OSAGE DEVELOPMENT STORMWATER MANAGEMENT FACILITY-BEST MANAGEMENT PRACTICES OPERATION AND MAINTENANCE PLAN

Prepared for:

Clayton Properties Group, Inc. dba Summit Homes

Lee's Summit, Missouri

June 2021

olsson®

Update Header

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Review text highlighted in yellow throughout the document for capitalization, spelling, etc.

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PURPOSE

Stormwater Best Management Practices (BMPs) are implemented in this development to meet stormwater discharge water-quality standards of the City of Lee's Summit, Missouri. Permanent BMPs are provided via this development. In order for physical stormwater BMPs to be effective, proper maintenance is essential. Maintenance includes both routinely scheduled activities, as well as non-routine repairs that may be required after large storms, or because of other unforeseen conditions. Maintenance of site specific BMPs is the responsibility of the property owner and a requirement of approval for this development. The property owner, heirs and assigns shall maintain appropriate funds to provide all maintenance required up to and including replacement of said facilities at end of their useful life. The property owners shall require implementation of this manual for all BMPs transferred with land ownership transfer to subsequent property owners, heirs and assigns.

1. GENERAL SITE OVERVIEW

Osage Development is a single-family residential development with 160 units. The development is located at the southwest intersection of Northwest Pryor Road and Highway 150 in Lee's Summit, Jackson County, Missouri.

Figure 1. Location Map.

1.1 Locations of Stormwater Best Management Practices

The Osage Development has one stormwater detention basin located within the development. This basin is Tract C, west of SW Pryor Road, east of SW Maryville Place and south of SW Osage Drive, Appendix A.

1.2 Types of Stormwater Best Management Practices

There are many different measures which can provide stormwater BMPs. The below list are the ones utilized within this development.

- Stormwater dry detention basin
- Native vegetation

2. MAINTENANCE OF STORMWATER MANAGEMENT FACILITIES

Stormwater management facilities need to be maintained to function properly. This section will discuss how to properly maintain the facilities within this development.

2.1 Native Vegetation

Maybe reword?

Native vegetation provides many benefits for stormwater management. Per the APWA/MARC BMP manual, dated October 2012, the below are some of these benefits:

- Because it is indigenous to the area, so will be able to thrive in the local climate with less maintenance.
- Deep roots enhance stormwater infiltration into the soil.
- With deep-routed nature, native vegetation is able to withstand flooding events as well as extended dry periods.
- Reduces flow velocity of stormwater runoff.
- Attracts wildlife and improved biological diversity.
- Requires little to no fertilizer or chemical maintenance, as well as reduced amounts of water to survive.

Rooted

With these benefits, the bottom of a stormwater basin is an ideal place for native vegetation to be planted. The basin located within Tract C, is intended to be vegetated by natives. Some of the typical plants one may see are below:

- Prairie Cordgrass
- Dark Green Bulrush
- Dudley's Rush
- Milkweed
- Fox Sedge
- Water plantain
- Aster
- Iris
- Sedge
- Coneflower
- Goldenrod
- Blazingstar
- Fescue
- Cattail*
- Switchgrass
- Indian Grass
- Little Bluestem
- Big Bluestem

*Cattail growth shall be monitored to limit spread and not crowd out other species.

The maintenance requirements for native vegetation will vary depending on the climate, thus the maintenance of such should be flexible and allowed to change over time to allow responses to nature. The plan laid out in the below table are recommendations, the formal maintenance shall be adoptive based on the recommendations in Table 1.

