED FIRE HYDRANT
- PROPOSED GATE VALVE
- PROPOSED REDUCER
- PROPOSED WATER BEND/TEE
- PROPOSED SANITARY MANHOLE
- PROPOSED FES
- PROPOSED STORM MANHOLE
- PROPOSED CDOT TYPE R STORM INLET



KEY MAP
SCALE: 1"=500'

MATCHLINE SHEET C3.1



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FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	02/09/2021

PRELIMINARY UTILITY PLAN

C3.2
Sheet 9 of 12

FALCON MEADOWS AT BENT GRASS

EL PASO COUNTY, COLORADO

PUD PRELIMINARY LANDSCAPE PLAN

LANDSCAPE NOTES

1. ALL PRESERVATION AREAS CONTAINING VEGETATION DESIGNATED TO BE PRESERVED, SHALL BE FENCED OFF DURING CONSTRUCTION TO MINIMIZE DISTURBANCE IN THESE AREAS. ALL FENCING SHALL BE INSTALLED AROUND PRESERVED VEGETATION PRIOR TO ANY GRADING ON THE PROPERTY. A 4-FOOT, ORANGE, CONSTRUCTION SAFETY FENCE SHALL BE USED IN THIS APPLICATION.
2. SOIL AMENDMENT - INCORPORATE 3 CUBIC YARDS/1000 SF AREA OF "PREMIUM 3 ORGANIC COMPOST", OR APPROVED EQUAL, ON BLUEGRASS TURF AREAS. INCORPORATE 2 CUBIC YARDS/1000 SF AREA OF ORGANIC COMPOST (DECOMPOSED MANURE) TO ALL NATIVE SEED AREAS. TILL INTO TOP 8" OF SOIL. FOR PLANTING PIT AMENDMENTS, SEE LANDSCAPE DETAILS. FERTILIZER REQUIREMENTS BELOW ARE BASED ON SOIL ANALYSIS.

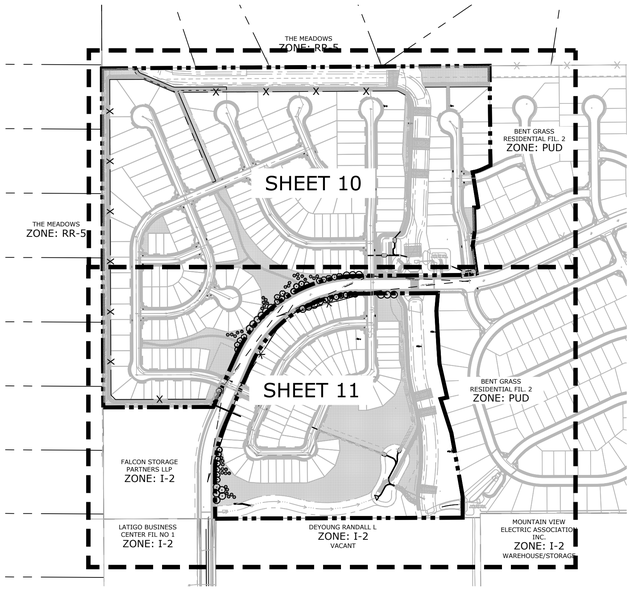
NITROGEN	0 LBS/1000SF
PHOSPHORUS (P205)	0 LBS/1000SF
POTASSIUM (K20)	0 LBS/1000SF
SULFUR (SO4-S)	0 LBS/1000SF
LIME	0 LBS/1000SF

-OR-

RECOMMENDED SOIL AMENDMENT:
TRI-MIX III as supplied by C&C Sand
-To be applied as backfill in planting pits

3. CONTRACTOR TO APPLY EROSION CONTROL BLANKET TO ALL SEED AREAS WITH GREATER THAN 3:1 SLOPES.
4. FOR ALL SEED AREAS REFER TO SEED MIXES SPECIFIED ON THIS SHEET.
5. ALL NATIVE SEED AREAS SHALL HAVE A TEMPORARY ABOVE-GROUND SPRAY IRRIGATION SYSTEM UTILIZED UNTIL SEED IS ESTABLISHED, AND ALL TREES AND SHRUBS WITHIN NATIVE SEED AREAS SHALL HAVE A PERMANENT DRIP IRRIGATION SYSTEM.
6. A FULLY AUTOMATED SPRINKLER IRRIGATION SYSTEM WILL DRIP IRRIGATE ALL TREE, SHRUB, AND GROUND COVER PLANTINGS, AND SPRAY ALL TALL FESCUE SOD AND LOW ALTERNATIVE TURF AREAS. AN IRRIGATION PLAN WILL BE PREPARED AT A LATER DATE AND WILL INCLUDE AN IRRIGATION SCHEDULE THAT NOTES APPLICATION RATES BASED ON TURF TYPE, RATES FOR NEWLY INSTALLED PLANTS VS. ESTABLISHED PLANTS, AND GENERAL RECOMMENDATIONS REGARDING SEASONAL ADJUSTMENTS.
7. SOD TO BE TALL FESCUE BLEND.
8. NO SOD SHALL BE PLANTED ON SLOPES IN EXCESS OF 6:1 GRADIENT.
9. CONTRACTOR TO UTILIZE STOCKPILED TOPSOIL FROM GRADING OPERATION AS AVAILABLE. TILL INTO TOP 6" OF SOIL.
10. FOR GRADES REFER TO CIVIL ENGINEERING DRAWINGS.
11. NO TREES AND NO PLANTS OVER 2 FEET TALL SHALL BE INSTALLED WITHIN 5 FEET OF ANY FIRE HYDRANTS.
12. ALL PLANTS TO RECEIVE 3 INCH DEPTH OF GORILLA HAIR SHREDDED CEDAR WOOD MULCH UNLESS OTHERWISE SPECIFIED. FOLLOW PLANTING DETAILS FOR MULCH RING DIMENSIONS WITHIN ROCK, SOD, OR SEED AREAS.
13. COBBLE: 2-3" CRIPPLE CREEK ORE, AT 3-4" DEPTH, AT ALL INTERSECTION CORNERS BETWEEN HANDICAP RAMPS. INSTALL GEOTEXTILE FABRIC UNDER ALL COBBLE AREAS.
14. ROCK: 3/4" CIMARRON GRANITE, AT 3-4" DEPTH. INSTALL GEOTEXTILE FABRIC UNDER ALL ROCK AREAS.
15. ALL SHRUB BEDS TO BE ENCLOSED BY SOLID STEEL EDGING, AS A SEPARATOR FROM SOD, SEED, AND ALTERNATIVE TURF. SEPARATION BETWEEN SOD AND SEED, AND BETWEEN ALTERNATIVE TURF AND SEED SHALL BE A MOWED STRIP, WITHOUT STEEL EDGING.
16. SE: SOLID STEEL EDGING TO BE: "DURAEDGE" (1/8" THICK x 4" WIDE) STEEL LANDSCAPE EDGING, DARK GREEN COLOR, WITH ROLLED EDGE AND STEEL STAKES. USE SOLID STEEL EDGING EXCEPT WHERE NOTED ON THE PLANS.
17. PSE: PERFORATED STEEL EDGING TO BE: ACME (14 GA. x 4" WIDE) GALVANIZED STEEL EDGING, WITH ROLLED EDGE AND GALVANIZED STEEL STAKES. COLOR TO BE DARK GREEN. USE PERFORATED STEEL EDGING AT BREEZE GRAVEL TRAILS ONLY. SEE PLAN FOR TRAIL LOCATIONS.
18. ALL PLANTS NOT LABELED AS FULFILLING A COUNTY LANDSCAPE REQUIREMENT ARE "EXTRA" PER COUNTY STANDARDS, AND WILL BE INSTALLED AT THE OWNER'S DISCRETION.
19. ANY FIELD CHANGES OR DEVIATIONS TO THESE PLANS WITHOUT PRIOR COUNTY APPROVAL OF AN AMENDED SITE DEVELOPMENT PLAN MAY RESULT IN A DELAY OF FINAL APPROVAL AND ISSUANCE OF A CERTIFICATE OF OCCUPANCY.
20. THESE PLANS ARE FOR COUNTY APPROVALS ONLY AND ARE NOT TO BE UTILIZED FOR CONSTRUCTION.
21. ALL TREES TO BE STAKED FOR A MINIMUM OF 18 MONTHS. REMOVE STAKING MATERIALS ONCE TREE IS ESTABLISHED, WHICH MAY DEPEND ON TREE SPECIES, MATURITY AND SITE CONDITIONS.
22. FENCING SHALL BE PROVIDED ALONG BENT GRASS MEADOWS BLVD. WHERE DOUBLE FRONTAGE LOTS OCCUR, AND SHALL BE MAINTAINED BY THE BENT GRASS METROPOLITAN DISTRICT.
23. LANDSCAPE REQUIREMENTS PERTAINING TO DOUBLE FRONTAGE NON-ARTERIAL COLLECTOR STREETS INCLUDE:
    A. DEPTH OF ROADWAY LANDSCAPING AREA: 10 FEET
    B. REQUIRED TREES: 1 PER 30 FEET
25. LANDSCAPE ENTRY FEATURES, OPEN SPACE TRACTS, PARKS AND TRAILS SERVING RESIDENTIAL AREAS SHALL BE OWNED (WHEN APPROPRIATE) AND MAINTAINED BY THE BENT GRASS METRO DISTRICT. ALL DOUBLE FRONTAGE LOTS SHALL RECEIVE A COMBINATION OF FENCING AND LANDSCAPE BETWEEN THE PROPERTY LINE AND THE CURB. ALL DOUBLE FRONTAGE STREETS SHALL HAVE A MINIMUM OF ONE TREE PER 30 FEET OF FRONTAGE. THESE TREES CAN BE CLUSTERED ALONG THE FRONTAGE AS DETERMINED BY THE SUBDIVIDER.
26. BUFFERING AND SCREENING SHALL INCLUDE BOTH FENCING, AND LANDSCAPING WHERE APPROPRIATE, ALONG THE PERIMETER OF THE PROJECT AND ALONG THE RIGHT-OF-WAY LINES OF BENT GRASS MEADOWS DRIVE AND BETWEEN CHANGES IN LAND USE. FENCING SHALL BE 6' CEDAR PRIVACY FENCE AND SHALL BE MAINTAINED BY THE BENT GRASS METROPOLITAN DISTRICT.
27. NO SUBSTITUTIONS WITHOUT PREVIOUS APPROVAL OF LANDSCAPE ARCHITECT. UNAPPROVED DEVIATIONS FROM THIS PLAN WILL BE RECTIFIED AT CONTRACTORS EXPENSE.

KEY MAP



Landscape Setbacks

See El Paso County General Development Standards - Landscape Standards 6.2.2

Street Name or Zone Boundary	Street Classification	Width (in Ft.) Req./Prov.	Linear Footage	Tree/Feet Required	No. of Trees Req./ Prov.	Setback Plant Abbr. Denoted on Plan
BENT GRASS MEADOWS DR. (North)	COLLECTOR	10' / 10'	1,590	1 / 30'	53 / 53	N
BENT GRASS MEADOWS DR. (South)	COLLECTOR	10' / 10'	1,200	1 / 30'	40 / 40	S

PLANT_SCHEDULE

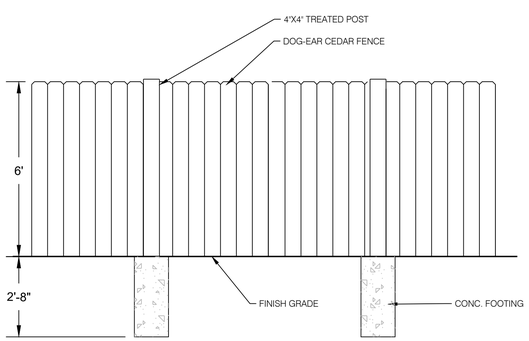
TREES	CODE	BOTANICAL / COMMON NAME	WIDTH	QTY
	AXF	Acer x freemanii `Jeffsred` TM / Autumn Blaze Maple	2" Cal.	20
	CO	Celtis occidentalis / Common Hackberry	1.5" Cal.	18
	QRU	Quercus rubra / Red Oak	1.5" Ht.	33
	PPO	Pinus Ponderosa / Ponderosa Pine	8` Ht.	36

HATCH LEGEND

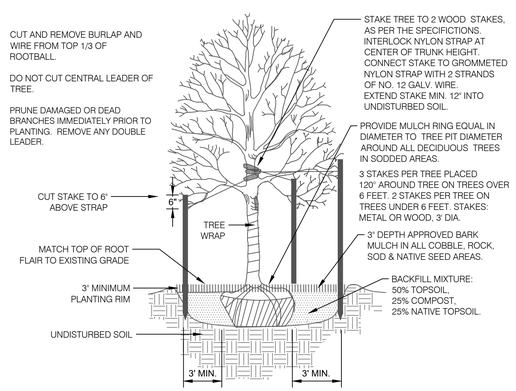
NATIVE SEED MIX
Arkansas Valley Seed
30% Ephraim Crested Wheatgrass (Agropyron cristatum)
25% Sheep Fescue (Festuca ovina)
20% Perennial Rye (Lolium perenne)
15% Chewings Fescue (Festuca rubra subsp. commutata)
-

ROCK MULCH
-

1. SEED MAINTENANCE: MOW LOW GROW MIX ABOUT ½ THE AMOUNT AS SODDED TURFGRASS OR AS NEEDED. MOW NATIVE/FOOTHILLS SEED AREAS ONCE A MONTH OR ONLY WHEN NEEDED TO CONTROL WEEDS OR AT END OF GROWING SEASON.
2. MOW LOW GROW SEED MIX TO A 4" HEIGHT AND LET NATIVE SEED MIX GROW TO 8"-16" HEIGHT. HAND PULL WEED OR SPOT WEED USING A BROADLEAF APPLICATION DURING FIRST 3 GROWING SEASONS.
3. DISTURBED AREAS TO BE RESEEDED WITH NATIVE LOW GROW MIX UNLESS OTHERWISE NOTED. RE: CIVIL PLANS

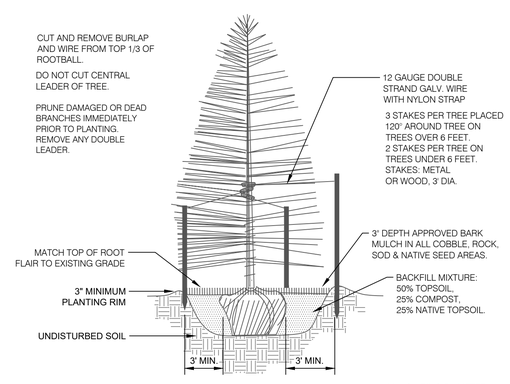


1 CEDAR FENCE DETAIL
N.T.S.



ROOTBALL SIZES:	TREE PIT DIAMETER:	MULCH RING DIAMETER:
1.5" Cal. = 1'-8"	1.5" Cal. = 7'-8"	1.5" Cal. = 7'-8"
2" Cal. = 2'-0"	2" Cal. = 8'-0"	2" Cal. = 8'-0"
2.5" Cal. = 2'-4"	2.5" Cal. = 8'-4"	2.5" Cal. = 8'-4"
3" Cal. = 2'-6"	3" Cal. = 8'-6"	3" Cal. = 8'-6"

2 DECIDUOUS TREE PLANTING DETAIL
N.T.S. NES-LS-01



ROOTBALL SIZES:	TREE PIT DIAMETER:	MULCH RING DIAMETER:
6' HT. = 1'-10"	6' HT. = 7'-10"	6' HT. = 7'-10"
8' HT. = 2'-3"	8' HT. = 8'-3"	8' HT. = 8'-3"
10' HT.. = 2'-10"	10' HT. = 8'-10"	10' HT. = 8'-10"
12' HT. = 2'-10"	12' HT. = 8'-10"	12' HT. = 8'-10" (OR EXTENDED BEYOND BRANCHING)

3 CONIFEROUS TREE PLANTING DETAIL
N.T.S. NES-LS-02

Land Planning
Landscape Architecture
Urban Design
NES
N.E.S. Inc.
619 N. Cascade Avenue, Suite 200
Colorado Springs, CO 80903
Tel. 719.471.0073
Fax 719.471.0267
www.nescolorado.com

PLANNERS · LANDSCAPE ARCHITECT

IN ASSOCIATION WITH

FALCON MEADOWS AT BENT GRASS

PUD PRELIMINARY PLAN

PROJECT INFO

DATE:	8/6/2020
PROJECT MGR:	E. GANAWAY
PREPARED BY:	B. SWENSON

SEAL

ISSUE INFO

DATE:	BY:	DESCRIPTION:
12.22.2020	JBS	PER COUNTY COMMENTS
01.29.2021	JBS	PER COUNTY COMMENTS
03.12.2021	JBS	PER COUNTY COMMENTS

ISSUE REVISION

SHEET TITLE

PRELIMINARY LANDSCAPE DETAILS & NOTES

SHEET NUMBER

10

10 OF 12

PLAN FILE #

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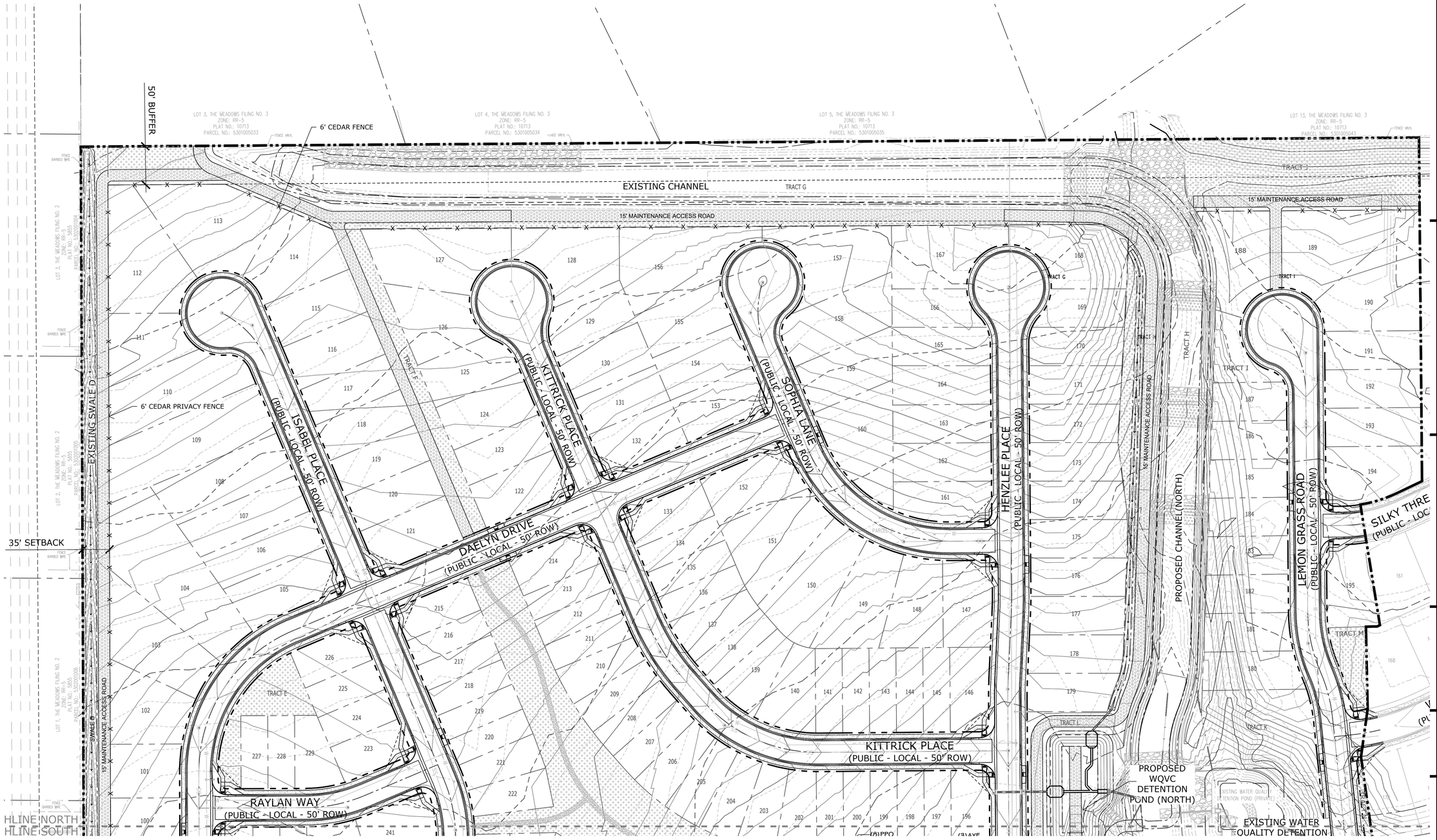

HATCH LEGEND

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Arkansas Valley Seed
30% Ephraim Crested Wheatgrass (Agropyron cristatum)
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-

ROCK MULCH
-

NORTH

0 30 60 120
SCALE: 1" = 60'

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PLANNERS · LANDSCAPE ARCHITECTS

IN ASSOCIATION WITH

FALCON MEADOWS AT BENT GRASS

PUD PRELIMINARY PLAN

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PROJECT MGR:	E. GANAWAY
PREPARED BY:	B. SWENSON

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12.22.2020	JBS	PER COUNTY COMMENTS
01.29.2021	JBS	PER COUNTY COMMENTS
03.12.2021	JBS	PER COUNTY COMMENTS

ISSUE REVISION

SHEET TITLE

PRELIMINARY LANDSCAPE PLAN NORTH

SHEET NUMBER

11

11 OF 12

PLAN FILE #

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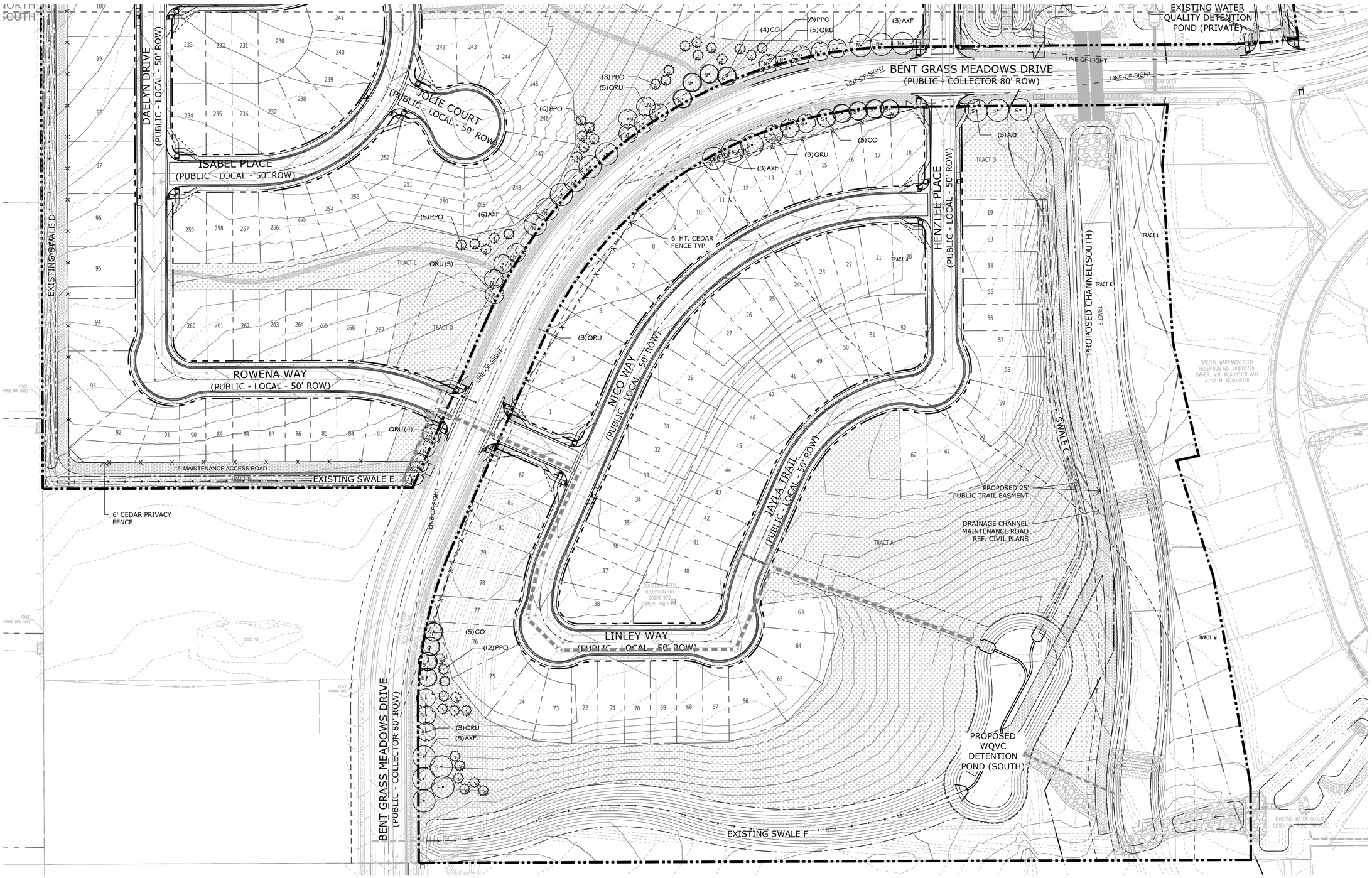

PLANT_SCHEDULE

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-

ROCK MULCH
-

NORTH

0 30 60 120
SCALE: 1" = 60'

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PLANNERS · LANDSCAPE ARCHITECT

IN ASSOCIATION WITH

FALCON MEADOWS AT BENT GRASS

PUD PRELIMINARY PLAN

PROJECT INFO

DATE: 8/6/2020
PROJECT MGR: E. GANAWAY
PREPARED BY: B. SWENSON

SEAL

ISSUE INFO

DATE:	BY:	DESCRIPTION:
12.22.2020	JBS	PER COUNTY COMMENTS
01.29.2021	JBS	PER COUNTY COMMENTS
03.12.2021	JBS	PER COUNTY COMMENTS

ISSUE REVISION

SHEET TITLE

PRELIMINARY LANDSCAPE PLAN SOUTH

SHEET NUMBER

12

12 OF 12

PLAN FILE #

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PRELIMINARY DRAINAGE REPORT

FALCON MEADOWS AT BENT GRASS

El Paso County, Colorado

Engineering Review

04/12/2021 8:03:41 AM
dsdrice
JeffRice@elpasoco.com
(719) 520-7877
EPC Planning & Community Development Department

Also see comment letter.

Galloway responses

PREPARED FOR:
Challenger Homes
8605 Explorer Dr., Suite 250
Colorado Springs, CO 80920

PREPARED BY:
Galloway & Company, Inc.
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920

DATE:
August 5, 2020
Revised December 2020
Revised February 2021

PUDSP-20-005

ENGINEER'S STATEMENT

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____ _____

Charlene Durham, P.E. #36727 Date
For and on behalf of Galloway & Company, Inc.

DEVELOPER'S CERTIFICATION

I, The developer, have read and will comply with all of the requirements specified in this drainage report and plan.

By:_____ _____
Date

Address: Challenger Homes
8605 Explorer Dr., Suite 250
Colorado Springs, CO 80920

By:_____ _____
Date

Address: Better Land LLC
8605 Explorer Dr., Suite 250
Colorado Springs, CO 80920

EL PASO COUNTY CERTIFICATION

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

_____ _____

Jennifer Irvine, P.E. Date
County Engineer/ECM Administrator

Conditions:

TABLE OF CONTENTS

I. Purpose

The purpose of this Preliminary Drainage Report is to identify on and offsite drainage patterns, locate and identify tributary or downstream drainage features and facilities that impact the site, and to identify which types of drainage facilities will be needed and where they will be located. This report will remain in general compliance with the MDDP submitted for review in January for the site prepared by Galloway & Company.

II. General Description

The project is a single-family residential development located in the Falcon area of El Paso County, Colorado. The site is located in the Northwest ¼ and Southwest ¼ of Section 1, Township 13S, Range 65W, of the Sixth Principal Meridian, County of El Paso, State of Colorado. The subject property is bounded by Bent Grass Meadows Filing No.2 to the east, Latigo Business Center Filing No. 1 to the south, The Meadows Filings No. 1 & 2 to the west, and The Meadows Filing No. 3 to the north. A Vicinity Map is included in Appendix A.

This preliminary drainage report was the basis for the drainage facility design contained within the previously approved MDDP for the site prepared by Galloway & Company. The site consists of approximately 66.6 acres and includes 267 dwelling units.

The existing soil types within the proposed site as determined by the NRCS Web Soil Survey for El Paso County Area consist of Columbine gravelly sandy loam, Blakeland-Fluvaquentic Haplaquolls, and Blakeland loamy sand. All soils are defined as having a hydrologic soil group of A. See the soils map included in Appendix A.

III. Previous Reports

The proposed site has been included in multiple drainage studies in the past. The following is a composite list of the existing reports pertaining to this site analysis.

1. *Falcon Drainage Basin Planning Study*, by Matrix Design Group, September 2015.
2. *Master Development Drainage Plan – Bent Grass Residential Subdivision*, by Galloway & Company, *Revision in Progress per Meridian Road Intersection Comments.*
3. *Master Development Drainage Plan and Preliminary Drainage Plan – Bent Grass Subdivision*, by Kiowa Engineering Corporation, December 2006.
4. *Final Drainage Report for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2014.
5. *Final Drainage Report Addendum for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2015.
6. *Master Development Drainage Plan for The Ranch*, by Classic Consulting Engineers & Surveyors, LLC, November 2018.
7. *Falcon Highlands Master Development Drainage Plan & Preliminary Drainage Report & Final Drainage Report for Filing 1*, by URS, January 2005.
8. *Final Drainage Report and Erosion Control Plan – Latigo Business Center Filing No. 1 A Re-subdivision of a Portion of Latigo Business and Research Center Filing No. 1*, by Kiowa Engineering Corporation, November 2004.
9. *Final Drainage Letter Report for Lot 1, Latigo Business Center Filing No. 1*, by Colorado Design Concepts, April 2005.

10. *Final Drainage and Erosion Control for The Meadows Filing Three Subdivision,* by LADD Engineering, July 2000.
11. *Final Drainage Report for Bent Grass Residential (Filing No. 2),* by Galloway & Company, May 2020.

IV. Drainage Criteria

Hydrology calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs/El Paso County Drainage Criteria Manual as revised in May 2014.

The drainage calculations were based on the criteria manual Figure 6-5 and IDF equations to determine the intensity and are listed in Table 1 below.

Table 1 - Precipitation Data

Return Period	One Hour Depth (in).	Intensity (in/hr)
5-year	1.50	5.17
100-year	2.52	8.68

The rational method was used to calculate peak flows as the tributary areas are less than 100 acres. The rational method has been proven to be accurate for basins of this size and is based on the following formula:

Q = CIA

Where:

Q = Peak Discharge (cfs)
C = Runoff Coefficient
I = Runoff intensity (inches/hour)
A = Drainage area (acres)

The runoff coefficients are calculated based on land use, percent imperviousness, and design storm for each basin, as shown in the drainage criteria manual (Table 6-6). Composite percent impervious and C values were calculated using the residential, streets, roofs, and lawns coefficients found in Table 6-6 of the manual.

The 100-year event was used as the major storm event. The 5-year event was used as the minor event.

The UD-Detention v3.07 spreadsheet was utilized for the design of the proposed on-site water quality ponds, Pond (North) and Pond (South).

V. Existing Drainage Conditions

The site is contained fully within one major drainage basin; the West Falcon Tributary. The site generally drains from north to south with an average slope of 2% outside of the channel. The rational method was used to analyze the individual basins within the site because their size permits it.

In addition to the DBPS, The Ranch MDDP to the north and west of the site has revisited their existing conditions as well as existing conditions from the site directly to the north of them. Several detention ponds have been created within the Paint Brush Hills Subdivision which revise the offsite flow entering the site within the major drainageway. This is taken into account with The Ranch MDDP. While The Ranch is still in design stage, they are proposing detention ponds within their site to release at historic rates. This will revise the flow rates in their designed section of the RWT204 channel rates that are lower than those identified within the DBPS. An updated HEC-HMS model was submitted with the MDDP.

Per the DBPS the site lies within the basins, WT200, WT210, and WT220. These basins connect to channel reaches RWT202, RWT204, and RWT210. Both the RWT204 and RWT210 sections of channel currently exist and appear as a drainageway when visiting the site. With Bent Grass Filing No. 2, Reach RWT202 from Basin WT200 was “relocated and improved”. The channel reach is now along the north border of the Bent Grass property and drains towards the east, where it combines with channel reach RWT204. The channel is a 26-ft bottom trapezoidal section with 4:1 side slopes and a longitudinal slope of 1.00%.

A historic basin map has been prepared for this site to analyze the existing basins as well as the offsite basins contributing to the site. The historic map is included in Appendix D and basins are described below.

Basin EX-1 (1.19 AC, Q_5 = 0.4 cfs, Q_{100} = 2.5 cfs): is associated with the northeastern portion of the proposed site east of the existing channel. The basin is currently undeveloped. Runoff from the basin generally flows to the southwest, into Basin EX-2 at **DP 4.**

Basin EX-2 (1.56 AC, Q_5 = 0.5 cfs, Q_{100} = 3.7 cfs): is along the eastern boundary portion of the proposed site and is south of Basin EX-1, east of the existing channel. The basin is currently undeveloped and receives flows from Basins OS-4 & OS-5. Runoff from the basin generally flows to the southeast into Basin EX-3 at **DP 5** combined with flows from **DP 1, 2, & 4**.

Basin EX-3 (0.62 AC, Q_5 = 0.2 cfs, Q_{100} = 1.5 cfs): is along the eastern boundary of the proposed site south of Basin EX-2 and east of the existing channel. The basin currently contains an existing WQCV pond created as part of Bent Grass Residential Filing No. 2. This basin receives flows from **DP 5** and **DP 3**.

Basin EX-4 (12.49 AC, Q_5 = 3.7 cfs, Q_{100} = 25.1 cfs): is located along the northern boundary, just south of the swale built with Bent Grass Meadows Drive and west of the existing channel. The basin is currently undeveloped. Runoff from the basin generally flows to the south onto Bent Grass Meadows Drive at **DP 6**. From there, it flows via curb & gutter to the east into an existing sump inlet, ultimately discharging into the existing WQCV pond located in Basin EX-3.

Basin EX-5 (5.15 AC, Q_5 = 1.6 cfs, Q_{100} = 10.6 cfs): is west of Basin EX-4 and north of Bent Grass Meadows Drive. The basin is currently undeveloped. Runoff from the basin generally flows to the south onto Bent Grass Meadows Drive at **DP 7**. From there, it flows via curb & gutter to the east into an existing sump inlet, ultimately discharging into the existing WQCV pond located in Basin EX-3.

Basin EX-6 (9.53 AC, Q_5 = 2.7 cfs, Q_{100} = 17.8 cfs): is along the west boundary of the site. The basin is currently undeveloped and receives off-site flows from Basins OS-2 & OS-3. Runoff from the basin

generally flows to the south into the existing drainage ditch entering an existing inlet at DP 11 and flowing under Bent Grass Meadows Drive and discharging into an existing drainage swale in Basin EX-8.

Basin EX-7 (9.16 AC, Q_5 = 2.8 cfs, Q_{100} = 18.9 cfs): is north & west of Bent Grass Meadows Drive, between Basins EX-5 & EX-6. The basin is currently undeveloped. Runoff from the basin generally flows to the southeast into Bent Grass Meadows Drive at **DP 8**. From there, it flows via curb & gutter to the south into an existing sump inlet, ultimately discharging into the existing sediment pond located in Basin EX-8.

Basin EX-8 (21.3 AC, Q_5 = 6.6 cfs, Q_{100} = 43.9 cfs): is a portion of the site south and east of Bent Grass Meadows Drive, north of the south property line and west of Bent Grass Filing No. 2. The basin is currently undeveloped and contains two drainage ditches, a sediment pond, and a portion of the creek associated with Basin WT200 from the Falcon DBPS. Runoff from the basin generally flows to the southeast into the existing channel.

Basin OS-1 (32.28 AC, Q5 = 15.1 cfs, Q100 = 65.1 cfs) is associated with The Meadows Filing No. 3 lots 14, 15, 16, and 17. Runoff from this basin sheet flows to the northern property line of the site and then flow, via an existing drainage ditch, into the existing channel associated with Basin WT200 from the Falcon DBPS.

Basin OS-2 (20.08 AC, Q5 = 9.0 cfs, Q100 = 43.4 cfs) is associated with The Meadows Filing No. 1 lots 1, 2, 3, 4, 5, and 6. Runoff from this basin sheet flows from the northwest to the southeast, crossing the west property line of the site at **DP 9**. The runoff will continue to sheet flow through Basin EX-6 to the south until entering the existing drainage swale on the southern boundary of Basin EX-6 at **DP 11**.

