DRAINAGE LETTER

for

ACADEMY MARTIAL ARTS
LOTS 9-10, VILLAGE CENTER AT WOODMOOR FILING NO. 4

Prepared for:

Hammers Construction, Inc.
1411 Woolsey Heights
Colorado Springs, CO 80915

August 26, 2022

Prepared by:

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JPS Project No. 062202

ACADEMY MARTIAL ARTS
LOTS 9-10, VILLAGE CENTER AT WOODMOOR FILING NO. 4
DRAINAGE REPORT STATEMENTS

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 City/County for drainage reports and said report is in conformity with the master plan for the drainage basin. I accept responsibility for liability caused by negligent acts, errors or omissions on my part in preparing this report:

_____

John P. Schwab Colorado P.E. No. 29891

I. INTRODUCTION

Hammers Construction is planning to construct a new building for Academy Martial Arts on a vacant commercial site addressed as 980-992 Gold Canyon Road in Monument, Colorado. The 1.8-acre site is platted as Lots 9 and 10, Village Center at Woodmoor Filing No. 4 (El Paso County Assessor's No. 71133-01-065 and 71133-01-080). The property is located at the northeast corner of Gold Canyon Road and Morning Canyon Road. The property is zoned Planned Unit Development (PUD) and planned for commercial center use.

Gold Canyon Road is an existing paved public street along the south boundary of this vacant site, and Morning Canyon Road is an existing paved public street adjoining thew west boundary of the site. Highway 105 is an existing paved public arterial street along the north boundary of the property. The east boundary of the site adjoins Tract B, Village Center at Woodmoor Filing No. 3A, which is an open space tract owned by the Town of Monument.

The site development will consist of a proposed 9,000 square-foot, single-story retail building with associated parking and site improvements. Access to the site will be provided by a private driveway connection to Gold Canyon Road along the south boundary of the property.

This report is intended to meet the requirements of a site-specific "Letter Type" drainage report in accordance with Town of Monument drainage criteria.

II. EXISTING / PROPOSED DRAINAGE CONDITIONS

Drainage planning for this site was previously studied in several drainage reports on file for the "Village Center at Woodmoor" Subdivision, including the "Preliminary Drainage Report, Village Center at Woodmoor" dated June 3, 2004 by JPS Engineering and the "Preliminary Drainage Report for Village Center Filing No. 4" dated March, 2010 by JR Engineering.

The previous drainage reports identify developed flows from this site draining into an existing stormwater detention pond located immediately downstream of this property at the southeast corner of Gold Canyon Road and Morning Canyon Road. The existing detention facilities were designed to accept developed drainage from this site.

The on-site drainage area has been delineated as Basin T (1.8 acres) as depicted on the attached Drainage Plan (Sheet D1). Basin T generally flows southwesterly across the site, with developed peak flows calculated as $Q_5 = 5.2$ cfs and $Q_{100} = 10.5$ cfs. The site is impacted by a small off-site drainage area (Basin OT1) along the southeast boundary of the property, which sheet flows northwesterly into Basin T. Developed peak flows from Basin OT1 are calculated as $Q_5 = 0.1$ cfs and $Q_{100} = 0.7$ cfs.

Drainage from Basin OT1 and T will generally sheet flow westerly to the curb and gutter and crosspans within the parking area surrounding the new building, draining to private storm inlets at selected low points. A private storm sewer system will convey the developed flows southwesterly across the site. Inlets T1.1 and T1.2 (Private Type 13 Inlets) will intercept surface drainage from the driveway along the east side of the building, and Storm Sewer T1.1-T1.2

(Private 12" HDPE) will convey this flow southwesterly to Inlet T1.4 in the southwest parking lot. Inlet T1.3 (Private Type 16) will intercept surface drainage from the north parking area, and Storm Sewer T1.3 (Private 12" HDPE) will convey this flow south around the west side of the building to Inlet T1.4. Private Inlet T1.4 (5' Type R) will intercept surface drainage from the south parking lot, and Storm Sewer T1.4 (Private 18" HDPE) will discharge the combined flows into the existing stormwater detention pond on the south side of Gold Canyon Road.

In the event of clogging, overflows from the on-site private Storm Inlets T1.1-T1.4 will flow southwesterly across the parking lot towards the southwest corner of the site, draining to the existing downstream public storm inlets and detention pond.

Developed flows from Basins OT1 and T combined at Design Point #1, with developed peak flows calculated as $Q_5 = 5.3$ cfs and $Q_{100} = 11.3$ cfs. The 2010 "Preliminary Drainage Report for Village Center Filing No. 4" by JR Engineering identified developed peak flows of $Q_5 = 7.7$ cfs and $Q_{100} = 13.7$ cfs for Basin T, so the calculated flows in this report are consistent with the previously approved subdivision drainage report.