Table 1. Maintenance of Native Vegetation

Required Action	Maintenance Objective	Frequency of Action
Debris and Litter Removal	Removal of debris and litter from the basin area to minimize outlet clogging and improve aesthetics	Periodically and after large rain events
1st year of establishment-mowing*	To maintain a healthy level of vegetation	Mow no more than monthly to a minimum height of 5”
2nd year of establishment-mowing*	To maintain a healthy level of vegetation	Mow once in June to a minimum height of 8”, spot treat weeds as necessary
3rd year and beyond of establishment-mowing*	To maintain a healthy level of vegetation	Mow once in the off-season (Late October to Early March) to a minimum height of 8”
Removal of invasive species	To encourage a healthy native plant environment, growth of species invasive to the area shall occur	Periodically
Seeding (recommend to use a mix with the above plantings)	To establish plantings in bare areas	Shall occur if areas are bare soil for extend period of time

Huh? Is this backwards?

*Native vegetation shall never be mowed in wet or muddy conditions.

2.2 Extended Dry Detention Basin

Extended dry detention basins provide detention for the water quality volume with a 40-hour release rate, along with detention for up to the 100-year storm event. These basins a typically simple in design, which helps make them relatively easy and inexpensive to maintain.

The basins within this development are planted with native vegetation, which maintenance requirements were discussed in section 2.1, thus Table 2, is looking at the maintenance for the overall detention basin and not focused on the vegetation.

Recommend revising each of these to "Every spring and periodically until winter."

Table 2. Maintenance of Extended Dry Detention Basin

Required Action	Maintenance Objective	Frequency of Action
Debris and Litter Removal	Removal of debris and litter from the basin area to minimize outlet clogging and improve aesthetics	Periodically and after large rain events
Repairing Erosion	If erosional channels occur due to lack of vegetation and large rainfall events, the area shall be re-graded to fill in the channels and new vegetation shall be established per Section 2.1.	Periodically, as occurs after large rain events
Inspection of Outlet	To ensure the outlet box for the basin is function properly	Periodically
Inspection of the Spillway	To ensure spillway is stable and functioning correctly	Periodically
Removal of Sediment	To ensure the basin has enough volume to handle rainfall events and function as designed	Rare once the area draining to the basin is fully developed and vegetation established. Should occur if owner notices large amounts of silt in the bottom that is preventing the basin from draining/functioning.

How is disposal of silt to be handled? Might include a note regarding the disposal.

Maintenance for the basin shall be minimal to the owner, however if unforeseen events happen, the owner shall restore the basin, per the Detention Basin As-built sheet, Appendix B.

2.3 Inspection of Facilities

The above sections mentioned maintenance and frequency for each action. When an inspection of the facilities is performed, the form found in appendix C, shall be filled out and included in this report for record keeping. It is recommended that owner walks around the facility areas yearly to check conditions and make sure no major concerns are occurring. If they see something of concern, they should reach out to a licensed professional for a deeper inspection of the issues and guidance on repairs required.

2.4 Repairs to Facilities

Some of the regular maintenance items can be done by the owner, however in the event larger repairs are needed the owner shall seek out a qualified contractor. Such items that may require a contractor to preform are:

- Removal of sediment build up.
- Repairs to the concrete outlet structure, spillway, or outlet pipe.
- Major erosional channels occurring on the sides slopes of the basin.

This is confusing, or at least doesn't read right. Suggest rewording for clarity.

3. CHANGES TO THE CURRENT PLAN

If changes are desired to the current Stormwater Management Facility-Best Management Practices Operation and Maintenance Plan, the below should be performed.

3.1 Ownership Change

In the event of ownership change of the land which BMPs are located on the following steps should be performed.

add comma - ...on, the...

1. Current owner shall have all BMPs inspected and reviewed to be fully functioning, per this plan. If deficiencies are found both parties shall discuss and agree upon a plan to address deficiencies.
2. City shall be notified via writing of the ownership change within 30 days.
3. Appendix D shall be updated with the new owner information.

3.2 Additional Land Added to the Development

If additional land is added into the development, this document shall be updated to include any stormwater management facilities located within the additional area. A revision date shall be provided for the document along with a copy provided to the City of Lee's Summit, Missouri for review.