Basin OS-3 (10.62 AC, Q5 = 4.7 cfs, Q100 = 22.7 cfs) is associated with The Meadows Filing No. 1 lot 11 and The Meadows Filing No. 2 Lots 1 & 2. Runoff from this basin sheet flows from the northwest to the southeast, crossing the west property line of the site at **DP 10**. The runoff will continue to sheet flow through Basin EX-6 to the south until entering the existing drainage ditch on the southern boundary of Basin EX-6 at **DP 11**.

Basin OS-4 (4.46 AC, Q5 = 5.6 cfs, Q100 = 14.0 cfs) is associated with The Bent Grass Residential Filing No. 2, lots 152-160, lots 163-168, Tract D, and portions of Thedford Court & Willmore Drive. Runoff from this basin flows via curb & gutter south on Thedford Court then continues flowing west along the northern curb & gutter along Willmore Drive before discharging into southeast corner of Basin EX-2 at **DP 1**.

Basin OS-5 (0.46 AC, Q5 = 1.1 cfs, Q100 = 2.3 cfs): is associated with The Bent Grass Residential Filing No. 2, lots 161 & 162 along with a portion of Silky Thread Road. Runoff from this basin generally flows to the west via curb & gutter along Silky Thread Road before discharging into the northeast corner of Basin EX-2 at **DP 2**.

Basin OS-6 (1.17 AC, Q5 = 2.0 cfs, Q100 = 4.3 cfs): is associated with The Bent Grass Residential Filing No. 2, the northern halves of Lots 170-178 and a portion of the southern side of Willmore Drive. Runoff from this basin generally flows to the west via curb & gutter along Willmore Drive before discharging into the northeast corner of Basin EX-3 at **DP 3**.

- Basins E-1 thru E-5, C-8 and I-1, are basins from the Bent Grass Filing No. 2 report, which are within the Falcon Meadows project area. The basins were “developed” as part of the Filing No. 2 project and retain the same basin and flow characteristics. Brief summaries from the Filing No. 2 report are included here for reference.

Basin E-1 (1.71 AC, Q5 = 3.6 cfs, Q100 = 7.7 cfs): a basin that is east of Falcon Meadows and encompasses the north portion of Bent Grass Meadows Drive. A high point on the far East of the basin at the near the Filing No. 2 boundary, forces water to flow to a low point at **DP-8**, which represents an existing 20' CDOT Type R sump inlet, which conveys stormwater via proposed 36" RCP storm sewer to the existing Filing No. 2 north water quality detention pond. Emergency overflow will spill over the crown of the road and enter into an existing 10' CDOT Type R sump inlet on the south side of Bent Grass Meadows Drive.

Basin E-2 (0.68 AC, Q5 = 2.4 cfs, Q100 = 4.6 cfs): a basin that is in west of Basin E-1 and encompasses a portion of the north section Bent Grass Meadows Drive. A high point on the far West of the basin forces water to flow to a low point at **DP-8**, which represents an existing 20' CDOT Type R sump inlet, which conveys stormwater via a proposed 36" RCP storm sewer to the existing Filing No. 2 north water quality detention pond. Emergency overflow will spill over the crown of the road and enter into an existing 10' CDOT Type R sump inlet on the south side of Bent Grass Meadows Drive.

Basin E-3 (0.78 AC, Q5 = 2.9 cfs, Q100 = 5.3 cfs): a basin that is south of Basin E-2 and encompasses a portion of the south half of Bent Grass Meadows Drive. A high point on the far West of the basin forces water to flow to a low point, which is an existing 10' CDOT Type R sump inlet, which conveys stormwater via an existing 24" storm sewer to **DP-8**. This inlet receives emergency overflow from DP-8.

Basin E-4 (0.91 AC, Q5 = 3.0 cfs, Q100 = 5.7 cfs): a basin that is in the Southwest area of the Bent Grass Filing No. 2 site and encompasses a portion of the north and west sections of Bent Grass Meadows Drive. Runoff from this basin is captured by existing curb and gutter and then routed South where the 5 yr. and 100 yr. flows will be captured by an existing 25' CDOT Type R (1-10' and 1-15' inlet) on-grade inlet, **DP-24**. Captured flow will be routed by a 24" RCP storm drain piped to DP-25. A temporary water quality facility will treat this flow for the Bent Grass Filing No. 2 development and will remain in place until further development occurs.

Basin E-5 (0.89 AC, Q5 = 3.3 cfs, Q100 = 6.1 cfs): a basin that is in the Southwest area of the site and encompasses a portion of south and east sections Bent Grass Meadows Drive. Runoff from this basin is captured by existing curb and gutter and then routed South where the 5 yr. and 100 yr. flows will be captured by a proposed 25' CDOT Type R (1-10' and 1-15' inlet) on-grade inlet, **DP-25**. Captured flow will be routed by a 24" RCP storm drain piped to an outfall at DP-26, where a temporary sediment basin will provide water quality for the basin. Flows will then be routed East by Existing Swale – F until out-falling into RWT210.

Basin C-8 (0.42 AC, Q5 = 0.2 cfs, Q100 = 1.0 cfs): a basin that is in the South-central area of the site adjacent to RWT204 and RWT 210. It encompasses the rears of single-family residential Type B lots. Runoff will sheet flow West directly into RWT204 and RWT210.

Design Point CC is the location in channel reach RWT210, where flows exit the Bent Grass Site, including the offsite flows from RWT202, RWT204 and WT200. The minor flows are 302.4 cfs and the major flows are 1336.7 cfs.

Updated rational flows. Added MDDP and DBPS flows for reference/comparison.

269?

Yes, current MDDP flow is 1041. DBPS has 1200 cfs exiting site.

1040 per DBPS - pg 109 of MDDP?

Flows updated and compared to MDDP. 1041is HMS flow, rational flow at this location is 1187.

If grass buffers are proposed they need to meet criteria, be within a PBMP easement and be shown on the WQCV Plan

reference to grass buffers has been removed.

VI. Four Step Process

The Four Step Process is used to minimize the adverse impacts of urbanization and is a vital component of developing a balanced, sustainable project. Below identifies the approach to the four-step process:

1. Employ Runoff Reduction Practices

This step uses low impact development (LID) practices to reduce runoff at the source. Generally, rather than creating point discharges that are directly connected to impervious areas runoff is routed through pervious areas to promote infiltration. Grass buffers have been utilized where possible. The Impervious Reduction Factor (IRF) method was used and calculations can be found in Appendix B.

2. Provide Water Quality Capture Volume (WQCV)

This step utilizes formalized water quality capture volume to slow the release of runoff from the site. The EURV volume will release in 72 hours, while the WQCV will release in no less than 40 hours. On-site water quality control volume detention ponds will provide water quality treatment for all but 0.86 acres of the developed areas, prior to the runoff being released into the channel. Refer to WQCV Plan in Appendix D.

see redlines; any areas net treated need to be justifiable

3. Stabilize Drainageways

Reason added as to why this area can't be captured and goes directly to channel.

This step implements stabilization [illegible] loped flows while protecting infrastructure and controlling sedi[illegible] inageways. Erosion protection in the form of riprap pads at all outfall points to the channel to prevent scouring of the channel from point discharges. A HEC-RAS model will be created and used to evaluate the stability of the existing and proposed channels as part of the Final Drainage Report for the next phase of the site.

4. Consider Need for Industrial and Commercial BMPs

As this project as all residential development and no commercial or industrial development is proposed, there will be no need for any specialized BMPs which would be associated with an industrial or commercial site.

VII. Proposed Drainage Conditions

There have been very minor changes to the overall Falcon Area Basin delineation with the proposed condition. This will be discussed with the individual basins. All necessary calculations can be found within the appendices of the report.

According to the DBPS, there are two channels that run through the site. As was discussed within the Existing Conditions portion of the report both the RWT202 and RWT204 run through the site. In the Bent Grass Filing No. 2 report & CD's, the RWT202 channel was rerouted to run along the north boundary & combine with the existing RWT204 channel. The proposed development will drain to the RWT204 channel, which becomes RWT210 south of Bent Grass Meadows Drive.

The site will provide two WQCV Detention Ponds, North Pond & South Pond, to provide water quality treatment prior to discharging the runoff directly into the West Tributary channel RWT204 - RWT210.

As has been mentioned previously, the site is proposed to be single family residential. The site has been designed to provide a large lot buffer between the existing large lots to the north and west of the site and the proposed site. Beyond this buffer, the remainder of the site is smaller, approximately 1/8 acre lots.

address OS-2 and OS-3

OS-2 & OS-3 are included on next page.

Basin OS-1 (32.28 AC, Q5 = 15.1 cfs, Q100 = 65.1 cfs) is associated with The Meadows Filing No. 3 lots 14, 15, 16, and 17. Runoff from this basin sheet flows to the northern property line of the site and then flows, via an existing drainage swale, into the existing channel reach RWT204 from the Falcon DBPS at **DP 21**.

flows don't match plan

Basin OS-4 (4 Updated = 5.6 cfs, Q100 = 14.0 cfs) is associated with The Bent Grass Residential Filing No. 2, lots 152-160, lots 163-168, Tract D, and portions of Thedford Court & Willmore Drive. Runoff from this basin flows via curb & gutter south on Thedford Court then continues flowing west along the northern curb & gutter along Willmore Drive before discharging into Basin A-1 at **DP 1**.

Basin OS-5 (0.46 AC, Q5 = 1.1 cfs, Q100 = 2.3 cfs): is associated with The Bent Grass Residential Filing No. 2, lots 161 & 162 along with a portion of Silky Thread Road. Runoff from this basin generally flows to the west via curb & gutter along Silky Thread Road before discharging into Basin A-1 at **DP 2**.

Basin OS-6 (1.17 AC, Q5 = 2.0 cfs, Q100 = 4.3 cfs): is associated with The Bent Grass Residential Filing No. 2, the northern halves of Lots 170-178 and a portion of the southern side of Willmore Drive. Runoff from this basin generally flows to the west via curb & gutter along Willmore Drive before discharging into Basin A-1 at **DP 3**.

Basin A-1 (2.16 AC, Q5 = 4.9 cfs, Q100 = 11.7 cfs): a basin that includes residential lots, portions of 2 tracts & the east half of Lemon Grass Road. It encompasses single-family residential lots. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mo flows to **DP 4**. Flows will then enter a proposed CDOT Type 'R' inle Bent Grass Filing No. 2 WQCV pond located in Basin A-2 at **DP 6**.

Reason for why this basin is not captured has been included under 4-step process. MDDP has been updated to remove statement that "all" areas are treated.

Basin A-2 (0.86 AC, Q5 = 2.0 cfs, Q100 = 4.4 cfs): a basin that includes the back ¾ of single-family residential lots. Runoff will flow from each lot into the existing channel (RWT204). These flows will not be detained but are less than 1.0 acre max allowed per criteria.

justification is required and MDDP says all areas will be treated

Basin A-3 (0.92 AC, Q5 = 2.6 cfs, Q100 = 5.2 cfs): a basin that includes the west half of Lemon Grass Road and the front ¼ of single-family residential lots. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to **DP 5**. Flows will then enter a proposed CDOT Type 'R' inlet where it will be piped into the existing Bent Grass Filing No. 2 WQCV pond.

Basin A-4 (0.82 AC, Q5 = 0.4 cfs, Q100 = 2.6 cfs): a basin that includes the existing north water quality facility built with Bent Grass Filing No. 2 (Tract K). This basin will combine with the other flows being diverted to this facility and upon treatment, will be released into the existing channel (RWT204).

Basin C-6 (1.37 AC, Q5 = 2.1 cfs, Q100 = 5.1 cfs): a basin that includes a portion of residential lots between Henzlee Place and Channel RWT204. These lots drain towards the east, towards the channel. A proposed swale with intercept these flows at the top bank of the channel and divert the flows towards the south to **DP 19**, where an area inlet will capture the flows and release into the proposed north water quality pond.

north- Added

Basin B-1 (4.32 AC, Q5 = 2.2 cfs, Q100 = 7.8 cfs): a basin that is in the center of the site and encompasses the existing rerouted channel RWT202 and existing improved channel RWT204. Flows will sheet flow into the existing channel where they will then be conveyed to **DP 22**.

provide size

Added

Basin C-1 (9.07 AC, Q5 = 16.9 cfs, Q100 = 36.0 cfs): a basin that includes Sophia Lane, the west half of Henzlee Place, north portion of Kittrick Place, and encompasses single-family residential lots. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to **DP 15.** Flows will then enter a proposed CDOT Type 'R' inlet where it will be piped to the proposed north WQCV pond at **DP 13**.

Basin C-2 (1.11 AC, Q5 = 2.8 cfs, Q100 = 6.2 cfs): It encompasses single-family residential lots including the east half of Henzlee Place. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to **DP 12.** Flows will then enter a proposed CDOT Type 'R' inlet where it will be piped to the proposed north WQCV pond at **DP 13**.

Basin C-3 (1.52 AC, Q5 = 5.3 cfs, Q100 = 9.9 cfs): It encompasses Kittrick Place between Henzlee Place & Daelyn Drive, as well as single-family residential lots. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to **DP 8.** Flows will then enter an existing CDOT Type 'R' inlet on the north side of Bent Grass Meadows Drive, where it will then be released into the existing Filing No. 2 North WQCV Pond.

DP15? Updated

Basin C-4 (4.70 AC, Q5 = 8.0 cfs, Q100 = 21.0 cfs): It encompasses residential lots and open space between Henzlee Place & Bent Grass Meadows Drive. Runoff will flow from each lot onto the proposed open space, eventually releasing into the public R.O.W. of Bent Grass Meadows Drive, where existing curb and gutter will convey flows to **DP 8.** Flows will then enter an existing CDOT Type 'R' inlet where it will then be released into the existing Filing No. 2 North WQCV Pond.

Basin C-5 (0.51 AC, Q5 = 0.3 cfs, Q100 = 1.6 cfs): It encompasses the proposed north WQCV pond area. The stormwater within the proposed north WQCV pond will be released at a controlled rate, via an outlet structure with orifice holes, into the existing channel RWT204.

Basin OS-2 (20.07 AC, Q5 = 9.0 cfs, Q100 = 43.4 cfs): is associated with The Meadows Filing No. 1 lots 1, 2, 3, 4, 5, and 6. Runoff from this basin sheet flows from the northwest to the southeast, crossing the west property line of the site at **DP 15.** Flows will then be conveyed via a proposed drainage swale to the south where it will enter Basin D-3 and tie-into the existing drainage swale along the southern boundary of Basin D-3. It will then continue flowing east before entering an existing area inlet at **DP 11** where it will be piped, ultimately outfalling into the proposed south WQCV pond at **DP 31**.

30? Updated

DP9?

Basin OS-3 (10.61 AC, Q5 = 4.7 cfs, Q100 = 24.3 cfs): is associated with The Meadows Filing No. 1 lot 11 and The Meadows Filing No. 2 Lots 1 & 2. Runoff from this basin sheet flows from the northwest to the southeast, crossing the west property line of the site into Basin D-3 at **DP 10**. Flows will then be conveyed via an existing drainage swale to the east where it will enter an existing area inlet at **DP 11** where it will be piped, ultimately outfalling into the proposed south WQCV pond at **DP 31**.

Updated

Basin D-1 (8.13 AC, Q5 = 10.0 cfs, Q100 = 23.8 cfs): a basin along the west property line of the site. It encompasses single-family residential lots, Isabel Place, & west half of Daelyn Drive. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to **DP 16.** Flows will then enter a proposed CDOT at grade Type 'R' inlet where captured flows will then be piped and ultimately outfall in the proposed south WQCV pond at **DP 31**. Bypass flows from the inlet will continue to the south in Bent Grass Meadows Drive to be intercepted by the existing CDOT Type R inlet at **DP 24**.

Basin D-2 (6.72 AC, Q5 = 14.3 cfs, Q100 = 29.6 cfs): a basin east of Basin D-1. It encompasses single-family residential lots, Isabel Place, Raylan Way, Jolie Court, as well as the east half of D Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountab gutter will convey flows to **DP 14.** Flows will then enter a proposed at grade CDOT Type captured flows will then be piped and ultimately outfall in the proposed south WQCV pon Bypass flows from the inlet would overtop Rowena Way to **DP 16**. DP24?

No, Flow will overtop centerline of Rowena to Proposed inlet at DP 16, then any bypass from there would continue down BGMD to DP 24.

Basin D-3 (2.93 AC, Q5 = 2.0 cfs, Q100 = 5.1 cfs): a basin that is in the southwest corner of the site, south of Basin D-1. It encompasses the backs of several proposed residential lots as well as an existing drainage ditch and proposed Swale D. Runoff will flow from basin OS-2 and OS-3 into Swale D, and convey flows to the existing drainage ditch which will convey flows to an existing area inlet at **DP 11**. From there, flows will be piped and ultimately outfall at the south WQCV pond at **DP 31**. 30? Updated

Basin D-4 (4.38 AC, Q5 = 7.8 cfs, Q100 = 16.6 cfs): a basin that is east of Bent Grass Meadows Drive. It encompasses single-family residential lots, Rowena Way, & portions of Linley Way, Jayla Trail, and Henzlee Place. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to **DP 17**. Overflow from this inlet would be to overtop the curb and then continue via a proposed swale, following the same path as the proposed pipe, to the east until flows are released into the proposed south water quality pond. Flows will then enter a proposed sump CDOT Type 'R' inlet where it will then be piped and ultimately outfall in the proposed south WQCV pond at **DP 31**.

provide size Added

Basin D-5 (1.08 AC, Q5 = 2.2 cfs, Q100 = 4.6 cfs): a basin that is located at the southwest corner of Bent Grass Meadows Drive and Henzlee Place. It includes residential lots, as well as a portion of the north half of Nico Way and west half of Henzlee Place. Flows will be directed towards the public R.O.W. where proposed curb and gutter will convey flows to the south along Henzlee Place to **DP 18**. Flows will then enter a proposed CDOT Type 'R' inlet where it will then be piped and ultimately outfall in the proposed south WQCV pond at **DP 31**.

provide size Added

Basin D-6 (4.01 AC, Q5 = 8.2 cfs, Q100 = 17.2 cfs): a basin that is south of Basin D-5 & east of Basin D-4. It encompasses single-family residential lots & half of Linley Way, Jayla Trail, Henzlee Place, & Nico Way. Runoff will flow from each lot onto the proposed public R.O.W. where proposed mountable curb and gutter will convey flows to **DP 18.** Flows will then enter a proposed sump CDOT Type 'R' inlet where it will then be piped and ultimately outfall in the proposed south WQCV pond at **DP 31**.

Basin D-7 (6.39 AC, Q5 = 3.2 cfs, Q100 = 14.8 cfs): a basin that is in the south end of the site, east of Bent Grass Meadows Drive & west of the existing channel. It encompasses the back half of several single-family residential lots as well as proposed south WQCV pond, an existing sediment basin, and an existing drainage ditch. Runoff will flow, via sheet flow, until it enters the existing drainage ditch and is conveyed to the proposed south WQCV pond or will directly flow into the proposed south WQCV pond.

Basin D-8 (1.69 AC, Q5 = 1.3 cfs, Q100 = 4.5 cfs): a basin that is west of the existing channel & south of Bent Grass Meadows Drive. It encompasses the back half of single-family residential lots. Runoff will flow from each lot and discharge into a proposed drainage ditch. The drainage ditch (Swale C) will then convey flows, ultimately discharging into the proposed south WQCV pond at **DP 32**.

Basin B-2 (1.17 AC, Q5 = 0.4 cfs, Q100 = 2.5 cfs): a basin that is in the south area of the site and encompasses the existing channel RWT210. Flows will sheet flow into the existing channel where they will then be conveyed to **DP CC** exiting the site.

Basins E-1 thru E-5 are the same as discussed under the Existing Conditions Section, as these basins represent the already built Bent Grass Meadows Drive through the proposed site.

Basin RWT202 (1574.4 AC,Q5 = 200 cfs, Q100 = 1000 cfs), RWT204 (38.4 AC, Q5 = 7 cfs, Q100 = 43 cfs) and WT200 (192 AC, Q5 = 52 cfs, Q100 = 190 cfs) represent larger offsite basins to the north of the proposed project. These areas were studied as part of the Falcon Basin DBPS prepared by Matrix and were also part of the Bent Grass MDDP, submitted for review in January. There have been no changes to these basins as they are offsite and existing.

provide combined flows entering the site

Added

Design Point CC is the location in channel reach RWT210, where flows exit the Bent Grass Site, including the offsite flows from RWT202, RWT204 and WT200. The minor flows are 260.1 cfs and the major flows are 1137.6 cfs.

VIII. Storm Sewer System

All development is anticipated to be urban and will include storm sewer & street inlets. Storm sewers collect storm water runoff and convey the water to water quality facilities prior to discharging. Storm sewer systems will be designed to the 100-year storm and checked with the 5-year storm. Inlets will be placed at sump areas and intersections where street flow is larger than street capacity. UDFCD Inlet spreadsheet will be used to determine the size of all at-grade and sump inlets. There will be a minimum of 3 proposed storm systems within the site. One will collect flows on the north and east side of the project, prior to entering Bent Grass Meadows Drive. Intercepted flows will be released into the Bent Grass Filing No. 2 existing North water quality pond. Any bypass flows will travel west in Bent Grass Meadows Drive to an existing storm system in the roadway.

has been?

CHanged wording

The second system will collect the north and west portion of the site, intercepting flows prior Bent Grass Meadows Drive. These flows will be released into the proposed North water qua flows bypassed from the storm system will enter Bent Grass Meadows Drive and travel east existing storm sewer system.

or existing Filing 2 pond?

No, this storm system releases to proposed north pond. Existing System in BGMD releases into existing Filing No. 2 pond.

The final proposed system will be designed for the remaining south and west portion of the intercepted by inlets will be released into the proposed South water quality pond.

state the proposed materials (RCP, CDOT type R inlets)

Added

Final drainage report will include details concerning inlet location, street capacity, storm sewer sizing, outlet protection and location.

The south pond will be constructed in conformance with water quality requirements with the early grading.

IX. Proposed Water Quality Detention Ponds

Two Water Quality Capture Volume Detention Ponds will be provided for the proposed site. One will be provided for the area north of Bent Grass Meadows Drive and the other will be provided for the area to the south. Both ponds are private and will be maintained by Bent Grass Metro District. These detention ponds will only provide water quality. The EURV and 100-year volumes will be conveyed via the emergency overflow weir, which will be lined. The water quality volume release will be controlled with an orifice plate that will release in 40 hours. Outlet structures, forebays, trickle channels, etc. will be designed with the final drainage report during final plat. The required WQCV volume of the North & South pond are 0.289 acre-feet & 0.875 acre-feet, relatively. The north water quality pond will release into RWT204 and the south will release into RWT210. Initial sizing of the ponds has been provided in Appendix C.

Sentence Added

Address revisions to the existing F2 north pond

Added-Updated Detention spreadshet to ananlyze ex pond has been included in Appendix C

X. Proposed Channel Improvements

The channel design is anticipated to have a series of Grouted Sloping Boulder Drops within it. Final design and details of the channel and associated structures will be provided with the corresponding Final Drainage Reports.

Riprap protection will be provided at the individu
scouring from the point discharges if velocity co

Based on discussion with County staff, statement added that we are currently assuming DBPS recommendations are more than adequate to handle the channel flow, but final channel design will determine if any additional improvements would be warranted.

Improvements to the existing channel are outlin
Grass Residential Subdivision (MDDP). As part
for the existing channel will be implemented. Fi
associated with it will be completed with the Fin
structure design, etc.

You need to address whether the DBPS improvements will be adequate for the increased flows (~1300 vs ~900 cfs? and what the proposed revisions are.

XI. Maintenance

The proposed channels are to be public facilities. A buffer has been provided along the north boundary of the site between the rerouted channel RWT202 and the back of the proposed lots. After completion of construction and upon the Board of County Commissioners acceptance the West Tributary channel is anticipated to be owned and maintained by El Paso County along with all drainage facilities within the public Right-of-Way. Swale D, which is located along the west property line, will run through an existing easement through the back of several residential lots. The swale will be maintained by the Bent Grass Metro District.

Added proposed tract

The existing swale along the north property line, built as part of Bent Grass Filing No. 2, will have a maintenance access road constructed beginning at the north end of the Lemon Grass Road cul-de sac.

to be maintained by the district?

Added

XII. Wetlands Mitigation

No wetlands are located on site.

Also address the swale from the northwest corner in Tract G

Discussion of Swale D already mentioned in first paragraph.

XIII. Floodplain Statement

A portion of the project site lies within Zone AE Special Flood Hazard Area as defined by the FIRM Map number 08041C0553G effective December 7, 2018. A copy of the FIRM Panel is included in Appendix A.

The portion of channel that has a floodplain designation is only the RWT210 and RWT204 portions of the channel. It is unknown why the western channel, RWT202 is unmapped since it is the larger contributor regarding flow rates. Discussions have occurred with PPRBD and a no rise certificate will be required for the existing channel. Models have been obtained from FEMA which show that the FEMA discharges are higher than the DBPS. Therefore, the culvert crossing at Bent Grass Meadows Parkway has been sized per the FEMA flows and not the DBPS. The no rise certification will be provided under a separate report.

XIV. Drainage Fees & Maintenance

Falcon Basin is part of the El Paso County drainage basin fee program all applicable fees well be presented in the final drainage report.

A presentation of accurate, complete, and current estimate of cost for proposed facilities will be presented with the final drainage report.

XV. Conclusion

The Falcon Meadows at Bent Grass residential subdivision lies within the West Tributary of the Falcon Area Watershed. Recommendations are made within this report to establish and stabilize multiple drainageways through the project site. Water quality for the site is provided in two on-site WQCV ponds, North Pond & South Pond. All drainage facilities within this report were sized according to the El Paso County Drainage Criteria Manuals. The West Tributary channel segment is proposed to be publicly owned and maintained and shall be the responsibility of El Paso County. The two WQCV ponds and all of the swales will be maintained by Bent Grass Metro District. A Final Drainage Report will be submitted along with the final plat and construction drawings.

upon completion of the required improvements

Added

XVI. References

1. *City of Colorado Springs/County of El Paso Drainage Criteria Manual*, October 1991.
2. *Drainage Criteria Manual, Volume 2*, City of Colorado Springs, November 2002.
3. *Urban Storm Drainage Criteria Manual*, Urban Drainage and Flood Control District, January 2016 (with current revisions).
4. *Falcon Drainage Basin Planning Study*, by Matrix Design Group, September 2015.
5. *Master Development Drainage Plan and Preliminary Drainage Plan – Bent Grass Subdivision*, by Kiowa Engineering Corporation, December 2006.
6. *Final Drainage Report for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2014.
7. *Final Drainage Report Addendum for Bent Grass Residential (Filing No. 1)*, by Classic Consulting Engineers & Surveyors, LLC, August 2015.
8. *Master Development Drainage Plan for The Ranch*, by Classic Consulting Engineers & Surveyors, LLC, November 2018.
9. *Falcon Highlands Master Development Drainage Plan & Preliminary Drainage Report & Final Drainage Report for Filing 1*, by URS, January 2005.
10. *Final Drainage Report and Erosion Control Plan – Latigo Business Center Filing No. 1 A Re-subdivision of a Portion of Latigo Business and Research Center Filing No. 1*, by Kiowa Engineering Corporation, November 2004.
11. *Final Drainage Report for Bent Grass Residential (Filing No. 2),* by Galloway & Company, May 2020.

APPENDIX A

Exhibits and Figures

FALCON MEADOWS AT BENT GRASS

-

BENT GRASS MEADOWS DRIVE
SCALE: 1"=2,000'

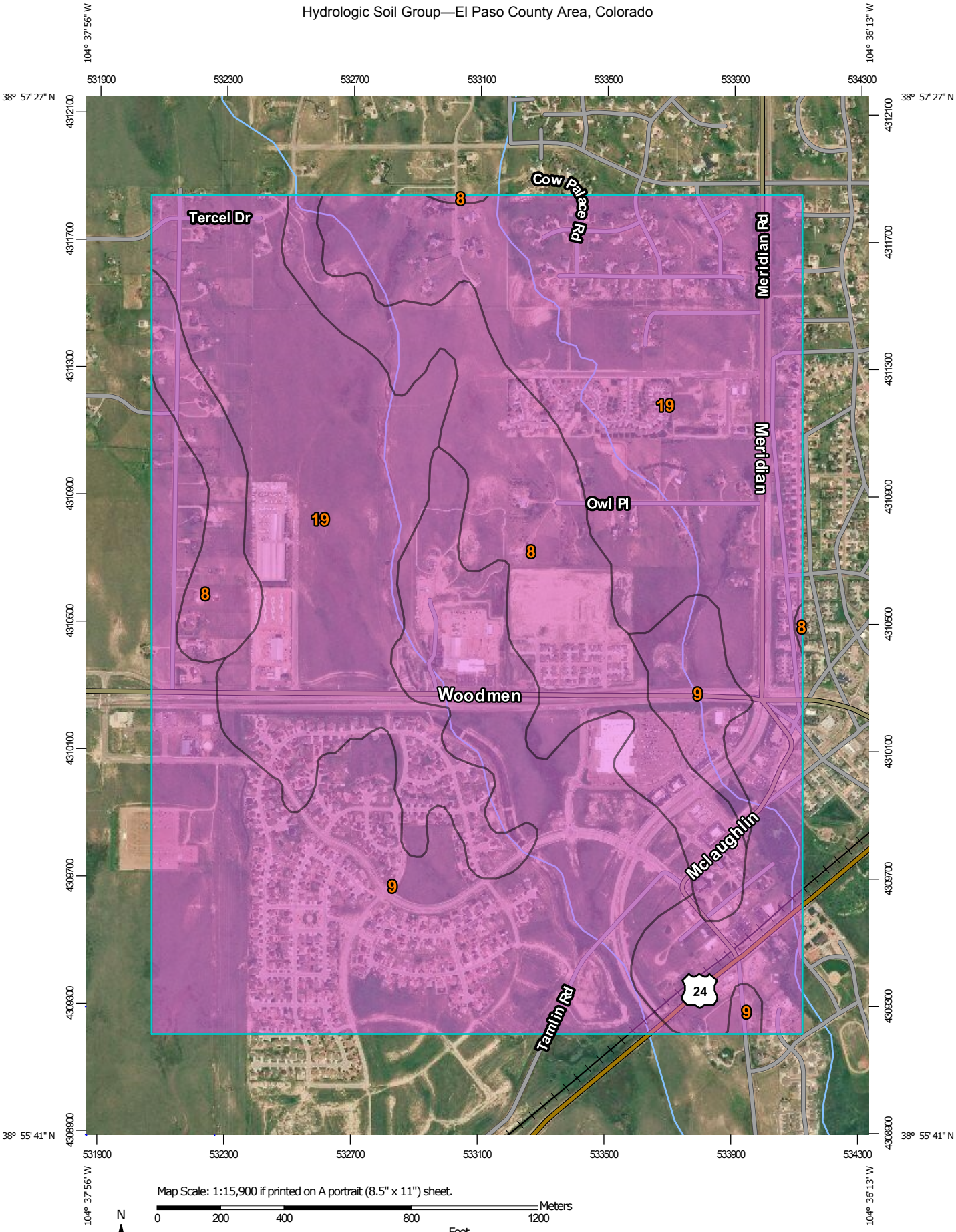
VICINITY MAP

Project No:	CLH000017.20
Drawn By:	TJE
Checked By:	CMD
Date:	06/19/2020

Galloway

1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220 • GallowayUS.com

Hydrologic Soil Group—El Paso County Area, Colorado



Map Scale: 1:15,900 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 16, Sep 10, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 7, 2016—Aug 17, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	214.3	16.0%
9	Blakeland-Fluvaquentic Haplaquolls	A	465.8	34.7%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	662.6	49.3%
Totals for Area of Interest			**1,342.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

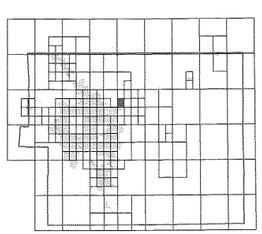
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

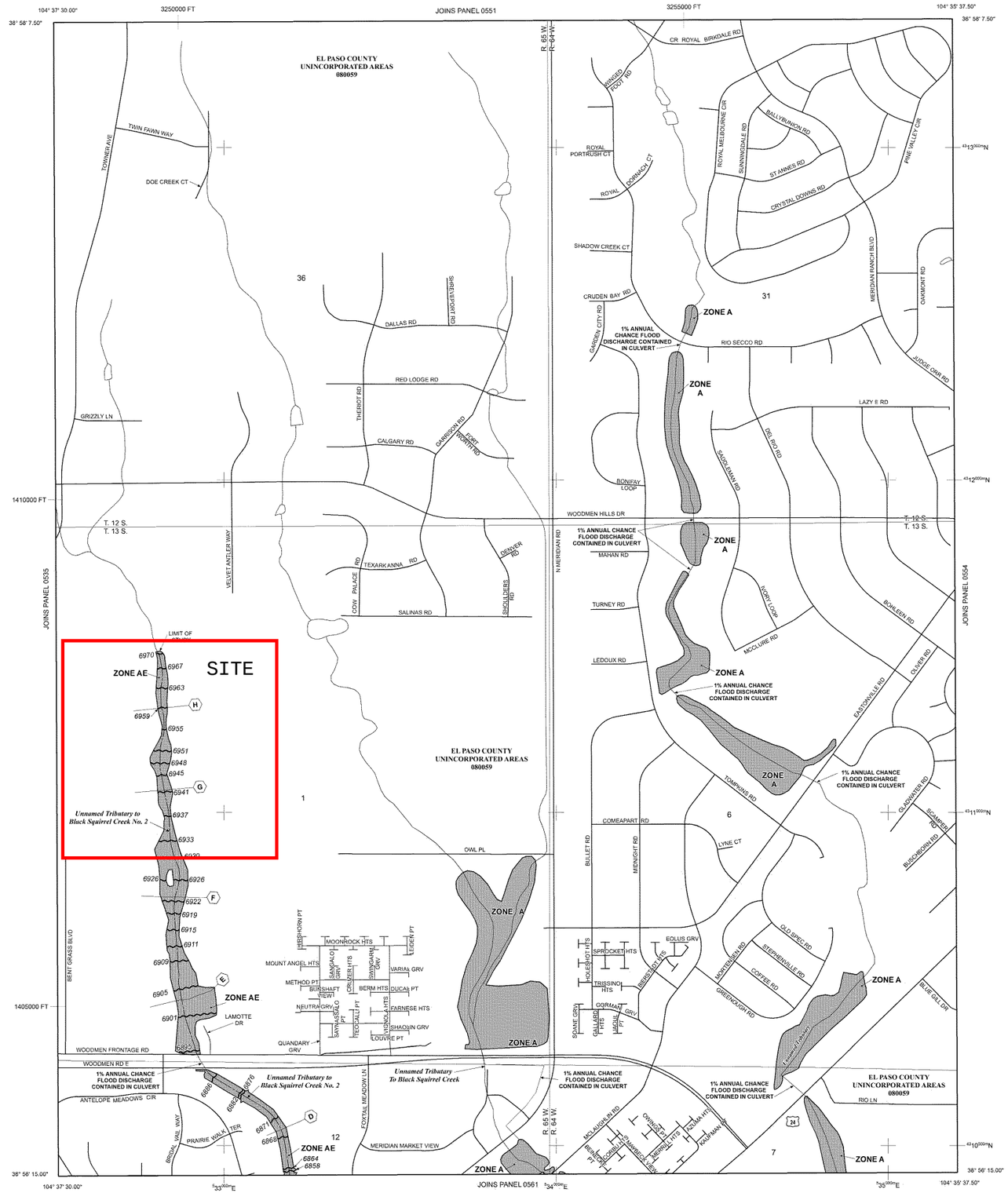
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain boundary
	Floodway boundary
	Zone D Boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A	Cross section line
23 - - - - 23	Transect line
97° 07' 30.00" 32° 22' 30.00"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
$^{42}75^{000m}$N	1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT	5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0553G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 553 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0553	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08041C0553G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

