M V E , Inc.

March 22, 2023

EPC Stormwater
Department of Public Works
3275 Akers Dr
Colorado Springs, CO 80922
Attn: Glenn Reese, P.E.

Re: ***Ellicott School Addition 2 bldgs***
Project No. 61183
PCD File No. PPR2250

Dear Mr. Reese,

I hope this letter finds you well. The latest versions of the Final Drainage Report, Alternative Landscape Plan, and Grading and Erosion Control Plan has been uploaded to EDARP updated to address the last set of redlines. This response letter elaborates on the major updates to the report and plans. Attached to this letter are some of the EPC Stormwater redlines along with comments detailing how the redlines have been addressed in this submittal.

1. The owner is obtaining a Modified Peculation Test which will be performed to the City requirements as shown on the policy included in the previous set of EPC Stormwater redlines. Test results will be provided to EPC Stormwater as soon as they are available.
2. Based on our phone call conversation, quantifying runoff reduction is not required if the WQCV Base Design standard is being used. Although runoff reduction practices are being employed as part of the four step process, only the WQCV Base Design standard is being used for water quality treatment for this site, utilizing the two proposed rain gardens. All statements mentioning the Runoff Reduction Base Design Standard have been removed from the updated report. Although no areas are now being assumed as SPA, all pervious disturbed areas will receive native seeding as shown on the Alternative Landscape Plan.
3. A statement about the SDI Forms and Spillway sizing calculations has been added to the Hydrologic Criteria section of the updated report, and SDI Forms as well as Spillway weir calculations for both rain gardens have been added to the Appendix.
4. An El Paso County GIS generated map showing the overall property and indicating the outfall and downstream conveyance location has been added to the updated report appendix.

Very truly yours,
M.V.E., Inc.

Omar Ali

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Engineers • Surveyors
1903 Lelaray Street, Suite 200 • Colorado Springs, CO 80909 • Phone 719-635-5736
Fax 719-635-5450 • e-mail mve@mvecivil.com

Final Drainage Report Comments Response

M.V.E., Inc. ● Engineers ● Surveyors
1903 Lelaray Street, Suite 200 ● Colorado Springs, CO 80909 ● Phone 719-635-5736
Fax 719-635-5450 ● e-mail mve@mvecivil.com

Previous comment:
For sites where full infiltration for WQ is proposed, an on-site infiltration test using double-ring infiltrometer is required. Infiltration tests should be performed or supervised by a licensed professional engineer and conducted at a minimum depth equal to the bottom of the sand filter. Underdrains are required for sand filters and should be provided if infiltration tests show rates slower than 2 times that required to drain the WQCV over 12 hours. Refer to the City's guidance policy (link provided)

A Modified Peculation Test will be performed to the City requirements as shown on the attached policy. Owner is obtaining the tests which will be provided as soon as available.

3.2 Hydrologic Criteria

For this Final Drainage Report, the Rational Method as described in the *City of C Drainage Criteria Manual (DCM)* has been used for all Storm Runoff calcu development and all sub-basins are less than 130 acres in area. "Colorado Springs Duration Frequency" curves, Figure 6-5 in the DCM, was used to obtain the design copy is included in the **Appendix**. The "Overland (Initial) Flow Equation" (Eq. 6-8) Manning's equation with estimated depths were used in time of concentration calculations. "Runoff Coefficients for Rational Method", Table 6-6 in the DCM, was utilized as a guide in estimating runoff coefficient and Percent Impervious values; a copy is included in the **Appendix**. Peak runoff discharges were calculated for each drainage sub-basin for both the 5-year storm event and the 100-year storm event with the Rational Method formula, (Eq. 6-5) in the DCM.[11]

Porous Landscape Detention Areas (PLDs), more commonly known as **Rain Gardens** "utilizes bioretention is an engineered, depressed landscape area designed to capture and filter or infiltrate the water quality capture volume (WQCV)". Two rain gardens are proposed for this project site intended to provide water quality enhancement to their respective phase of development. The areas of the site designated as rain gardens are called out on the **Phase-I Drainage Map (Proposed)** and the **Phase-II Drainage Map (Proposed)** included in the **Appendix**. The soil where both rain gardens are proposed to be located is Columbine Gravelly Sandy Loam, classified as part of Hydrologic Soil Group "A". It is typically deep, well drained to excessively drained and has very rapid permeability. The very rapid permeability of this soil will allow the full infiltration of the WQCV with a drain time of 12 hours.

Where are calcs to back this up? See related comment at the top of this page.

The runoff reduction calculation was made with the aid of the "*UD-BMP_v3.07*" spreadsheet developed by Mile High Flood District, and a copy is included in the **Appendix** along with the **BMP Area ID Map**.

3.3 Previous Drainage Studies

There is no effective and official Drainage Basin Planning Study for the Ellicott Consolidated major drainage basin. No previous drainage report addresses flows relevant to the project site, and so none were used in the drainage design for this site. All properties adjacent to the site are unplatted and no drainage reports for these properties are expected to exist.

4 Drainage Facility Design

4.1 General Concept

The intent of the drainage concept presented in this Final Drainage Report is to maintain the existing drainage patterns on the site while addressing water quality requirements for the new Phase I and Phase II additions. Major and minor storm flows will continue to be safely conveyed through the site and downstream.

The existing and proposed drainage hydrologic conditions are described in more detail below. Input data and results for all calculations are included in the **Appendix**. Drainage maps for the hydrology are also included in the **Appendix**.

4.2 Specific Details

4.2.1 Existing Hydrologic Conditions

The **Phase-I Drainage Map (Existing)** and **Phase-II Drainage Map (Existing)** depict the existing topographic mapping, drainage basin delineations, drainage patterns, existing drives, drainage facilities, and runoff quantities with a data table including drainage areas and flow rates and a channel calculation for the site outfall at the Handle Road roadside Ditch in the existing conditions is included in the **Appendix**.

11 CS DCM Vol 1

and Q100 = 6.2 cfs (existing flows). Flows from this basin sheet flow southerly and combine with flows from DP12 in the Handle Road roadside ditch at Design Point 13 (DP13).

Design Point 13 is the site outfall. Flows exit the site in the Handle Road roadside ditch at the southeast corner of the site. A channel calculation, **Handle Road Ditch (Existing Conditions)**, is included in the **Appendix**. The flow path delivers the flows east to Black Squirrel Creek located 6,000 feet east of the east property line of the site.

Existing sub-basin EX-S11 (0.45 acres) is located on the east property line, northeast of EX-S10 and contains an undeveloped pasture/meadow area. Sub-basin EX-S11 produces peak discharges of Q5 = 0.2 cfs and Q100 = 1.4 cfs (existing flows). Flows from this basin drain southerly and easterly and sheet flow out of the site.

Existing sub-basin EX-S12 (1.68 acres) is located on the northeast corner of the site and contains an undeveloped pasture/meadow area and portions of a baseball field. Sub-basin EX-S12 produces peak discharges of Q5 = 0.5 cfs and Q100 = 3.8 cfs (existing flows). Flows from this basin drain southerly and easterly and sheet flow out of the site.

4.2.2 Proposed Hydrologic Conditions

The **Phase-I Drainage Map (Proposed)** and **Phase-II Drainage Map (Proposed)** depict the proposed topographic mapping, drainage basin delineations, drainage patterns, proposed drives, drainage facilities, and runoff quantities with a data table including drainage areas and flow rates and a channel calculation for the site outfall at the Handle Road roadside Ditch in the proposed conditions is included in the **Appendix**.