3.3 Changes to How Maintenance is Preformed

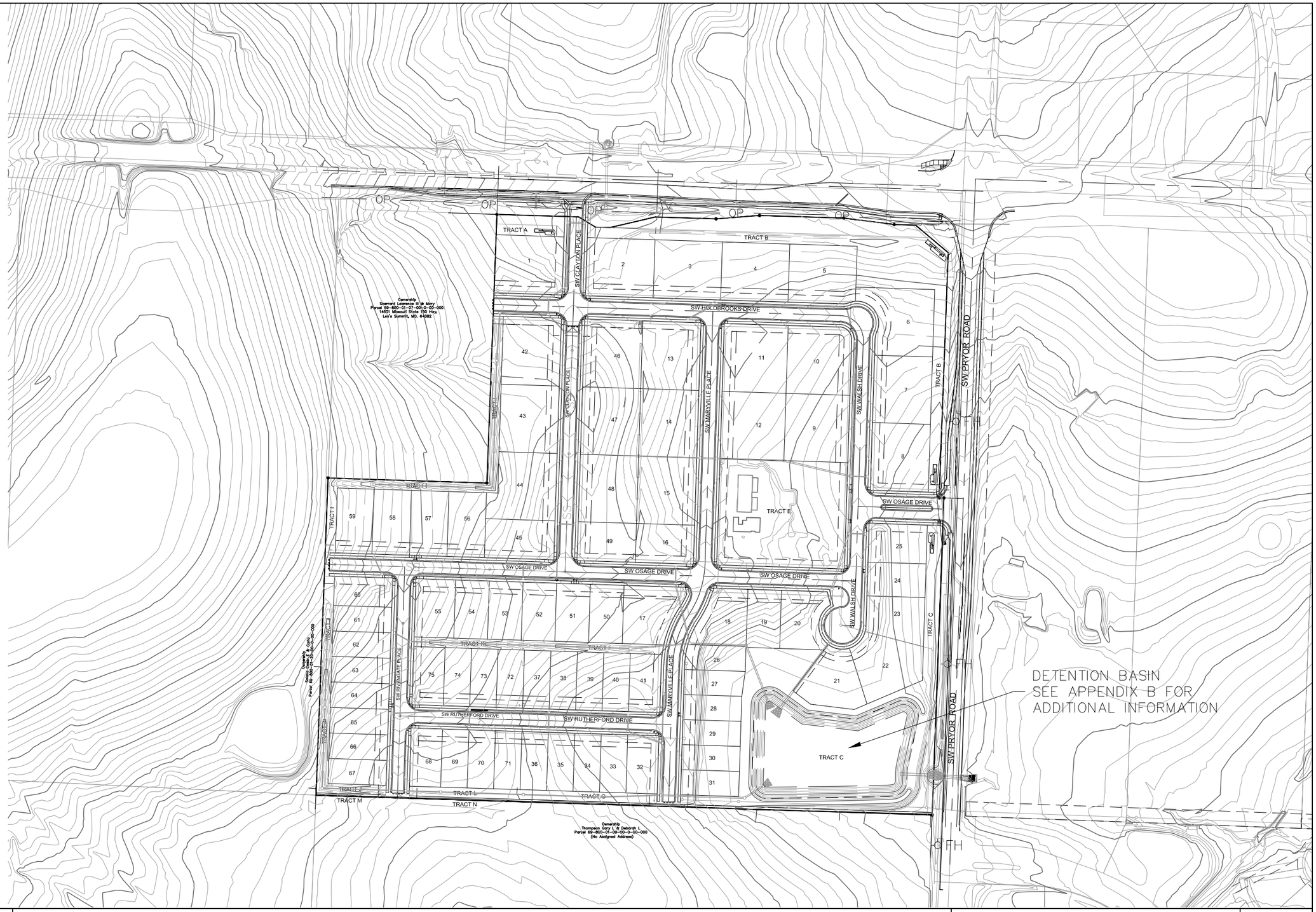
If the owner has desire to change the recommended maintenance mentioned in this document, they shall prepare an update to this document and present it to the City of Lee's Summit, Missouri to review. The City may require a licensed professional to update the recommendations.