FALCON DRAINAGE BASIN PLANNING STUDY

SELECTED PLAN REPORT

FINAL - SEPTEMBER 2015

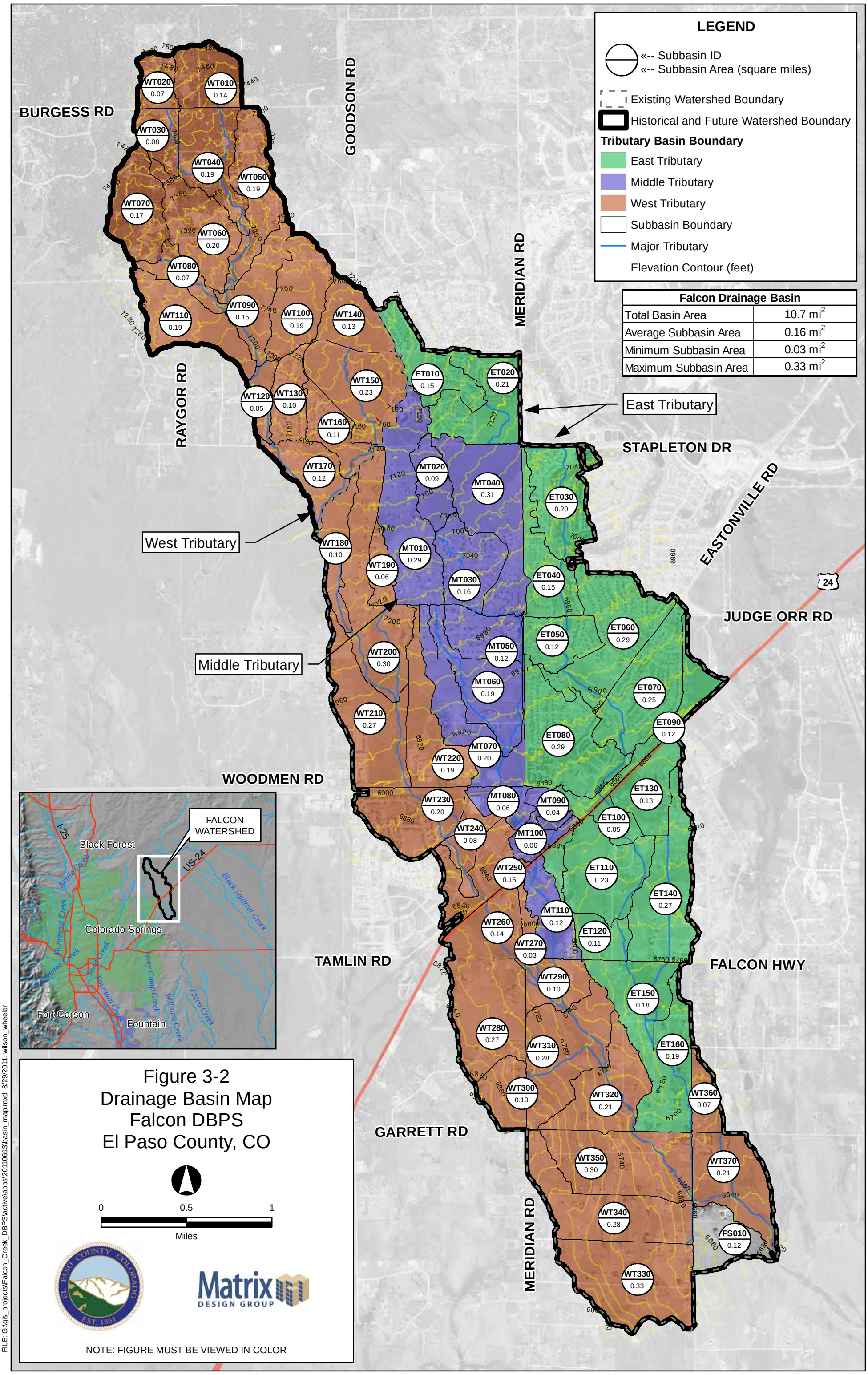
Prepared for:

El Paso County Public Services Department
3275 Akers Drive
Colorado Springs, CO 80922

Prepared By:

Matrix Design Group
2435 Research Parkway, Suite 300
Colorado Springs, CO 80920

Matrix Project No. 10.122.003


LEGEND
«-- Subbasin ID
«-- Subbasin Area (square miles)
Existing Watershed Boundary
Historical and Future Watershed Boundary
Tributary Basin Boundary
East Tributary
Middle Tributary
West Tributary
Subbasin Boundary
Major Tributary
Elevation Contour (feet)
Falcon Drainage Basin
Total Basin Area 10.7 mi²
Average Subbasin Area 0.16 mi²
Minimum Subbasin Area 0.03 mi²
Maximum Subbasin Area 0.33 mi²
BURGESS RD
GOODSON RD
MERIDIAN RD
RAYGOR RD
STAPLETON DR
EASTONVILLE RD
JUDGE ORR RD
WOODMEN RD
TAMLIN RD
FALCON HWY
GARRETT RD
East Tributary
West Tributary
Middle Tributary
FALCON WATERSHED
Black Forest
Colorado Springs
Fort Carson
Fountain
I-25
US-24
Kettle Creek
Monument Creek
Black Squirrel Creek
Jimmy Camp Creek
Williams Creek
Chico Creek
Sand Creek
Fountain Creek
Figure 3-2
Drainage Basin Map
Falcon DBPS
El Paso County, CO
0
0.5
1
Miles
Matrix DESIGN GROUP
NOTE: FIGURE MUST BE VIEWED IN COLOR
FILE: G:\gis_projects\Falcon_Creek_DBPS\active\apps\20110613\basin_map.mxd, 8/29/2011, wilson_wheeler

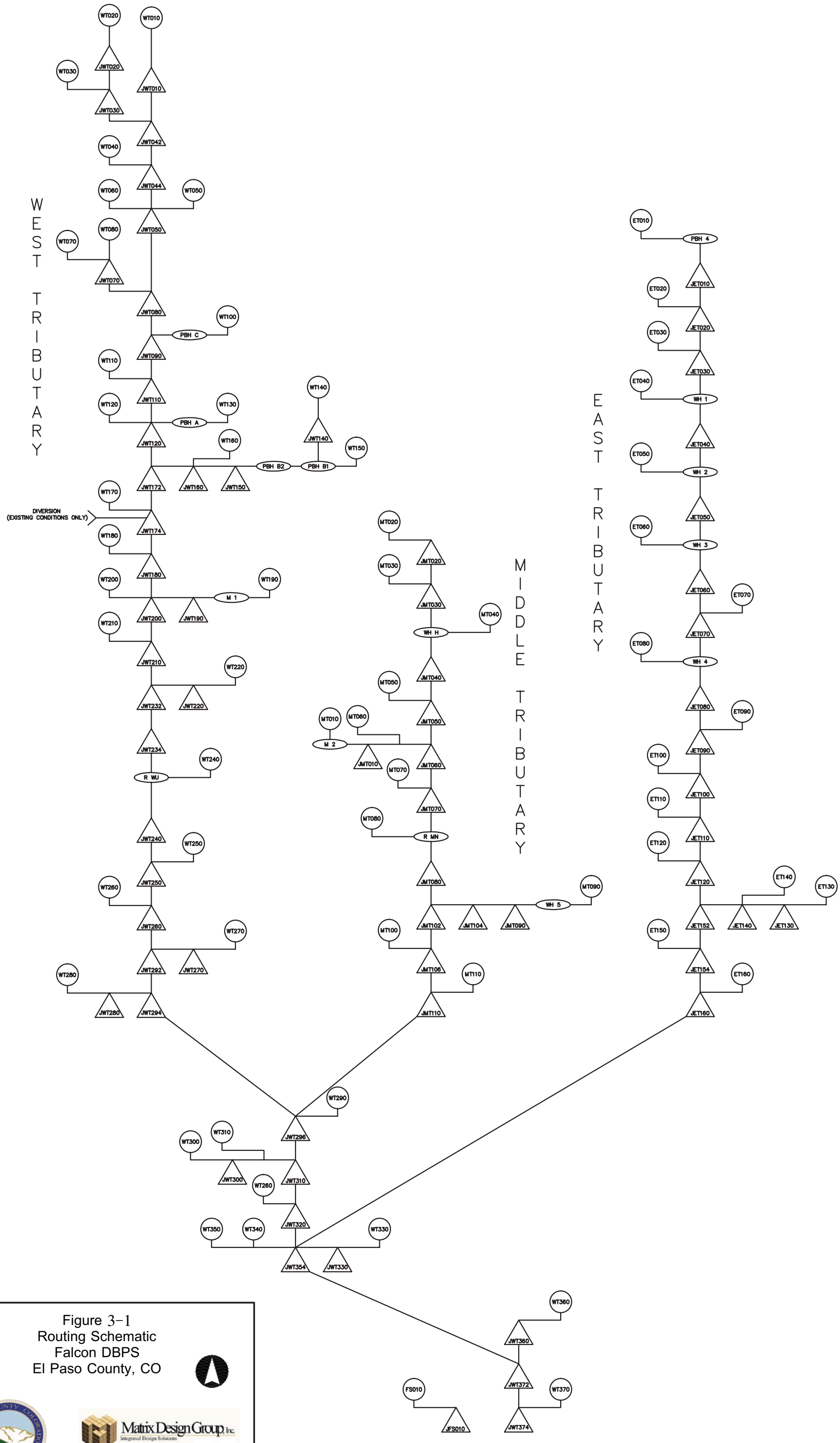


Figure 3-1
Routing Schematic
Falcon DBPS
El Paso County, CO

Matrix Design Group Inc.
Integrated Design Solutions

DRAWING NOT TO SCALE

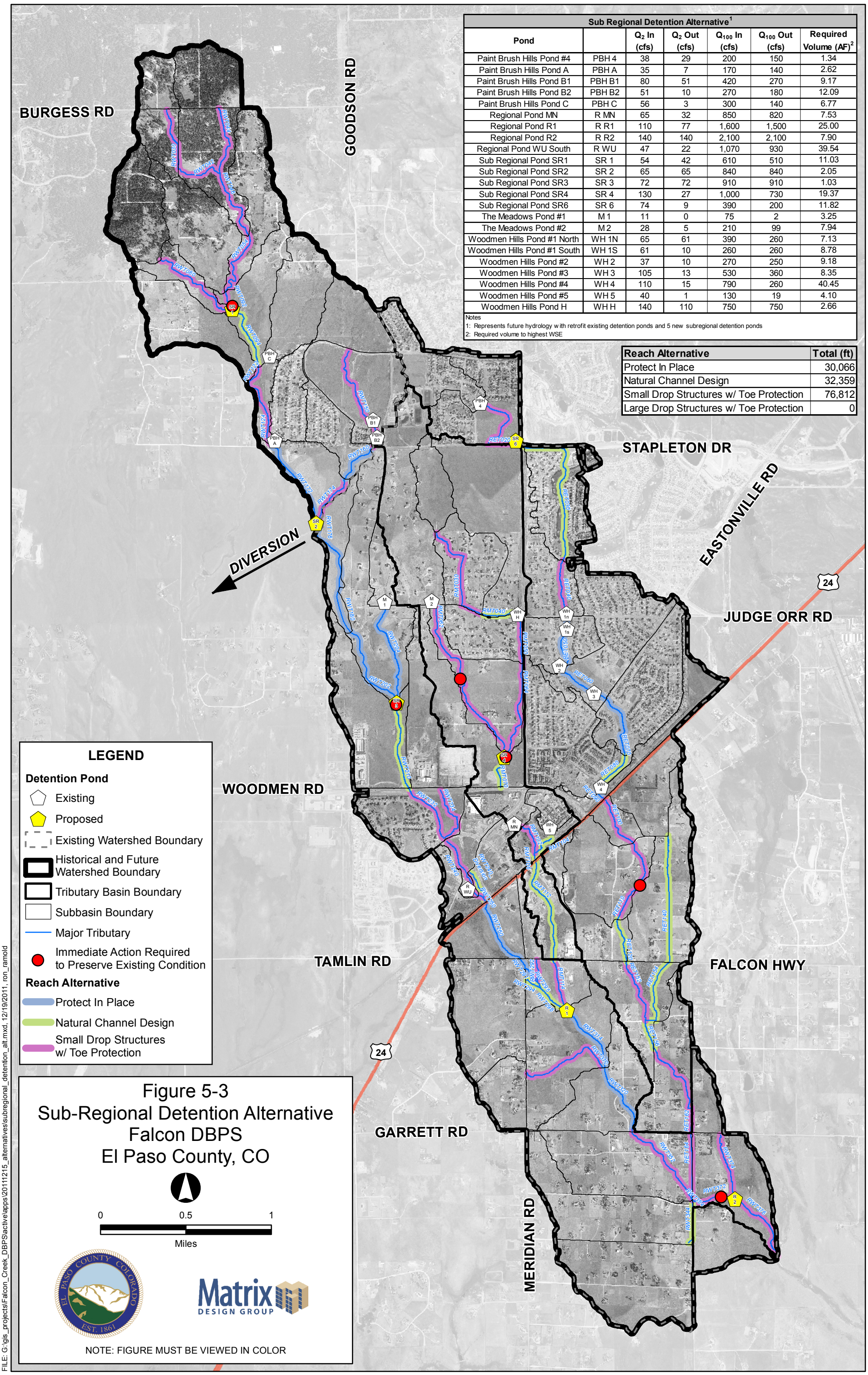


Figure 5-3
Sub-Regional Detention Alternative
Falcon DBPS
El Paso County, CO

Sub Regional Detention Alternative[1]						
Pond		Q_2 In (cfs)	Q_2 Out (cfs)	Q_{100} In (cfs)	Q_{100} Out (cfs)	Required Volume (AF)[2]
Paint Brush Hills Pond #4	PBH 4	38	29	200	150	1.34
Paint Brush Hills Pond A	PBH A	35	7	170	140	2.62
Paint Brush Hills Pond B1	PBH B1	80	51	420	270	9.17
Paint Brush Hills Pond B2	PBH B2	51	10	270	180	12.09
Paint Brush Hills Pond C	PBH C	56	3	300	140	6.77
Regional Pond MN	R MN	65	32	850	820	7.53
Regional Pond R1	R R1	110	77	1,600	1,500	25.00
Regional Pond R2	R R2	140	140	2,100	2,100	7.90
Regional Pond WU South	R WU	47	22	1,070	930	39.54
Sub Regional Pond SR1	SR 1	54	42	610	510	11.03
Sub Regional Pond SR2	SR 2	65	65	840	840	2.05
Sub Regional Pond SR3	SR 3	72	72	910	910	1.03
Sub Regional Pond SR4	SR 4	130	27	1,000	730	19.37
Sub Regional Pond SR6	SR 6	74	9	390	200	11.82
The Meadows Pond #1	M 1	11	0	75	2	3.25
The Meadows Pond #2	M 2	28	5	210	99	7.94
Woodmen Hills Pond #1 North	WH 1N	65	61	390	260	7.13
Woodmen Hills Pond #1 South	WH 1S	61	10	260	260	8.78
Woodmen Hills Pond #2	WH 2	37	10	270	250	9.18
Woodmen Hills Pond #3	WH 3	105	13	530	360	8.35
Woodmen Hills Pond #4	WH 4	110	15	790	260	40.45
Woodmen Hills Pond #5	WH 5	40	1	130	19	4.10
Woodmen Hills Pond H	WH H	140	110	750	750	2.66

Notes
1: Represents future hydrology with retrofit existing detention ponds and 5 new subregional detention ponds
2: Required volume to highest WSE

Reach Alternative	Total (ft)
Protect In Place	30,066
Natural Channel Design	32,359
Small Drop Structures w/ Toe Protection	76,812
Large Drop Structures w/ Toe Protection	0

APPENDIX B

Hydrologic Computations

Worksheet Protected

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer:	CMWJ
Company:	Galloway & Co.
Date:	February 9, 2021
Project:	Falcon Meadows at Bent Grass
Location:	North WQ Pond

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	C
Receiving Pervious Area Soil Type	Sandy Loam
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	13.580
Directly Connected Impervious Area (DCIA, acres)	5.300
Unconnected Impervious Area (UIA, acres)	2.900
Receiving Pervious Area (RPA, acres)	0.000
Separate Pervious Area (SPA, acres)	5.380
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	13.580
Directly Connected Impervious Area (DCIA, %)	39.0%
Unconnected Impervious Area (UIA, %)	21.4%
Receiving Pervious Area (RPA, %)	0.0%
Separate Pervious Area (SPA, %)	39.6%
A_R (RPA / UIA)	0.000
I_a Check	1.000
f / I for WQCV Event:	1.7
f / I for 5-Year Event:	0.5
f / I for 100-Year Event:	0.3
f / I for Optional User Defined Storm CUHP:	
IRF for WQCV Event:	1.00
IRF for 5-Year Event:	1.00
IRF for 100-Year Event:	1.00
IRF for Optional User Defined Storm CUHP:	
Total Site Imperviousness: I_{total}	60.4%
Effective Imperviousness for WQCV Event:	60.4%
Effective Imperviousness for 5-Year Event:	60.4%
Effective Imperviousness for 100-Year Event:	60.4%
Effective Imperviousness for Optional User Defined Storm CUHP:	

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	60.4%
Total Site Effective Imperviousness for WQCV Event:	60.4%
Total Site Effective Imperviousness for 5-Year Event:	60.4%
Total Site Effective Imperviousness for 100-Year Event:	60.4%
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

Worksheet Protected

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	0		

Designer:	CMWJ
Company:	Galloway & Co.
Date:	February 9, 2021
Project:	Falcon Meadows at Bent Grass
Location:	South WQ Pond

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	D	E	Off Site											
Receiving Pervious Area Soil Type	Sandy Loam	Sandy Loam	Sandy Loam											
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	35.330	1.800	30.680											
Directly Connected Impervious Area (DCIA, acres)	11.900	1.800	2.400											
Unconnected Impervious Area (UIA, acres)	4.900	0.000	0.000											
Receiving Pervious Area (RPA, acres)	0.000	0.000	0.000											
Separate Pervious Area (SPA, acres)	18.530	0.000	28.280											
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C	C	C											

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	35.330	1.800	30.680											
Directly Connected Impervious Area (DCIA, %)	33.7%	100.0%	7.8%											
Unconnected Impervious Area (UIA, %)	13.9%	0.0%	0.0%											
Receiving Pervious Area (RPA, %)	0.0%	0.0%	0.0%											
Separate Pervious Area (SPA, %)	52.4%	0.0%	92.2%											
A_R (RPA / UIA)	0.000	0.000	0.000											
I_a Check	1.000	1.000	1.000											
f / I for WQCV Event:	1.7	1.7	1.7											
f / I for 5-Year Event:	0.5	0.5	0.5											
f / I for 100-Year Event:	0.3	0.3	0.3											
f / I for Optional User Defined Storm CUHP:														
IRF for WQCV Event:	1.00	1.00	1.00											
IRF for 5-Year Event:	1.00	1.00	1.00											
IRF for 100-Year Event:	1.00	1.00	1.00											
IRF for Optional User Defined Storm CUHP:														
Total Site Imperviousness: I_{total}	47.6%	100.0%	7.8%											
Effective Imperviousness for WQCV Event:	47.6%	100.0%	7.8%											
Effective Imperviousness for 5-Year Event:	47.6%	100.0%	7.8%											
Effective Imperviousness for 100-Year Event:	47.6%	100.0%	7.8%											
Effective Imperviousness for Optional User Defined Storm CUHP:														

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	0.0%	0.0%	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	0.0%	0.0%	0.0%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:														

Total Site Imperviousness:	31.0%
Total Site Effective Imperviousness for WQCV Event:	31.0%
Total Site Effective Imperviousness for 5-Year Event:	31.0%
Total Site Effective Imperviousness for 100-Year Event:	31.0%
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

Existing Computations

COMPOSITE % IMPERVIOUS CALCULATIONS: EXISTING

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Basin ID	**Total Area (ac)**	**Paved/Gravel Roads**			**Lawns/Undeveloped**			**Roofs**			**Residential - 1/8 Acre**			**Residential - 1/4 Acre**			**Residential - 1/3 Acre**			**Residential - 1/2 Acre**			**Residential - 1 Acre**			**Basins Total Weighted % Imp.**
		% Imp.	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	**% Imp.**	**Area (ac)**	**Weighted % Imp.**	
EX-1	1.19	100	0.00	0.0	2	1.19	2.0	2	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
EX-2	1.56	100	0.00	0.0	2	1.56	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
EX-3	0.62	100	0.00	0.0	2	0.62	2.0	1	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
EX-4	12.49	100	0.00	0.0	2	12.49	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
EX-5	5.15	100	0.00	0.0	2	5.15	2.0	10	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
EX-6	9.53	100	0.00	0.0	2	9.53	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
EX-7	9.16	100	0.00	0.0	2	9.16	2.0	18	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
EX-8	21.30	100	0.00	0.0	2	21.30	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
OS-1	32.28	100	2.15	6.7	2	29.25	1.8	90	0.88	2.5	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	11.0
OS-2	20.08	80	0.90	3.6	2	18.62	1.9	90	0.56	2.5	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	8.0
OS-3	10.62	80	0.48	3.6	2	9.84	1.9	19	0.30	0.5	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	6.0
OS-4	4.46	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	2.28	33.2	40	1.46	13.1	30	0.00	0.0	25	0.00	0.0	20	0.72	3.2	49.5
OS-5	0.46	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	0.46	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
OS-6	1.17	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	1.17	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
C-8	0.42	100	0.00	0.0	2	0.42	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
E-1	1.71	100	0.78	45.6	2	0.23	0.3	90	0.00	0.0	65.0	0.00	0.0	40	0.70	16.4	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	62.3
E-2	0.68	100	0.56	82.4	2	0.12	0.4	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	82.8
E-3	0.78	100	0.69	88.5	2	0.09	0.2	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	88.7
E-4	0.91	100	0.73	80.2	2	0.18	0.4	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	80.6
E-5	0.89	100	0.79	88.8	2	0.10	0.2	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	89.0
I-1	0.31	100	0.22	71.0	2	0.09	0.6	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	71.6

Lot Type Identification:	
Lot Size (SF)	*Lot Size (Acre)*
0 - 8,167	1/8 Acre
8,168 - 12,704	1/4 Acre
12,705 - 18,149	1/3 Acre
18,150 - 32,670	1/2 Acre
32,671 - 43,560	1 Acre

NOTES:
% Impervious values are taken directly from Table 6-6 in the Colorado Springs DCM Vol. 1. CH. 6 (Referencing UDFCD 2001)

COMPOSITE RUNOFF COEFFICIENT CALCULATIONS: EXISTING

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Basin ID	**Total Area (ac)**	**Paved/Gravel Roads**			**Lawns/Undeveloped**			**Roofs**			**Residential - 1/8 Acre**			**Residential - 1/4 Acre**			**Residential - 1/3 Acre**			**Residential - 1/2 Acre**			**Residential - 1 Acre**			**Composite C_5**	**Composite C_{100}**
		C_5	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**		
EX-1	1.19	0.90	0.96	0.00	0.09	0.36	1.19	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
EX-2	1.56	0.90	0.96	0.00	0.09	0.36	1.56	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
EX-3	0.62	0.90	0.96	0.00	0.09	0.36	0.62	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
EX-4	12.49	0.90	0.96	0.00	0.09	0.36	12.49	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
EX-5	5.15	0.90	0.96	0.00	0.09	0.36	5.15	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
EX-6	9.53	0.90	0.96	0.00	0.09	0.36	9.53	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
EX-7	9.16	0.90	0.96	0.00	0.09	0.36	9.16	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
EX-8	21.30	0.90	0.96	0.00	0.09	0.36	21.30	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
OS-1	32.28	0.90	0.96	2.15	0.09	0.36	29.25	0.73	0.81	0.88	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.16	0.41
OS-2	20.08	0.90	0.96	0.90	0.09	0.36	18.62	0.73	0.81	0.56	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.14	0.40
OS-3	10.62	0.90	0.96	0.48	0.09	0.36	9.84	0.73	0.81	0.30	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.14	0.40
OS-4	4.46	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	2.28	0.30	0.50	1.46	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.72	0.36	0.54
OS-5	0.46	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.46	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
OS-6	1.17	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	1.17	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
C-8	0.42	0.90	0.96	0.00	0.09	0.36	0.42	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
E-1	1.71	0.90	0.96	0.78	0.09	0.36	0.23	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.70	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.55	0.69
E-2	0.68	0.90	0.96	0.56	0.09	0.36	0.12	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.76	0.85
E-3	0.78	0.90	0.96	0.69	0.09	0.36	0.09	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.81	0.89
E-4	0.91	0.90	0.96	0.73	0.09	0.36	0.18	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.74	0.84
E-5	0.89	0.90	0.96	0.79	0.09	0.36	0.10	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.81	0.89
I-1	0.31	0.90	0.96	0.22	0.09	0.36	0.09	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.66	0.79

Lot Type Identification:	
Lot Size (SF)	*Lot Size (Acre)*
0 - 8,167	<= 1/8 Acre
8,168 - 12,704	1/4 Acre
12,705 - 18,149	1/3 Acre
18,150 - 32,670	1/2 Acre
32,671 - 43,560	1 Acre

NOTES:
C values are taken directly from Table 6-6 in the Colorado Springs DCM Vol. 1. CH. 6 (Referencing UDFCD 2001)
Coeffficients use HSG A&B soils - Refer to "Appendix A: Exhibits and Figures" for soil map

STANDARD FORM SF-2
TIME OF CONCENTRATION: EXISTING

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SUB-BASIN						INITIAL/OVERLAND			TRAVEL TIME					Tc CHECK			
DATA						(T_i)			(T_t)					(URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C_5	C_{100}	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH(FT)	Urbanized T_c (MIN)	T_c (MIN)
EX-1	1.19	A	2.0	0.09	0.36	300	2.7	23.0	690	2.7	15	2.5	4.7	27.7	990.0	15.5	15.5
EX-2	1.56	A	2.0	0.09	0.36	200	2.7	18.8	100	2.7	15	2.5	0.7	19.5	300.0	11.7	11.7
EX-3	0.62	A	2.0	0.09	0.36	100	5.0	10.8	30	2.7	15	2.5	0.2	11.0	130.0	10.7	10.7
EX-4	12.49	A	2.0	0.09	0.36	100	2.7	13.3	1180	2.7	15	2.5	8.0	21.3	1280.0	17.1	17.1
EX-5	5.15	A	2.0	0.09	0.36	100	2.7	13.3	1000	2.7	15	2.5	6.8	20.0	1100.0	16.1	16.1
EX-6	9.53	A	2.0	0.09	0.36	100	2.7	13.3	1700	2.7	15	2.5	11.5	24.8	1800.0	20.0	20.0
EX-7	9.16	A	2.0	0.09	0.36	90	2.7	12.6	1020	2.7	15	2.5	6.9	19.5	1110.0	16.2	16.2
EX-8	21.30	A	2.0	0.09	0.36	100	2.7	13.3	996	2.7	15	2.5	6.7	20.0	1095.5	16.1	16.1
OS-1	32.28	A	11.0	0.16	0.41	100	2.4	12.9	2100	2.2	15	2.2	15.7	28.6	2200.0	22.2	22.2
OS-2	20.08	A	8.0	0.14	0.40	100	2.3	13.3	1400	2.3	15	2.3	10.3	23.6	1500.0	18.3	18.3
OS-3	10.62	A	8.0	0.14	0.40	100	2.0	14.0	1500	2.0	15	2.1	11.8	25.7	1600.0	18.9	18.9
OS-4	4.46	A	49.5	0.36	0.54	100	2.0	10.8	910	1.2	20	2.2	6.9	17.7	1010.0	15.6	15.6
OS-5	0.46	A	65.0	0.45	0.59	15	2.0	3.7	190	1.0	20	2.0	1.6	5.2	205.0	11.1	5.2
OS-6	1.17	A	65.0	0.45	0.59	85	0.2	18.7	430	0.9	20	1.9	3.9	22.6	515.0	12.9	12.9
C-8	0.42	A	2.0	0.09	0.36	100	2.5	13.6	170	2.5	15	2.4	1.2	14.8	270.0	11.5	11.5
E-1	1.71	A	62.3	0.55	0.69	25	2.0	4.0	940	1.0	20	2.0	7.8	11.8	965.0	15.4	11.8
E-2	0.68	A	82.8	0.76	0.85	25	2.0	2.5	665	1.6	20	2.5	4.4	6.9	690.0	13.8	6.9
E-3	0.78	A	88.7	0.81	0.89	25	2.0	2.1	632	1.0	20	2.0	5.3	7.4	657.0	13.7	7.4
E-4	0.91	A	80.6	0.74	0.84	25	2.0	2.6	913	2.0	20	2.8	5.4	8.0	938.0	15.2	8.0
E-5	0.89	A	89.0	0.81	0.89	25	2.0	2.1	903	2.1	20	2.9	5.2	7.3	928.0	15.2	7.3
I-1	0.31	A	71.6	0.66	0.79	25	2.0	3.2	135	2.0	20	2.8	0.8	4.0	160.0	10.9	5.0

NOTES:

T_i = (0.395*(1.1 - C_5)*(L)^0.5)/((S)^0.33), S in ft/ft

T_t=L/60V (Velocity From Fig. 501)

Velocity V=Cv*S^0.5, S in ft/ft

Tc Check = 10+L/180

For Urbanized basins a minimum T_c of 5.0 minutes is required.

For non-urbanized basins a minimum T_c of 10.0 minutes is required

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN: EXISTING

(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
		WT200	192.00									190.0									From Falcon DBPS by Matrix
	1	OS-4	4.46	0.54	15.6	2.41	5.81	14.0					1.2	14.0				910	2.2	6.9	Flow obtained from Bent Grass Filing No. 2 FDR.
	2	OS-5	0.46	0.59	5.2	0.27	8.56	2.3					1	2.3				190	2.0	1.6	Flow obtained from Bent Grass Filing No. 2 FDR.
	3	OS-6	1.17	0.59	12.9	0.69	6.30	4.3					0.86	4.3				430	1.9	3.9	Flow obtained from Bent Grass Filing No. 2 FDR.
	4	EX-1	1.19	0.36	15.5	0.43	5.83	2.5													
	5	EX-2	1.56	0.36	11.7	0.56	6.54	3.7	15.6	4.36	5.81	25.3									Total flows to DP 5 discharging into existing WQCV Pond.
		EX-3	0.62	0.36	10.7	0.22	6.76	1.5													Existing WQCV Pond.
	6	EX-4	12.49	0.36	17.1	4.50	5.58	25.1													
	7	EX-5	5.15	0.36	16.1	1.85	5.73	10.6	17.1	6.35	5.58	35.4									Total flow from DP 6 & EX-5 flowing onto Bent Grass Meadows Drive.
	8	EX-7	9.16	0.36	16.2	3.30	5.72	18.9													Flows from DP 8 go off-site into Bent Grass Meadows Drive.
	9	OS-2	20.08	0.40	18.3	8.03	5.41	43.4													Flow obtained from Bent Grass Filing No. 2 FDR.
	10	OS-3	10.62	0.40	18.9	4.25	5.33	22.7													Flow obtained from Bent Grass Filing No. 2 FDR.
	11	EX-6	9.53	0.36	20.0	3.43	5.19	17.8	20.0	15.71	5.19	81.5									Total flows entering existing inlet at DP 11. (Basins OS-2, OS-3 & EX-6)
		EX-8	21.30	0.36	16.1	7.67	5.73	43.9													Existing flows from basin discharge into creek.
	12	OS-1	32.28	0.41	22.2	13.23	4.92	65.1													Existing off-site flows into creek via existing swale.
		E-1	1.71	0.69	11.8	1.18	6.51	7.7													
		E-2	0.68	0.85	6.9	0.58	7.89	4.6													
	4X								17.3	4.03	5.55	22.4									DP-4 from Bent Grass Filing No. 2 FDR (
	21								17.3	10.29	5.55	57.1									Combine Basins Ex-4, E-1 & E-2 at Existing Inlet from Bent Grass Filing No. 2 FDR
	15A											37.0									Release Rate from WQCV Pond North in Bent Grass Filing No. FDR
		E-3	0.78	0.89	7.4	0.69	7.70	5.3													
	AA											297.4									Combine Basins WT200 & E-3 w/Design Points 12 & 15A
		E-4	0.91	0.84	8.0	0.76	7.50	5.7													
		E-5	0.89	0.89	7.3	0.79	7.73	6.1													

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN: EXISTING

(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
		I-1	0.31	0.79	5.0	0.24	8.68	2.1													
	26								20.0	17.50	3.09	54.1									Combine Basins E-4, E-5 & I-1 w/DP 11 at Existing Inlet from Bent Grass Filing No. 2 FDR
	20B											64.9									Release Rate from WQCV Pond South in Bent Grass Filing No. FDR
		C-8	0.42	0.36	11.5	0.15	6.58	1.0													
	CC											417.4									Flows exiting site - Combined flows from Basin C-8 w/Design Points AA, 26 & 20B

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN: EXISTING

(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

		DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
STREET	Design Point	Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
		RWT202	1574.40						46.6	120.88	1.82	220.0									From Falcon DBPS by Matrix
		RWT204	38.40						11.37	1.78	3.94	7.0									From Falcon DBPS by Matrix
		WT200	192.00						37.8	24.41	2.13	52.0									From Falcon DBPS by Matrix
	1	OS-4	4.46	0.36	15.6	1.61	3.46	5.6					1.2	5.6				910	2.2	6.9	Flows from Basin B-1 of Bent Grass Filing No. 2 FDR.
	2	OS-5	0.46	0.45	5.2	0.21	5.10	1.1					1	1.1				190	2.0	1.6	Flows from Basin B-2 of Bent Grass Filing No. 2 FDR
	3	OS-6	1.17	0.45	12.9	0.53	3.75	2.0					0.86	2.0				430	1.9	3.9	Flows from Basin B-3 of Bent Grass Filing No. 2 FDR.
	4	EX-1	1.19	0.09	15.5	0.11	3.47	0.4													
	5	EX-2	1.56	0.09	11.7	0.14	3.90	0.5	15.6	2.60	3.46	9.0									Total flows to DP 5 discharging into existing WQCV Pond.
		EX-3	0.62	0.09	10.7	0.06	4.02	0.2													Existing WQCV Pond.
P P																					
p p	6	EX-4	12.49	0.09	17.1	1.12	3.32	3.7													
p	7	EX-5	5.15	0.09	16.1	0.46	3.41	1.6	17.1	1.58	3.32	5.2									Total flow from DP 6 & EX-5 flowing onto Bent Grass Meadows Drive.
	8	EX-7	9.16	0.09	16.2	0.82	3.41	2.8													Flows from DP 8 go off-site into Bent Grass Meadows Drive.
	9	OS-2	20.08	0.14	18.3	2.81	3.22	9.0													Flow obtained from Bent Grass Filing No. 2 FDR.
	10	OS-3	10.62	0.14	18.9	1.49	3.18	4.7													Flow obtained from Bent Grass Filing No. 2 FDR.
	11	EX-6	9.53	0.09	20.0	0.86	3.09	2.7	20.0	5.16	3.09	15.9									Total flows entering existing inlet at DP 11. (Basins OS-2, OS-3 & EX-6)
		EX-8	21.30	0.09	16.1	1.92	3.42	6.6													Existing flows from basin discharge into creek.
	12	OS-1	32.28	0.16	22.2	5.16	2.93	15.1													Existing off-site flows into creek via existing swale.
		E-1	1.71	0.55	11.8	0.94	3.88	3.6													Existing Basin from Filing No. 2(East side of BGMD)
		E-2	0.68	0.76	6.9	0.52	4.70	2.4													Existing Basin from Filing No. 2(West side of BGMD)
	4X								17.3	2.60	3.31	8.6									DP-4 from Bent Grass Filing No. 2 FDR (
	21								17.3	5.18	3.31	17.1									Combine Basins Ex-4, E-1 & E-2 at Existing Inlet from Bent Grass Filing No. 2 FDI
	15A								5.0	2.42	5.17	12.5									Release Rate from Ex WQCV Pond North in Bent Grass Filing No.2 FDR
		E-3	0.78	0.81	7.4	0.63	4.59	2.9													
	AA								46.6	155.28	1.82	282.6									Combine Basins WT200 & E-3 w/Design Points 12 & 15A
		E-4	0.91	0.74	8.0	0.67	4.46	3.0													

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN: EXISTING

(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
		E-5	0.89	0.81	7.3	0.72	4.60	3.3													
		I-1	0.31	0.66	5.0	0.20	5.17	1.0													
	26								20.0	6.75	3.09	20.9									Combine Basins E-4, E-5 & I-1 w/DP 11 at Existing Inlet from Bent Grass Filing No. 2 FDR
	20B								5.0	4.10	5.17	21.2									Release Rate from Ex WQCV Pond South in Bent Grass Filing No. FDR
		C-8	0.42	0.09	11.5	0.04	3.92	0.2													
	CC								46.6	166.17	1.82	302.4									Flows exiting site - Combined flows from Basin C-8 w/Design Points AA, 26 & 20B