Water quality treatment for the new disturbed and impervious areas on the site will be provided by two (2) rain gardens, each one located downstream of each new building addition. The development of the site increases the rate of flows leaving the site by 2 cfs (a 3% increase from the existing conditions). No detention for flood control is being provided because the downstream effects of the 3% increases in peak flow rates are negligible. The 2 cfs increase in flows have no effect on peak flows in Black Squirrel Creek and do not present a hazard to the downstream properties, drainage basin, or drainageways and no storm detention is required. Calculations are included in the **Appendix** for all proposed swales and the existing roadside ditch on handle road. All proposed swales are discussed in more detail in **4.4.1. Proposed Swales** and on the **Phase I - PBMP Tributary Map** and **Phase II - PBMP Tributary Map** included in the **Appendix.**

The runoff reduction assumptions are all shown on the MHFD "*UD-BMP_v3.07*" spreadsheet included in the **Appendix**. As shown on the **BMP Area ID Map**, all newly developed and disturbed land is labeled with the respective Area ID and surface type. Areas considered Unconnected Impervious Area (UIA) will drain onto areas of Receiving Pervious Area (RPA) before draining, see UIA:RPA interface detail on the **BMP Area ID Map**. Portions of disturbed area assumed as fully pervious are considered Separate Pervious Area (SPA) and will require no permanent water quality treatment measure. Disturbed impervious area or newly developed impervious area where runoff does not flow onto an RPA before draining is cons ous Area (DCIA). Disturbance as part of Post-Construction n criteria "*Aboveground and Underground Utilities activity - MS* delineated and will require no permanent water quality treatmer **Untreated Applicable Development"**, as discussed in more d ancement **Control Measures**, are portions of the site where, div ens would not be practicable given the physical conditions of t hat those portions of the site be excluded from the applicable undergo permanent water quality treatment measures.

Proposed sub-basin A (4.23 acres) is located on the n ntains an existing gravel parking, a portion of existing paved pri ng paved Ellicott Highway, existing concrete pavement, and m ntains an existing swale which initiates at the curb and gutter loc drive and extends easterly. This swale will be regraded to divert flows around the proposed Phase-I

This statement has been removed along with all statements mentioning the runoff reduction base design standard. Runoff Reduction Standard is no longer employed, however, all pervious disturbed areas will receive native seeding as shown on the Landscape Plan.
Only WQCV Base Design standard is being used for WQ treatment utilizing the two proposed rain gardens.

I agree with this statement but then all of the SPA's should be shown as receiving native seeding on the Landscape Plan, which they currently do not. Please update landscape plan accordingly.

development. As shown on the **BMP Area ID Map,** the majority of these portions of resulting disturbed area are Separate Pervious Area (SPA) and will require no permanent water quality treatment measure (Area ID 1F). Sub-basin A produces peak developed discharges of Q5 = 4.0 cfs and Q100 = 12.2 cfs (proposed flows). Flows from the western portion of sub-basin A drain easterly in a combination of sheet flow and an area of concentrated flow in the central portion of the basin towards the proposed swale. Flows exit the basin at Design Point 1 (DP1), as shown on the **Drainage Maps (Proposed)**, in the form of concentrated flow to enter sub-basin C where the swale continues. A channel calculation for that swale, **Swale C (DP1) (Proposed)**, is included in the **Appendix**.

Proposed sub-basin B1 (0.44 acres), located in the north central portion of the site and bordering sub-basin EX-A to the south, currently contains a portion of the existing paved private asphalt drive and concrete pavement, an existing gravel parking area, meadow/pasture area, and a portion of an existing steel building. This sub-basin will be further developed to include portions of the southwestern Phase-I concrete pavement and southern portion of the proposed gravel access road. The developed discharges from sub-basin B1 are Q5 = 0.9 cfs and Q100 = 1.9 cfs (proposed flows). These flows travel overland easterly towards the southeastern corner of the basin and continue draining south towards Design Point 3 (DP3), as shown on the **Drainage Maps (Proposed)**. As shown on the **BMP Area ID Map**, the majority of the Phase-I concrete pavement in this basin is considered Unconnected Impervious Area (UIA) and will drain onto approximately 1800 SF of Receiving Pervious Area (RPA) before draining south (Area ID 1C). The remainder of disturbed impervious area in this sub-basin is considered Directly Connected Impervious Area (DCIA)(Area ID 1D).

Proposed sub-basin B2 (0.62 acres) will contain the proposed Phase-I building addition, a proposed gravel access road, proposed concrete sidewalks, and two proposed swales to convey flows to the proposed Phase-I rain garden. The developed discharges from sub-basin B2 are Q5 = 1.5 cfs and Q100 = 3.3 cfs (proposed flows). The proposed Phase-I building addition will have downspouts on the north and south, as highlighted on the **Phase-I Drainage Map (Proposed)**. Two proposed swales will convey flows from this basin to the proposed Phase-I rain garden. Flows from the northern portion of the sub-basin drain to the proposed grassed swale located north and east of the new building and flow to the Phase-I rain garden at DP2, as shown on the **Drainage Maps (Proposed)**. A channel calculation for that swale, **Swale A (DP2) (Proposed)**, is included in the **Appendix**. Flows from the southern portion of the sub-basin will be conveyed by a proposed swale south of the new building to a 12” HDPE culvert connecting it to the proposed Phase-I rain garden to the east at Design Point 2 (DP2). A channel calculation for that swale, **Swale B (Culvert) (Proposed)**, is included in the **Appendix**. WQCV will be infiltrated through the soil and flows exceeding the WQCV will leave the Phase-I rain garden through the rip-rap lined spillway to continue south towards Design Point 3 (DP3). An existing swale located approximately 100 ft south of the proposed Phase-I rain garden spillway captures the combined flows from DP3 and conveys them south towards Design Point 5 (DP5). The flows in the existing swale are concentrated, as depicted by the “Existing Concentrated Flow” delineation on the **Phase-I PBMP Tributary Map**, and a channel calculation for that swale, **Existing Swale DP5 (Proposed Conditions)**, is included in the **Appendix**. The Phase I rain garden spillway acts to spread the flow and does not act to further concentrate the downstream flows any more than the existing conditions. The Phase I rain garden spillway is sufficiently wide to act as a level spreader as shown on the spillway detail for the Phase I rain garden spillway on the **Phase-I PBMP Tributary Map**. As shown on the **BMP Area ID Map**, flows from the portion of pervious area in this basin draining to the north are assumed to be flows on UIA draining onto the north and east grassed swale (RPA) before reaching the Phase-I rain garden (Area ID 1A); and flows from the portion of pervious area in this basin draining to the south are assumed to be flows on UIA draining onto the grassed swale to the south (RPA) before reaching the Phase-I rain garden through the HDPE culvert (Area ID 1B).

Proposed sub-basin C (1.33 acres) currently contains an existing paved batting cage and portions of an existing baseball field, and will only be further developed by adding portions of a proposed swale and a proposed level spreader at the end of the swale. The developed discharges from sub-basin C are Q5 = 0.4 cfs and Q100 = 3.1 cfs (proposed flows). Flows from this basin drain easterly towards

support these statements with calcs.

with a drain time of 12 hours. WQCV will be infiltrated through the soil and flows exceeding the WQCV will leave the rain garden through the rip-rap lined spillway. The rain garden spillways are sufficiently wide to act as a level spreader as shown on the spillways detail for the Phase-I rain garden spillway and the Phase-II rain garden spillway on the **Phase-I PBMP Tributary Map** and **Phase-II PBMP Tributary Map respectively**.