Add "Development Services Department with the"

APPENDIX A

Location of Stormwater Management Facilities

DWG: F:\2019\2001-2500\019-2339-A\40-Design\Reports\GNCV\BMPMaintenancePlan\CAD Files\AppendixA.dwg USER: jsellers
DATE: May 26, 2021 12:49pm XREFS: OverallDevelopmentexhibit



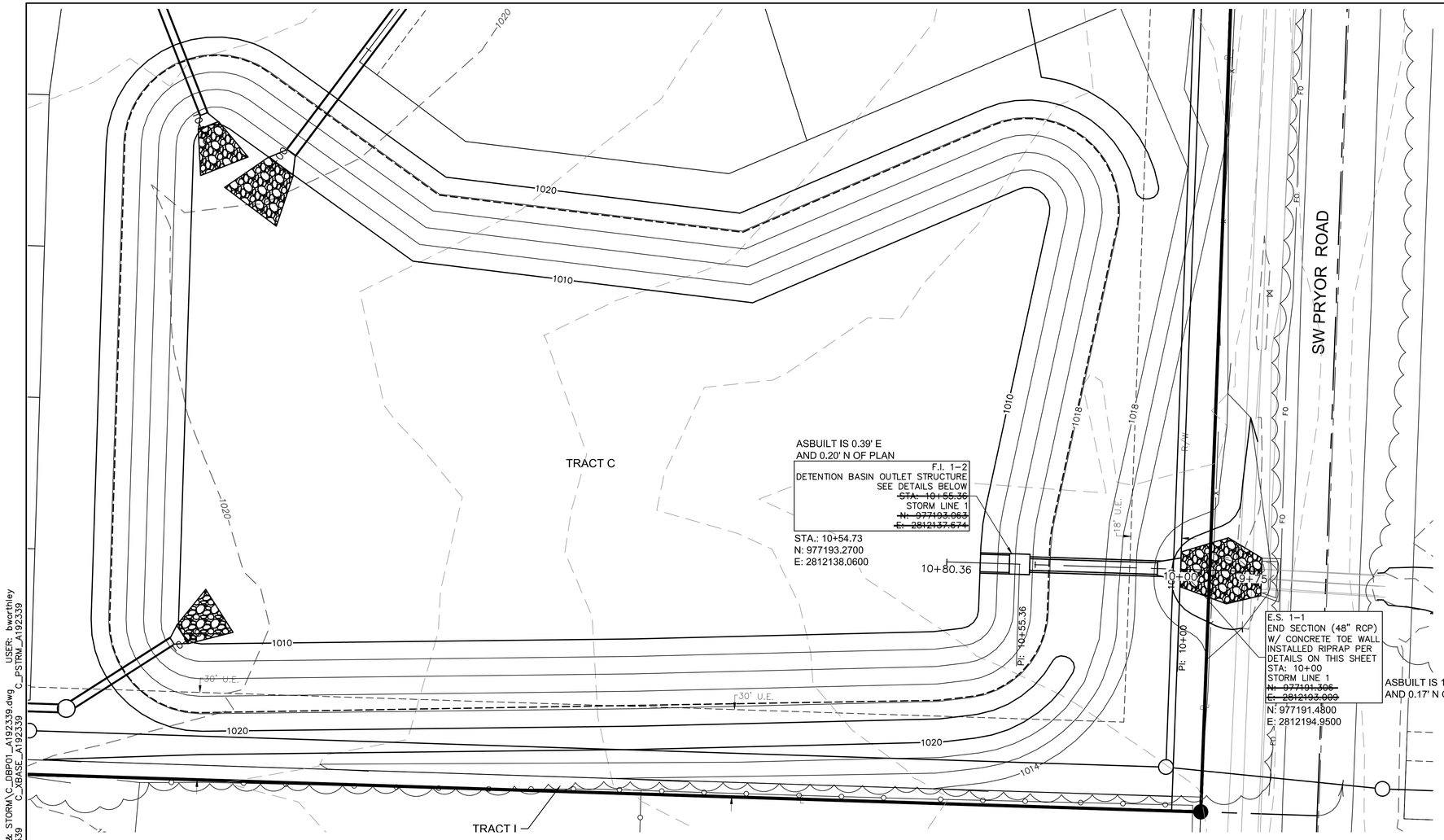
N

0' 100' 200'
SCALE IN FEET

PROJECT NO: A019-2339	APPENDIX A-STORM WATER MANAGEMENT FACILITY LOCATION	olsson 1301 Burlington Street North Kansas City, MO 64116 TEL 816.361.1177	EXHIBIT 1
DRAWN BY: JES			
DATE: 2021.05.24			

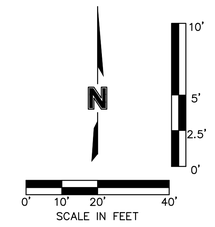
APPENDIX B

Detention Basin As-Built Plan



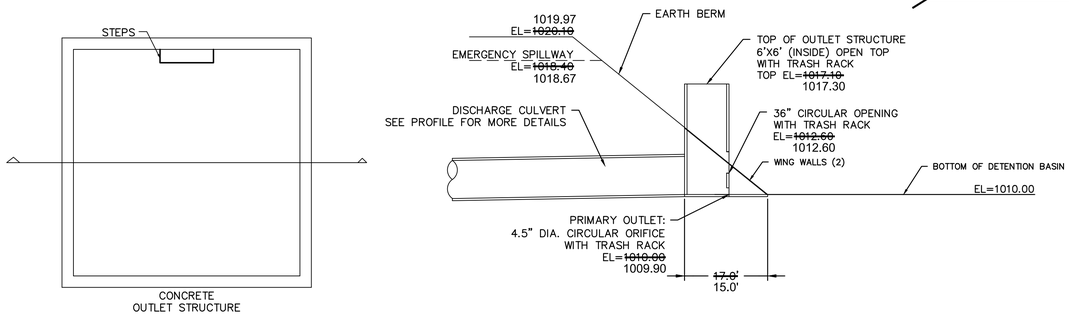
RIP RAP DETAIL
1"=10'

Riprap Calculations							