Proposed Computations

COMPOSITE % IMPERVIOUS CALCULATIONS: PROPOSED

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
		Paved/Gravel Roads			Lawns/Undeveloped			Roofs			Residential - 1/8 Acre			Residential - 1/4 Acre			Residential - 1/3 Acre			Residential - 1/2 Acre			Residential - 1 Acre			Basins Total
Basin ID	Total Area (ac)	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	Weighted % Imp.
A-1	2.16	100	0.50	23.1	2	0.00	0.0	90	0.00	0.0	65.0	0.93	28.0	40	0.00	0.0	30	0.73	10.1	25	0.00	0.0	20	0.75	6.9	68.1
A-2	0.86	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	0.86	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
A-3	0.92	100	0.64	69.6	2	0.28	0.6	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	70.2
A-4	0.82	100	0.00	0.0	2	0.82	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
B-1	4.32	100	0.00	0.0	2	4.32	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
B-2	4.16	100	0.00	0.0	2	4.41	2.1	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.1
C-1	9.07	100	2.14	23.6	2	0.33	0.1	90	0.00	0.0	65.0	4.56	32.7	40	1.70	7.5	30	0.34	1.1	25	0.00	0.0	20	0.00	0.0	65.0
C-2	1.11	100	0.37	33.3	2	0.19	0.3	90	0.00	0.0	65.0	0.30	17.6	40	0.00	0.0	30	0.25	6.8	25	0.00	0.0	20	0.00	0.0	58.0
C-3	1.52	100	0.94	61.8	2	0.00	0.0	90	0.00	0.0	65.0	0.58	24.8	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	86.6
C-4	4.70	100	0.36	7.7	2	1.85	0.8	90	0.00	0.0	65.0	2.49	34.4	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	42.9
C-5	0.51	100	0.00	0.0	2	0.51	2.0	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	2.0
C-6	1.37	100	0.00	0.0	2	0.30	0.4	90	0.00	0.0	65.0	1.07	50.8	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	51.2
D-1	8.13	100	1.52	18.7	2	0.69	0.2	90	0.00	0.0	65.0	1.85	14.8	40	1.42	7.0	30	1.53	5.6	25	1.12	3.4	20	0.00	0.0	49.7
D-2	6.72	100	2.31	34.4	2	0.76	0.2	90	0.00	0.0	65.0	3.65	35.3	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	69.9
D-3	2.93	100	0.00	0.0	2	0.28	0.2	90	0.00	0.0	65.0	1.26	28.0	40	0.17	2.3	30	0.12	1.2	25	0.00	0.0	20	0.00	0.0	31.7
D-4	4.38	100	1.21	27.6	2	0.63	0.3	90	0.00	0.0	65.0	2.53	37.5	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.4
D-5	1.08	100	0.22	20.4	2	0.11	0.2	90	0.00	0.0	65.0	0.75	45.1	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.7
D-6	4.01	100	0.91	22.7	2	0.09	0.0	90	0.00	0.0	65.0	3.01	48.8	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	71.5
D-7	6.39	100	0.00	0.0	2	5.59	1.7	90	0.00	0.0	65.0	0.80	8.1	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	9.8
D-8	1.69	100	0.00	0.0	2	1.13	1.3	90	0.00	0.0	65.0	0.56	21.5	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	22.8
E-1	1.71	100	0.78	45.6	2	0.23	0.3	90	0.00	0.0	65.0	0.00	0.0	40	0.70	16.4	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	62.3
E-2	0.68	100	0.56	82.4	2	0.12	0.4	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	82.8
E-3	0.78	100	0.69	88.5	2	0.09	0.2	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	88.7
E-4	0.91	100	0.73	80.2	2	0.18	0.4	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	80.6
E-5	0.89	100	0.79	88.8	2	0.10	0.2	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	89.0
I-1	0.31	100	0.22	71.0	2	0.09	0.6	90	0.00	0.0	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	71.6
OS-1	32.28	100	2.15	6.7	2	29.25	1.8	90	0.88	2.5	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	11.0
OS-2	20.07	80	0.90	3.6	2	18.62	1.9	90	0.56	2.5	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	8.0
OS-3	10.61	80	0.48	3.6	2	9.84	1.9	90	0.30	2.5	65.0	0.00	0.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	8.0
OS-4	4.46	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	2.28	33.2	40	1.46	13.1	30	0.00	0.0	25	0.00	0.0	20	0.72	3.2	49.5
OS-5	0.46	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	0.46	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0
OS-6	1.17	100	0.00	0.0	2	0.00	0.0	90	0.00	0.0	65.0	1.17	65.0	40	0.00	0.0	30	0.00	0.0	25	0.00	0.0	20	0.00	0.0	65.0

Lot Type Identification:	
Lot Size (SF)	*Lot Size (Acre)*
0 - 8,167	1/8 Acre
8,168 - 12,704	1/4 Acre
12,705 - 18,149	1/3 Acre
18,150 - 32,670	1/2 Acre
32,671 - 43,560	1 Acre

NOTES:
% Impervious values are taken directly from Table 6-6 in the Colorado Springs DCM Vol. 1. CH. 6 (Referencing UDFCD 2001)

COMPOSITE RUNOFF COEFFICIENT CALCULATIONS: PROPOSED

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Basin ID	**Total Area (ac)**	**Paved/Gravel Roads**			**Lawns/Undeveloped**			**Roofs**			**Residential - 1/8 Acre**			**Residential - 1/4 Acre**			**Residential - 1/3 Acre**			**Residential - 1/2 Acre**			**Residential - 1 Acre**			**Composite C_5**	**Composite C_{100}**
		C_5	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**	**C_5**	**C_{100}**	**Area (ac)**		
A-1	2.16	0.90	0.96	0.50	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.93	0.30	0.50	0.00	0.25	0.47	0.73	0.22	0.46	0.00	0.20	0.44	0.75	0.56	0.79
A-2	0.86	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.86	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
A-3	0.92	0.90	0.96	0.64	0.09	0.36	0.28	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.65	0.78
A-4	0.82	0.90	0.96	0.00	0.09	0.36	0.82	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
B-1	4.32	0.90	0.96	0.00	0.09	0.36	4.32	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
B-2	4.16	0.90	0.96	0.00	0.09	0.36	4.41	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.10	0.38
C-1	9.07	0.90	0.96	2.14	0.09	0.36	0.33	0.73	0.81	0.00	0.45	0.59	4.56	0.30	0.50	1.70	0.25	0.47	0.34	0.22	0.46	0.00	0.20	0.44	0.00	0.51	0.65
C-2	1.11	0.90	0.96	0.37	0.09	0.36	0.19	0.73	0.81	0.00	0.45	0.59	0.30	0.30	0.50	0.00	0.25	0.47	0.25	0.22	0.46	0.00	0.20	0.44	0.00	0.49	0.65
C-3	1.52	0.90	0.96	0.94	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.58	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.73	0.82
C-4	4.70	0.90	0.96	0.36	0.09	0.36	1.85	0.73	0.81	0.00	0.45	0.59	2.49	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.34	0.53
C-5	0.51	0.90	0.96	0.00	0.09	0.36	0.51	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.09	0.36
C-6	1.37	0.90	0.96	0.00	0.09	0.36	0.30	0.73	0.81	0.00	0.45	0.59	1.07	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.37	0.54
D-1	8.13	0.90	0.96	1.52	0.09	0.36	0.69	0.73	0.81	0.00	0.45	0.59	1.85	0.30	0.50	1.42	0.25	0.47	1.53	0.22	0.46	1.12	0.20	0.44	0.00	0.41	0.58
D-2	6.72	0.90	0.96	2.31	0.09	0.36	0.76	0.73	0.81	0.00	0.45	0.59	3.65	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.56	0.69
D-3	2.93	0.90	0.96	0.00	0.09	0.36	0.28	0.73	0.81	0.00	0.45	0.59	1.26	0.30	0.50	0.17	0.25	0.47	0.12	0.22	0.46	0.00	0.20	0.44	0.00	0.23	0.34
D-4	4.38	0.90	0.96	1.21	0.09	0.36	0.63	0.73	0.81	0.00	0.45	0.59	2.53	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.52	0.66
D-5	1.08	0.90	0.96	0.22	0.09	0.36	0.11	0.73	0.81	0.00	0.45	0.59	0.75	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.51	0.64
D-6	4.01	0.90	0.96	0.91	0.09	0.36	0.09	0.73	0.81	0.00	0.45	0.59	3.01	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.54	0.67
D-7	6.39	0.90	0.96	0.00	0.09	0.36	5.59	0.73	0.81	0.00	0.45	0.59	0.80	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.14	0.39
D-8	1.69	0.90	0.96	0.00	0.09	0.36	1.13	0.73	0.81	0.00	0.45	0.59	0.56	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.21	0.44
E-1	1.71	0.90	0.96	0.78	0.09	0.36	0.23	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.70	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.55	0.69
E-2	0.68	0.90	0.96	0.56	0.09	0.36	0.12	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.76	0.85
E-3	0.78	0.90	0.96	0.69	0.09	0.36	0.09	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.81	0.89
E-4	0.91	0.90	0.96	0.73	0.09	0.36	0.18	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.74	0.84
E-5	0.89	0.90	0.96	0.79	0.09	0.36	0.10	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.81	0.89
I-1	0.31	0.90	0.96	0.22	0.09	0.36	0.09	0.73	0.81	0.00	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.66	0.79
OS-1	32.28	0.90	0.96	2.15	0.09	0.36	29.25	0.73	0.81	0.88	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.16	0.41
OS-2	20.07	0.90	0.96	0.90	0.09	0.36	18.62	0.73	0.81	0.56	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.14	0.40
OS-3	10.61	0.90	0.96	0.48	0.09	0.36	9.84	0.73	0.81	0.30	0.45	0.59	0.00	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.14	0.40
OS-4	4.46	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	2.28	0.30	0.50	1.46	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.72	0.36	0.54
OS-5	0.46	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	0.46	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59
OS-6	1.17	0.90	0.96	0.00	0.09	0.36	0.00	0.73	0.81	0.00	0.45	0.59	1.17	0.30	0.50	0.00	0.25	0.47	0.00	0.22	0.46	0.00	0.20	0.44	0.00	0.45	0.59

Lot Type Identification:

Lot Size (SF)	*Lot Size (Acre)*
0 - 8,167	<= 1/8 Acre
8,168 - 12,704	1/4 Acre
12,705 - 18,149	1/3 Acre
18,150 - 32,670	1/2 Acre
32,671 - 43,560	1 Acre

NOTES:
C values are taken directly from Table 6-6 in the Colorado Springs DCM Vol. 1. CH. 6 (Referencing UDFCD 2001)
Coeffficients use HSG A&B soils - Refer to "Appendix A: Exhibits and Figures" for soil map

STANDARD FORM SF-2: PROPOSED
TIME OF CONCENTRATION

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
SUB-BASIN						INITIAL/OVERLAND			TRAVEL TIME					Tc CHECK			
DATA						(T_i)			(T_t)					(URBANIZED BASINS)			FINAL
BASIN ID	D.A. (AC)	Hydrologic Soils Group	Impervious (%)	C_5	C_{100}	L (FT)	S (%)	T_i (MIN)	L (FT)	S (%)	Cv	VEL. (FPS)	T_t (MIN)	COMP. T_c (MIN)	TOTAL LENGTH(FT)	Urbanized T_c (MIN)	T_c (MIN)
A-1	2.16	A	68.1	0.56	0.79	100	4.0	6.2	765	2.5	20	3.2	4.0	10.3	865.0	14.8	10.3
A-2	0.86	A	65.0	0.45	0.59	5	2.0	2.1	110	7.0	20	5.3	0.3	2.5	115.0	10.6	5.0
A-3	0.92	A	70.2	0.65	0.78	60	2.0	5.1	735	2.5	20	3.2	3.9	8.9	795.0	14.4	8.9
A-4	0.82	A	2.0	0.09	0.36	5	2.0	3.3	105	5.7	20	4.8	0.4	3.6	110.0	10.6	5.0
B-1	4.32	A	2.0	0.09	0.36	90	6.4	9.5	2000	1.7	15	2.0	17.0	26.5	2090.0	21.6	21.6
B-2	1.17	A	2.1	0.10	0.38	160	11.0	10.4	920	1.6	15	1.9	8.1	18.5	1080.0	16.0	16.0
C-1	9.07	A	65.0	0.51	0.65	75	2.0	7.4	1160	2.3	20	3.0	6.4	13.9	1235.0	16.9	13.9
C-2	1.11	A	58.0	0.49	0.65	10	2.0	2.8	380	4.0	20	4.0	1.6	4.4	390.0	12.2	5.0
C-3	1.52	A	86.6	0.73	0.82	10	2.0	1.7	945	2.5	20	3.2	5.0	6.7	955.0	15.3	6.7
C-4	4.70	A	42.9	0.34	0.53	5	2.0	2.5	575	2.5	20	3.2	3.0	5.5	580.0	13.2	5.5
C-5	0.51	A	2.0	0.09	0.36	5	2.0	3.3		1.0	15	1.5	0.0	3.3	5.0	10.0	5.0
C-6	1.37	A	51.2	0.37	0.54	100	6.8	7.1	500	3.0	15	2.6	3.2	10.3	600.0	13.3	10.3
D-1	8.13	A	49.7	0.41	0.58	100	2.6	9.2	1900	1.3	20	2.3	13.9	23.1	2000.0	21.1	21.1
D-2	6.72	A	69.9	0.56	0.69	10	2.0	2.5	1355	1.3	20	2.3	9.9	12.4	1365.0	17.6	12.4
D-3	2.93	A	31.7	0.23	0.34	25	8.0	4.0	1960	1.0	15	1.5	21.8	25.8	1985.0	21.0	21.0
D-4	4.38	A	65.4	0.52	0.66	100	2.3	8.0	980	1.0	20	2.0	8.2	16.2	1080.0	16.0	16.0
D-5	1.08	A	65.7	0.51	0.64	100	2.0	8.6	300	1.1	20	2.1	2.4	11.0	400.0	12.2	11.0
D-6	4.01	A	71.5	0.54	0.67	45	2.0	5.5	835	1.0	20	2.0	7.0	12.4	880.0	14.9	12.4
D-7	6.39	A	9.8	0.14	0.39	200	7.5	12.7	665	1.0	15	1.5	7.4	20.1	865.0	14.8	14.8
D-8	1.69	A	22.8	0.21	0.44	125	3.7	11.8	600	1.0	15	1.5	6.7	18.4	725.0	14.0	14.0
E-1	1.71	A	62.3	0.55	0.69	25	2.0	4.0	940	1.0	20	2.0	7.8	11.8	965.0	15.4	11.8
E-2	0.68	A	82.8	0.76	0.85	25	2.0	2.5	665	1.6	20	2.5	4.4	6.9	690.0	13.8	6.9
E-3	0.78	A	88.7	0.81	0.89	25	2.0	2.1	632	1.0	20	2.0	5.3	7.4	657.0	13.7	7.4
E-4	0.91	A	80.6	0.74	0.84	25	2.0	2.6	913	2.0	20	2.8	5.4	8.0	938.0	15.2	8.0
E-5	0.89	A	89.0	0.81	0.89	25	2.0	2.1	903	2.1	20	2.9	5.2	7.3	928.0	15.2	7.3
I-1	0.31	A	71.6	0.66	0.79	25	2.0	3.2	135	2.0	20	2.8	0.8	4.0	160.0	10.9	5.0
OS-1	32.28	A	11.0	0.16	0.41	100	2.4	12.9	2100	2.2	15	2.2	15.7	28.6	2200.0	22.2	22.2
OS-2	20.07	A	8.0	0.14	0.40	100	2.3	13.3	1400	2.3	15	2.3	10.3	23.6	1500.0	18.3	18.3
OS-3	10.61	A	8.0	0.14	0.40	100	2.0	14.0	1500	2.0	15	2.1	11.8	25.7	1600.0	18.9	18.9
OS-4	4.46	A	49.5	0.36	0.54	100	2.0	10.8	910	1.2	20	2.2	6.9	17.7	1010.0	15.6	15.6
OS-5	0.46	A	65.0	0.45	0.59	15	2.0	3.7	190	1.0	20	2.0	1.6	5.2	205.0	11.1	5.2
OS-6	1.17	A	65.0	0.45	0.59	85	0.2	18.7	430	0.9	20	1.9	3.8	22.5	515.0	12.9	12.9

NOTES:

T_i = (0.395*(1.1 - C_5)*(L)^0.5)/((S)^0.33), S in ft/ft

T_t=L/60V (Velocity From Fig. 501)

Velocity V=Cv*S^0.5, S in ft/ft

Tc Check = 10+L/180

For Urbanized basins a minimum T_c of 5.0 minutes is required.

For non-urbanized basins a minimum T_c of 10.0 minutes is required

STANDARD FORM SF-3: PROPOSED

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	
		RWT202	1574.40						46.6	327.87	3.05	1000.0									From Falcon DBPS by Matrix
		RWT204	38.40						11.4	6.52	6.60	43.0									From Falcon DBPS by Matrix
		WT200	192.00						37.8	53.07	3.58	190.0									From Falcon DBPS by Matrix
		OS-1	32.28	0.41	22.2	13.23	4.92	65.1													Flows obtained from Bent Grass Filing No. 2 FDR. Q=65.1 CFS
		OS-4	4.46	0.54	15.6	2.41	5.81	14.0					1.2	14.0				910	2.2	6.9	Flows from Basin B-1 of Bent Grass Filing No. 2 FDR.
		OS-5	0.46	0.59	5.2	0.27	8.56	2.3					1	2.3				190	2.0	1.6	Flows from Basin B-2 of Bent Grass Filing No. 2 FDR
		OS-6	1.17	0.59	12.9	0.69	6.30	4.3					0.9	4.3				430	1.9	3.8	Flows from Basin B-3 of Bent Grass Filing No. 2 FDR.
		A-1	2.16	0.79	10.3	1.71	6.87	11.7					2.5	11.7				765	3.2	4.0	
		A-4	0.82	0.36	5.0	0.30	8.68	2.6													Existing North WQ Pond Bent Grass Filing No. 2
		A-3	0.92	0.78	8.9	0.72	7.21	5.2					2.5	5.2				735	3.2	3.9	Flow into proposed inlet.
		A-2	0.86	0.59	5.0	0.51	8.68	4.4													Releases directly to Channel
		C-4	4.70	0.53	5.5	2.49	8.44	21.0					2.5	21.0				575	3.2	3.0	Flow into Ex inlet in BGMD at DP 8
		E-1	1.71	0.69	11.8	1.18	6.51	7.7	11.8	1.18	6.51	7.7									Ex Basin from Filing No. 2(East side of BGMD)
		E-2	0.68	0.85	6.9	0.58	7.89	4.6													Ex Basin from Filing No. 2(West side of BGMD)
		B-1	4.32	0.36	21.6	1.56	4.99	7.8													
		C-6	1.37	0.54	10.3	0.74	6.87	5.1													
		C-2	1.11	0.65	5.0	0.72	8.68	6.2					4	6.25				380	4.0	1.583	Flow into proposed inlet.
		C-1	9.07	0.65	13.9	5.90	6.11	36.0					2.25	36.05				1160	3.0	6.4	Flow into proposed inlet.
		C-3	1.52	0.82	6.7	1.25	7.95	9.9					2.5	9.9				945	3.2	5.0	
		C-5	0.51	0.36	5.0	0.18	8.68	1.6													North Pond
		OS-2	20.07	0.40	18.3	8.03	5.41	43.4													Overland flow into Basin D-3. Flow obtained from Bent Grass Filing No. 2 FDR
		OS-3	10.61	0.40	18.9	4.24	5.33	24.3													Offsite flow into Basin D-3. Flow obtained from Bent Grass Filing No. 2 FDR
		D-3	2.93	0.34	21.0	1.00	5.06	5.1													Flows conveyed via existing ditch into proposed area inlet.
		D-2	6.72	0.69	12.4	4.64	6.39	29.6					1.3	29.65				1355	2.3	9.9	Flow into proposed inlet. Piped to DP 14.
		D-1	8.13	0.58	21.1	4.72	5.05	23.8					1.3	23.8				1900	2.3	13.9	Combined flows from D-1 into proposed inlet.
		D-4	4.38	0.66	16.0	2.89	5.75	16.6					1	16.6				980	2.0	8.2	Flow into proposed inlet.
		D-5	1.08	0.64	11.0	0.69	6.70	4.6					1.1	4.6				300	2.1	2.4	
		D-6	4.01	0.67	12.4	2.69	6.39	17.2					1	17.2				835	2.0	7.0	
		E-4	0.91	0.84	8.0	0.76	7.50	5.7					2	5.7				913	2.8	5.4	Flow into Ex inlet.
		E-5	0.89	0.89	7.3	0.79	7.73	6.1					2.1	6.1				903	2.9	5.2	Flow into Ex inlet.

STANDARD FORM SF-3: PROPOSED

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs
Design Storm: 100-Year

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
		I-1	0.31	0.79	5.0	0.24	8.68	2.1					2	2.1				135	2.8	0.8	Flow into Ex inlet.
		D-7	6.39	0.39	14.8	2.49	5.94	14.8													
		D-8	1.69	0.44	14.0	0.74	6.08	4.5													Flow in Swale C (Basin D-8) into proposed south pond
		E-3	0.78	0.89	7.4	0.69	7.70	5.3					1	5.3				632	2.0	5.3	Flow into Ex Inlet in BGMD (South Side)
		B-2	1.17	0.38	16.0	0.44	5.75	2.5													

STANDARD FORM SF-3: PROPOSED

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
		RWT202	1574.40						46.6	120.88	1.82	220.0									From Falcon DBPS by Matrix
		RWT204	38.40						11.37	1.78	3.94	7.0									From Falcon DBPS by Matrix
		WT200	192.00						37.8	24.41	2.13	52.0									From Falcon DBPS by Matrix
		OS-1	32.28	0.16	22.2	5.16	2.93	15.1													Flows obtained from Bent Grass Filing No. 2 FDR. Q=65.1 CFS
		OS-4	4.46	0.36	15.6	1.61	3.46	5.6					1.2	5.6				910	2.2	6.9	Flows from Basin B-1 of Bent Grass Filing No. 2 FDR.
		OS-5	0.46	0.45	5.2	0.21	5.10	1.1					1	1.1				190	2.0	1.6	Flows from Basin B-2 of Bent Grass Filing No. 2 FDR
		OS-6	1.17	0.45	12.9	0.53	3.75	2.0					0.9	2.0				430	1.9	3.8	Flows from Basin B-3 of Bent Grass Filing No. 2 FDR.
		A-1	2.16	0.56	10.3	1.21	4.09	4.9					2.5	4.9				765	3.2	4.0	
		A-4	0.82	0.09	5.0	0.07	5.17	0.4					5.7	0.4				105	4.8	0.4	Existing North WQ Pond Bent Grass Filing No. 2
		A-3	0.92	0.65	8.9	0.60	4.30	2.6					2.5	2.6				735	3.2	3.9	Flow into proposed inlet.
		A-2	0.86	0.45	5.0	0.39	5.17	2.0					7.0	2.0				110	5.3	0.3	Releases directly to Channel
		C-4	4.70	0.34	5.5	1.60	5.03	8.0					2.5	8.0				575	3.2	3.0	Flow into Ex inlet in BGMD at DP 8
		E-1	1.71	0.55	11.8	0.94	3.88	3.6													Ex Basin from Filing No. 2(East side of BGMD)
		E-2	0.68	0.76	6.9	0.52	4.70	2.4													Ex Basin from Filing No. 2(West side of BGMD)
		B-1	4.32	0.09	21.6	0.39	2.97	1.2													
		C-6	1.37	0.37	10.3	0.51	4.09	2.1													
		C-2	1.11	0.49	5.0	0.54	5.17	2.8					4	2.792				380	4.0	1.6	Flow into proposed inlet.
		C-1	9.07	0.51	13.9	4.63	3.64	16.9					2.25	16.85				1160	3.0	6.4	Flow into proposed inlet.
		C-3	1.52	0.73	6.7	1.11	4.73	5.3					2.5	5.3				945	3.2	5.0	
		C-5	0.51	0.09	5.0	0.05	5.17	0.3													North Pond
		OS-2	20.07	0.14	18.3	2.81	3.22	9.0													Overland flow into Basin D-3. Flow obtained from Bent Grass Filing No. 2 FDR
		OS-3	10.61	0.14	18.9	1.49	3.18	4.7													Offsite flow into Basin D-3. Flow obtained from Bent Grass Filing No. 2 FDR
		D-3	2.93	0.23	21.0	0.67	3.01	2.0													Flows conveyed via existing ditch into proposed area inlet.
		D-2	6.72	0.56	12.4	3.76	3.81	14.3					1.3	14.3				1355	2.3	9.9	Flow into proposed inlet. Piped to DP 14.
		D-1	8.13	0.41	21.1	3.33	3.01	10.0					1.3	10.0				1900	2.3	13.9	Combined flows from D-1 into proposed inlet.
		D-4	4.38	0.52	16.0	2.28	3.42	7.8					1	7.8				980	2.0	8.2	Flow into proposed inlet.
		D-5	1.08	0.51	11.0	0.55	3.99	2.2					1.1	2.2				300	2.1	2.4	
		D-6	4.01	0.54	12.4	2.17	3.80	8.2					1	8.2				835	2.0	7.0	
		E-4	0.91	0.74	8.0	0.67	4.46	3.0													Flow into Ex inlet.
		E-5	0.89	0.81	7.3	0.72	4.60	3.3													Flow into Ex inlet.

STANDARD FORM SF-3: PROPOSED

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs
Design Storm: 5-Year

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			
		Basin ID	Area (Ac)	Runoff Coeff.	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Tc (min)	C*A (Ac)	I (in/hr)	Q (cfs)	Slope (%)	Street Flow (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	Tt (min)	REMARKS
		I-1	0.31	0.66	5.0	0.20	5.17	1.0													Flow into Ex inlet.
		D-7	6.39	0.14	14.8	0.89	3.54	3.2													
		D-8	1.69	0.21	14.0	0.35	3.62	1.3													Flow in Swale C (Basin D-8) into proposed south pond
		E-3	0.78	0.81	7.4	0.63	4.59	2.9													Flow into Ex Inlet in BGMD (South Side)
		B-2	1.17	0.10	16.0	0.12	3.42	0.4													

provide current and proposed

DP 22 label on plan Renamed to Future Conditions. "Existing" spreadsheet renamed to "Current" and Historic conditions map and calcs are copied from original Bent Grass FDR for reference. - Routing on those two models is done the SF-3 "minor" & "major" spreadsheets. This form is renamed Proposed

RIDIAN ROAD - PDR
CURRENT CONDITIONS

DESIGN POINT					INTENSITY		TOTAL FLOWS		NOTES
					I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
					1.8	3.1	220.0	1000.0	
				TRAVEL TIME					
		124.80	324.77	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				CHANNEL	2000	5.0	6.7	53.3	
	RWT204	1.83	6.43	11.4	3.8	6.7	7.0	43.0	
				TRAVEL TIME					
		1.83	6.43	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				CHANNEL	800	5.0	2.7	14.1	
	WT200	25.81	54.00	37.8	2.0	3.5	52.0	190.0	
				TRAVEL TIME					
		25.81	54.00	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				CHANNEL	800	5.0	2.7	40.5	
21	OS-1	5.16	13.23	22.2	2.8	4.8	14.2	63.6	
				TRAVEL TIME					
		5.16	13.23	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				CHANNEL	800	5.0	2.7	24.9	
2	OS-4	1.61	2.41	15.6	3.3	5.8	5.3	13.9	
				TRAVEL TIME					
		1.61	2.41	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	200	3.2	1.0	16.7	
1	OS-5	0.21	0.27	16.7	3.2	5.6	5.8	15.0	
	DP 2	1.61	2.41	TRAVEL TIME					
		1.82	2.68	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	55	3.2	0.3	16.9	
3	OS-6	0.53	0.69	16.9	3.2	5.5	7.5	18.7	
	DP 1	1.82	2.68	TRAVEL TIME					
		2.35	3.37	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	115	3.2	0.6	17.5	
4	A-1	1.21	1.71	17.5	3.1	5.5	11.1	27.7	@ GRADE INLET
	DP 3	2.35	3.37	TRAVEL TIME					
		3.56	5.08	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	40	2.4	0.3	17.8	
5	A-3	0.60	0.72	8.9	4.2	7.4	3.6	16.5	@ GRADE INLET
	FB DP 4	0.26	1.51	TRAVEL TIME					
		0.86	2.23	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	80	2.0	0.7	9.6	
6	A-4	0.07	0.30	17.8	3.1	5.4	13.9	41.2	EX BG FIL NO. 2 WQ POND
	DP 4	3.56	5.08						
	DP 5	0.86	2.23	TRAVEL TIME					
		4.49	7.61	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.0	0.0	17.8	
15A	EX NORTH WQ POND RELEASE	2.35	4.08	5.0	5.2	9.1	12.2	37.0	
				TRAVEL TIME					
		2.35	4.08	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	5.0	

DESIGN POINT	CONTRIBUTING BASINS	CA(equivalent) CA(5)	CA(100)	Tc (min.)	INTENSITY I(5) (in/hr)	I(100) (in/hr)	TOTAL FLOWS Q(5) (cfs)	Q(100) (cfs)	NOTES
7	E-3	0.63	0.69	7.4	4.6	8.0	2.9	5.5	EX SUMP INLET
				TRAVEL TIME					
		0.63	0.69	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	7.4	
8	E-1	0.94	1.18	11.8	3.8	6.6	11.5	36.4	EX SUMP INLET
	E-2	0.52	0.58						
	C-4	1.60	2.49						
	FB DP 5	0.00	1.28	TRAVEL TIME					
		3.06	5.53	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	11.8	
AA	RWT202	124.80	324.77	53.3	1.6	2.8	260.0	1143.5	CHANNEL FLOW & EX BOX CULVERTS @ BGMD
	RWT204	1.83	6.43						
	WT200	25.81	54.00						
	OS-1	5.16	13.23						
	B-1	0.39	1.56						
	DP 8	3.06	5.53	TRAVEL TIME					
	DP 15A	2.35	4.08						
		161.05	405.52	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				CHANNEL	900	5.0	3.0	56.3	
12	C-2	0.54	0.72	5.0	5.2	9.1	9.7	31.2	@ GRADE INLET
	FB DP 15	1.33	2.73	TRAVEL TIME					
		1.87	3.45	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	350	2.5	2.3	7.3	
15	C-1	4.63	5.90	13.9	3.5	6.1	20.1	43.7	@ GRADE INLET
	C-3	1.11	1.25	TRAVEL TIME					
		5.74	7.15	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	40	2.0	0.3	14.2	
19	C-6	0.51	0.74	10.3	4.0	7.0	2.0	5.2	AREA INLET
				TRAVEL TIME					
		0.51	0.74	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						3.2	0.0	10.3	
13	DP 12	1.87	3.45	14.2	3.5	6.0	28.1	68.6	TOTAL FLOW INTO PR NORTH WQ POND
	DP 15	5.74	7.15						
	DP 19	0.51	0.74	TRAVEL TIME					
		8.12	11.34	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	14.2	
13A	NORTH WQ POND RELEASE	0.64	2.47	5.0	5.2	9.1	3.3	22.4	
				TRAVEL TIME					
		0.64	2.47	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	5.0	
9	OS-2	2.81	8.03	18.3	3.1	5.3	8.6	42.8	
				TRAVEL TIME					
		2.81	8.03	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				SWALE	1150	5.6	3.4	21.8	
10	OS-3	1.49	4.24	18.9	3.0	5.2	4.5	22.2	
				TRAVEL TIME					
		1.49	4.24	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				SWALE	3.33	6.1	0.0	18.9	

DESIGN POINT	CONTRIBUTING BASINS	CA(equivalent) CA(5)	CA(100)	Tc (min.)	INTENSITY I(5) (in/hr)	I(100) (in/hr)	TOTAL FLOWS Q(5) (cfs)	Q(100) (cfs)	NOTES
11	D-3	0.67	1.00	21.8	2.8	4.9	13.8	64.5	AREA INLET
	DP 9	2.81	8.03						
	DP 10	1.49	4.24	TRAVEL TIME					
		4.97	13.27	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						6.0	0.0	21.8	
14	D-2	3.76	4.64	12.4	3.7	6.4	13.9	29.9	@ GRADE INLET
				TRAVEL TIME					
		3.76	4.64	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	40	2.0	0.3	12.7	
16	D-1	3.33	4.72	21.1	2.8	4.9	12.0	36.4	@ GRADE INLET
	FB DP 14	0.92	2.65	TRAVEL TIME					
		4.25	7.37	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				STREET	900	2.8	5.4	26.5	
17	D-4	2.28	2.89	16.0	3.3	5.7	7.5	16.5	SUMP INLET
				TRAVEL TIME					
		2.28	2.89	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						6.1	0.0	16.0	
18	D-5	0.55	0.69	12.4	3.7	6.4	10.0	21.8	SUMP INLET
	D-6	2.17	2.69	TRAVEL TIME					
		2.72	3.38	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						6.2	0.0	12.4	
31	DP 17	2.28	2.89	26.5	2.5	4.4	32.5	79.7	FLOW INTO PR SOUTH WQ POND
	DP 14	3.76	4.64						
	DP 16	4.25	7.37						
	DP 18	2.72	3.38	TRAVEL TIME					
		13.01	18.28	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						6.0	0.0	26.5	
24	E-4	0.67	0.76	26.5	2.5	4.4	5.9	27.0	EX @ GRADE INLET
	FB DP 16	1.68	5.44	TRAVEL TIME					
		2.35	6.20	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	26.5	
25	E-5	0.72	0.79	7.3	4.6	8.0	3.3	9.9	EX @ GRADE INLET
	FB DP 24	0.00	0.45	TRAVEL TIME					
		0.72	1.24	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	7.3	
26	DP 24	2.35	6.20	26.5	2.5	4.4	7.7	32.4	FLOWS INTO SWALE F
	DP 25	0.72	1.24	TRAVEL TIME					
		3.07	7.44	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
				SWALE	740	3.5	3.5	30.0	
30	D-7	0.89	2.49	14.8	3.4	5.9	13.5	58.9	FLOW INTO PR SOUTH WQ POND
	DP 26	3.07	7.44	TRAVEL TIME					
		3.96	9.93	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	14.8	
32	D-8	0.35	0.74	14.0	3.5	6.1	1.2	4.5	FLOW INTO PR SOUTH WQ POND
				TRAVEL TIME					
		0.35	0.74	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						6.1	0.0	14.0	

DESIGN POINT	CONTRIBUTING BASINS	CA(equivalent)		Tc	INTENSITY		TOTAL FLOWS		NOTES
		CA(5)	CA(100)	(min.)	I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
20	DP 30	3.96	9.93	26.5	2.5	4.4	43.2	126.1	TOTAL FLOW INTO PR SOUTH WQ POND
	DP 31	13.01	18.28						
	DP 32	0.35	0.74	TRAVEL TIME					
		17.32	28.95	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	26.5	
20A	PR SOUTH WQ POND RELEASE	1.85	5.20	5.0	5.2	9.1	9.6	47.1	
				TRAVEL TIME					
		1.85	5.20	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	5.0	
20B	EX SOUTH WQ POND RELEASE	4.11	7.28	5.0	5.2	9.1	21.3	66.0	
				TRAVEL TIME					
		4.11	7.28	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	5.0	
CC	B-2	0.12	0.44	56.3	1.6	2.7	260.1	1137.6	FLOWS EXITING SITE IN CHANNEL
	DP AA	161.05	405.52						
	DP 20A	1.85	5.20						
	DP 20B	4.11	7.28	TRAVEL TIME					
		167.13	418.44	Type/flow	Length (ft)	Velocity (fps)	d. Time (min)	T. Time (min)	
						2.6	0.0	56.3	

APPENDIX C

Hydraulic Computations

Swale Calculations

Swales with supercritical designs highlighted.

Swales will be riprap lined

Worksheet for Swale - A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.02580	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Discharge	5.20	ft^3/s

Results

Normal Depth	0.61	ft
Flow Area	1.48	ft^2
Wetted Perimeter	5.01	ft
Hydraulic Radius	0.29	ft
Top Width	4.86	ft
Critical Depth	0.64	ft
Critical Slope	0.01999	ft/ft
Velocity	3.52	ft/s
Velocity Head	0.19	ft
Specific Energy	0.80	ft
Froude Number	1.13	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.61	ft
Critical Depth	0.64	ft
Channel Slope	0.02580	ft/ft
Critical Slope	0.01999	ft/ft

Worksheet for Swale - C

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.02400	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	1.00	ft
Discharge	4.50	ft^3/s

Results

Normal Depth	0.47	ft
Flow Area	1.37	ft^2
Wetted Perimeter	4.91	ft
Hydraulic Radius	0.28	ft
Top Width	4.79	ft
Critical Depth	0.49	ft
Critical Slope	0.02033	ft/ft
Velocity	3.28	ft/s
Velocity Head	0.17	ft
Specific Energy	0.64	ft
Froude Number	1.08	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.47	ft
Critical Depth	0.49	ft
Channel Slope	0.02400	ft/ft
Critical Slope	0.02033	ft/ft

Worksheet for Swale - D

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.02000	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	2.00	ft
Discharge	50.00	ft^3/s

Results

Normal Depth	1.26	ft
Flow Area	8.91	ft^2
Wetted Perimeter	12.42	ft
Hydraulic Radius	0.72	ft
Top Width	12.10	ft
Critical Depth	1.35	ft
Critical Slope	0.01474	ft/ft
Velocity	5.61	ft/s
Velocity Head	0.49	ft
Specific Energy	1.75	ft
Froude Number	1.15	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.26	ft
Critical Depth	1.35	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.01474	ft/ft

Worksheet for Swale - E

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	3.00	ft
Discharge	64.50	ft^3/s

Results

Normal Depth	1.79	ft
Flow Area	18.15	ft^2
Wetted Perimeter	17.74	ft
Hydraulic Radius	1.02	ft
Top Width	17.30	ft
Critical Depth	1.42	ft
Critical Slope	0.01426	ft/ft
Velocity	3.55	ft/s
Velocity Head	0.20	ft
Specific Energy	1.98	ft
Froude Number	0.61	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.79	ft
Critical Depth	1.42	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.01426	ft/ft

Worksheet for Swale - F

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01000	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	6.00	ft
Discharge	32.40	ft^3/s

Results

Normal Depth	0.91	ft
Flow Area	8.73	ft^2
Wetted Perimeter	13.48	ft
Hydraulic Radius	0.65	ft
Top Width	13.26	ft
Critical Depth	0.80	ft
Critical Slope	0.01592	ft/ft
Velocity	3.71	ft/s
Velocity Head	0.21	ft
Specific Energy	1.12	ft
Froude Number	0.81	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.91	ft
Critical Depth	0.80	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.01592	ft/ft

Inlet Calculations

Inlet calculations not checked with this review.