Although the Water Quality Capture Volume (WQCV) Standard intends to provide treatment and/or infiltration of the WQCV and 100% of the applicable development site is captured, the ECM allows the County to exclude "*up to 20 percent, not to exceed* *development site area when the County has determined that it is not practi* *om portions of the site that will not drain towards control measures. In additio* *determine that the implementation of a separate control measure for that por* *cticable.*"

Weir Calculations for Spillways have been added

As shown on the **BMP Area ID Map**, areas delineated as **Development"** are 0.09 ± acres and 0.08 ± acres in size for the Phase-I addi dition respectively. Diverting runoff from those areas towards the rain gardens would not be practicable given the physical conditions of the site and it is being requested that those portions of the site be excluded from the applicable development area on this site to undergo permanent water quality treatment measures.

A Grading and Erosion Control Plan for the construction of the site has been prepared in accordance with the provisions of the DCM.

The El Paso County Engineering Criteria Manual[12] (Appendix I, Section I.7.2) requires the consideration of a "Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainageways, and implementing long term source controls". The Four Step Process is incorporated in this project and the elements are discussed below.

1) Runoff Reduction Practices are employed in this project. Impervious surfaces have been reduced as much as practically possible. There is only minimal concrete or other hard surfaces proposed. The proposed drive area will be stabilized with gravel, which remains a partially pervious surface. Minimized Directly Connected Impervious Areas (MDCIA) is employed on the project because runoff passes through open space meadow area before leaving the site.

2) All drainage paths on the site are stabilized with pavement or appropriate landscape treatment.

3) The project contains no potentially hazardous uses. All developed areas drain into a proposed WQCV BMP as allowed by applicable regrading.

4) The site contains no storage of potentially harmful substances or use of potentially harmful substances. No Site Specific or Other Source Control CMs are required.

5 Opinion of Probable Cost for Drainage Facilities

Costs for the drainage improvements for Ellicott School Addition - 2 Buildings are listed in the table below.

12 ECM, Appendix I

10 Hydraulic Calculations

MHFD Rain Garden Spreadsheet, “UD-BMP_v3.07”
Culvert Channel Calculation
Swales Channel Calculations

Also complete MHFD-Detention spreadsheets for each RG to show that drain times are acceptable and that the spillway is sized sufficiently for storms exceeding the WQCV event.

I saw that you completely the SDI Form (attached to MS4 Form and as separate docs in EDARP). But the form was not referenced in the report text above. Also, that form shows the drain times as being acceptable but doesn't provide spillway sizing calcs. Thus the MHFD-Detention spreadsheets are also needed. Unless you want to attach the SDI form to this report and do spillway calcs separately (on your own spreadsheet). Whichever way you want to do it is fine.

A statement has been added to the FDR. SDI Forms and Spillway weir calculations have been added to the Appendix

Design Procedure Form: Rain Garden (RG)

UD-BMP (Version 3.07, March 2018) — Sheet 1 of 2

Designer: O. Ali
Company: M.V.E. Inc.
Date: January 17, 2023
Project: Ellicott School Addition 2 bldgs
Location: Phase I Addition SE Corner

1. Basin Storage Volume

A) Effective Imperviousness of Tributary Area, I_a (100% if all paved and roofed areas upstream of rain garden): I_a = 58.0 %

B) Tributary Area's Imperviousness Ratio ($i = I_a/100$): i = 0.580

C) Water Quality Capture Volume (WQCV) for a 12-hour Drain Time ($WQCV = 0.8 * (0.91 * i^3 - 1.19 * i^2 + 0.78 * i)$): WQCV = 0.18 watershed inches

D) Contributing Watershed Area (including rain garden area): Area = 27,171 sq ft

E) Water Quality Capture Volume (WQCV) Design Volume, Vol = (WQCV / 12) * Area: V_{WQCV} = cu ft

F) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm: d_6 = 0.42 in

G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume: $V_{WQCV\ OTHER}$ = 406 cu ft

H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired): $V_{WQCV\ USER}$ = cu ft

2. Basin Geometry

A) WQCV Depth (12-inch maximum): D_{WQCV} = 12 in

B) Rain Garden Side Slopes (Z = 4 min., horiz. dist per unit vertical) (Use "0" if rain garden has vertical walls): Z = 3.00 ft / ft Z < 4:1

C) Mimimum Flat Surface Area: A_{Min} = 315 sq ft

D) Actual Flat Surface Area: A_{Actual} = 315 sq ft

E) Area at Design Depth (Top Surface Area): A_{Top} = 1889 sq ft

F) Rain Garden Total Volume ($V_T = ((A_{Top} + A_{Actual}) / 2) * Depth$): V_T = 1,102 cu ft

3. Growing Media

Choose One
- (●) 18" Rain Garden Growing Media
- ( ) Other (Explain):

4. Underdrain System

A) Are underdrains provided?

Choose One
- ( ) YES
- (●) NO

B) Underdrain system orifice diameter for 12 hour drain time

i) Distance From Lowest Elevation of the Storage Volume to the Center of the Orifice: y = N/A ft

ii) Volume to Drain in 12 Hours: Vol_{12} = N/A cu ft

iii) Orifice Diameter, 3/8" Minimum: D_O = N/A in

Unresolved previous comment: If no underdrain is provided, it must be shown that pond can infiltrate the WQCV within 12hrs. Otherwise provide an underdrain with orfice that allows WQCV to drain within 12hrs.

A Modified Peculation Test will be performed to the City requirements as shown on the attached policy. Owner is obtaining the tests which will be provided as soon as available.

Design Procedure Form: Rain Garden (RG)

UD-BMP (Version 3.07, March 2018)

Designer: O. Ali
Company: M.V.E., Inc.
Date: January 16, 2023
Project: Ellicott School Addition 2 bldgs
Location: Phase II Addition SE Corner

1. Basin Storage Volume	
A) Effective Imperviousness of Tributary Area, I_a (100% if all paved and roofed areas upstream of rain garden)	I_a = 28.7 %
B) Tributary Area's Imperviousness Ratio (i = I_a/100)	i = 0.287
C) Water Quality Capture Volume (WQCV) for a 12-hour Drain Time (WQCV= 0.8 * (0.91* i^3 - 1.19 * i^2 + 0.78 * i)	WQCV = 0.12 watershed inches
D) Contributing Watershed Area (including rain garden area)	Area = 80,163 sq ft
E) Water Quality Capture Volume (WQCV) Design Volume Vol = (WQCV / 12) * Area	V_{WQCV} = cu ft
F) For Watersheds Outside of the Denver Region, Depth of Average Runoff Producing Storm	d_6 = 0.42 in
G) For Watersheds Outside of the Denver Region, Water Quality Capture Volume (WQCV) Design Volume	$V_{WQCV\ OTHER}$ = 769 cu ft
H) User Input of Water Quality Capture Volume (WQCV) Design Volume (Only if a different WQCV Design Volume is desired)	$V_{WQCV\ USER}$ = cu ft
2. Basin Geometry	
A) WQCV Depth (12-inch maximum)	D_{WQCV} = 12 in
B) Rain Garden Side Slopes (Z = 4 min., horiz. dist per unit vertical) (Use "0" if rain garden has vertical walls)	Z = 4.00 ft / ft
C) Mimimum Flat Surface Area	A_{Min} = 460 sq ft
D) Actual Flat Surface Area	A_{Actual} = 704 sq ft
E) Area at Design Depth (Top Surface Area)	A_{Top} = 1443 sq ft
F) Rain Garden Total Volume (V_T= ((A_{Top} + A_{Actual}) / 2) * Depth)	V_T= 1,074 cu ft
3. Growing Media	Choose One: (•) 18" Rain Garden Growing Media ( ) Other (Explain):
4. Underdrain System	
A) Are underdrains provided?	Choose One: ( ) YES (•) NO
B) Underdrain system orifice diameter for 12 hour drain time	
i) Distance From Lowest Elevation of the Storage Volume to the Center of the Orifice	y = N/A ft
ii) Volume to Drain in 12 Hours	Vol_{12} = N/A
iii) Orifice Diameter, 3/8" Minimum	D_O = N/A

A Modified Peculation Test will be performed to the City requirements as shown on the attached policy. Owner is obtaining the tests which will be provided as soon as available.