End Section	Q_{100} (cfs)	Pipe Diameter (ft)	Class*	D50* (in)	Apron Length (ft)	Apron Depth (ft)	Minimum Area (SY)
E.S. 1-1	56.3	4	2	6	16	1.65	30.8
*Per Table 10.1 HEC 14-FHWA-Energy Dissipators Pg. 10-18							



~~BASIN SPILLWAY DETAILS~~	
~~TYPE~~	~~RECTANGULAR BROAD CRESTED WEIR~~
~~LENGTH~~	~~160 FT~~
~~SPILLWAY ELEVATION~~	~~1018.40 FT~~
~~SPILLWAY DEPTH~~	~~1.70 FT~~
~~TOP ELEVATION~~	~~1020.10 FT~~
~~100-YR FLOW (AT 0.88' FLOW DEPTH)~~	~~233.27 CFS~~

AS-BUILT BASIN DETAILS	
SPILLWAY TYPE	RECTANGULAR BROAD CRESTED WEIR
SPILLWAY LENGTH	200 FT
LOW POINT ON SPILLWAY ELEVATION	1018.60 FT
SPILLWAY DEPTH	1.40 FT
LOW POINT ON DAM ELEVATION	1020.00 FT
100-YR DESIGN WATER SURFACE ELEVATION	1017.16 FT
100-YR AS-BUILT WATER SURFACE ELEVATION	1017.15 FT
DESIGN STORAGE	528,652 CF
AS-BUILT STORAGE	513,200 CF