Noted

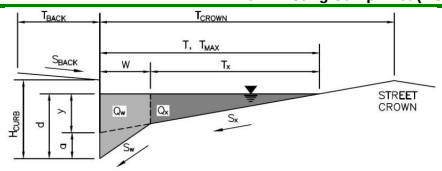
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass**

Inlet ID: **DP 8 - Existing Sump Inlet (BG Filing No. 2)**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	18.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

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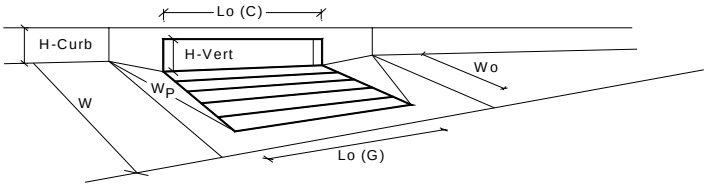

Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	12.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.83	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.57	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.79	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**14.4**	**52.7**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	11.5	36.4	cfs

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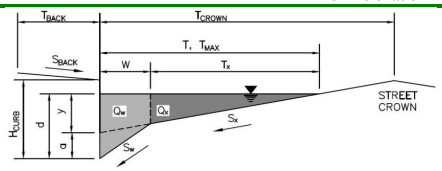
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass**

Inlet ID: **DP 5 - At Grade Inlet**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.051	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	16.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**3.4**	**22.8**	**cfs**

WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

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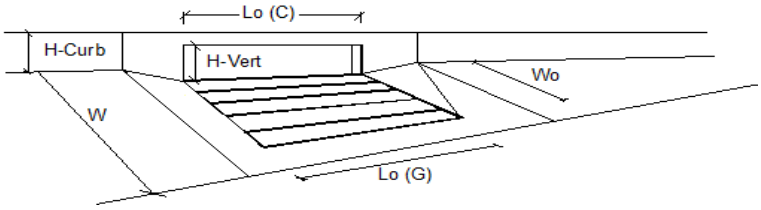


Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: WARNING: Q > ALLOWABLE Q FOR MINOR STORM'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.6**	**9.2**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**7.3**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**56**	**%**

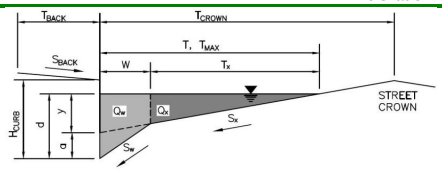
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass**

Inlet ID: **DP 12 - At Grade Inlet**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	16.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

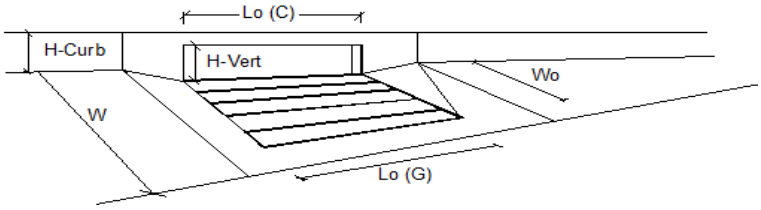
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**2.1**	**14.2**	**cfs**

WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

WARNING: MAJOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: WARNING: Q > ALLOWABLE Q FOR MINOR & MAJOR STORM		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**8.7**	**16.3**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**1.0**	**14.9**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**90**	**52**	**%**

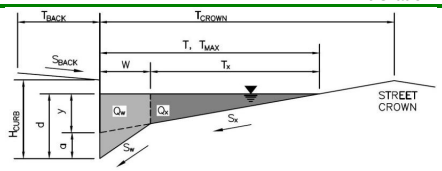
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass**

Inlet ID: **DP 14 - At Grade Inlet**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	16.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

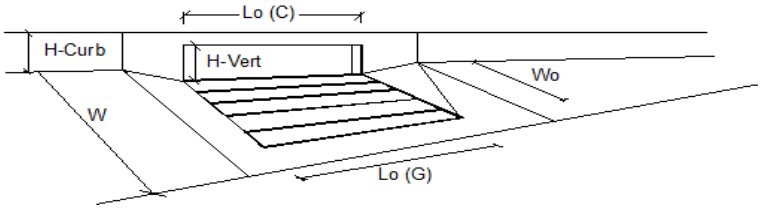
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	Q_{allow} =	**1.7**	**11.5**	**cfs**

WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

WARNING: MAJOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: WARNING: Q > ALLOWABLE Q FOR MINOR & MAJOR STORM		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**11.3**	**16.8**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**2.6**	**13.1**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**82**	**56**	**%**

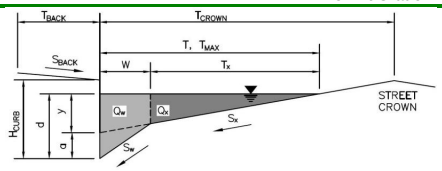
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass**

Inlet ID: **DP 15 - At Grade Inlet**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	16.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

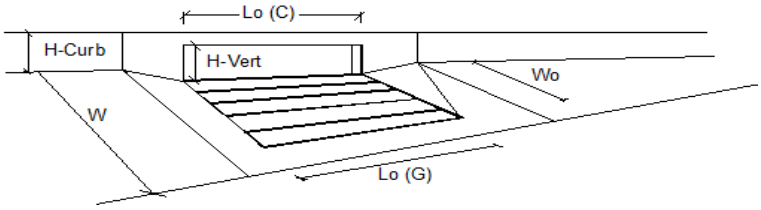
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**2.1**	**14.2**	**cfs**

WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

WARNING: MAJOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	15.00	15.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: WARNING: Q > ALLOWABLE Q FOR MINOR & MAJOR STORM		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**13.2**	**19.0**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**6.9**	**24.7**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**66**	**43**	**%**

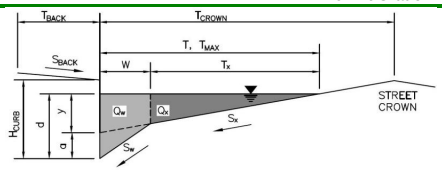
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass**

Inlet ID: **DP 16 - At Grade Inlet**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.013	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	16.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

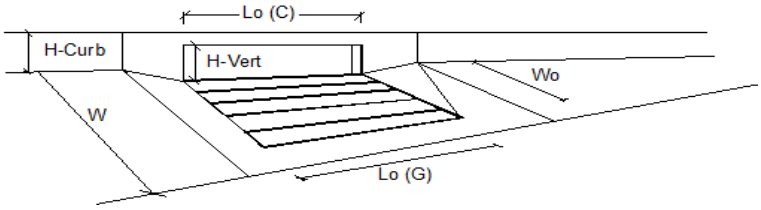
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**1.7**	**11.5**	**cfs**

WARNING: MINOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

WARNING: MAJOR STORM max. allowable capacity is less than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	10.00	10.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: WARNING: Q > ALLOWABLE Q FOR MINOR & MAJOR STORM		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**7.8**	**12.7**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**4.2**	**23.7**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**65**	**35**	**%**

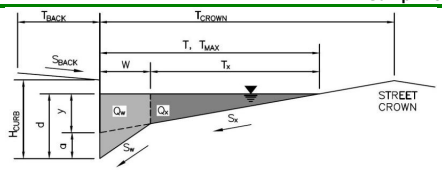
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass**

Inlet ID: **DP 17 - Sump Inlet**



Gutter Geometry (Enter data in the blue cells)

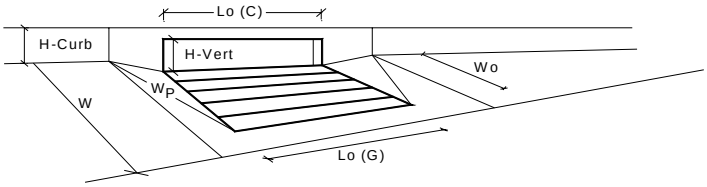
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	16.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.4	5.7	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.20	0.31	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.42	0.54	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.67	0.77	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	Q_a =	**7.9**	**17.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	7.5	16.5	cfs

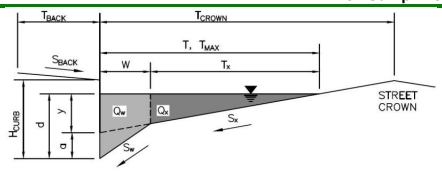
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass**

Inlet ID: **DP 18 - Sump Inlet**



Gutter Geometry (Enter data in the blue cells)

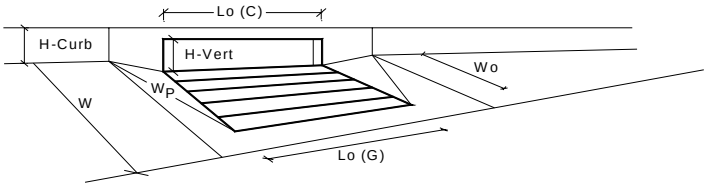
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	8.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.5	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	7.0	16.5	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.06 Released August 2018



		MINOR	MAJOR	
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.8	6.0	inches
Grate Information		MINOR	MAJOR	☑ Override Depths
Length of a Unit Grate	L_o (G) =	N/A	N/A	feet
Width of a Unit Grate	W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	N/A	N/A	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	15.00	15.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.23	0.33	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.45	0.57	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	0.70	0.79	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	N/A	N/A	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**10.4**	**19.9**	**cfs**
WARNING: Inlet Capacity less than Q Peak for Major Storm	$Q_{PEAK\ REQUIRED}$ =	10.0	21.8	cfs

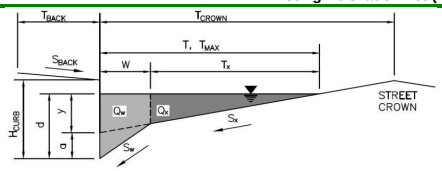
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass**

Inlet ID: **DP 24 - Existing At Grade Inlet (BG Filing No. 2)**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.028	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.016	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	18.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

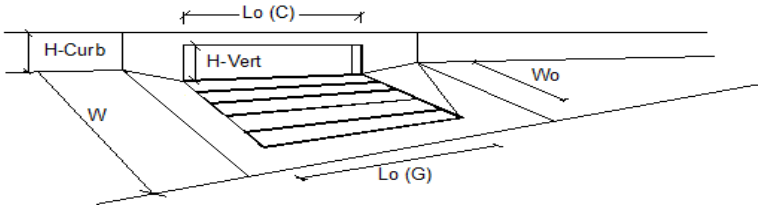
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**18.1**	**55.5**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	25.00	25.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	

Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**5.9**	**23.4**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**3.6**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**87**	**%**

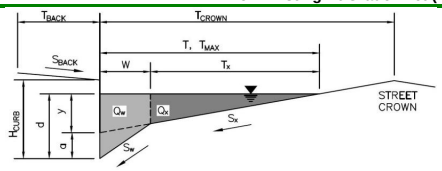
Version 4.06 Released August 2018

ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: **Falcon Meadows at Bent Grass**

Inlet ID: **DP 25 - Existing At Grade Inlet (BG Filing No. 2)**



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	14.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.013	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	26.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.028	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	18.0	26.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	12.0	inches
Allow Flow Depth at Street Crown (leave blank for no)		☐	☐	check = yes

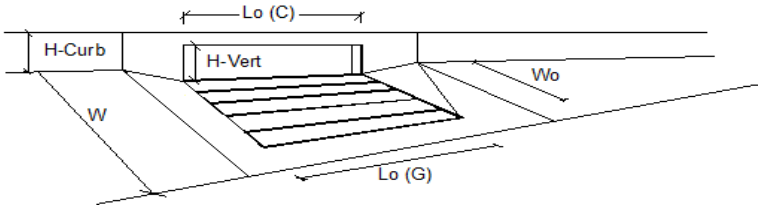
		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**22.2**	**68.2**	**cfs**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

INLET ON A CONTINUOUS GRADE

Version 4.06 Released August 2018



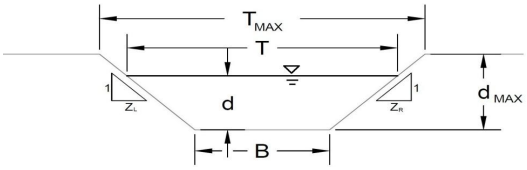
Design Information (Input)		MINOR	MAJOR	
Type of Inlet (CDOT Type R Curb Opening)	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a')	a_{LOCAL} =	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	No =	1	1	
Length of a Single Unit Inlet (Grate or Curb Opening)	L_o =	25.00	25.00	ft
Width of a Unit Grate (cannot be greater than W, Gutter Width)	W_o =	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C_f-G =	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C_f-C =	0.10	0.10	
Street Hydraulics: OK - Q < Allowable Street Capacity'		MINOR	MAJOR	
Total Inlet Interception Capacity	**Q =**	**3.3**	**9.9**	**cfs**
Total Inlet Carry-Over Flow (flow bypassing inlet)	**Q_b =**	**0.0**	**0.0**	**cfs**
Capture Percentage = Q_a/Q_o =	**C% =**	**100**	**100**	**%**

Version 4.06 Released August 2018

AREA INLET IN A SWALE

Falcon Meadows at Bent Grass

DP 11 - Type D Area Inlet (Relocated)



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.030	
Channel Invert Slope	S_O =	0.0050	ft/ft
Bottom Width	B =	3.00	ft
Left Side Slope	Z1 =	4.00	ft/ft
Right Side Slope	Z2 =	4.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- Non-Cohesive
- Cohesive
- Paved

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	11.00	18.00	feet
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	1.00	2.00	feet

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	17.9	72.2	cfs
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	1.00	1.88	ft

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	13.8	64.5	cfs
Water Depth	d =	0.88	1.79	feet

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.06 Released August 2018

AREA INLET IN A SWALE

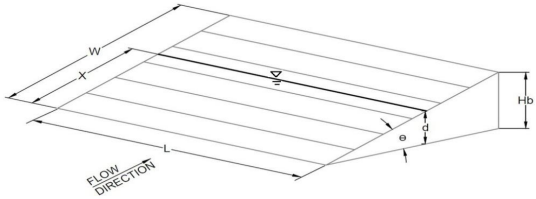
Falcon Meadows at Bent Grass

DP 11 - Type D Area Inlet (Relocated)

Inlet Design Information (Input)

Type of Inlet: CDOT TYPE D (Parallel & Depressed)

Inlet Type = CDOT TYPE D (Parallel & Depressed)



Angle of Inclined Grate (must be <= 30 degrees)	θ =	25.00	degrees
Width of Grate	W =	6.00	feet
Length of Grate	L =	3.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	1.27	feet
Clogging Factor	C_f =	0.38	
Grate Discharge Coefficient	C_d =	0.63	
Orifice Coefficient	C_o =	0.42	
Weir Coefficient	C_w =	1.34	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	1.88	2.79	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**44.1**	**57.2**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**7.3**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**89**	**%**

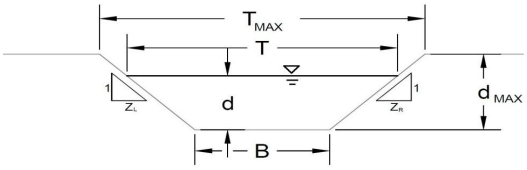
Warning 04: Froude No. exceeds USDCM Volume I recommendation.

Version 4.06 Released August 2018

AREA INLET IN A SWALE

Falcon Meadows at Bent Grass

DP 19 - Type C Area Inlet



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.030	
Channel Invert Slope	S_O =	0.0260	ft/ft
Bottom Width	B =	0.00	ft
Left Side Slope	Z1 =	4.00	ft/ft
Right Side Slope	Z2 =	4.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- (●) **Non-Cohesive**
- ( ) **Cohesive**
- ( ) **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**16.00**	**16.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**1.00**	**1.00**	**feet**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**19.8**	**19.8**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**1.00**	**1.00**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**2.0**	**5.2**	**cfs**
Water Depth	**d =**	**0.42**	**0.61**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.06 Released August 2018

AREA INLET IN A SWALE

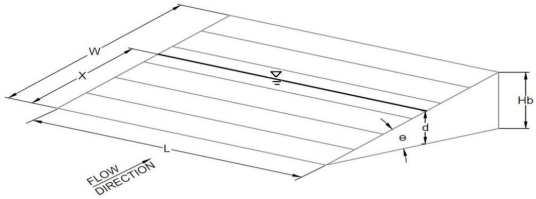
Falcon Meadows at Bent Grass

DP 19 - Type C Area Inlet

Inlet Design Information (Input)

Type of Inlet: CDOT Type C

Inlet Type = CDOT Type C



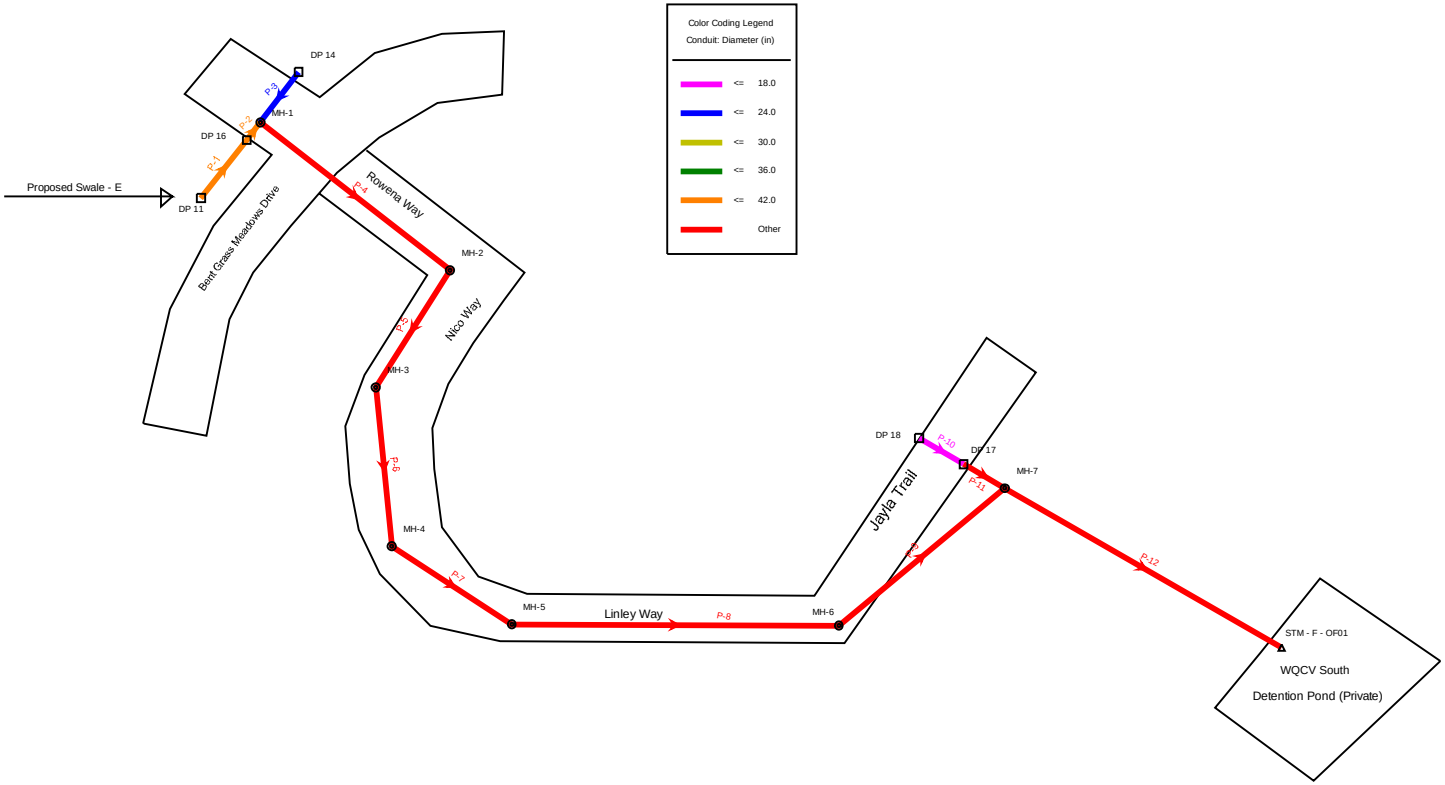
Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	feet
Length of Grate	L =	3.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	0.96	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.42	0.61	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**5.1**	**8.7**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

Warning 04: Froude No. exceeds USDCM Volume I recommendation.

StormCAD

BG Filing No. 3 Storm



flow is higher than capacity - are watertight gasket joints proposed?

Pipe upsized.

BG Filing No. 3 Storm

FlexTable: Conduit Table

Active Scenario: 100 YR

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calc) (ft/ft)	Dia (in)	Manning's n	Flow (cfs)	Vel (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
P-12	MH-7	Outfall	6,927.48	6,926.00	296.0	0.005	48.0	0.013	128.81	10.25	101.57	6,932.05	6,929.40	6,933.68	6,931.39
P-1	DP 11	DP 16	6,940.50	6,939.59	96.5	0.009	42.0	0.013	56.02	10.50	97.69	6,943.92	6,943.63	6,944.46	6,944.16
P-2	DP 16	MH-1	6,939.29	6,939.24	5.0	0.010	42.0	0.013	86.57	9.00	100.60	6,943.00	6,942.97	6,944.26	6,944.22
P-3	DP 14	MH-1	6,942.50	6,941.24	27.5	0.046	24.0	0.013	24.85	15.52	48.44	6,944.26	6,942.46	6,945.38	6,944.85
P-4	MH-1	MH-2	6,938.74	6,936.65	211.5	0.010	48.0	0.013	106.07	12.45	142.80	6,941.86	6,940.56	6,943.44	6,941.68
P-5	MH-2	MH-3	6,936.35	6,935.03	132.1	0.010	48.0	0.013	105.37	12.49	143.59	6,939.46	6,938.93	6,941.03	6,940.04
P-6	MH-3	MH-4	6,934.73	6,933.99	75.2	0.010	48.0	0.013	104.93	12.40	142.45	6,937.83	6,937.91	6,939.40	6,939.01
P-7	MH-4	MH-5	6,933.69	6,933.08	61.2	0.010	48.0	0.013	104.68	12.45	143.39	6,936.88	6,936.97	6,938.36	6,938.06
P-8	MH-5	MH-6	6,932.78	6,929.88	235.3	0.012	48.0	0.013	104.48	13.53	159.45	6,935.88	6,934.72	6,937.43	6,935.79
P-9	MH-6	MH-7	6,929.58	6,927.78	119.8	0.015	48.0	0.013	103.76	8.26	176.10	6,933.98	6,933.35	6,935.04	6,934.41
P-10	DP 18	DP 17	6,931.23	6,930.63	35.0	0.017	18.0	0.013	13.85	7.83	13.75	6,934.04	6,933.43	6,934.99	6,934.38
P-11	DP 17	MH-7	6,928.13	6,928.08	9.2	0.005	48.0	0.013	29.99	2.39	105.77	6,933.36	6,933.35	6,933.44	6,933.44

BG Filing No. 3 Storm

FlexTable: Manhole Table

Active Scenario: 100 YR

Label	Elevation (Rim) (ft)	Headloss Coefficient (Standard)	Headloss Method	Headloss (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Diameter (in)
MH-1	6,947.98	0.700	Standard	1.11	6,941.86	6,942.97	6,945.35	6,943.44	84.0
MH-2	6,946.72	0.700	Standard	1.10	6,939.46	6,940.56	6,941.68	6,941.03	96.0
MH-3	6,945.39	0.700	Standard	1.10	6,937.83	6,938.93	6,940.04	6,939.40	96.0
MH-4	6,944.74	0.700	Standard	1.03	6,936.88	6,937.91	6,939.01	6,938.36	96.0
MH-5	6,944.50	0.700	Standard	1.09	6,935.88	6,936.97	6,938.06	6,937.43	96.0
MH-6	6,942.08	0.700	Standard	0.74	6,933.98	6,934.72	6,935.79	6,935.04	96.0
MH-7	6,941.75	0.800	Standard	1.31	6,932.05	6,933.35	6,934.41	6,933.68	96.0

BG Filing No. 3 Storm

FlexTable: Outfall Table

Active Scenario: 100 YR

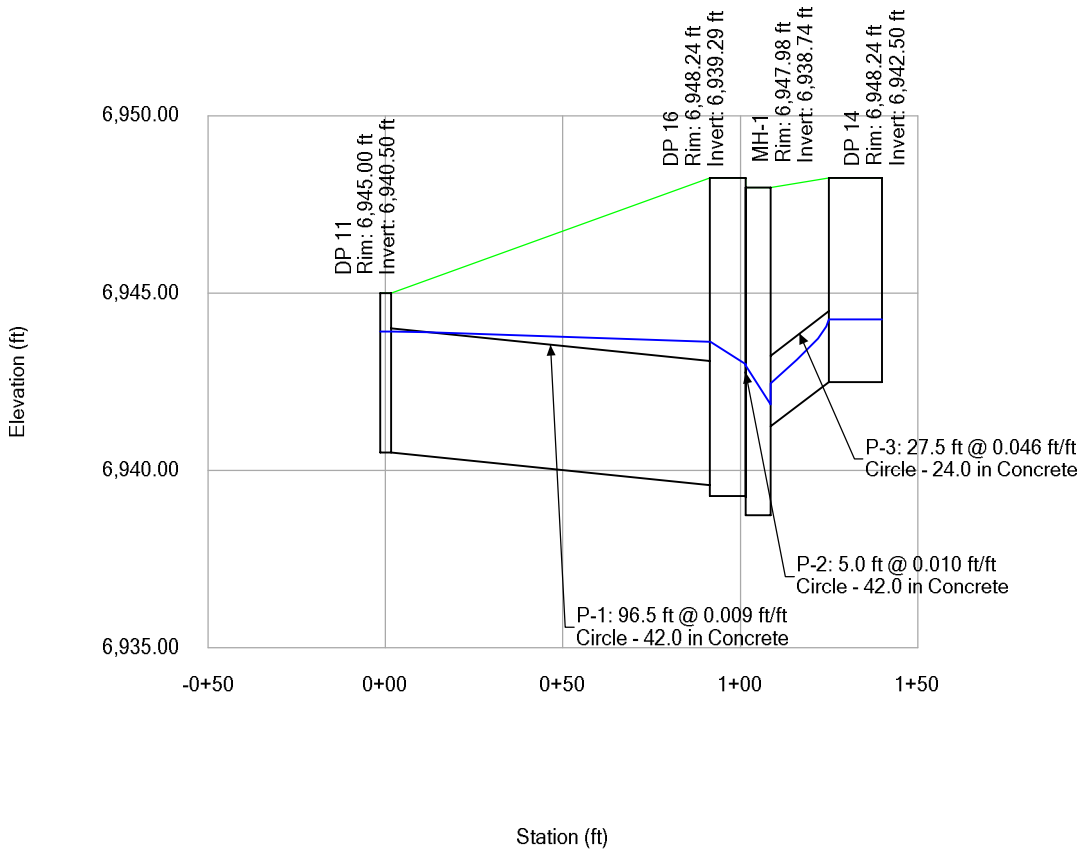
Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Energy Grade Line (ft)	Flow (Total Out) (cfs)
Outfall	6,929.00	6,926.00	User Defined Tailwater	6,928.46	6,929.40	6,929.40	127.32

BG Filing No. 3 Storm

Profile Report

Engineering Profile - Profile - 1 (BG Filing 3 StormCAD.stsw)

Active Scenario: 100 YR

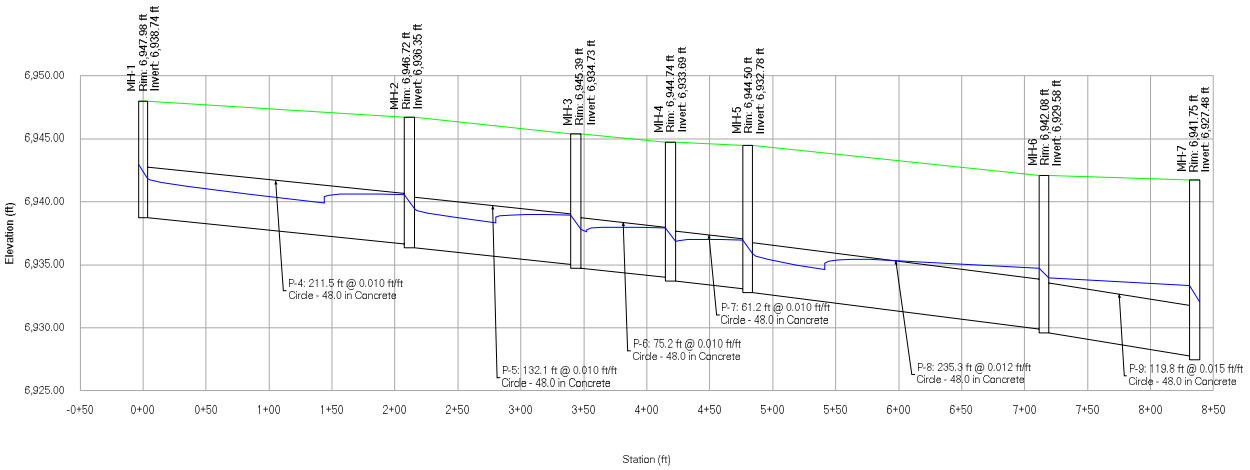


BG Filing No. 3 Storm

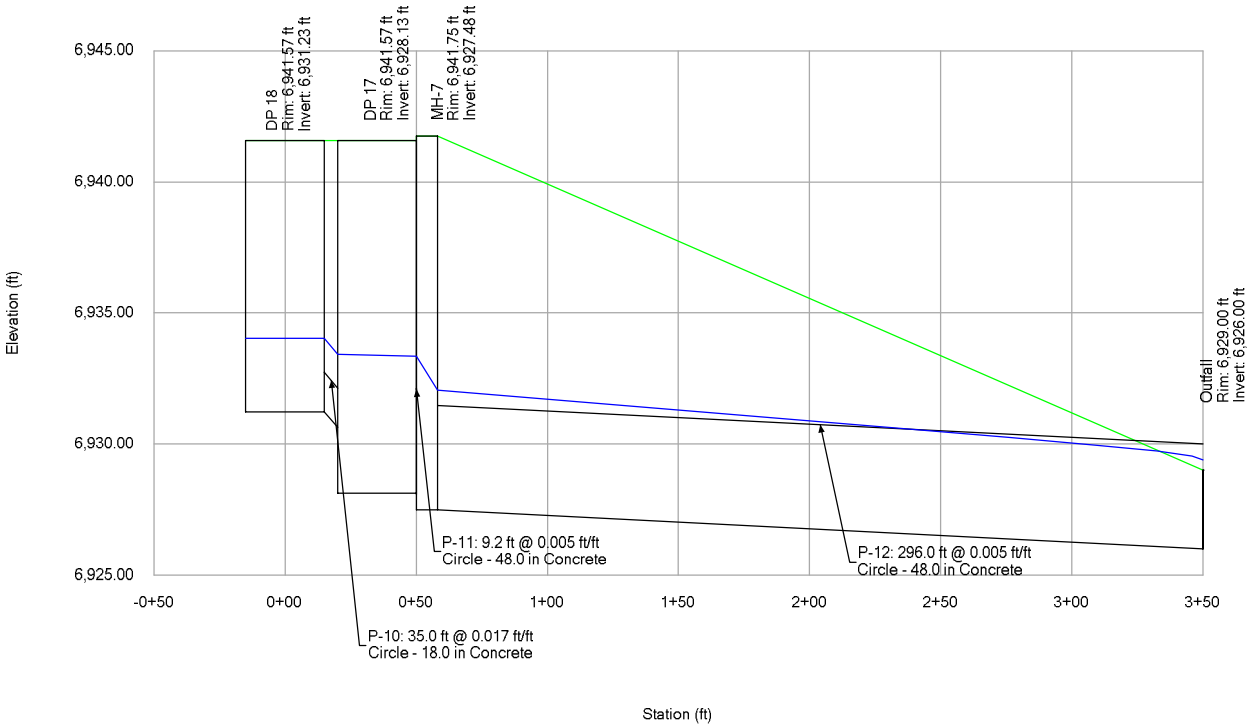
Profile Report

Engineering Profile - Profile - 2 (BG Filing 3 StormCAD.stsw)

Active Scenario: 100 YR



BG Filing No. 3 Storm
Profile Report
Engineering Profile - Profile - 3 (BG Filing 3 StormCAD.stsw)
Active Scenario: 100 YR



BG Filing No. 3 Storm

FlexTable: Conduit Table

Active Scenario: 5 YR

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calc) (ft/ft)	Dia (in)	Manning's n	Flow (cfs)	Vel (ft/s)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)
P-12	MH-7	Outfall	6,927.48	6,926.00	296.0	0.005	48.0	0.013	38.33	7.52	101.57	6,929.33	6,927.70	6,930.04	6,928.58
P-1	DP 11	DP 16	6,940.50	6,939.59	96.5	0.009	42.0	0.013	11.00	6.72	97.69	6,941.50	6,940.93	6,941.87	6,941.10
P-2	DP 16	MH-1	6,939.29	6,939.24	5.0	0.010	42.0	0.013	20.45	8.20	100.60	6,940.68	6,940.74	6,941.19	6,941.16
P-3	DP 14	MH-1	6,942.50	6,941.24	27.5	0.046	24.0	0.013	10.55	12.33	48.44	6,943.66	6,941.96	6,944.14	6,943.62
P-4	MH-1	MH-2	6,938.74	6,936.65	211.5	0.010	48.0	0.013	28.71	8.89	142.80	6,940.33	6,938.34	6,940.92	6,938.84
P-5	MH-2	MH-3	6,936.35	6,935.03	132.1	0.010	48.0	0.013	28.45	8.90	143.59	6,937.93	6,936.72	6,938.52	6,937.21
P-6	MH-3	MH-4	6,934.73	6,933.99	75.2	0.010	48.0	0.013	28.28	8.83	142.45	6,936.31	6,935.67	6,936.89	6,936.17
P-7	MH-4	MH-5	6,933.69	6,933.08	61.2	0.010	48.0	0.013	28.19	8.87	143.39	6,935.26	6,934.76	6,935.85	6,935.25
P-8	MH-5	MH-6	6,932.78	6,929.88	235.3	0.012	48.0	0.013	28.11	9.56	159.45	6,934.35	6,931.55	6,934.94	6,932.05
P-9	MH-6	MH-7	6,929.58	6,927.78	119.8	0.015	48.0	0.013	27.84	10.23	176.10	6,931.14	6,929.89	6,931.73	6,930.16
P-10	DP 18	DP 17	6,931.23	6,930.63	35.0	0.017	18.0	0.013	5.72	7.42	13.75	6,932.15	6,931.33	6,932.54	6,932.11
P-11	DP 17	MH-7	6,928.13	6,928.08	9.2	0.005	48.0	0.013	12.53	5.65	105.77	6,929.89	6,929.89	6,929.98	6,929.97

BG Filing No. 3 Storm

FlexTable: Manhole Table

Active Scenario: 5 YR

Label	Elevation (Rim) (ft)	Headloss Coefficient (Standard)	Headloss Method	Headloss (ft)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Energy Grade Line (In) (ft)	Energy Grade Line (Out) (ft)	Diameter (in)
MH-1	6,947.98	0.700	Standard	0.42	6,940.33	6,940.74	6,941.16	6,940.92	84.0
MH-2	6,946.72	0.700	Standard	0.41	6,937.93	6,938.34	6,938.84	6,938.52	96.0
MH-3	6,945.39	0.700	Standard	0.41	6,936.31	6,936.72	6,937.21	6,936.89	96.0
MH-4	6,944.74	0.700	Standard	0.41	6,935.26	6,935.67	6,936.17	6,935.85	96.0
MH-5	6,944.50	0.700	Standard	0.41	6,934.35	6,934.76	6,935.25	6,934.94	96.0
MH-6	6,942.08	0.700	Standard	0.41	6,931.14	6,931.55	6,932.05	6,931.73	96.0
MH-7	6,941.75	0.800	Standard	0.57	6,929.33	6,929.89	6,930.16	6,930.04	96.0