Unresolved previous comment: If no underdrain is provided, it must be shown that pond can infiltrate the WQCV within 12hrs. Otherwise provide an underdrain with orfice that allows WQCV to drain within 12hrs.

11 Report Maps

- BMP Area ID Map
- Drainage Maps (Existing)
  - Phase I Drainage Map (Existing)
  - Phase II Drainage Map (Existing)
- Drainage Maps (Proposed)
  - Phase I Drainage Map (Proposed)
  - Phase II Drainage Map (Proposed)
- PBMP Tributary Maps
  - Phase I - PBMP Tributary Map
  - Phase II - PBMP Tributary Map

Map showing the overall property and indicating the outfall and downstream conveyance location has been added to the report appendix.

Please provide an overall reference map showing the overall property and indicating the outfall and downstream conveyance location.

General comment about WQ for the whole site:
1) all areas within the LOD must be shown as having either WQ treatment or WQ exclusion. This has not been done on your maps yet. Show LOD on all WQ maps.
2) Between these BMP Area ID Maps (runoff reduction) and PBMP Tributary Maps (rain gardens), there is double treatment shown for many areas. Please make the overall WQ picture for this site more clear by removing all areas treated by the rain gardens from the RR maps (ie: make another color on this map for "treated by rain gardens") and update the RR calc spreadsheet and report text.
3) Please review MHFD Detail T-0. There appears to be a misunderstanding of what constitutes a DCIA.

Just for reference, the above comments are provided as further clarification to my previous comment (copied below in italics) that were not fully addressed with this submittal, so this isn't a new request. Plus so much of the design has changed since the last submittal (all runoff reduction calcs and maps are new), I am now able to clarify my previous comment further.

It is unclear which disturbed areas (and how much acreage) area not conveyed to the Rain Gardens. We need to know how much disturbed area is untreated and if there are any exclusions that apply to those areas.

So please create a basic overview map (or modify an existing drainage map) with color shading/hatching that shows areas tributary to each PBMP (pond, runoff reduction, etc) and those disturbed areas that are not treated by a PBMP, with the applicable exclusion labeled (ex: 20% up to 1ac of development can be excluded per ECM App I.7.1.C.1 and exclusions listed in ECM App I.7.1.B.#).

PROPOSED

84 INTERMEDIATE CONTOUR

5985 INDEX CONTOUR

ATE CONTOUR

BASIN BOUNDARY
ED CONDITIONS)

UNDISTU S OF
URBANCE

D

AREA

1A AREA I.D.

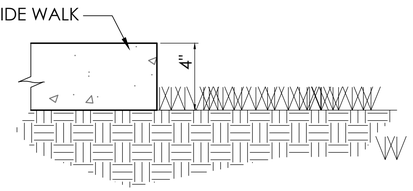
UIA:RPA

1 DOWNSTREAM DESIGN POINT

Runoff Reduction Standard is no longer employed, however, all previous disturbed areas will receive native seeding as shown on the Landscape Plan. Only WQCV Base Design standard is being used for WQ treatment utilizing the two proposed rain gardens.

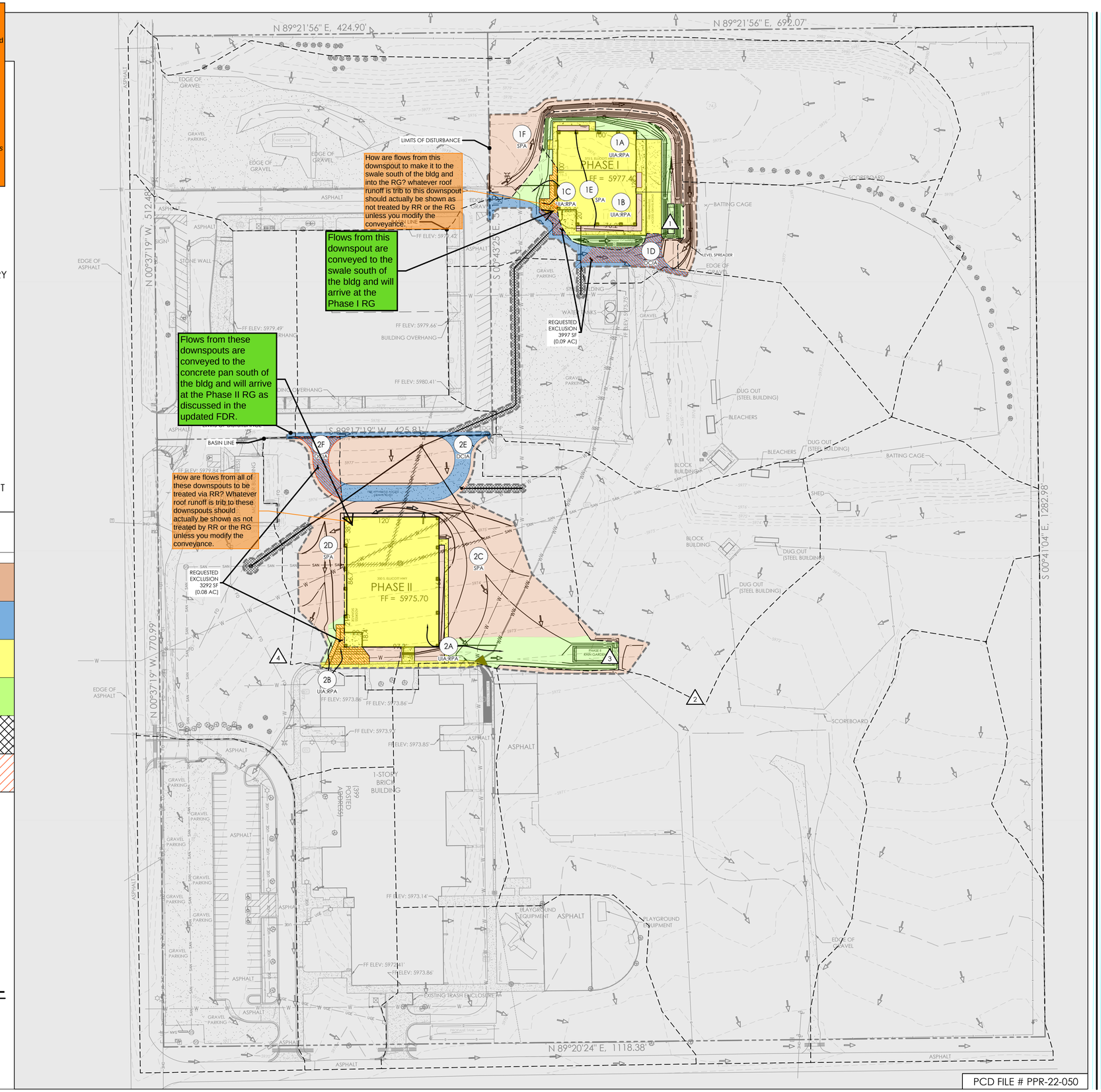
SURFACE TYPES

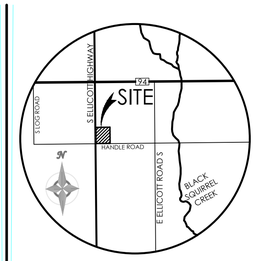
SEPARATE PERVIOUS AREA (SPA)	
DIRECTLY CONNECTED IMPERVIOUS AREA (DCIA)	
UNCONNECTED IMPERVIOUS AREA (UIA)	
RECEIVING PERVIOUS AREA (RPA)	
EXCLUDED PER MS4 PERMIT I.E.4.A.I (D) (UTILITIES ACTIVITY)	
UNTREATED APPLICABLE DEVELOPMENT (REQUESTED 20% EXCLUSION UP TO 1 AC)	