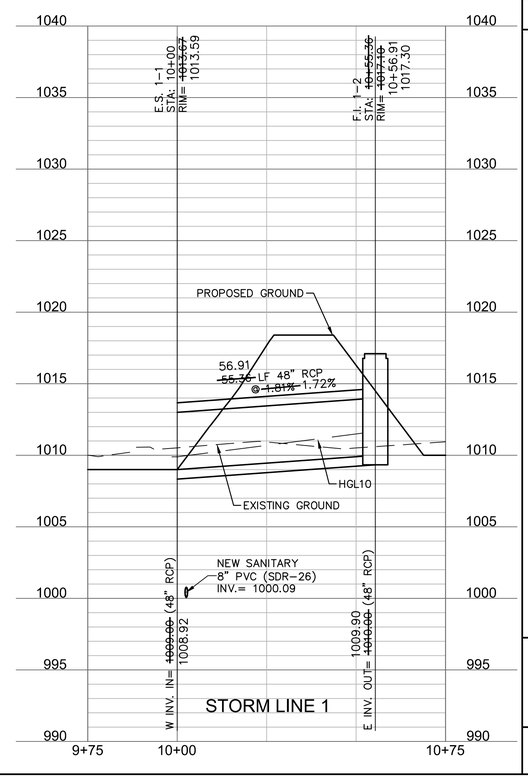


BASIN OUTLET STRUCTURE DETAIL
N.T.S.

AS-BUILT

4/14/2021

REFER TO MASTER
DRAINAGE PLAN
FOR UPDATED GRADING



olsson
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STATE OF MISSOURI
BROCK M. WORTHLEY
NUMBER PE-2019000237
4/14/2021
PROFESSIONAL ENGINEER

REVISIONS

REV. NO.	DATE	REVISIONS DESCRIPTION	BY
1	6/15/2020	TRASH RACKS ADDED TO OUTLET STRUCTURE DETAIL	

DETENTION BASIN PLAN
STREET & STORM SEWER PLANS

OSAGE
FIRST PLAT

2020

LEE'S SUMMIT, MISSOURI

drawn by:	AA
checked by:	SS
designed by:	AA
QA/QC by:	JES
project no.:	A19-2339
drawing no.:	C_DBP01_A192339
date:	3/17/2020

SHEET
C108

DWG: F:\2019\2001-2500\019-2339-A\40-Design\AutoCAD\Final Plans - Asbuilts\Sheets\GNCV\STREET & STORM\C_DBP01_A192339.dwg USER: bworthley
DATE: Apr 14, 2021 11:31am XREFS: C_PTBLK_A192339 C_PBASE_A192339 C_PBNDY_A192339 C_XBASE_A192339 C_PSTRM_A192339

APPENDIX C

Inspection Report Form

STORMWATER BMP INSPECTION REPORT FORM

Location of BMP:_____ BMP Type:_____

Date of Inspection:_____ Inspected by:_____

Features				
Maintenance Item	**Yes**	**No**	**N/A**	**Comments**
Functioning to avoid complaints				
Aesthetically maintained				
Free of trash and debris				
Good vegetation cover				
Free of invasive species				
Evidence of erosion				
Bottom of basin clear of excess sediment				
Outlet structure in working condition				
Spillway in working condition				

Action to be taken: _____

_____

_____

_____

_____

APPENDIX D

Ownership Information

OWNERSHIP INFORMATION

Ownership information shall be updated in the event the property owner where the stormwater BMP's are located changes. Below is contact information for the property owner, shall they need to be contracted regarding the stormwater BMPs.

Stormwater BMP Property Ownership	
Property Owner	Clayton Properties Group, dba Summit Homes
Contact Person	Travis Ruf
Address	120 SE 30th Street, Lee's Summit, MO 64082
Phone Number	816.246.6700
Email Address	development@summithomeskc.com

Stormwater BMP Property Change of Ownership	
Property Owner	
Contact Person	
Address	
Phone Number	
Email Address	

Stormwater BMP Property Change of Ownership	
Property Owner	
Contact Person	
Address	
Phone Number	
Email Address	

Stormwater BMP Property Change of Ownership	
Property Owner	
Contact Person	
Address	
Phone Number	
Email Address	