BG Filing No. 3 Storm

FlexTable: Outfall Table

Active Scenario: 5 YR

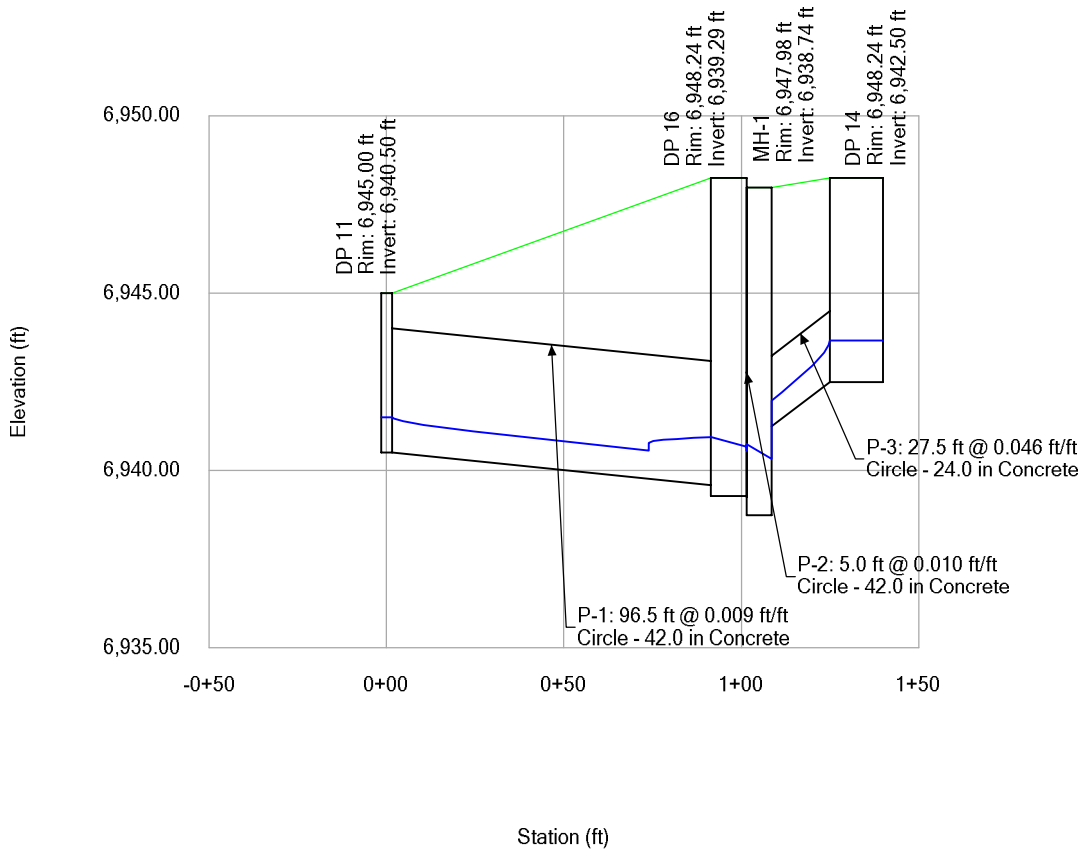
Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Energy Grade Line (ft)	Flow (Total Out) (cfs)
Outfall	6,929.00	6,926.00	User Defined Tailwater	6,926.78	6,927.70	6,927.70	37.72

BG Filing No. 3 Storm

Profile Report

Engineering Profile - Profile - 1 (BG Filing 3 StormCAD.stsw)

Active Scenario: 5 YR

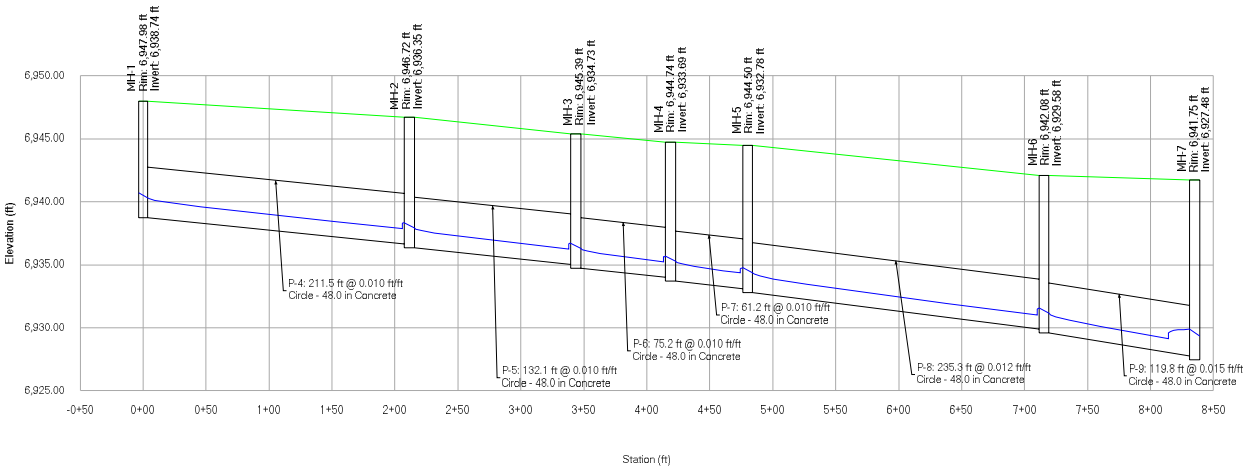


BG Filing No. 3 Storm

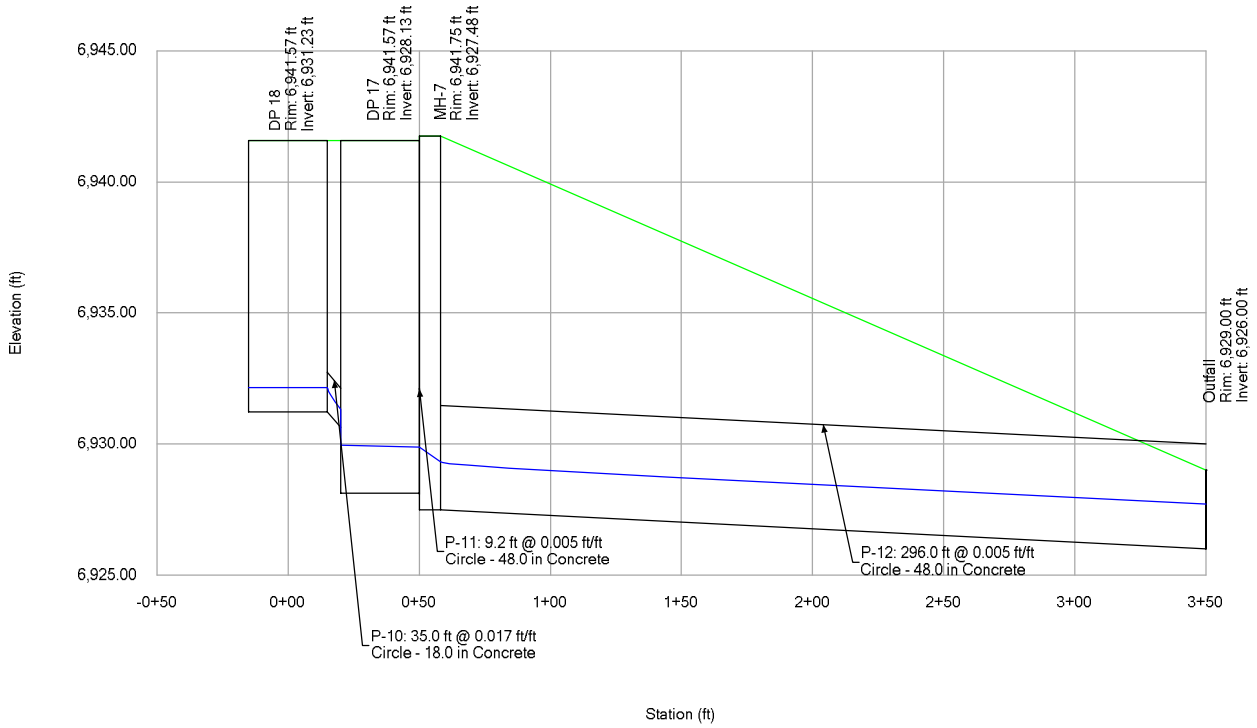
Profile Report

Engineering Profile - Profile - 2 (BG Filing 3 StormCAD.stsw)

Active Scenario: 5 YR



BG Filing No. 3 Storm
Profile Report
Engineering Profile - Profile - 3 (BG Filing 3 StormCAD.stsw)
Active Scenario: 5 YR



Pond Calculations

Detention Pond Tributary Areas

Subdivision: Falcon Meadows at Bent Grass
Location: CO, Colorado Springs

Project Name: Falcon Meadows at Bent Grass
Project No.: CLH000017
Calculated By: TJE
Checked By: CMD
Date: 6/19/20

Pond (North)

Basin	Area	% Imp
C-1	9.07	65
C-2	1.11	58
C-3	1.52	86.6
C-5	0.51	2
C-6	1.37	51.2
Total	**13.58**	**63.1**

Provide update for Filing 2 North pond

Table for Trib Areas to Existing North Pond Added

Pond (South)

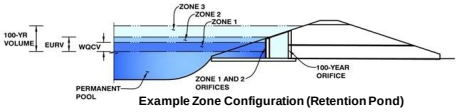
Basin	Area	% Imp
D-1	8.13	49.7
D-2	6.72	69.9
D-3	2.93	31.7
D-4	4.38	65.4
D-5	1.08	65.7
D-6	4.01	71.5
D-7	6.39	9.8
D-8	1.69	22.8
E-4	0.91	80.6
E-5	0.89	89
OS-2	20.07	8
OS-3	10.61	8
Total	**67.81**	**31.1**

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

Project: Falcon Meadows at Bent Grass

Basin ID: WQCV Pond - North



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	13.94	acres
Watershed Length =	1,275	ft
Watershed Length to Centroid =	750	ft
Watershed Slope =	0.030	ft/ft
Watershed Imperviousness =	63.60%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.289	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.093	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.798	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	1.048	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	1.248	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	1.513	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	1.774	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	2.092	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	3.418	acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	0.711	acre-feet		
Approximate 5-yr Detention Volume =	0.930	acre-feet		
Approximate 10-yr Detention Volume =	1.122	acre-feet		
Approximate 25-yr Detention Volume =	1.352	acre-feet		
Approximate 50-yr Detention Volume =	1.491	acre-feet		
Approximate 100-yr Detention Volume =	1.638	acre-feet		

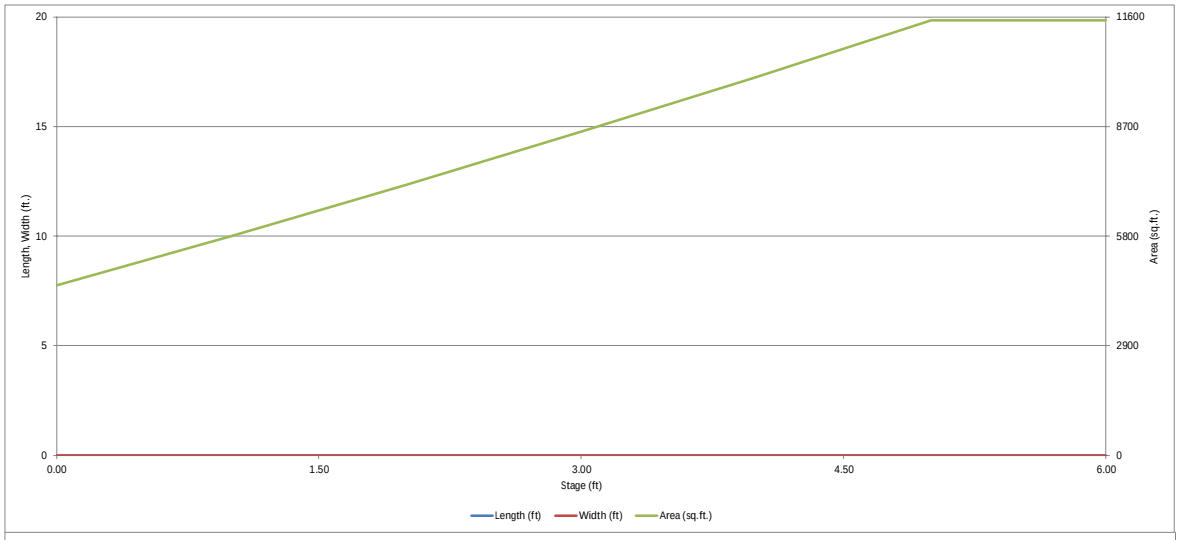
Define Zones and Basin Geometry

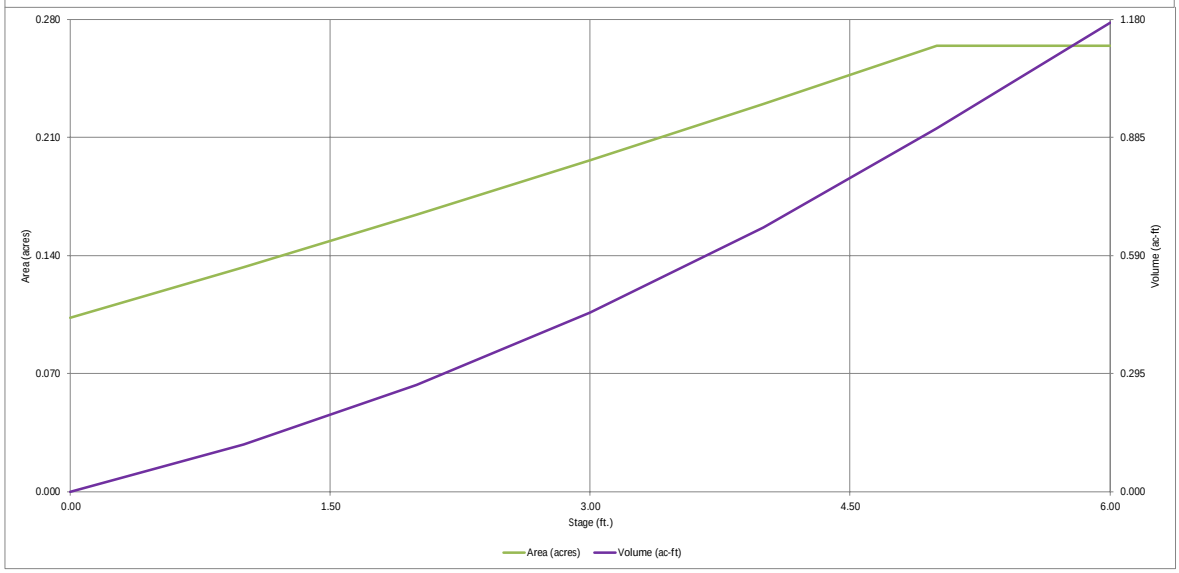
Zone 1 Volume (WQCV) =	0.289	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.289	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	user	acre-feet

Total detention volume is less than 100-year volume.

Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	4,501	0.103		
6943	--	1.00	--	--	--	5,796	0.133	5,148	0.118
6944	--	2.00	--	--	--	7,155	0.164	11,624	0.267
6945	--	3.00	--	--	--	8,560	0.197	19,481	0.447
6946	--	4.00	--	--	--	10,011	0.230	28,767	0.660
6947	--	5.00	--	--	--	11,524	0.265	39,534	0.908
6948	--	6.00	--	--	--	11,524	0.265	51,058	1.172


20
15
10
5
0
Length, Width (ft.)
11600
8700
5800
2900
0
Area (sq.ft.)
0.00
1.50
3.00
4.50
6.00
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)

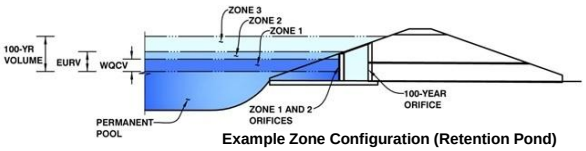

0.280
0.210
0.140
0.070
0.000
Area (acres)
1.180
0.885
0.590
0.295
0.000
Volume (ac-ft)
0.00
1.50
3.00
4.50
6.00
Stage (ft.)
Area (acres)
Volume (ac-ft)

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Project: Falcon Meadows at Bent Grass

Basin ID: WQCV Pond - North



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.14	0.289	Orifice Plate
Zone 2			
Zone 3			
Total (all zones)		0.289	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =		ft (distance below the filtration media surface)	Underdrain Orifice Area =		ft^2
Underdrain Orifice Diameter =		inches	Underdrain Orifice Centroid =		feet

Calculated Parameters for Underdrain

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	1.332E-02	ft^2
Depth at top of Zone using Orifice Plate =	1.94	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	9.00	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	1.92	sq. inches (diameter = 1-9/16 inches)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.80	1.60					
Orifice Area (sq. inches)	1.92	1.92	1.92					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =			ft^2
Depth at top of Zone using Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =			feet
Vertical Orifice Diameter =			inches				

Calculated Parameters for Vertical Orifice

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)

	Not Selected	Not Selected			Not Selected	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.50		ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	4.50		feet
Overflow Weir Front Edge Length =	6.00		feet	Overflow Weir Slope Length =	3.00		feet
Overflow Weir Grate Slope =	0.00		H:V	Grate Open Area / 100-yr Orifice Area =	7.13		
Horiz. Length of Weir Sides =	3.00		feet	Overflow Grate Open Area w/o Debris =	12.60		ft^2
Overflow Grate Open Area % =	70%		%, grate open area/total area	Overflow Grate Open Area w/ Debris =	6.30		ft^2
Debris Clogging % =	50%		%				

Calculated Parameters for Overflow Weir

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Not Selected	Not Selected			Not Selected	Not Selected	
Depth to Invert of Outlet Pipe =	2.50		ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.77		ft^2
Circular Orifice Diameter =	18.00		inches	Outlet Orifice Centroid =	0.75		feet
				Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	5.75	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.37	feet
Spillway Crest Length =	50.00	feet	Stage at Top of Freeboard =	6.12	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.26	acres
Freeboard above Max Water Surface =	0.00	feet	Basin Volume at Top of Freeboard =	1.17	acre-ft

Calculated Parameters for Spillway

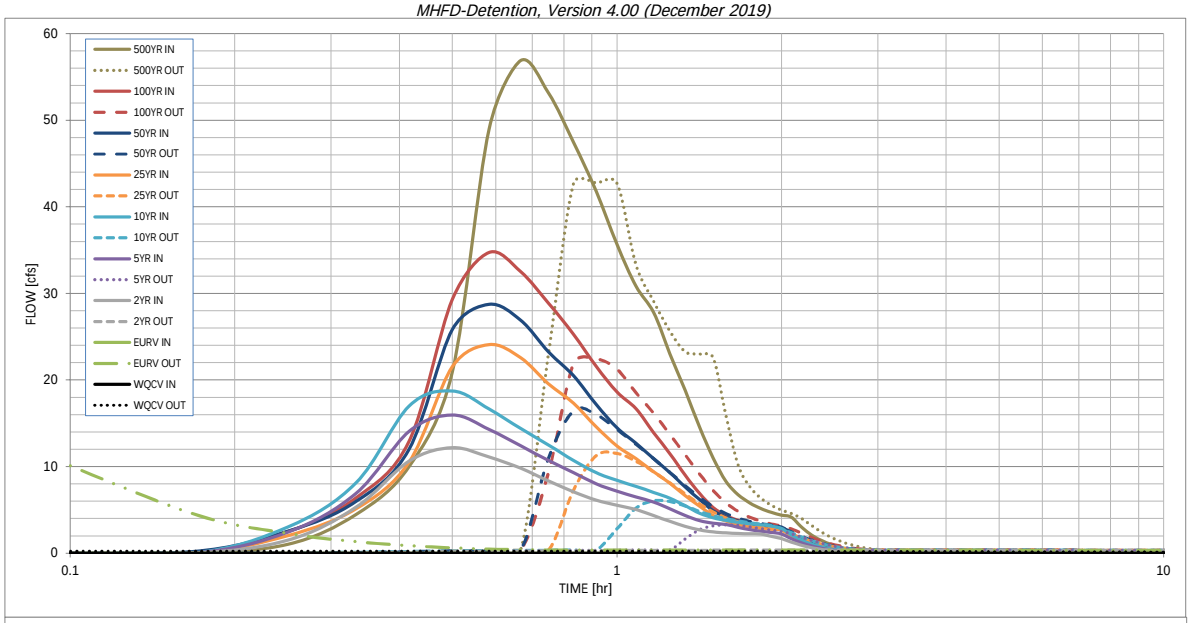
Routed Hydrograph Results

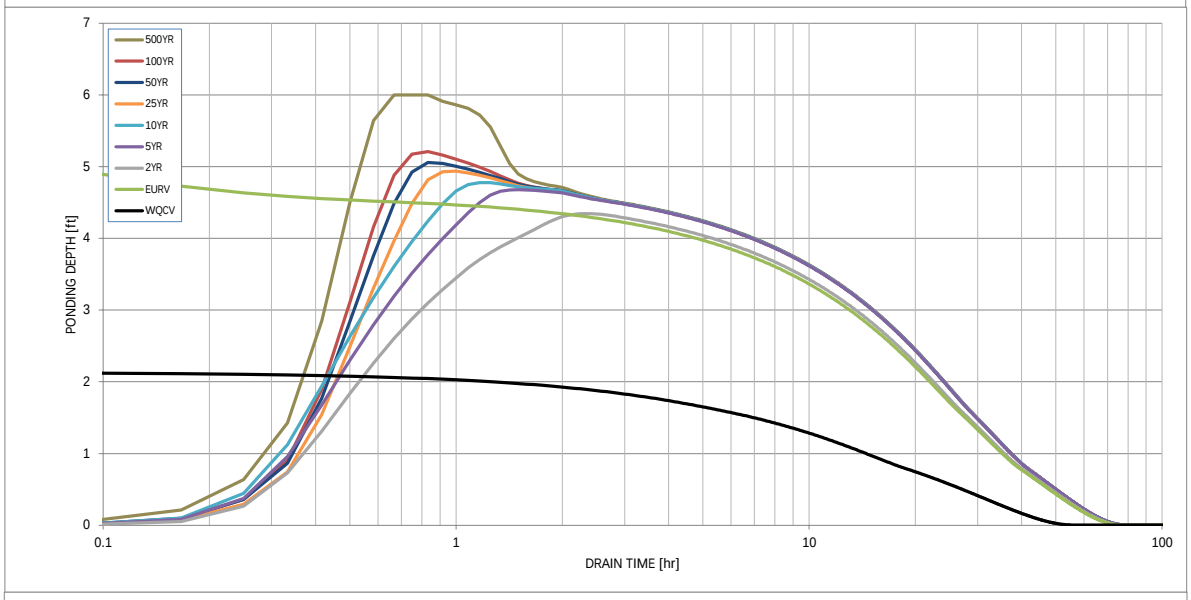
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

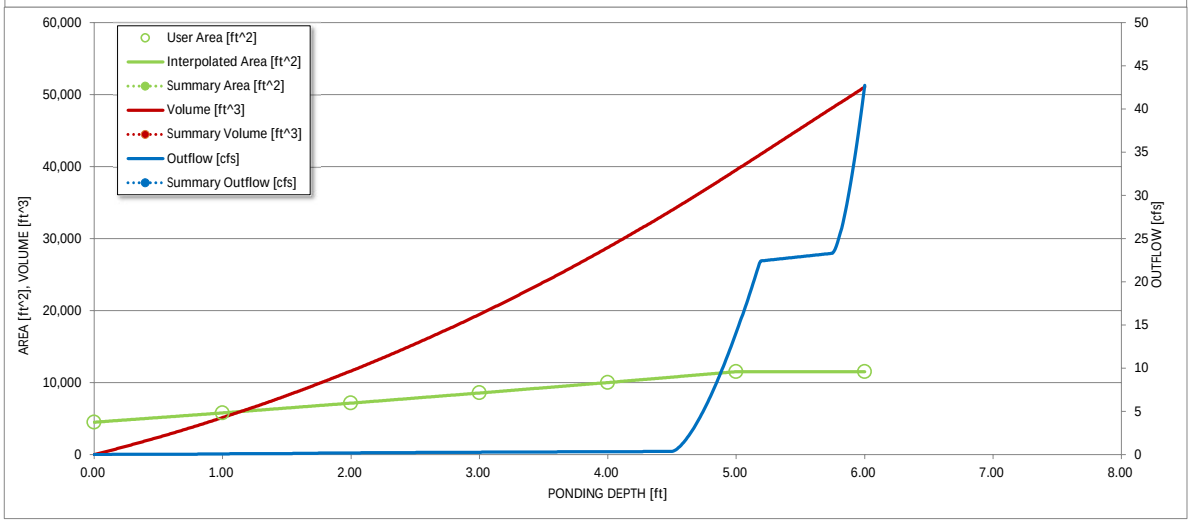
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.68
CUHP Runoff Volume (acre-ft) =	0.289	1.093	0.798	1.048	1.248	1.513	1.774	2.092	3.418
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.798	1.048	1.248	1.513	1.774	2.092	3.418
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.1	0.2	0.3	2.3	4.6	7.6	19.6
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.01	0.02	0.17	0.33	0.54	1.40
Peak Inflow Q (cfs) =	N/A	N/A	12.2	16.0	18.7	24.1	28.7	34.7	56.9
Peak Outflow Q (cfs) =	0.2	22.8	0.4	3.3	6.0	11.5	16.4	22.4	42.7
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	18.3	24.1	5.0	3.5	3.0	2.2
Structure Controlling Flow =	Plate	Outlet Plate 1	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	N/A
Max Velocity through Grate 1 (fps) =	N/A	1.81	N/A	0.2	0.5	0.9	1.3	1.7	1.8
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	45	56	58	57	55	53	51	48	40
Time to Drain 99% of Inflow Volume (hours) =	50	65	67	66	65	64	63	61	56
Maximum Ponding Depth (ft) =	2.14	5.71	4.34	4.68	4.78	4.93	5.05	5.21	6.00
Area at Maximum Ponding Depth (acres) =	0.17	0.26	0.24	0.25	0.26	0.26	0.26	0.26	0.26
Maximum Volume Stored (acre-ft) =	0.290	1.095	0.741	0.822	0.848	0.889	0.921	0.960	1.172

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.00 (December 2019)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.02	1.01
	0:15:00	0.00	0.00	1.50	2.44	3.03	2.03	2.53	2.48	4.48
	0:20:00	0.00	0.00	5.29	6.91	8.12	5.12	5.96	6.40	10.00
	0:25:00	0.00	0.00	10.64	14.07	16.97	10.53	12.01	12.91	20.90
	0:30:00	0.00	0.00	12.18	15.95	18.74	21.53	25.83	29.30	48.97
	0:35:00	0.00	0.00	11.09	14.29	16.64	24.08	28.74	34.73	56.89
	0:40:00	0.00	0.00	9.81	12.39	14.38	22.55	26.89	32.49	53.12
	0:45:00	0.00	0.00	8.34	10.69	12.49	19.55	23.23	28.86	47.44
	0:50:00	0.00	0.00	7.09	9.29	10.70	17.30	20.48	25.25	41.77
	0:55:00	0.00	0.00	6.13	8.01	9.29	14.58	17.16	21.56	35.66
	1:00:00	0.00	0.00	5.51	7.16	8.40	12.38	14.47	18.60	30.85
	1:05:00	0.00	0.00	5.03	6.51	7.70	10.91	12.71	16.68	27.81
	1:10:00	0.00	0.00	4.33	5.89	7.02	9.41	10.91	13.93	23.01
	1:15:00	0.00	0.00	3.67	5.12	6.33	8.07	9.32	11.49	18.79
	1:20:00	0.00	0.00	3.09	4.34	5.47	6.64	7.63	9.00	14.56
	1:25:00	0.00	0.00	2.67	3.77	4.60	5.43	6.19	6.90	11.00
	1:30:00	0.00	0.00	2.45	3.47	4.09	4.34	4.92	5.28	8.31
	1:35:00	0.00	0.00	2.34	3.31	3.78	3.70	4.18	4.34	6.75
	1:40:00	0.00	0.00	2.27	2.98	3.56	3.31	3.73	3.79	5.81
	1:45:00	0.00	0.00	2.23	2.72	3.39	3.05	3.44	3.41	5.15
	1:50:00	0.00	0.00	2.20	2.53	3.28	2.87	3.23	3.16	4.71
	1:55:00	0.00	0.00	1.93	2.39	3.12	2.76	3.10	2.97	4.39
	2:00:00	0.00	0.00	1.70	2.22	2.84	2.67	3.00	2.85	4.17
	2:05:00	0.00	0.00	1.28	1.67	2.14	2.02	2.27	2.13	3.11
	2:10:00	0.00	0.00	0.95	1.23	1.56	1.47	1.66	1.56	2.27
	2:15:00	0.00	0.00	0.69	0.90	1.14	1.08	1.21	1.14	1.66
	2:20:00	0.00	0.00	0.50	0.65	0.82	0.78	0.88	0.84	1.22
	2:25:00	0.00	0.00	0.36	0.45	0.59	0.56	0.62	0.60	0.86
	2:30:00	0.00	0.00	0.25	0.31	0.41	0.39	0.44	0.42	0.61
	2:35:00	0.00	0.00	0.17	0.22	0.29	0.28	0.31	0.30	0.43
	2:40:00	0.00	0.00	0.10	0.14	0.18	0.18	0.20	0.19	0.28
	2:45:00	0.00	0.00	0.05	0.08	0.10	0.11	0.12	0.11	0.16
	2:50:00	0.00	0.00	0.02	0.04	0.05	0.05	0.06	0.05	0.08
	2:55:00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft ^{2}]	Area [acres]	Volume [ft ^{3}]	Volume [ac-ft]	Total Outflow [cfs]

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

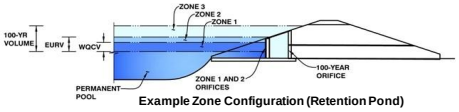
Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

Project: Falcon Meadows at Bent Grass

Basin ID: WQCV Pond - South



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	67.81	acres
Watershed Length =	3,600	ft
Watershed Length to Centroid =	1,500	ft
Watershed Slope =	0.030	ft/ft
Watershed Imperviousness =	31.10%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.875	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	2.129	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	1.505	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	2.066	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	2.534	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	3.682	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	4.754	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	6.187	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.68 in.) =	12.228	acre-feet	3.68	inches
Approximate 2-yr Detention Volume =	1.341	acre-feet		
Approximate 5-yr Detention Volume =	1.787	acre-feet		
Approximate 10-yr Detention Volume =	2.230	acre-feet		
Approximate 25-yr Detention Volume =	2.811	acre-feet		
Approximate 50-yr Detention Volume =	3.239	acre-feet		
Approximate 100-yr Detention Volume =	3.920	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.875	acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	0.875	acre-feet
Initial Surcharge Volume (ISV) =	user	ft^3
Initial Surcharge Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft^2
Volume of Basin Floor (V_{FLOOR}) =	user	ft^3
Depth of Main Basin (H_{MAIN}) =	user	ft
Length of Main Basin (L_{MAIN}) =	user	ft
Width of Main Basin (W_{MAIN}) =	user	ft
Area of Main Basin (A_{MAIN}) =	user	ft^2
Volume of Main Basin (V_{MAIN}) =	user	ft^3
Calculated Total Basin Volume (V_{total}) =	user	acre-feet

Total detention volume is less than 100-year volume.

Depth Increment = 1.00 ft

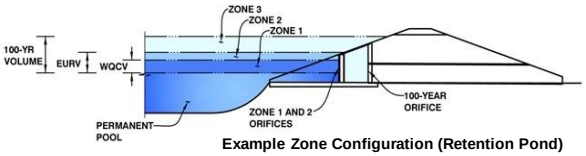
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	--	0.00	--	--	--	56	0.001		
6924	--	0.33	--	--	--	12,476	0.286	2,067	0.047
6925	--	1.33	--	--	--	18,677	0.429	17,643	0.405
6926	--	2.33	--	--	--	23,065	0.529	38,514	0.884
6927	--	3.33	--	--	--	27,922	0.641	64,008	1.469
6928	--	4.33	--	--	--	33,784	0.776	94,861	2.178
6929	--	5.33	--	--	--	40,499	0.930	132,002	3.030

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.03 (May 2020)

Project: Falcon Meadows at Bent Grass

Basin ID: WQCV Pond - South



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.32	0.875	Orifice Plate
Zone 2			
Zone 3			
Total (all zones)		0.875	

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =		ft (distance below the filtration media surface)	Underdrain Orifice Area =		ft^2
Underdrain Orifice Diameter =		inches	Underdrain Orifice Centroid =		feet

Calculated Parameters for Underdrain

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)	WQ Orifice Area per Row =	3.472E-02	ft^2
Depth at top of Zone using Orifice Plate =	2.32	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	9.00	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	5.00	sq. inches (use rectangular openings)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	0.80	1.60					
Orifice Area (sq. inches)	5.00	5.00	5.00					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	2.32		ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.06		ft^2
Depth at top of Zone using Vertical Orifice =	4.27		ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.08		feet
Vertical Orifice Diameter or Height =	2.00		inches				
Vertical Orifice Width =	4.00		inches				

Calculated Parameters for Vertical Orifice

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir (and No Outlet Pipe)

	Not Selected	Not Selected			Not Selected	Not Selected	
Overflow Weir Front Edge Height, Ho =	2.50		ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	2.50		feet
Overflow Weir Front Edge Length =	6.00		feet	Overflow Weir Slope Length =	3.00		feet
Overflow Weir Grate Slope =	0.00		H:V	Grate Open Area / 100-yr Orifice Area =	2.57		
Horiz. Length of Weir Sides =	3.00		feet	Overflow Grate Open Area w/o Debris =	12.60		ft^2
Overflow Grate Open Area % =	70%		%, grate open area/total area	Overflow Grate Open Area w/ Debris =	6.30		ft^2
Debris Clogging % =	50%		%				

Calculated Parameters for Overflow Weir

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Not Selected	Not Selected			Not Selected	Not Selected	
Depth to Invert of Outlet Pipe =	2.50		ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	4.91		ft^2
Circular Orifice Diameter =	30.00		inches	Outlet Orifice Centroid =	1.25		feet
				Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	4.33	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	1.00	feet
Spillway Crest Length =	20.00	feet	Stage at Top of Freeboard =	5.33	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.93	acres
Freeboard above Max Water Surface =	0.00	feet	Basin Volume at Top of Freeboard =	3.03	acre-ft

Calculated Parameters for Spillway

Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

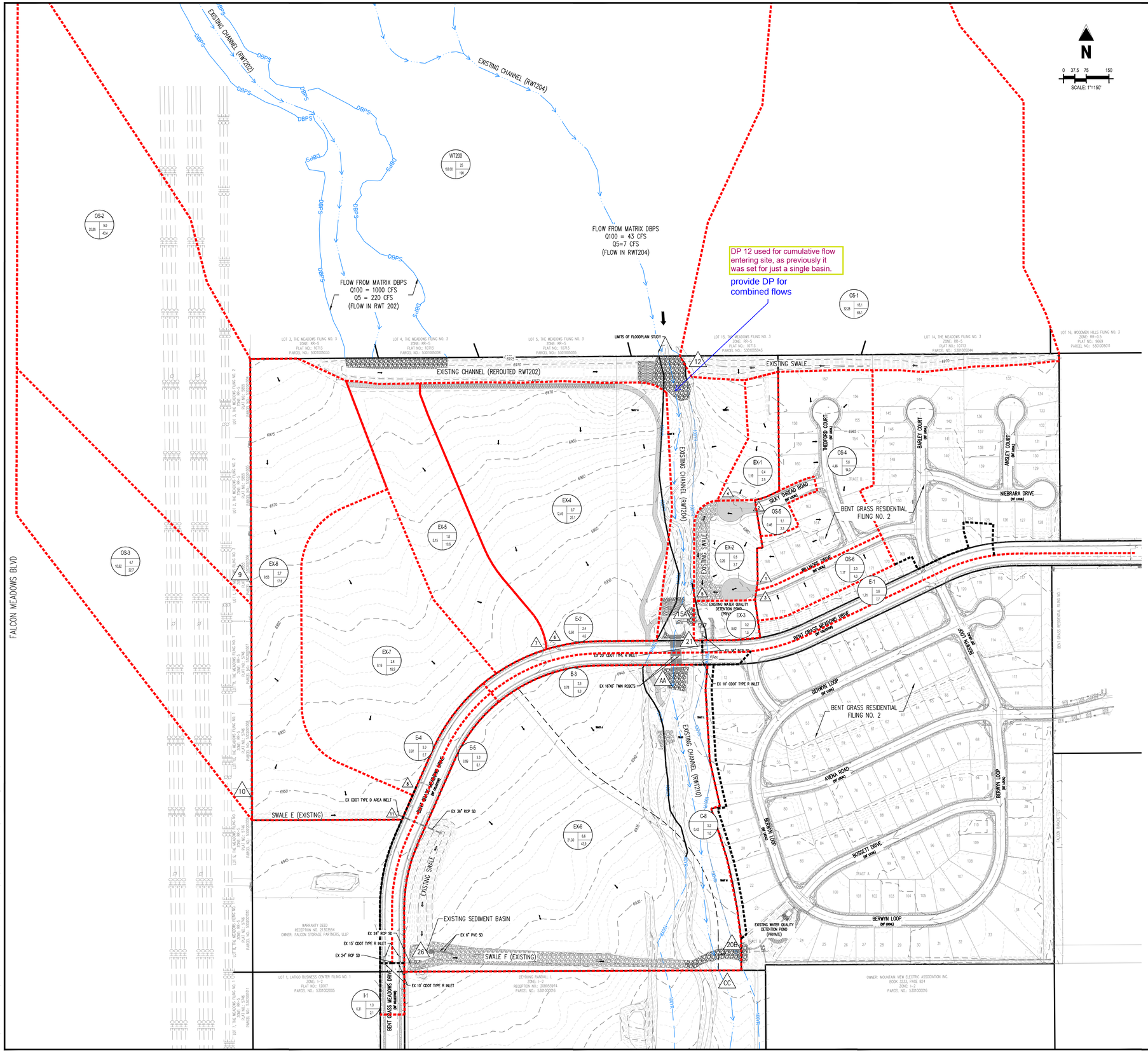
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.19	1.50	1.75	2.00	2.25	2.52	3.68
CUHP Runoff Volume (acre-ft) =	0.875	2.129	1.505	2.066	2.534	3.682	4.754	6.187	12.228
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.505	2.066	2.534	3.682	4.754	6.187	12.228
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.4	0.8	1.1	10.1	20.3	33.7	87.9
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.01	0.02	0.15	0.30	0.50	1.30
Peak Inflow Q (cfs) =	N/A	N/A	14.2	19.8	24.5	40.0	53.5	70.5	139.1
Peak Outflow Q (cfs) =	0.6	46.3	5.0	9.6	13.8	27.0	36.9	47.1	118.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	12.3	12.6	2.7	1.8	1.4	1.3
Structure Controlling Flow =	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	3.82	0.32	0.7	1.0	2.1	2.8	3.6	4.7
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	40	39	43	42	40	36	33	30	20
Time to Drain 99% of Inflow Volume (hours) =	43	45	48	47	46	45	43	42	35
Maximum Ponding Depth (ft) =	2.32	4.27	2.72	2.87	2.98	3.27	3.57	4.11	5.23
Area at Maximum Ponding Depth (acres) =	0.53	0.77	0.57	0.59	0.60	0.63	0.67	0.75	0.91
Maximum Volume Stored (acre-ft) =	0.879	2.131	1.099	1.180	1.246	1.431	1.620	2.010	2.929

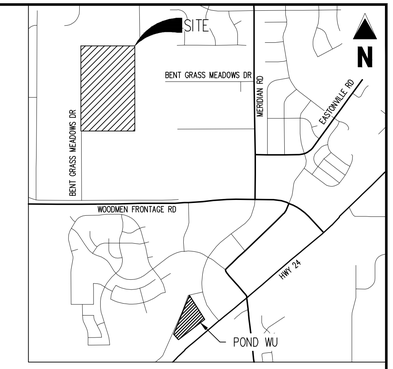
Box size upgraded. Final design is done as part of FDR.

grate velocity is dangerous - larger box size is recommended

APPENDIX D

Drainage Maps





VICINITY MAP
1"=2,000'

DRAINAGE LEGEND

- PROPERTY LINE
- 6485 — EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- BASIN BOUNDARY LINE
- 100YR — FEMA EFFECTIVE 100-YR FLOODPLAIN
- DBPS — 100-YR FLOODPLAIN LIMITS FROM DBPS
- CENTERLINE OF STREAM
- EXISTING RIPRAP
- BASIN DESIGNATION
- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DESIGN POINT
- DIRECTION OF RUNOFF

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
RWT202	1574.40	220.0	1000.0
RWT204	38.40	7.0	43.0
WT200	192.00	52.0	190.0
EX-1	1.19	0.4	2.5
EX-2	1.56	0.5	3.7
EX-3	0.62	0.2	1.5
EX-4	12.49	3.7	25.1
EX-5	5.15	1.6	10.6
EX-6	9.53	2.7	17.8
EX-7	9.16	2.8	18.9
EX-8	21.30	6.6	43.9
OS-1	32.28	15.1	65.1
OS-2	20.08	9.0	43.4
OS-3	10.62	4.7	22.7
OS-4	4.46	5.6	14.0
OS-5	0.46	1.1	2.3
OS-6	1.17	2.0	4.3
C-8	0.42	0.2	1.0
E-1	1.71	3.6	7.7
E-2	0.68	2.4	4.6
E-3	0.78	2.9	5.3
E-4	0.91	3.0	5.7
E-5	0.89	3.3	6.1
I-1	0.31	[illegible]	[illegible]

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
1	5.6	14.0
2	1.1	2.3
3	2.0	4.3
4	0.4	2.5
5	9.0	25.3
6	3.7	25.1
7	5.2	35.4
8	2.8	18.9
9	9.0	43.4
10	4.7	22.7
11	15.9	81.5
12	15.1	65.1
4X	8.6	22.4
21	17.1	57.1
15A	12.5	37.0
AA	282.6	1260.1
26	20.9	54.1
20B	21.2	64.9
CC	302.4	1336.7

Copy of Historic drainage plan and calcs added from BG Filing No. 2 report.

also label pre-development flows for CC

Add combined DP at N channel

DP 12 represents cumulative flow entering site

Label if these are FEMA / DBPS / calculated flows.