UIA:RPA INTERFACE DETAIL

NOT TO SCALE

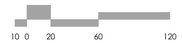




VICINITY MAP

NOT TO SCALE

BENCHMARK



1" = 60' 1:720

MVE, INC.
ENGINEERS, SURVEYORS
1903 lelaray street, suite 200 colorado springs co 80909 719.635.5736

REVISIONS

DESIGNED BY
DRAWN BY
CHECKED BY
AS-BUILTS BY
CHECKED BY

ELLICOTT SCHOOL
ADDITION 2 BLDGS

BMP AREA ID MAP

MVE PROJECT 61183
MVE DRAWING BMP-Area

JANUARY 20, 2023
SHEET 1 OF 1

PCD FILE # PPR-22-050

Discrepancy in your measurement and rain garden spreadsheet values are due to unadjusted map scale of 1=10. Adjusted in the updated FDR and no discrepancy should exist.

Pg 91 shows trib area is 27,171sq ft. Where are you getting that? I only get ~7,000 sq ft from this map. Although, oversizing the pond is acceptable.

How is flow from this downspout conveyed to the rain garden? Surface flow from there will not convey flows to the swale south of the bldg and into the RG.

Flows from this downspout are conveyed to the swale south of the bldg and will arrive at the Phase I RG

Tributary area Column Added to PBMP Tributary Maps abd Exclusions Map

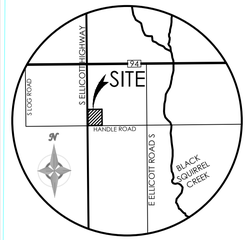
Add a column for area trib to each.

SURFACE TYPES

FLOWS CONVEYED TO RAIN GARDEN	
FLOWS DIVERTED DOWNSTREAM BY SWALE C	
EXISTING CONCENTRATED FLOW	

DESCRIPTION OF SWALES

SWALES A AND B CONVEY FLOWS FROM THE PROPOSED BUILDING, SIDEWALK, AND GRAVEL ACCESS ROAD TO THE PROPOSED RAIN GARDEN. SWALE C DIVERT FLOWS AWAY FROM THE PROPOSED RAIN GARDEN AND DOWNSTREAM TOWARDS A LEVEL SPREADER.



VICINITY MAP
NOT TO SCALE

BENCHMARK

THE EXISTING TOPOGRAPHY SHOWN ON THIS PLAN WAS PREPARED BY AND PROVIDED BY CLARK LAND SURVEYING INC.
ELEVATIONS SHOWN ARE RELATIVE TO THE NAVD 88 VERTICAL DATUM.

1 0 5 10 20
1" = 10' 1:120

MVE, INC.
ENGINEERS, SURVEYORS
1903 lelaray street, suite 200 colorado springs co 80909 719.635.5736

REVISIONS

DESIGNED BY
DRAWN BY
CHECKED BY
AS-BUILTS BY
CHECKED BY

ELLICOTT SCHOOL
ADDITION 2 BLDGS

PHASE I - PBMP
TRIBUTARY
MAP

MVE PROJECT 61183
MVE DRAWING PBMP-TRIB-I

JANUARY 3, 2023
SHEET 1 OF 2

SPILLWAY DETAIL
SCALE: NTS

EXISTING CURB AND GUTTER

EXISTING CURB AND GUTTER

ASPHALT

S 89°17'19" W 425.81'

EXISTING CURB AND GUTTER

EDGE OF GRAVEL

EXISTING CONCRETE PAN

1-STORY MODULAR BUILDING

(395 POSTED ADDRESS)

SIGN

FF ELEV: 5979.09'

FF ELEV: 5979.84'

FF ELEV: 5979.82'

36.4

60.1'

24.0'

61.2'

17.3'

Swale E

Swale D

Flows from these downspouts are conveyed to the concrete pan south of the bldg and will arrive at the Phase II RG as discussed in the updated FDR.

Why is the whole building shown as trib to the rain garden when these downspouts appear to be conveyed to the west? I don't see any piping that conveys them to the east.

Pg 93 shows trib area is 80,163sq ft. Where are you getting that? I get ~180,000 sq ft from this map.

Discrepancy in your measurement and rain garden spreadsheet values are due to unadjusted map scale of 1=30. Adjusted in the updated FDR and no discrepancy should exist.

60,024 sf

180,633 sf

350 S. ELLICOTT HWY

PHASE II

FF = 5975.70

ROOF DRAIN DOWNSPOUTS DRAINING EAST

ROOF DRAIN DOWNSPOUTS DRAINING EAST

PHASE II RAIN GARDEN

GRASS

ASPHALT

EXISTING FIRE LANE

FF ELEV: 5973.86'

FF ELEV: 5973.86'

FF ELEV: 5973.93'

FF ELEV: 5973.85'

Add a column for area trib to each.

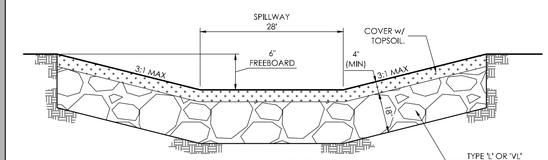
Tributary area Column Added to PBMP Tributary Maps abd Exclusions Map

SURFACE TYPES

FLOWS TRIBUTARY TO RAIN GARDEN BY SWALE D	
FLOWS CONVEYED DOWNSTREAM BY SWALE E	
EXISTING CONCENTRATED FLOW	

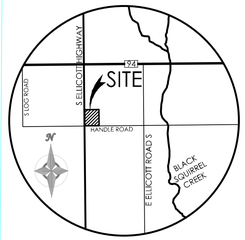
DESCRIPTION OF SWALES

SWALE D CONVEYS FLOWS FROM THE PROPOSED BUILDING, SIDEWALK, AND GRAVEL ACCESS ROAD TO THE PROPOSED RAIN GARDEN. SWALE E CONVEYS FLOWS DOWNSTREAM TOWARDS THE EXISTING PARKING LOT.