Spreadsheet and write up indicates flows are DBPS flows entering site, which are combined with onsite rational developed flows. Technically, these 2 design points are neither DBPS or FEMA. Basins which are DBPS flows in adjacent table have been labeled as such instead.

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CHALLENGER HOMES

PRELIMINARY DRAINAGE REPORT
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNTIES, LLC

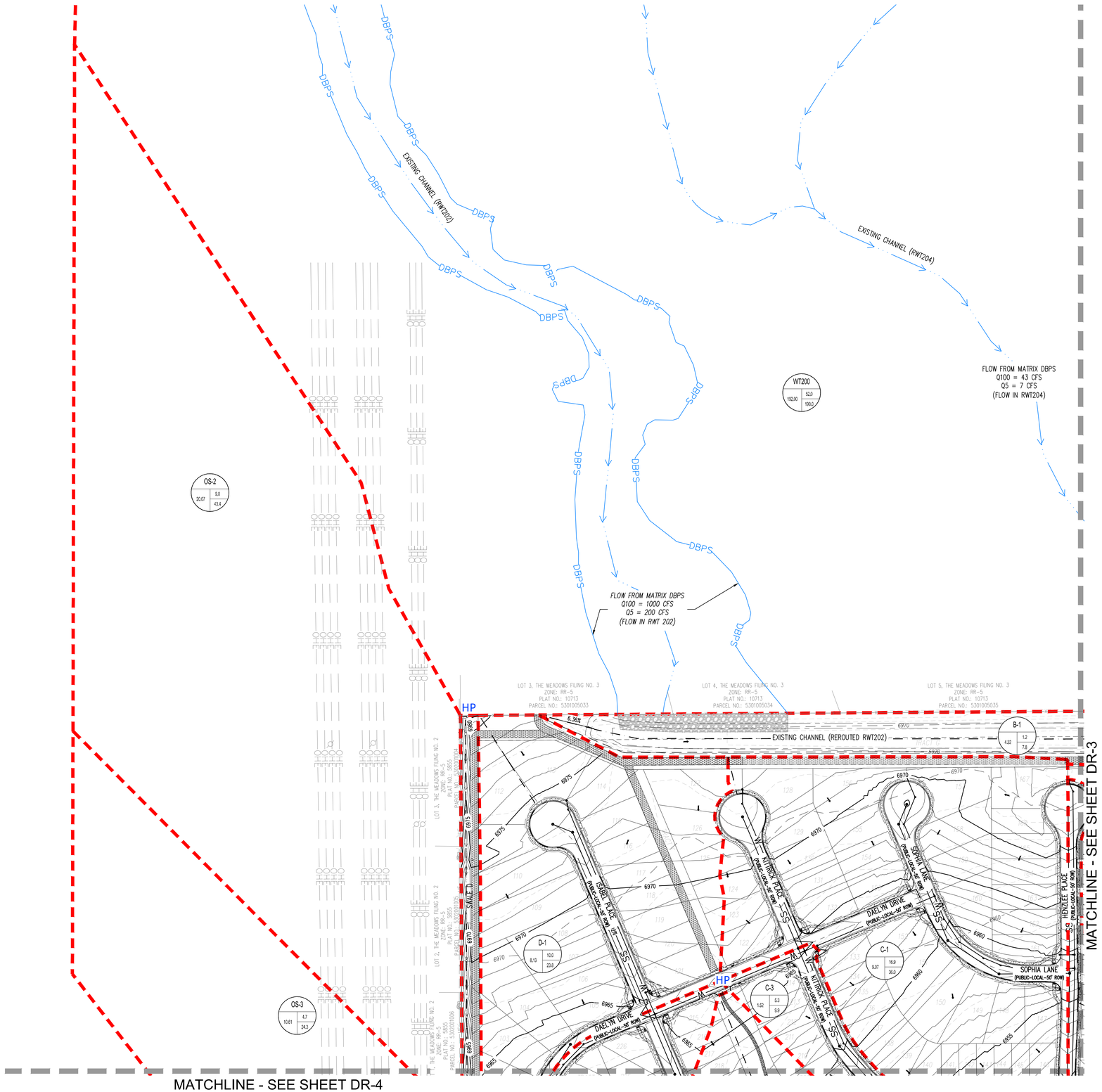
BENT GRASS MEADOWS DRIVE & MERDIAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

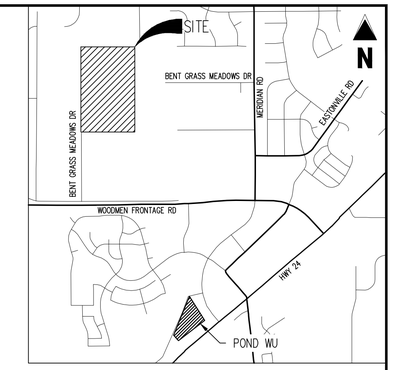
#	Date	Issue / Description	Init.

Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	08/05/2020

EXISTING DRAINAGE MAP

DR-1





VICINITY MAP
1"=2,000'

DRAINAGE LEGEND

- PROPERTY LINE
- 6480 — EXISTING MAJOR CONTOUR
- 6482 — EXISTING MINOR CONTOUR
- 6480 — PROPOSED MAJOR CONTOUR
- 6482 — PROPOSED MINOR CONTOUR
- BASIN BOUNDARY LINE
- DRAINAGE TRAVEL PATH
- 100YR — FEMA EFFECTIVE 100-YR FLOODPLAIN
- DBPS — FEMA EFFECTIVE 100-YR FLOODPLAIN
- CENTERLINE OF STREAM
- EXISTING RIPRAP
- PROPOSED RIPRAP
- PROPOSED ACCESS
- 1 — BASIN DESIGNATION
- 1.8 — 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 4.8 — 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 0.71 — BASIN AREA IN ACRES
- 1 — DESIGN POINT
- DIRECTION OF RUNOFF

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
RWT202	1574.40	220.0	1000.0
RWT204	38.40	7.0	43.0
WT200	192.00	52.0	190.0
A-1	2.16	4.9	11.7
A-2	0.86	2.0	4.4
A-3	0.92	2.6	5.2
A-4	0.82	0.4	2.6
B-1	4.32	1.2	7.8
B-2	1.17	0.4	2.5
C-1	9.07	16.9	36.0
C-2	1.11	2.8	6.2
C-3	1.52	5.3	9.9
C-4	4.70	8.0	21.0
C-5	0.51	0.3	1.6
C-6	1.37	2.1	5.1
D-1	8.13	10.0	23.8
D-2	6.72	14.3	29.6
D-3	2.93	2.0	5.1
D-4	4.38	7.8	16.6
D-5	1.08	2.2	4.6
D-6	4.01	8.2	17.2
D-7	6.39	3.2	14.8
D-8	1.69	1.3	4.5
OS-1	32.28	15.1	65.1
OS-2	20.07	9.0	43.4
OS-3	10.61	4.7	24.3
OS-4	4.46	5.6	14.0
OS-5	0.46	1.1	2.3
OS-6	1.17	2.0	4.3
E-1	1.71	3.6	7.7
E-2	0.68	2.4	4.6
E-3	0.78	2.9	5.3
E-4	0.91	3.0	5.7
E-5	0.89	3.3	6.1
I-1	0.31	1.0	2.1

DESIGN POINT SUMMARY TABLE

Design Point	Q_5 (cfs)	Q_{100} (cfs)
21	14.2	63.6
1	5.8	15.0
2	5.3	13.9
3	7.5	18.7
4	11.1	27.7
5	3.6	16.5
6	13.9	41.2
7	2.9	5.5
8	11.5	36.4
9	8.6	42.8
10	4.5	22.2
11	13.8	64.5
12	9.7	31.2
13	28.1	68.6
13A	3.3	22.4
14	13.9	29.9
15	20.1	43.7
16	12.0	36.4
17	7.5	16.5
18	10.0	21.8
19	2.0	5.2
15A	12.2	37.0
AA	260.0	1143.5
31	32.5	79.7
31	32.5	79.7
30	13.5	58.9
31	32.5	79.7
32	1.2	4.5
24	5.9	27.0
25	3.3	9.9
26	7.7	32.4
20	43.2	126.1
20A	9.6	47.1
20B	21.3	66.0
CC	260.1	1137.6

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CHALLENGER HOMES

PRELIMINARY DRAINAGE REPORT
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNTIES, LLC

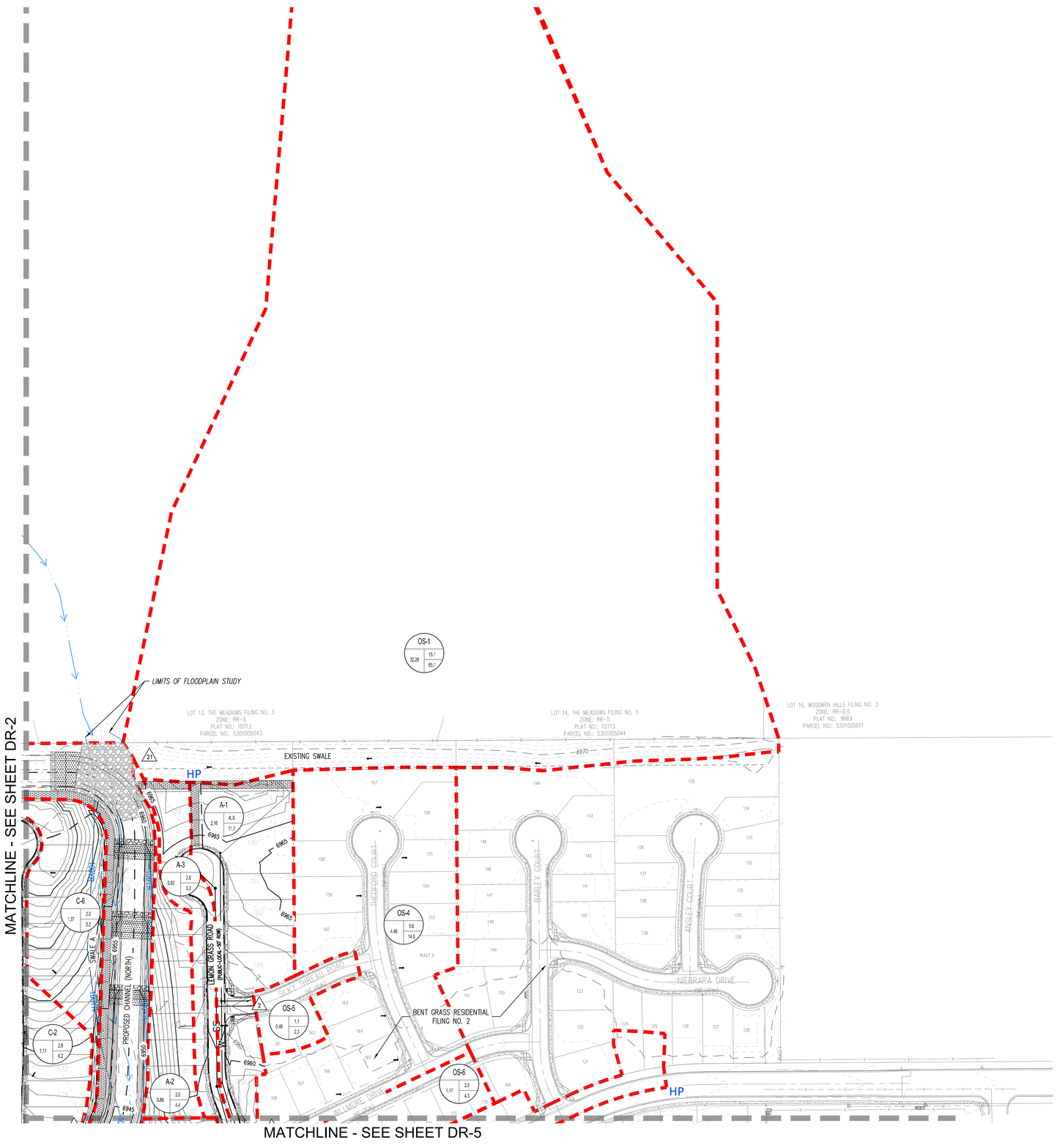
BENT GRASS MEADOWS DRIVE & MERDIAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

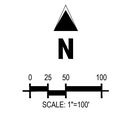
#	Date	Issue / Description	Init.

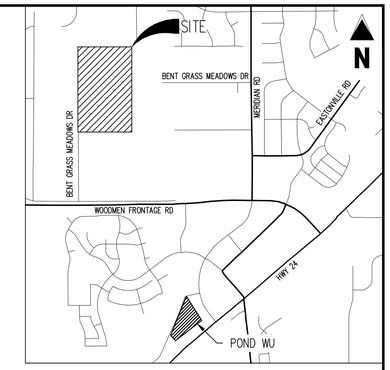
Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	08/05/2020

PROPOSED DRAINAGE MAP

DR-2







VICINITY MAP
1"=2,000'

DRAINAGE LEGEND

- PROPERTY LINE
- 6480 — EXISTING MAJOR CONTOUR
- 6482 — EXISTING MINOR CONTOUR
- 6480 — PROPOSED MAJOR CONTOUR
- 6482 — PROPOSED MINOR CONTOUR
- BASIN BOUNDARY LINE
- DRAINAGE TRAVEL PATH
- 100YR — FEMA EFFECTIVE 100-YR FLOODPLAIN
- DBPS — FEMA EFFECTIVE 100-YR FLOODPLAIN
- CENTERLINE OF STREAM
- EXISTING RIPRAP
- PROPOSED RIPRAP
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- 5-YEAR RUNOFF IN CUBIC FEET PER SECOND
- 100-YEAR RUNOFF IN CUBIC FEET PER SECOND
- BASIN AREA IN ACRES
- DESIGN POINT
- DIRECTION OF RUNOFF

RUNOFF SUMMARY TABLE

Basin ID	Area (acres)	Q_5 (cfs)	Q_{100} (cfs)
RWT202	1574.40	220.0	1000.0
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WT200	192.00	52.0	190.0
A-1	2.16	4.9	11.7
A-2	0.86	2.0	4.4
A-3	0.92	2.6	5.2
A-4	0.82	0.4	2.6
B-1	4.32	1.2	7.8
B-2	1.17	0.4	2.5
C-1	9.07	16.9	36.0
C-2	1.11	2.8	6.2
C-3	1.52	5.3	9.9
C-4	4.70	8.0	21.0
C-5	0.51	0.3	1.6
C-6	1.37	2.1	5.1
D-1	8.13	10.0	23.8
D-2	6.72	14.3	29.6
D-3	2.93	2.0	5.1
D-4	4.38	7.8	16.6
D-5	1.08	2.2	4.6
D-6	4.01	8.2	17.2
D-7	6.39	3.2	14.8
D-8	1.69	1.3	4.5
OS-1	32.28	15.1	65.1
OS-2	20.07	9.0	43.4
OS-3	10.61	4.7	24.3
OS-4	4.46	5.6	14.0
OS-5	0.46	1.1	2.3
OS-6	1.17	2.0	4.3
E-1	1.71	3.6	7.7
E-2	0.68	2.4	4.6
E-3	0.78	2.9	5.3
E-4	0.91	3.0	5.7
E-5	0.89	3.3	6.1
I-1	0.31	1.0	2.1

DESIGN POINT SUMMARY TABLE

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2	5.3	13.9
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6	13.9	41.2
7	2.9	5.5
8	11.5	36.4
9	8.6	42.8
10	4.5	22.2
11	13.8	64.5
12	9.7	31.2
13	28.1	68.6
13A	3.3	22.4
14	13.9	29.9
15	20.1	43.7
16	12.0	36.4
17	7.5	16.5
18	10.0	21.8
19	2.0	5.2
15A	12.2	37.0
AA	260.0	1143.5
31	32.5	79.7
31	32.5	79.7
30	13.5	58.9
31	32.5	79.7
32	1.2	4.5
24	5.9	27.0
25	3.3	9.9
26	7.7	32.4
20	43.2	126.1
20A	9.6	47.1
20B	21.3	66.0
CC	260.1	1137.6

Provide DP 22

DP 22 label on plan changed to DP AA to match calculation spreadsheets and table & "extra" DP 31's are deleted.

Galloway
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

PRELIMINARY
NOT FOR BIDDING
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CHALLENGER HOMES

PRELIMINARY DRAINAGE REPORT
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNTIES, LLC

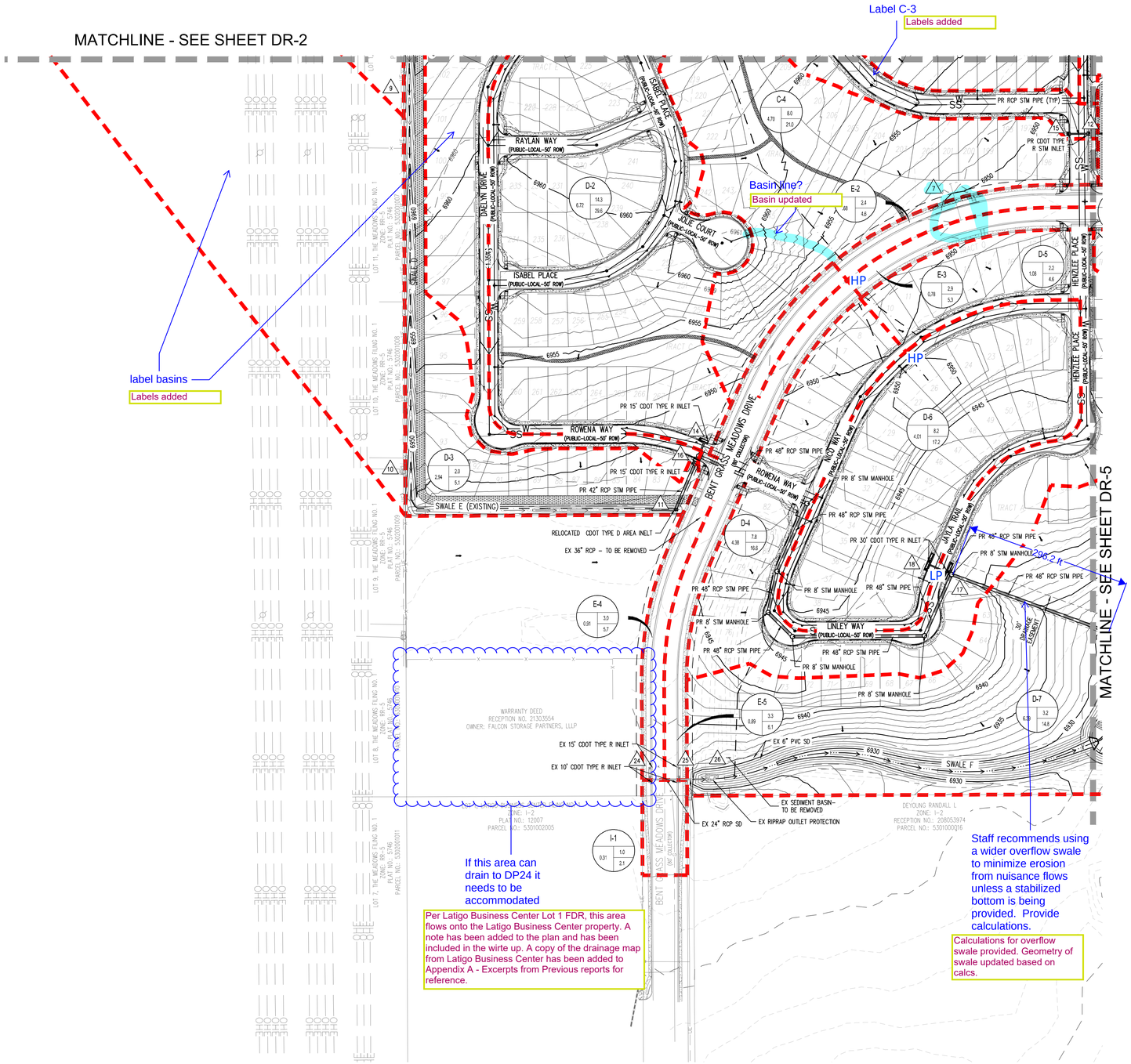
BENT GRASS MEADOWS DRIVE & MERDIAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	08/05/2020

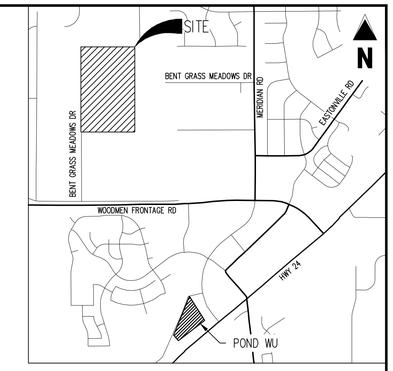
PROPOSED DRAINAGE MAP

DR-3



N

0 25 50 100
SCALE: 1"=100'



VICINITY MAP
1"=2,000'

DRAINAGE LEGEND

- PROPERTY LINE
- 6480 EXISTING MAJOR CONTOUR
- 6482 EXISTING MINOR CONTOUR
- 6480 PROPOSED MAJOR CONTOUR
- 6482 PROPOSED MINOR CONTOUR
- BASIN BOUNDARY LINE
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FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNTIES, LLC

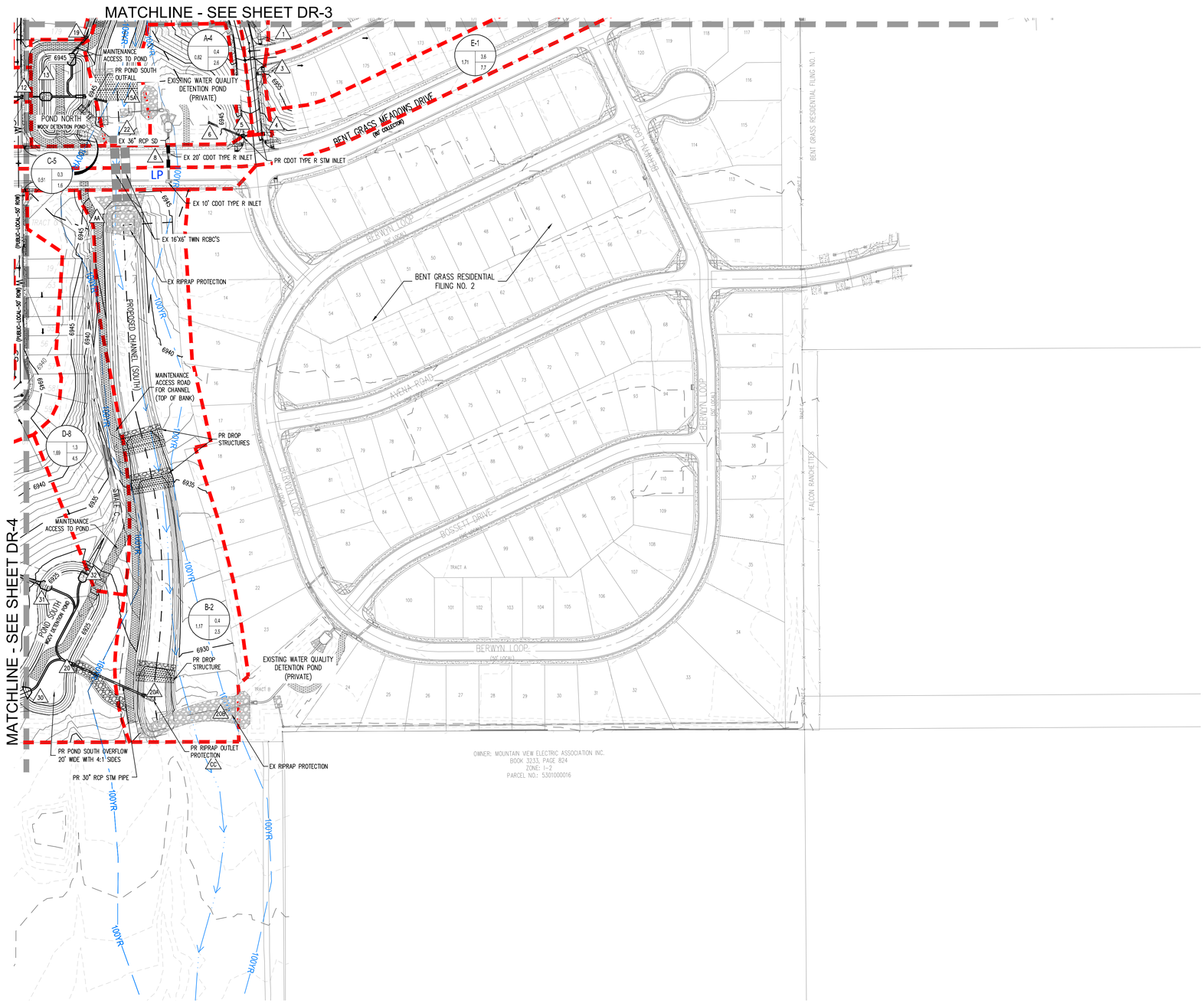
BENT GRASS MEADOWS DRIVE & MERDIAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

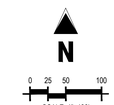
#	Date	Issue / Description	Init.

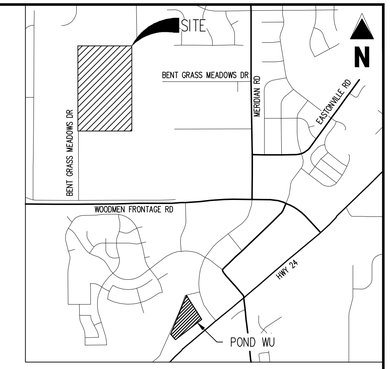
Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	08/05/2020

PROPOSED DRAINAGE MAP

DR-4







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provide DP 22 flows

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Galloway
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Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

PRELIMINARY
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CHALLENGER HOMES

PRELIMINARY DRAINAGE REPORT
FALCON MEADOWS AT BENT GRASS
FOR
CHALLENGER COMMUNITIES, LLC

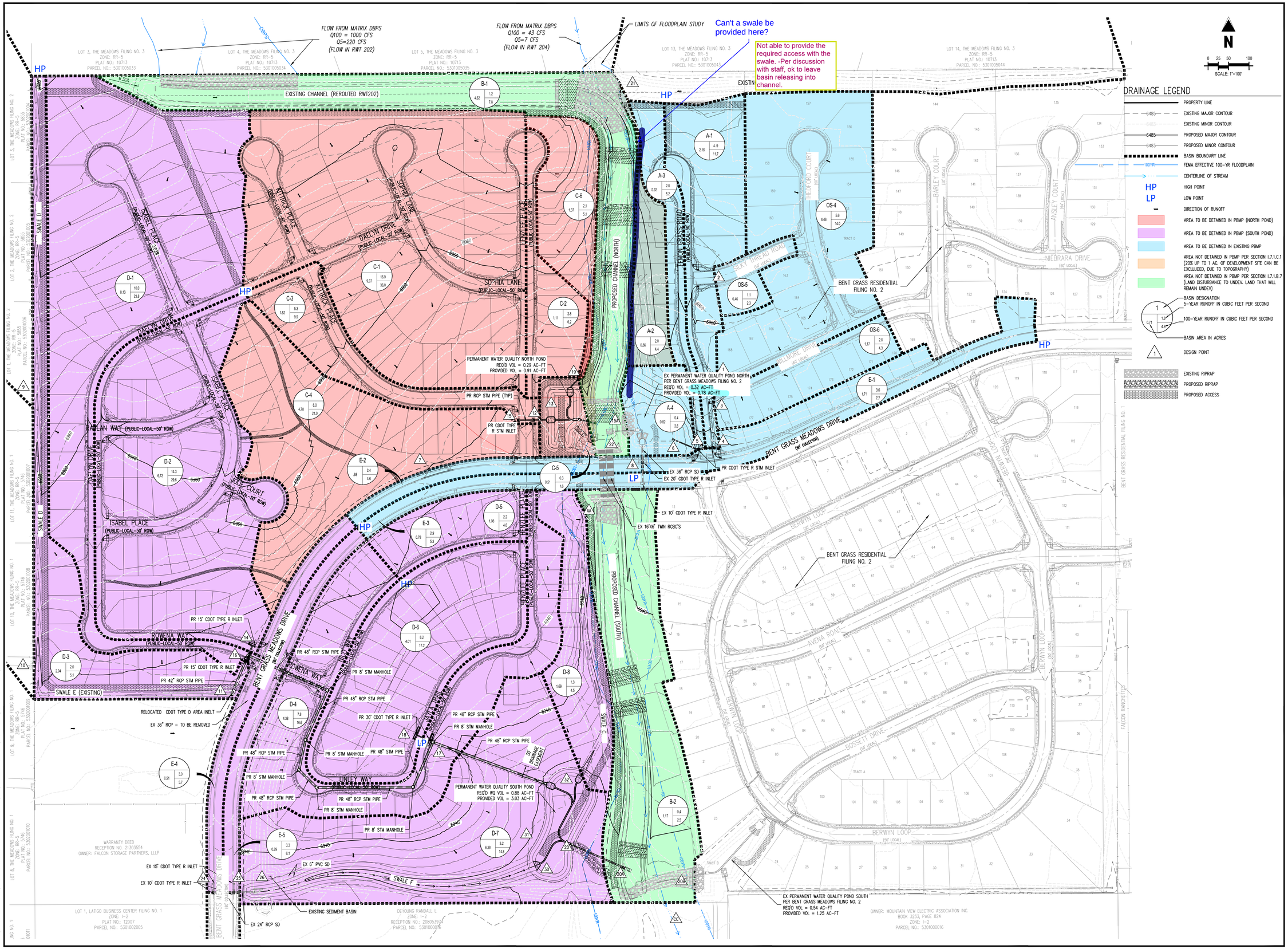
BENT GRASS MEADOWS DRIVE & MERDIAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	08/05/2020

PROPOSED DRAINAGE MAP

DR-5



Galloway
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Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

PRELIMINARY
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CHALLENGER HOMES

PRELIMINARY DRAINAGE REPORT FALCON MEADOWS AT BENT GRASS FOR CHALLENGER COMMUNTIES, LLC

BENT GRASS MEADOWS DRIVE & MERIDIAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No:	CLH000017
Drawn By:	CMWJ
Checked By:	RGD
Date:	08/05/2020

WQ PLAN

DR-6

OPERATIONS AND MANTENANCE MANUAL

BENT GRASS RESIDENTIAL FILING NO. 3
SEDIMENT BASIN

Bent Grass Meadows Drive
El Paso County, CO

add: / Interim WQCV Basin

Added

PREPARED FOR:
Challenger Homes, Inc.
8605 Explorer Dr., Suite 250
Colorado Springs, CO 80920

PREPARED BY:
Galloway & Company, Inc.
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920

DATE:
Prepared: February 17, 2021

Added

PUDSP-20-005

TABLE OF CONTENTS

Inspection

Inspection Frequency

- Inspections of the ponds should be, at a minimum, once every week until vegetation is re-established and then once a quarter. Inspections should also occur after major storm events.
- Hydraulic and structural facilities should be thoroughly inspected annually. Also, observations should be made for obvious problems during routine maintenance visits, especially for plugging of outlets.
- Inspections for debris and litter just before annual storm seasons (that is April and May) and following significant rainfall events.
- Results of inspections are to be recorded and kept at a central location for review and recording by the owner.
- Sediment removal should be performed when it occupies more than 20% of the WQCV. This time frame will vary, but should be expected to be done every 2 to 5 years as needed per inspection.
- Forebay and micro-pool will require s
- A baseline survey should be performe
  comparison surveys conducted every 2 years after.

strike this if these are not being constructed

Left as South Pond does have forebays and a micro pool

Inspection Items

- Inspections should evaluate the berm, spillway condition, depth of sediment behind the berm and condition of the downstream face of the pond. A site survey will be the best indication of excessive sediment buildup and degradation of the spillway.
- An inspection of the vegetation on the berm and the downstream face of the spillway should be performed. Bare areas should be noted and repaired using native grasses. Any sloughing or erosion of the embankment should also be noted and repaired.
- Items to record include erosion of the downstream face, excessive buildup of sediment in all areas of the pond (micro-pool, fore bay, etc), and the mowing frequency of the vegetation on the facility.

Inspection Personnel

A qualified engineer and/or surveyor should conduct inspections of the facility.

Operations

No specific operating instructions are required.

Maintenance

Mowing

Mowing shall occur to limit unwanted vegetation. Maintain irrigated turf grass as 2 to 4 inches tall and non irrigated native turf grasses at 4 to 8 inches.