SPILLWAY DETAIL

SCALE: NTS



VICINITY MAP

NOT TO SCALE

BENCHMARK

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N

30'-0"

5 0 10 30 60

1" = 30' 1:360

MVE, INC. ENGINEERS, SURVEYORS

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REVISIONS

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DRAWN BY
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CHECKED BY

ELLICOTT SCHOOL
ADDITION 2 BLDGS

PHASE II - PBMP TRIBUTARY MAP

MVE PROJECT 61183
MVE DRAWING PBMP-TRIB-II

JANUARY 3, 2023
SHEET 2 OF 2

Grading and Erosion Control Plan Comment Response

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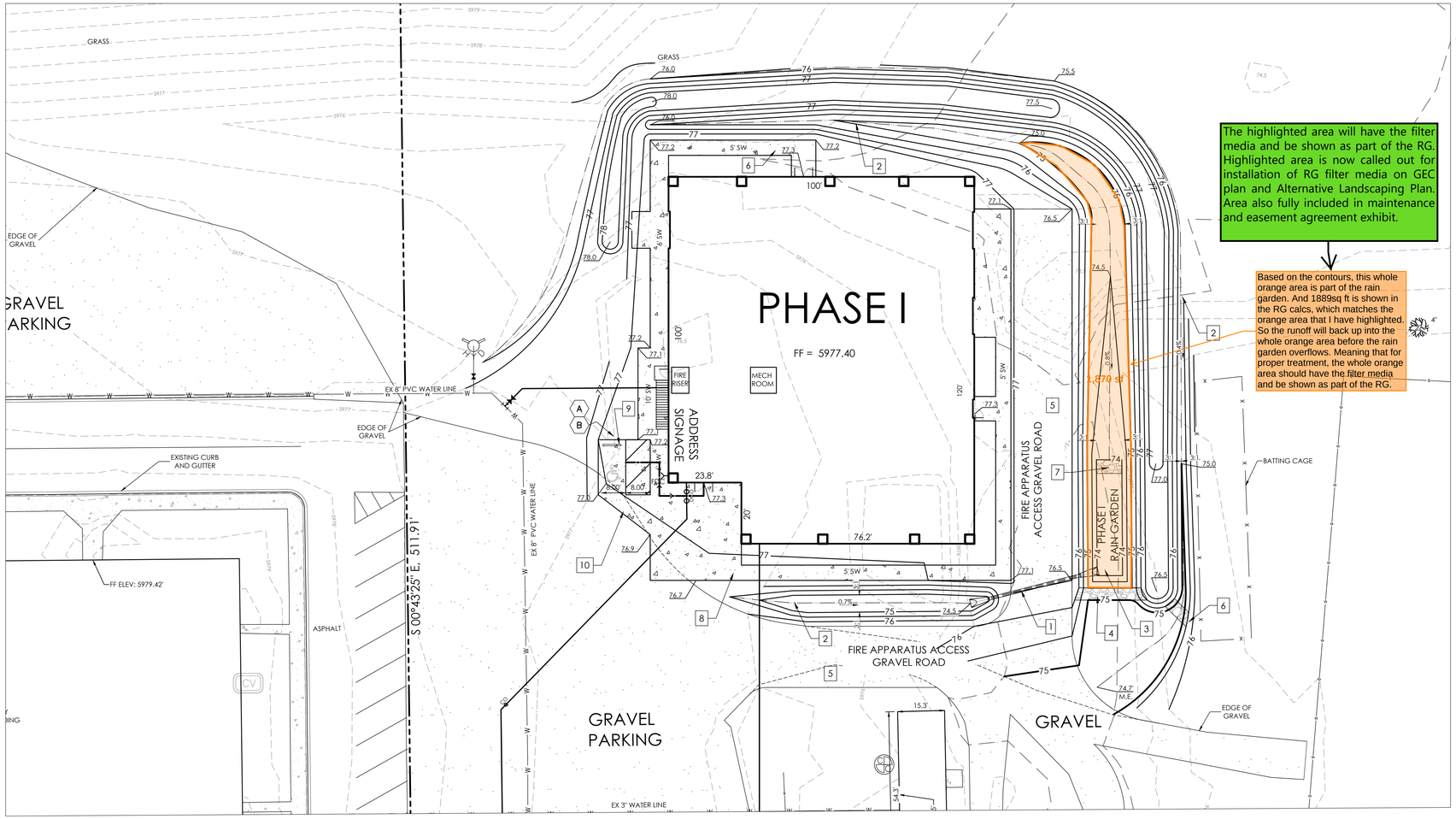


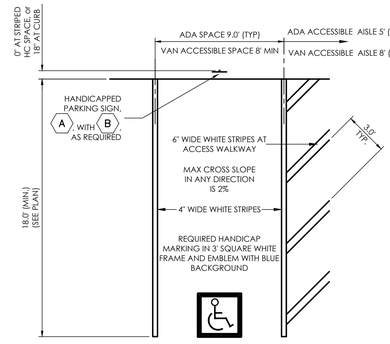
MAP NOTES

1. THE EXISTING TOPOGRAPHY SHOWN ON THIS PLAN WAS PREPARED AND PROVIDED BY CLARK LAND SURVEYING INC.
2. ALL EXISTING UNDERGROUND UTILITIES SHOWN ON THIS MAP ARE FROM UTILITY MAIN RECORD MAPS AND UTILITY SERVICE LOCATION MAPS. THE LOCATION OF UTILITIES AS SHOWN ARE APPROXIMATE. ALL UTILITIES MAY NOT BE SHOWN OR MAY NOT HAVE BEEN LOCATED. BELOW GROUND UTILITY LOCATIONS WERE NOT PERFORMED.

1. TYPOGRAPHY TO BE HELVETICA MEDIUM
2. ALL PRIMARY SIGNS TO BE MOUNTED ON METAL SIGN POST: 7'-0" ABOVE FINISH GRADE TO BOTTOM OF SIGN-TYP. ADDITIONAL PLACARD SIGNS SHALL BE MOUNTED AT LEAST 6'-0" ABOVE FINISH GRADE TO BOTTOM OF SIGN-TYP.
3. MOUNT HANDICAP SIGNAGE ON BUILDING.

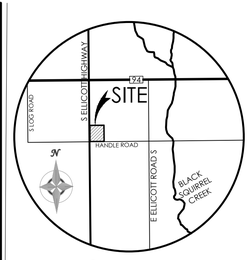
SITE SIGNAGE LEGEND

SCALE 1" = 1'



TYPICAL HANDICAP PARKING SPACE

SCALE 1" = 5'



VICINITY MAP

NOT TO SCALE

BENCHMARK

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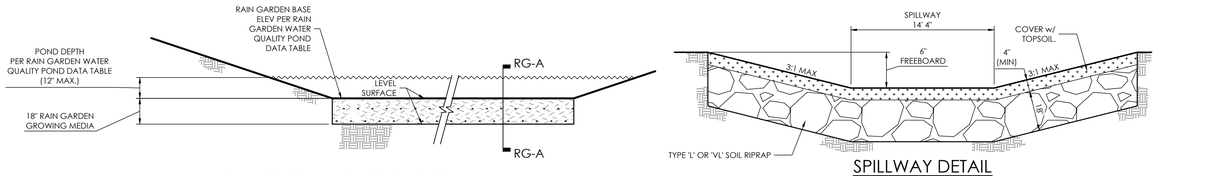
ELEVATIONS SHOWN ARE RELATIVE TO THE NAVD 88 VERTICAL DATUM.

SITE PLAN SPECIFIC NOTES

1. INSTALL 43 LF 12" HDPE PIPE W/ FES @ 1.16%
   FES INV IN = 74.5'
   FES INV OUT = 74.0'
2. INSTALL GRASS SWALE. SEE DETAIL ON THIS SHEET.
3. INSTALL RAIN GARDEN. SEE DETAIL ON THIS SHEET.
4. INSTALL RIP-RAP SPILLWAY. SEE DETAIL ON THIS SHEET.
5. INSTALL 6" CDOT CLASS 5 OR 6 AGGREGATE BASE COURSE, MIN L HVEEM VALUE OF 84, MOISTURE TREATED TO WITHIN 2% OPTIMUM MOISTURE CONTENT AND COMPACTED TO 95% (±3%) MAX DRY DENSITY - MOD. PROCTOR (ASTM D1557/AASHTO T-180)
6. INSTALL TYPE VL RIP-RAP LEVEL SPREADER. (SEE DETAIL)
7. INSTALL RIP-RAP. SEE CONCENTRATED IN-FLOW DETAIL.
8. INSTALL CONCRETE SIDEWALK 4" THICK (SEE DETAIL ON THIS SHEET)
9. INSTALL CONCRETE PARKING STOP BLOCKS
10. INSTALL CONCRETE PARKING AREA 6" THICK (SEE DETAIL ON THIS SHEET)

A HANDICAP PARKING SIGN (SEE DETAILS ON THIS SHEET)
B HANDICAP VAN PARKING SIGN (SEE DETAILS ON THIS SHEET)

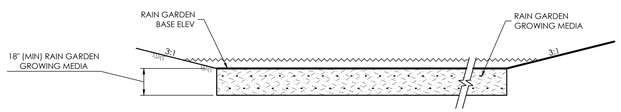


PHASE I RAIN GARDEN DETAIL

SCALE: NTS

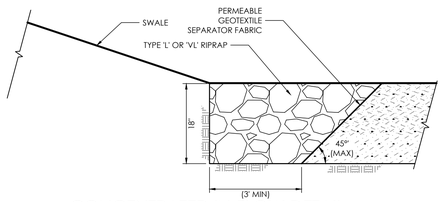
SPILLWAY DETAIL

SCALE: NTS



SECTION 'RG-A'

SCALE: NTS



CONCENTRATED IN-FLOW DETAIL

SCALE: NTS

RAIN GARDEN, SPECIFICATIONS, NOTES & REFERENCES:

REFERENCE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT (UDFCD), *URBAN STORM DRAINAGE CRITERIA MANUAL VOLUME 3*. SECTION T-3, FOR FULL SET OF RAIN GARDEN DETAILS AND SPECIFICATIONS AS IDENTIFIED.

- **GROWING MEDIA** (BY WEIGHT, USE 3-5% ORGANIC MATERIAL: 95-97% GROWING MEDIA SAND)
  - ORGANIC MATERIAL - LOOSELY PACKED, SHREDDED MULCH - AGED 6 MONTHS (MIN.)
  - GROWING MEDIA SAND - PER SOIL MATERIAL GRADATION TABLE
  - pH - 6.8-7.5
  - NITROGEN - 15 ppm (MAX)
  - PHOSPHORUS - 15 ppm (MAX)
  - SALINITY - 6 mmhos/cm (MAX)
- **VEGETATION** - SELECT PLANTS THAT ARE DROUGHT RESISTANT AND THRIVE IN SANDY SOIL. OPTIONAL: USE NATIVE SEED MIX PER RAIN GARDEN SEED MIX TABLE. AGGRESSIVE WEED CONTROL PROCEDURES WILL HELP THE DESIRED VEGETATION TO BECOME ESTABLISHED.
- **CONCENTRATED INFLOW** - PER CONCENTRATED INFLOW DETAIL.

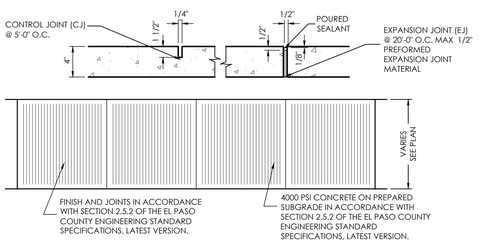
STANDARD SIEVE SIZE	% PASSING GROWING MEDIA[1,2]
1-1/2"	
3/4"	
NO. 4	100
NO. 10	85-100
NO. 50	
NO. 100	
NO. 200	80-90
NO. 230	3-17

[1]RAIN GARDEN ONLY
[2]LESS THAN 1.5% ORGANIC MATERIAL

RAIN GARDEN SEED MIX TABLE[1]
(SOURCE: UDFCD BIORETENTION (RG) TABLE 8-3)

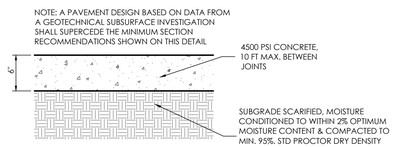
COMMON NAME	LB/AC PLS[2]
SAND BLUESTEM	3.5
SIDEOATS GRAMA	3
PRAIRIE SANDREED	3
INDIAN RICEGRASS	3
SWITCHGRASS	4
WESTERN WHEATGRASS	3
LITTLE BLUESTEM	3
ALKALI SACATON	3
SAND DROPSEED	3
TOTAL	27.5

[1]SEE UDFCD TABLE 8-3 FOR SCIENTIFIC NAMES AND WILDFLOWER MIX OPTION
[2]PLS = PURE LIVE SEED



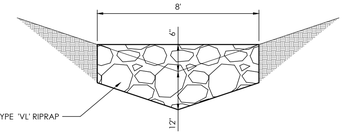
TYPICAL SIDEWALK DETAIL

SCALE 1" = 4.0'



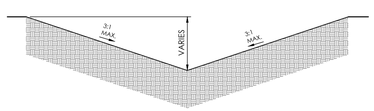
PAVEMENT SECTION VEHICLE TRAFFIC AREAS (CONCRETE)

SCALE 1" = 1.0'



RIPRAP LEVEL SPREADER DETAIL

SCALE 1" = NTS



TYPICAL SWALE

SCALE 1" = 1.0'