Debris and Litter Removal

Remove debris and litter from the entire pond to minimize outlet clogging and improve aesthetics.

Landscaping Removal and Replacement (PLD)

Not Applicable

Structural

Repair pond inlets, outlets, fore bays, low flow channel liners and energy dissipaters whenever damage is discovered.

Nuisance Control

Address odor, insects and overgrowth issues associated with stagnant or standing water in the bottom zone.

Erosion and Sediment Removal

Repair and revegetate eroded areas in the basin and channels. Remove accumulated sediment from the fore bay, micro-pool and the bottom of the basin.

An Operation and Maintenance Log follows.

Operation & Maintenance Log

OPERATION AND MAINTENANCE LOG

(Record inspections, items found maintenance and corrective actions taken. Also record any training received by Contractor personnel with regard to erosion control, materials handling and any inspections by outside agencies)

DATE	ITEM	SIGNATURE OF PERSON MAKING ENTRY

Updated

Falcon Meadows at Bent Grass

PRE-DEVELOPMENT SITE GRADING ACKNOWLEDGEMENT
AND RIGHT OF ACCESS FORM

The undersigned ("Applicant") owns and holds legal title to the real property to be known as SOUTH PARCEL _____ ("Property"), which Property is legally described on Exhibit A attached hereto and incorporated herein by this reference.

Applicant seeks approval for Pre-Development Site Grading under Section 6.2.6 of the El Paso County Land Development Code. As a condition of approval and issuance of Construction Permit No. _____, Applicant must complete and submit this Pre-Development Site Grading Acknowledgement and Right of Access Form. In compliance therewith, by signing below, Applicant hereby acknowledges and agrees as follows:

1. The approval and issuance of the Construction Permit does not guarantee or create a right in, or a right of expectation in, Applicant that the El Paso County Planning Commission will recommend or the Board of County Commissioners of El Paso County will approve Applicant's final plat for the Property. Applicant may proceed with grading under the Construction Permit at Applicant's sole risk.

2. The Construction Permit shall be personal to the Applicant and shall not run with the land. Any successors and/or assigns of the Applicant desiring to proceed or continue with the Pre-Development Site Grading approval shall execute their own Pre-Development Site Grading Acknowledgement and Right of Access Form, obtain their own Construction Permit and provide replacement financial guarantees.

3. Applicant hereby grants to El Paso County, its employees, agents, contractors, and/or subcontractors free access to enter upon the Property at all reasonable hours for the following purposes in accordance with requirements of the El Paso County Engineering Criteria Manual (ECM), Section I.5:

    a. To inspect and investigate for compliance with Construction Permit requirements, including, but not limited to, proper installation and maintenance of erosion and sediment control measures; and

    b. To inspect and investigate for completion of grading activities and soil stabilization requirements; and

    c. In the event of noncompliance with either of the above, to identify deficiencies, which may result in issuance of a Letter of Noncompliance which includes such deficiencies to be corrected by Applicant; and

    d. In the event the Applicant does not correct deficiencies identified in a Letter of Noncompliance, to draw on collateral provided and perform the work in order to correct said deficiencies pursuant to ECM Section I.6.1.H.

4. To the extent allowed by law, Applicant shall indemnify, defend, and forever hold harmless the Board of County Commissioners of El Paso County, their officers, employees, agents, contractors, and subcontractors, from any and all claim, demand, action, cause of action, loss, damage, injury, property damage, personal injury, death, liability, duty, obligation, costs and expenses (including attorney fees) arising out of or related to such entry on the Property. Nothing in this section shall be deemed to waive or otherwise limit the defenses available to the Board of County Commissioners pursuant to the Colorado Governmental Immunity Act or as otherwise provided by law.

5. In accordance with ECM Sections 5.3.15 and I.4.1.A.3, Applicant is obligated to provide security or collateral sufficient to make reasonable provision for completion of the grading, erosion control and final stabilization measures, in the amount set forth on Exhibit B attached hereto.

6. Applicant is responsible for providing any renewals of collateral to ensure that there is never a lapse in security coverage. Applicant shall procure renewal/extension/replacement collateral at least fifteen (15) days prior to the expiration of the original or renewal/extension/replacement collateral then in effect. Failure to procure renewal/extension/replacement collateral within this time limit shall allow the County to execute on the collateral.

7. All of those certain grading, erosion control and final stabilization measures to be completed as identified on Exhibit B shall be constructed in compliance with the following:
    a. All laws, resolutions and regulations of the United States, State of Colorado, El Paso County and its various agencies, affected special districts and/or servicing authorities.
    b. Such other designs, drawings, maps, specifications, sketches and other matter submitted to and approved by any of the above-stated governmental entities.

8. All grading, erosion control and final stabilization measures shall be completed by the Applicant within 12 (twelve) months from the date of notice to proceed in the Construction Permit. If Applicant determines that the completion date needs to be extended, Applicant shall submit a written request for a change in the completion date to the ECM Administrator at least 90 days in advance of the required completion date. The request shall include the reasons for the requested change in completion date, the proposed new completion date, and prove collateral is in place to cover the extension time requested. The completion date for the Construction Permit may be extended at the discretion of the ECM Administrator. Failure to meet the original or extended completion date, as applicable, shall allow the County to execute on the collateral.

IN WITNESS WHEREOF, the Applicant hereby executes this Pre-Development Site Grading Acknowledgement and Right of Access Form this _____ day of _____, 20__.

APPLICANT:

_____

(Name)
(Title—if applicable)

Fill out

Both Owners added

include all owners

STATE OF COLORADO)
)ss.
COUNTY OF EL PASO)

The foregoing instrument was acknowledged before me this ____day of _____, 20__, by _____.

Witness my hand and official seal.

Complete

My commission expires: _____

Notarized

_____

Notary Public

_____

Craig Dossey, Executive Director Date
Planning and Community Development Department

Approved as to Content and Form:

_____

Assistant County Attorney

EARLY METRO DISTRICT IMPROVEMENTS - WATER AND SANITARY SEWER PLANS
FALCON MEADOWS AT BENT GRASS
FALCON, CO 80831 - EL PASO COUNTY
CHALLENGER COMMUNITIES, LLC

Galloway responses

PROJECT CONTACTS

OWNER/DEVELOPER
CHALLENGER COMMUNITIES, LLC
13570 NORTHGATE ESTATES DR.
COLORADO SPRINGS, CO 80921
TELE: (719) 598-5190
ATTN: LEE EISENHEIM
EMAIL: LEISENHEIM@CHALLENGERHOMES.COM

APPLICANT
NES, INC.
619 NORTH CASCADE AVENUE, SUITE 200
COLORADO SPRINGS, CO 80903
TELE: (719) 471-0073
ATTN: ERIN GANAWAY
EMAIL: EGANAWAY@NESCOLORADO.COM

CIVIL ENGINEER
GALLOWAY & CO., INC.
1155 KELLY JOHNSON BLVD., SUITE 305
COLORADO SPRINGS, CO 80920
TELE: (719) 900-7220
ATTN: GRANT DENNIS, P.E.
EMAIL: GRANTDENNIS@GALLOWAYUS.COM

GEOTECHNICAL ENGINEER
ROCKY MOUNTAIN GROUP
2910 AUSTIN BLUFFS PKWY
COLORADO SPRINGS, CO 80918
TELE: (719) 394-3072
ATTN: TONY MUNGER, P.E.
EMAIL: TMUNGER@RMG-ENGINEERS.COM

TRAFFIC ENGINEER
LSC TRANSPORTATION CONSULTANTS, INC.
545 EAST PIKES PEAK AVENUE, SUITE 210
COLORADO SPRINGS, CO 80903
TELE: (719) 633-2868
ATTN: JEFFREY C. HODSON, P.E.
EMAIL: JEF@LSCTRANS.COM

SURVEYOR
GALLOWAY & CO., INC.
1155 KELLY JOHNSON BLVD., SUITE 305
COLORADO SPRINGS, CO 80920
TELE: (719) 337-1262
ATTN: BRIAN DENNIS
EMAIL: BRIANDENNIS@GALLOWAYUS.COM

UTILITY CONTACTS

WATER & WASTEWATER
WOODMEN HILLS METRO DISTRICT
8046 EASTONVILLE ROAD
FALCON, CO 80831
TELE: (719) 495-2500
ATTN: JERRY JACOBSON
EMAIL: JERRY@WHMD.ORG

ELECTRIC
MOUNTAIN VIEW ELECRIC
11140 E WOODMEN RD
FALCON, CO 80831
TELE: (719) 495-2283
CATHY HANSEN-LEE
EMAIL: CATHY.H@MVEA.COOP

NATURAL GAS
COLORADO SPRINGS UTILITIES (CSU)
7710 DURANT DRIVE, P.O. BOX 1103, MAIL CODE 2150
COLORADO SPRINGS, CO 80947-2150
TELE: (719) 668-5573
AARON CASSIO
EMAIL: ACASSIO@CSU.ORG

FIRE
FALCON FIRE PROTECTION DISTRICT
7030 OLD MERIDIAN ROAD
PEYTON, CO 80831
TELE: (719) 495-4050
EMAIL: FALCONFIRE@FALCONFIREPD.ORG

GENERAL NOTES:

1. ALL UTILITY CONSTRUCTION TO BE CONDUCTED IN CONFORMANCE WITH THE CURRENT WOODMEN HILLS METROPOLITAN DISTRICT (WHMD, THE DISTRICT) SPECIFICATIONS.
2. ALL PLANS ON THE JOB SITE SHALL BE SIGNED BY THE DISTRICT AND THE DISTRICT'S ENGINEER. ANY REVISION TO THE PLANS SHALL BE SO NOTED WITH THE OLD DRAWING MARKED NOT VALID.
3. ALL STATIONING IS CENTER LINE UNLESS OTHERWISE NOTED. ALL ELEVATIONS ARE CENTER LINE UNLESS OTHERWISE NOTED.
4. ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE DISTRICT. THE DISTRICT RESERVES THE RIGHT TO ACCEPT OR REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DOES NOT CONFORM TO ITS STANDARDS AND SPECIFICATIONS.
5. ALL WATER AND SEWER SERVICE LOCATIONS SHALL BE CLEARLY MARKED ON EITHER THE CURB HEAD OR THE FACE OF THE CURB, WITH AN 'S' FOR SEWER AND A 'W' FOR WATER.
6. DUCTILE IRON PIPES, INCLUDING FITTINGS, VALVES AND FIRE HYDRANTS, SHALL BE WRAPPED WITH POLYETHYLENE TUBING, DOUBLE BONDED AT EACH JOINT AND ELECTRICALLY ISOLATED. BONDING AND ANODE CONNECTIONS SHALL BE THOROUGHLY COATED WITH BITUMINOUS COATINGS.
7. ALL DUCTILE IRON PIPE LESS THAN 12 INCHES AND FITTINGS SHALL HAVE CATHODIC PROTECTION USING TWO NO. 6 WIRES WITH 17 LB. MAGNESIUM ANODES EVERY 400 FEET AND 9 LB. MAGNESIUM ANODES AT EACH FITTING. ALL DUCTILE IRON PIPE 12 INCHES AND GREATER AND FITTINGS SHALL HAVE CATHODIC PROTECTION USING TWO NO. 6 WIRES WITH 17 LB. MAGNESIUM ANODES EVERY 300 FEET AND 9 LB. MAGNESIUM ANODES AT EACH FITTING.
8. ALL PIPE MATERIAL, BACKFILL AND INSTALLATION SHALL CONFORM TO THE APPLICABLE SPECIFICATIONS OF THE CITY OF COLORADO SPRINGS, COLORADO DEPARTMENT OF TRANSPORTATION, EL PASO COUNTY DEPARTMENT OF TRANSPORTATION, COLORADO SPRINGS UTILITIES AND THE GEOTECHNICAL ENGINEER.
9. COMPACTION TESTS SHALL BE 95% STANDARD PROCTOR AS DETERMINED BY ASTM D698, UNLESS OTHERWISE APPROVED BY THE DISTRICT OR HIGHER STANDARD AS IMPOSED BY ANOTHER AGENCIES HAVING RIGHT-OF-WAY JURISDICTION. THIS SHALL INCLUDE ALL VALVES, FIRE HYDRANT RUNS, WATER & SEWER SERVICE LINES AND MANHOLES. ALL REPORTS SHALL BE SUBMITTED TO THE DISTRICT FOR REVIEW AND APPROVAL.
10. THE LOCATION OF ALL EXISTING UTILITIES SHOWN ON THE DRAWINGS ARE APPROXIMATE ONLY. THE LOCATION OF ALL UTILITIES SHALL BE FIELD VERIFIED PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES. THE DISTRICT SHALL BE NOTIFIED OF ANY DEVIATIONS TO THE LINE AND/OR GRADE AS DEPICTED ON THE PLANS. CONTRACTOR SHALL SUBMIT TO THE DISTRICT AND THE ENGINEER OF RECORD A REPORT OF THE FIELD VERIFIED INFORMATION PRIOR TO THE START OF CONSTRUCTION.
11. ALL BENDS SHALL BE FIELD STAKED PRIOR TO THE START OF CONSTRUCTION.
12. BENDS, DEFLECTION & CUT PIPE LENGTHS SHALL BE USED TO HOLD HORIZONTAL ALIGNMENT OF SEWER AND WATER LINES TO NO MORE THAN 0.5' FROM THE DESIGNED ALIGNMENT. CONSTRUCTION STAKES TO BE AT 25' INTERVALS ALONG CURVES TO ASSURE LOCATION OF PIPE LINE CONSTRUCTION.
13. AT ALL LOCATIONS WHERE CAP AND STUB IS NOTED ON DRAWINGS, PROVIDE A PLUG AT THE END OF THE PIPE JOINT NEAREST THE SPECIFIED STATION. PROVIDE A REVERSE ANCHOR AT ALL WATER LINE PLUGS.
14. ALL UNUSED SALVAGED WATER UTILITY MATERIAL SHALL BE RETURNED TO THE METROPOLITAN DISTRICT AS REQUESTED.
15. AT THE CONTRACTOR'S EXPENSE, ALL UTILITY MAINS SHALL BE SUPPORTED AND PROTECTED SUCH THAT THEY SHALL FUNCTION CONTINUOUSLY DURING CONSTRUCTION OPERATIONS. SHOULD A UTILITY MAIN FAIL AS A RESULT OF THE CONTRACTOR'S OPERATION, IT SHALL BE REPLACED IMMEDIATELY BY THE CONTRACTOR OR BY THE DISTRICT AT FULL COST OF LABOR AND MATERIALS TO THE CONTRACTOR/DEVELOPER.
16. PUMPING OR BYPASS OPERATIONS SHALL BE REVIEWED AND APPROVED BY BOTH THE DISTRICT AND THE DISTRICT ENGINEER PRIOR TO EXECUTION.
17. THE CONTRACTOR SHALL REPLACE OR REPAIR DAMAGE TO ALL SURFACE IMPROVEMENTS, INCLUDING BUT NOT LIMITED TO FENCES, LANDSCAPING, CURB AND GUTTER AND/OR ASPHALT THAT MAY BE CAUSED DURING CONSTRUCTION.
18. ALL CONTRACTORS WORKING ON OR NEAR A WATER OR SEWER FACILITY (TO INCLUDE SERVICE LINES) SHALL HAVE LIABILITY INSURANCE NAMING THE DISTRICT AS AN ADDITIONAL INSURED AND SHALL PROVIDE A CURRENT COPY OF WORKERS COMPENSATION INSURANCE ON FILE WITH THE DISTRICT. NO WORK CAN PROCEED WITHOUT CURRENT CERTIFICATES ON FILE AT THE DISTRICTS' OFFICE.
19. THE CONTRACTOR SHALL NOTIFY THE DISTRICT AND ALL AFFECTED UTILITY COMPANIES ADJACENT TO THE PROPOSED UTILITY CONSTRUCTION A MINIMUM OF 48 HOURS AND A MAXIMUM OF 96 HOURS PRIOR TO THE START OF CONSTRUCTION.
A WEEKLY CONSTRUCTION MEETING SHALL BE REQUIRED WITH THE CONTRACTOR, DISTRICT ENGINEER AND ALL OTHER PARTIES AS DEEMED NECESSARY BY THE DISTRICT.
20. COMMENCEMENT OF CONSTRUCTION OF WATER/SEWER SYSTEMS WITHIN METROPOLITAN DISTRICT:
   - A) PRIOR TO THE START OF CONSTRUCTION, A PRE-CONSTRUCTION MEETING IS REQUIRED A MINIMUM OF 48 HOURS IN ADVANCE OF COMMENCEMENT OF WORK. A REPRESENTATIVE OF THE OWNER OR DEVELOPER, A REPRESENTATIVE OF THE CONTRACTOR AND DESIGN ENGINEER ARE REQUIRED TO ATTEND. CONTACT THE DISTRICT TO SCHEDULE THE PRE-CONSTRUCTION MEETING. NO PRE-CONSTRUCTION MEETING CAN BE SCHEDULED PRIOR TO FOUR (4) SIGNED/APPROVED PLAN SETS ARE RECEIVED BY THE DISTRICT.
   - B) THE CONTRACTOR IS REQUIRED TO NOTIFY THE DISTRICT A MINIMUM OF 48 HOURS AND A MAXIMUM OF 2 WEEKS PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL ALSO NOTIFY AFFECTED UTILITY COMPANIES AT LEAST 48 HOURS PRIOR TO THE START OF CONSTRUCTION ADJACENT TO THE KNOWN UTILITY LINES.
21. TESTING OF FACILITIES:
   - A) THE CONTRACTOR SHALL NOTIFY THE DISTRICT A MINIMUM OF 48 HOURS AND A MAXIMUM OF 96 HOURS PRIOR TO THE START OF ANY TESTING.
   - B) ALL SECTIONS OF WATER LINE ARE TO MEET THE FOLLOWING PRESSURE TESTING REQUIREMENTS
     - TEST 100 % OF ALL LINES
     - MUST PASS PRESSURE TEST TO 200 PSI FOR TWO HOURS (UNLESS OTHERWISE APPROVED ON THE PLANS).
   - C) ALL SANITARY SEWER FACILITIES ARE TO MEET THE FOLLOWING TESTING REQUIREMENTS
     - ALL LINES SHALL BE JET CLEANED PRIOR TO VACUUM OR PRESSURE TESTING
     - ALL MANHOLES SHALL BE VACUUM TESTED WITH DISTRICT STAFF PRESENT PRIOR TO CCTV INSPECTION.
     - SEWER MAINS TO BE PRESSURE TEST PRIOR TO CCTV INSPECTION
     - ALL LINES SHALL BE CCTV INSPECTED AND VIDEO SHALL TO BE SUBMITTED TO THE DISTRICT FOR REVIEW AND APPROVAL.
22. PRELIMINARY ACCEPTANCE SHALL BE DEFINED AS THE POINT IN TIME THAT THE DISTRICT ACCEPTS THE FACILITY FOR USE. ALL SURFACE IMPROVEMENTS AND RESTORATION SHALL BE COMPLETED WITHIN 30 DAYS OF COMMENCEMENT.
SHOULD THE CONTRACTOR FAIL TO COMPLETE ALL SURFACE IMPROVEMENTS AND RESTORATION WITHIN 30 DAYS OF COMMENCEMENT OF SERVICE, THE DISTRICT, AT THEIR DISCRETION, MAY ELECT TO COMPLETE THE IMPROVEMENTS AT THE CONTRACTORS COST.
23. FINAL ACCEPTANCE BY THE DISTRICT OF ANY LINE OR SYSTEM SHALL NOT OCCUR UNTIL COMPLETION OF FINAL ASPHALT LAYERS AND/OR FINAL COMPLETION AND/OR RESTORATION OF ALL SURFACE IMPROVEMENTS. THE WARRANTY PERIOD FOR ALL FACILITIES PRIOR TO FINAL ACCEPTANCE SHALL BE 24 MONTHS COMMENCING AFTER PRELIMINARY ACCEPTANCE.
24. ACCEPTANCE:
   - A) THE DISTRICT MAY GIVE PRELIMINARY ACCEPTANCE ONCE ALL OF THE TESTS ON ALL THE LINES HAVE BEEN COMPLETED AND A WALK-THRU HAS OCCURRED.
   - B) A SECOND ACCEPTANCE MAY OCCUR ONCE FIRST LIFT OF ASPHALT GOES DOWN AND A SECOND WALK-THRU OF THE SYSTEM OCCURS. IF ALL FACILITIES ARE CLEAN AND ACCESSIBLE, A FINAL ACCEPTANCE MAY OCCUR (THE DISTRICT MAY REQUIRE CLEANING AND RE-VIDEO OF THE SYSTEM, DEPENDING ON THE SEVERITY OF THE CONTAMINATION).
25. ALL WATER AND SEWER MAINS, INCLUDING SERVICE LINES, SHALL HAVE "AS-BUILT" DRAWINGS PREPARED AND APPROVED PRIOR TO PRELIMINARY ACCEPTANCE BY THE DISTRICT.
26. ALL COMMERCIAL/BUSINESS DEVELOPMENTS SHALL HAVE AN EIGHT INCH (MIN.) WATER MAIN LOOPED THROUGH THE PROPOSED PROPERTY WITH GATE VALVES LOCATED WHERE THE MAIN ENTERS THE PROPERTY LINE. AN EIGHT INCH SEWER MAIN SHALL BE INSTALLED FOR SERVICE TO COMMERCIAL/BUSINESS DEVELOPMENTS, AND A MANHOLE SHALL BE LOCATED WHERE THE MAIN ENTERS THE PROPERTY. THE END OF THE MAINS SHALL BE MARKED WITH THE APPROPRIATE COLORED CARSONITE MARKER ALONG WITH TRACER WIRE.
27. AFTER REVIEW AND APPROVAL OF PLANS FOR THE EXTENSION OF LINES, FACILITIES AND/OR SERVICES, CONSTRUCTION MUST BE COMMENCED WITHIN 18 MONTHS FOR RESIDENTIAL SUBDIVISIONS AND 12 MONTHS FOR ANY COMMERCIAL INSTALLATIONS.
28. INSPECTION FEES: CALL THE DISTRICT (719-495-2500) FOR FEE SCHEDULE.

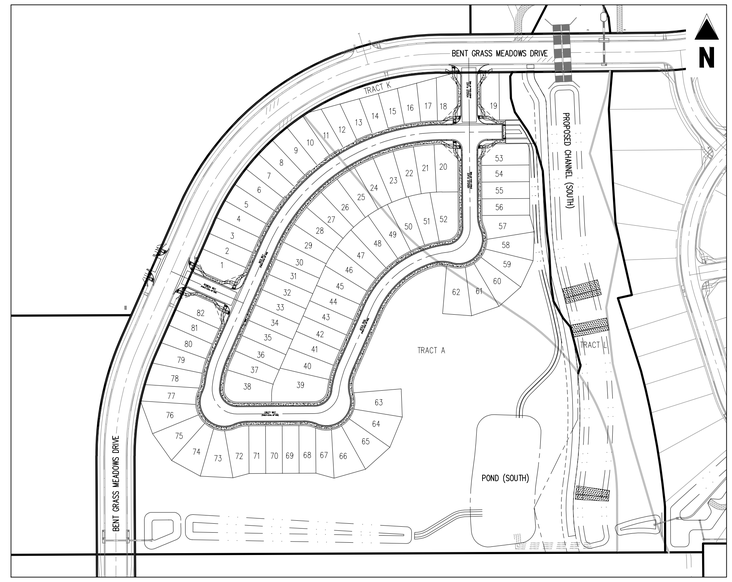
WATER SYSTEM INSTALLATION NOTES

29. ALL WATER AND FORCE MAIN PIPE SHALL BE AWWA C900 PVC, OR EQUAL, PRESSURE CLASS 200. ALL WATER AND FORCE MAIN FITTINGS SHALL HAVE MECHANICAL RESTRAINTS AND THRUST BLOCKS. ALL WATER AND FORCE MAIN PIPE SHALL HAVE A MINIMUM COVER DEPTH OF FIVE AND ONE-HALF (5.5) FEET.
30. ALL WATER VALVES ASSOCIATED WITH THE POTABLE WATER SYSTEM SHALL BE OPEN CLOCKWISE. ALL VALVES INSTALLED IN LANDSCAPED AREAS AND/OR NOT WITHIN PAVED STREETS SHALL BE MARKED WITH CARSONITE MARKERS. ALL VALVES ASSOCIATED WITH THE RAW WATER SYSTEM SHALL BE OPEN COUNTERCLOCKWISE AND MARKED WITH CARSONITE MARKERS AS APPLICABLE.
31. THE DEVELOPER OR HIS ENGINEER SHALL LOCATE ALL FIRE HYDRANTS AND SERVICE STUB OUTS FOR FUTURE DEVELOPMENT. ANY REQUIRED REALIGNMENT, (HORIZONTAL OR VERTICAL), SHALL BE AT THE EXPENSE OF THE DEVELOPER. FIRE HYDRANT LOCATION SHALL BE REVIEWED AND APPROVED BY THE APPLICABLE FIRE AUTHORITY.
32. FIRE HYDRANTS SHALL BE OPEN RIGHT WITH 7/8 X 7/8 SQUARE TAPERED ALONG WITH SERVICE CAPS. LUBRICATION TYPE: (GREASE). ACCEPTABLE BRANDS ARE AMERICAN AVK SERIES 2700 (MODERN) AND MUELLER SUPER CENTURION 250.
33. ALL MAIN LINES (PVC & DUCTILE IRON) SHALL BE INSTALLED WITH COATED #12 TRACER WIRE WITH TEST STATIONS AT INTERVALS NO GREATER THAN 500 FT (VALVE BOXES CAN BE USED AT INTERSECTIONS AND SERVICE STUBS).
34. CONTRACTOR SHALL MAKE CONNECTIONS TO EXISTING WATER LINE WITHOUT SHUTDOWN, OR ELSE NOTIFY THE DISTRICT OF ANY SERVICE SHUTDOWNS NECESSARY TO CONNECT TO EXISTING LINES.
35. IRRIGATION SERVICES SHALL HAVE A STOP AND WASTE CURB STOP VALVE INSTALLED ALONG WITH TRACER WIRE EXTENDING BACK TO THE MAIN LINE.
36. COMMENCEMENT OF USE OF WATER LINES AND/OR SYSTEMS:
   - A) NO WATER FACILITY SHALL BE PLACED IN SERVICE UNTIL AFTER THE COMPLETION OF ALL PRESSURE TESTING, FLUSHING, BAC-T TESTING, COMPACTION TESTING, AND AS-BUILT DRAWINGS ARE SUBMITTED AND APPROVED BY THE DISTRICT.
   - B) NO WATER FACILITY SHALL BE PLACED IN SERVICE UNTIL ALL SERVICE LINES ARE COMPLETED AND THE FIRST LIFT OF ASPHALT IS COMPLETED OVER THE LINE. IN THE CASE WHERE NO ASPHALT IS TO BE PLACED OVER THE LINE, SURFACE IMPROVEMENTS SHALL BE COMPLETED PRIOR TO USE OF THE FACILITY.
   - C) ALL EASEMENTS (PLATTED OR DEEDED) ARE DEDICATED, EXECUTED BY THE DISTRICT, AND RECORDED.

WASTEWATER SYSTEM INSTALLATION NOTES

37. SANITARY SEWER LENGTHS ARE MH CENTER-MH CENTER. ALL SANITARY SEWER PIPES SHALL BE SDR 35 PVC OR EQUAL. SEWER LINES MAY NOT EXCEED 7% GRADE FOR ANY SIZE WITHOUT PRIOR APPROVAL OF THE DISTRICT. ALL NEWLY CONSTRUCTED RESIDENTIAL SANITARY SEWER TAPS SHALL USE PRE-MANUFACTURED IN-LINE PVC PUSH-ON WYES. TAPPING SADDLES MAY ONLY BE USED FOR TAPPING PRE-EXISTING MAINS.
38. ALL SANITARY SEWER MANHOLES SHALL BE WRAPPED WITH RU116 - RUBR-NEK JOINT WRAP OR EQUIVALENT AND COATED.
39. COMMENCEMENT OF USE OF SEWER LINES AND/OR SYSTEMS:
   - A) NO SANITARY SEWER FACILITY SHALL BE PLACED IN SERVICE UNTIL THE COMPLETION OF ALL JET CLEANING, PRESSURE TESTING, VACUUM TESTING, CCTV INSPECTION, COMPACTION TESTING, AND AS-BUILT DRAWINGS ARE SUBMITTED AND APPROVED BY THE DISTRICT.
   - B) NO SANITARY SEWER FACILITY SHALL BE PLACED IN SERVICE UNTIL ALL SERVICE LINES ARE COMPLETED AND THE FIRST LIFT OF ASPHALT IS COMPLETED OVER THE LINE. IN THE CASE WHERE NO ASPHALT IS TO BE PLACED OVER THE LINE, ANY REQUIRED SURFACE IMPROVEMENTS SHALL BE COMPLETED PRIOR TO USE OF THE FACILITY.
   - C) ALL NECESSARY EASEMENTS (PLATTED OR DEEDED) ARE DEDICATED, EXECUTED BY THE DISTRICT, AND RECORDED.
   - D) DOWNSTREAM PLUG CAN BE REMOVED ONCE FIRST LIFT OF ASPHALT IS DOWN AND THE ABOVE REQUIREMENTS ARE MET.

THE ABOVE GUIDELINES ARE SUBJECT TO CHANGE AT ANY TIME.



SITE MAP
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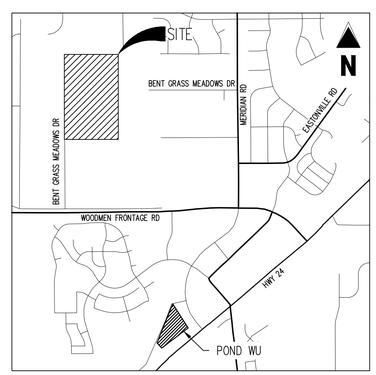
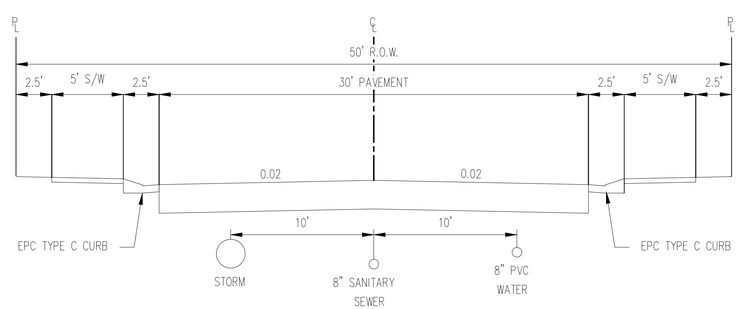


VICINITY MAP
1"=2,000'



TYPICAL STREET SECTION - URBAN LOCAL ROADWAY
N.T.S.

WATER AND SEWER MAIN EXTENSIONS:

ANY CHANGES OR ALTERATIONS AFFECTING THE GRADE, ALIGNMENT, ELEVATION AND/OR DEPTH OF COVER OF ANY WATER OR SEWER MAINS OR OTHER APPURTENANCE SHOWN ON THIS DRAWING SHALL BE THE RESPONSIBILITY OF THE OWNER/DEVELOPER. THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR ALL OPERATIONAL DAMAGES AND DEFECTS IN INSTALLATION AND MATERIAL FOR MAINS AND SERVICES FROM THE DATE OF APPROVAL UNTIL FINAL ACCEPTANCE IS ISSUED.

SIGNED _____ DATE _____
OWNER/DEVELOPER

PRINT NAME _____

DBA _____

ADDRESS _____

FIRE AUTHORITY APPROVAL:

THE NUMBER OF FIRE HYDRANTS AND HYDRANT LOCATIONS SHOWN ON THIS WATER INSTALLATION PLAN ARE CORRECT AND ADEQUATE TO SATISFY THE FIRE PROTECTION REQUIREMENTS AS SPECIFIED BY THE FIRE DISTRICT SERVING THE PROPERTY NOTED ON THE PLANS.

FIRE PROTECTION DISTRICT _____

SIGNED _____ DATE _____
FIRE PROTECTION DISTRICT

DISTRICT APPROVALS:

THE WOODMEN HILLS METROPOLITAN DISTRICT RECOGNIZES THE DESIGN ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN AND HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

WOODMEN HILLS METROPOLITAN DISTRICT
WATER DESIGN APPROVAL

DATE: _____ BY: _____

PROJECT NO. _____

IN CASE OF ERRORS OR OMISSIONS WITH THE WATER DESIGN AS SHOWN ON THIS DOCUMENT THE STANDARDS AS DEFINED IN THE 'RULES AND REGULATIONS FOR INSTALLATION OF WATER MAINS AND SERVICES' SHALL RULE.

APPROVAL EXPIRES 180 DAYS FROM DESIGN APPROVAL.

THE WOODMEN HILLS METROPOLITAN DISTRICT RECOGNIZES THE DESIGN ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN AND HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY.

WOODMEN HILLS METROPOLITAN DISTRICT
WASTEWATER DESIGN APPROVAL

DATE: _____ BY: _____

PROJECT NO. _____

IN CASE OF ERRORS OR OMISSIONS WITH THE WATER DESIGN AS SHOWN ON THIS DOCUMENT THE STANDARDS AS DEFINED IN THE 'RULES AND REGULATIONS FOR INSTALLATION OF WASTEWATER MAINS AND SERVICES' SHALL RULE.

APPROVAL EXPIRES 180 DAYS FROM DESIGN APPROVAL.

ENGINEERS STATEMENT:

THESE DETAILED PLANS AND SPECIFICATIONS WERE PREPARED UNDER MY DIRECTION AND SUPERVISION. SAID DETAILS AND SPECIFICATIONS HAVE BEEN PREPARED ACCORDING TO THE CRITERIA ESTABLISHED BY THE STATE OF COLORADO.

_____ _____
RONALD G. DENNIS, COLORADO P.E. NO. 0051622 DATE

Provide County CD signature block.

County CD Signature block added

SHEET INDEX

SHEET NUMBER	SHEET TITLE	SHEET DESCRIPTION
1	COVER SHEET	C0.0
2	PRELIMINARY WATER PLAN	C1.1
3	PRELIMINARY WATER PLAN	C1.2
4	PRELIMINARY SANITARY SEWER PLAN	C2.1
5	PRELIMINARY SANITARY SEWER PLAN	C2.2
6	PRELIMINARY SANITARY SEWER PLAN	C2.3
7	PRELIMINARY SANITARY SEWER PLAN	C2.4
8	PRELIMINARY SANITARY SEWER PLAN	C2.5

Are these preliminary or for construction?

Horizontal control sheet added to plan set not shown? A horizontal control plan is recommended.

Was preliminary design set. Plans have been updated to final design for Falcon Meadows at Bent Grass Filing No. 1

BASIS OF BEARINGS

ALL BEARINGS ARE GRID BEARINGS OF THE COLORADO STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM 1983. THE BEARING OF THE LINE BETWEEN THE SOUTHWEST CORNER OF SECTION 1, T13S, R65W AND THE WEST QUARTER CORNER SECTION 1, T13S, R65W IS N00°13'46"W AND MONUMENTED AS SHOWN.

BENCHMARK

THE SOUTHWESTERLY CORNER OF LOT 1 WOODMEN HILLS FILING NO. 4. MONUMENTED BY A YELLOW PLASTIC SURVEYORS CAP ON A NO. 4 REBAR LS# 24954 ELEVATION = 6947.67

CAUTION - NOTICE TO CONTRACTOR

1. ALL UTILITY LOCATIONS SHOWN ARE BASED ON MAPS PROVIDED BY THE APPROPRIATE UTILITY COMPANY AND FIELD SURFACE EVIDENCE AT THE TIME OF SURVEY AND IS TO BE CONSIDERED AN APPROXIMATE LOCATION ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE FIELD LOCATION OF ALL UTILITIES, PUBLIC OR PRIVATE, WHETHER SHOWN ON THE PLANS OR NOT, PRIOR TO CONSTRUCTION. REPORT ANY DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
2. WHERE A PROPOSED UTILITY CROSSES AN EXISTING UTILITY, IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF SUCH EXISTING UTILITY, EITHER THROUGH POTHOLING OR ALTERNATIVE METHOD. REPORT INFORMATION TO THE ENGINEER PRIOR TO CONSTRUCTION.

811 Know what's below. Call before you dig.

Galloway
1155 Kelly Johnson Blvd., Suite 305
Colorado Springs, CO 80920
719.900.7220
GallowayUS.com

PRELIMINARY
NOT FOR BIDDING
NOT FOR CONSTRUCTION

CHALLENGER HOMES

WATER AND SANITARY SEWER PLANS
BENT GRASS RESIDENTIAL FILING NO. 3
FOR
CHALLENGER COMMUNITIES, LLC

BENT GRASS MEADOWS DRIVE & MERIDIAN ROAD
FALCON, CO 80831 - EL PASO COUNTY

#	Date	Issue / Description	Init.

Project No:	CLH000018
Drawn By:	CMWJ
Checked By:	RGD
Date:	08/05/2020

COVER SHEET

C0.0