PCD FILE # PPR2250

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REVISIONS

DESIGNED BY
DRAWN BY
CHECKED BY
AS-BUILTS BY
CHECKED BY

ELLICOTT SCHOOL ADDITION 2 BLDGS

PHASE I GRADING PLAN

C1.2

MVE PROJECT 61183
MVE DRAWING GEC-GP-I

NOVEMBER 28, 2022

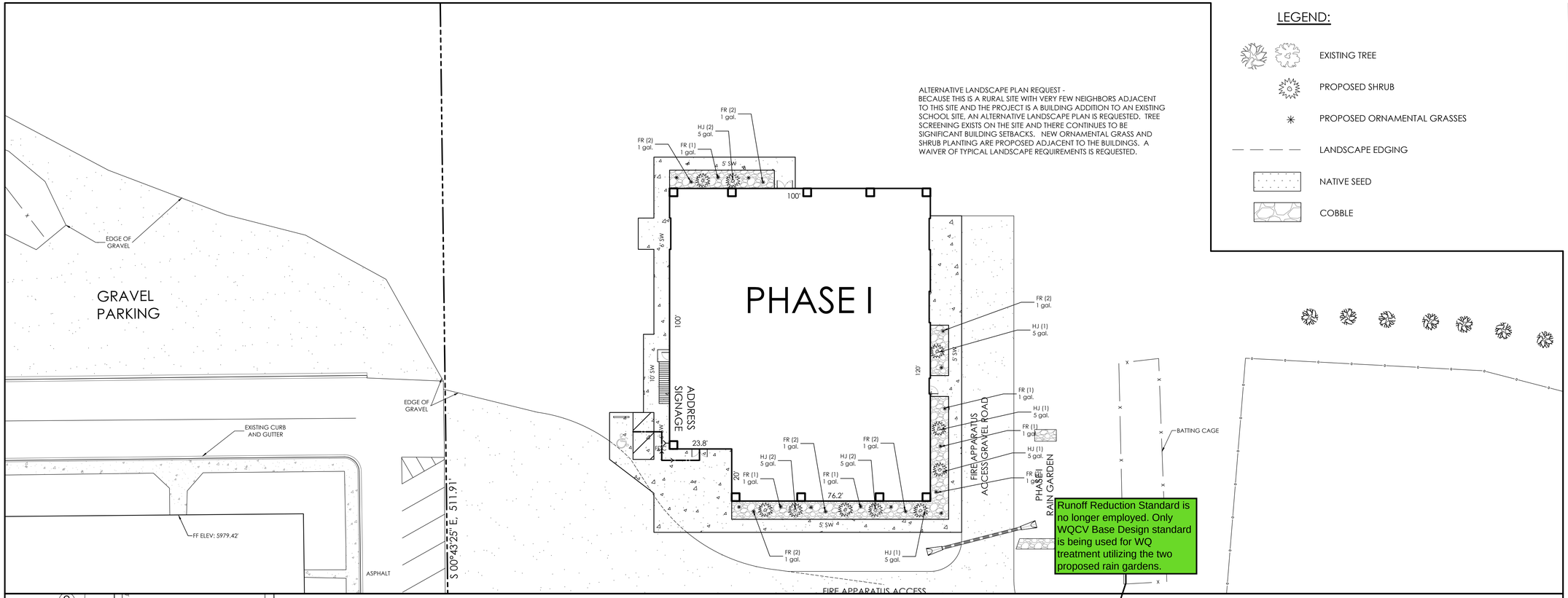
Landscape Plan Comments Response

M.V.E., Inc. ● Engineers ● Surveyors
1903 Lelaray Street, Suite 200 ● Colorado Springs, CO 80909 ● Phone 719-635-5736
Fax 719-635-5450 ● e-mail mve@mvecivil.com

LEGEND:

- EXISTING TREE
- PROPOSED SHRUB
- PROPOSED ORNAMENTAL GRASSES
- LANDSCAPE EDGING
- NATIVE SEED
- COBBLE

ALTERNATIVE LANDSCAPE PLAN REQUEST -
BECAUSE THIS IS A RURAL SITE WITH VERY FEW NEIGHBORS ADJACENT TO THIS SITE AND THE PROJECT IS A BUILDING ADDITION TO AN EXISTING SCHOOL SITE, AN ALTERNATIVE LANDSCAPE PLAN IS REQUESTED. TREE SCREENING EXISTS ON THE SITE AND THERE CONTINUES TO BE SIGNIFICANT BUILDING SETBACKS. NEW ORNAMENTAL GRASS AND SHRUB PLANTING ARE PROPOSED ADJACENT TO THE BUILDINGS. A WAIVER OF TYPICAL LANDSCAPE REQUIREMENTS IS REQUESTED.



Runoff Reduction Standard is no longer employed. Only WQCV Base Design standard is being used for WQ treatment utilizing the two proposed rain gardens.

All regions to be utilized as RPA's and SPA's (as shown on pg 105 of the FDR) should have seeding shown on this landscape plan. Update this landscape plan accordingly.

Additional requirements per MHFD Detail T-0 (shown on Landscape Plan and GEC Plan):

- All RPA/SPA areas will need to be within a no build/drainage easement (or tract) and discussed in the maintenance agreement and O&M manual.
- RPA vegetation should be turf grass (from seed [provide appropriate seed mix] or sod).
- Turf grass vegetation should have a uniform density of at least 80%.
- Irrigation (temp or permanent) is necessary to establish sufficient vegetation and not just weeds.
- Show suitability of topsoil of RPA and steps for proper preparation of topsoil per recommendations in MHFD detail T-0 Table RR-3
- RPA limits must be shown on GEC Plans (not just FDR) so our SW inspectors and the QSM know that these areas are to remain pervious, vegetated (80%), and irrigated post-construction. Our SW inspectors do not look at drainage reports.
  - for this req, just include the RR map that is currently in the FDR in the GEC Plan too.
- Provide a figure showing all proposed UIA, RPA and SPA areas to be utilized for runoff reduction.
  - done.
- Provide a detail for the UIA:RPA interface that shows the recommended vertical drop of 4".
- Show signage to be posted in RPAs so maintenance personnel and owners know that the area is a water quality treatment area (not just a regular grassy area and/or an SPA).

ALTERNATIVE LANDSCAPE PLAN REQUEST -
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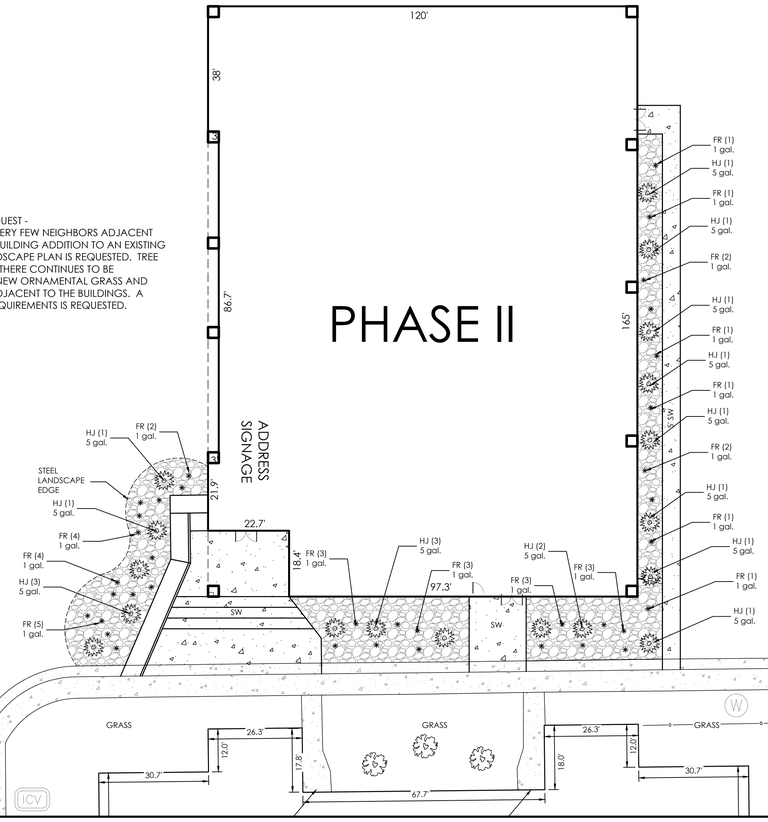

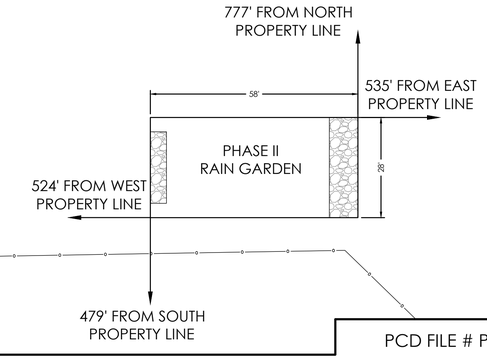

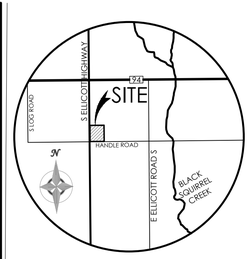

VICINITY MAP
NOT TO SCALE

BENCHMARK

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N

5 0 10 20 40
1" = 20' 1:240

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REVISIONS

DESIGNED BY
DRAWN BY
CHECKED BY
AS-BUILTS BY
CHECKED BY

ELLICOTT SCHOOL ADDITION 2 BLDGS

LANDSCAPING PLAN PHASE I & II

LS1.2

MVE PROJECT 61183
MVE DRAWING LS-PS

JANUARY 23, 2023

SHEET 2 **OF** 2

PCD FILE # PPR2250