Developed flows from Basins OT1 and T discharge into the existing downstream detention pond with anticipated flows in full conformance with the previously approved drainage reports for this subdivision.

III. GENERAL DRAINAGE RECOMMENDATIONS

The developed drainage plan for the site is to provide and maintain positive drainage away from proposed structures and conform to the established drainage patterns for the overall retail center. JPS Engineering recommends that positive drainage be established and maintained away from all structures within the site, in conformance with applicable building codes and geotechnical engineering recommendations.

In general, we recommend a minimum of 6 inches clearance from the top of concrete foundation walls to adjacent finished site grades. Positive drainage slopes should be maintained away from all structures, with a minimum recommended slope of 5 percent for the first 10 feet away from buildings in landscaped areas, a minimum recommended slope of 2 percent for the first 10 feet away from buildings in paved areas, and a minimum slope of 1 percent for paved areas beyond buildings.

Proper erosion control measures should be implemented and maintained in conjunction with any improvements or disturbance to the site, and vegetated buffer strips should be maintained where feasible along the downstream perimeter of the property to minimize off-site transport of sediment.

IV. DRAINAGE PLANNING – FOUR STEP PROCESS

Town of Monument Drainage Criteria require drainage planning to include 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 has been implemented as follows in the planning of this project:

Step 1: Employ Runoff Reduction Practices

- Detention Basin: Developed drainage from this lot will be routed through the existing Detention Basin immediately south of this property, which has a vegetated pond bottom to encourage stormwater infiltration prior to discharge to the downstream drainage system.

Step 2: Implement BMPs that Provide a Water Quality Capture Volume with Slow Release

- The existing Extended Detention Basin (EDB) mitigates developed drainage and water quality impacts from this lot.

Step 3: Stabilize Drainageways

- There are no major drainageways adjacent to this site. Impacts on downstream drainageways will be minimized by routing developed flows through the existing Detention Pond.

Step 4: Implement Site Specific and Other Source Control BMPs

- No outside storage or industrial uses are proposed for this site.
- The Property Owner will need to maintain proper stormwater management procedures, including good housekeeping practices and spill containment procedures.

V. DRAINAGE BASIN FEES

This parcel is located within the Teachout Creek Drainage Basin. No public drainage facilities are required for the proposed site development. The site consists of previously platted lots, so no drainage or bridge fees are applicable at this time.

VI. SUMMARY

The proposed drainage patterns associated with the Academy Martial Arts Building project will remain consistent with the overall drainage plan for the Village Center at Woodmoor Subdivision. Stormwater detention and water quality treatment for this site will be provided in the existing downstream Detention Pond immediately south of this property. Establishment and maintenance of positive drainage and proper erosion control practices will ensure that the proposed site development has no significant adverse drainage impact on adjacent properties or downstream facilities.

APPENDIX A

DRAINAGE CALCULATIONS & EXHIBITS

ACADEMY MARTIAL ARTS - LOTS 9-10, VILLAGE CENTER AT WOODMOOR FILING NO. 4
COMPOSITE RUNOFF COEFFICIENTS

DEVELOPED CONDITIONS

5-YEAR C VALUES

BASIN	TOTAL AREA (AC)	(AC)	SUB-AREA 1 DEVELOPMENT/ COVER	C	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	C	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	C	WEIGHTED C VALUE
OT1	0.30	0.30	MEADOW	0.08							0.080
T	1.80	1.20	BUILDINGS/IMPERVIOUS	0.9	0.60	LANDSCAPED	0.08				0.627
OT1,T	2.10										0.549

100-YEAR C VALUES

BASIN	TOTAL AREA (AC)	(AC)	SUB-AREA 1 DEVELOPMENT/ COVER	C	AREA (AC)	SUB-AREA 2 DEVELOPMENT/ COVER	C	(AC)	SUB-AREA 3 DEVELOPMENT/ COVER	C	WEIGHTED C VALUE
OT1	0.30	0.30	MEADOW	0.35							0.350
T	1.80	1.20	BUILDINGS/IMPERVIOUS	0.96	0.60	LANDSCAPED	0.35				0.757
OT1,T	2.10										0.699

ACADEMY MARTIAL ARTS - LOTS 9-10, VILLAGE CENTER AT WOODMOOR FILING NO. 4
RATIONAL METHOD

DEVELOPED FLOWS

					Overland Flow			Channel flow										
BASIN	DESIGN POINT	AREA (AC)	C 5-YEAR	C 100-YEAR	LENGTH (FT)	SLOPE (FT/FT)	Tco [1] (MIN)	CHANNEL LENGTH (FT)	CONVEYANCE COEFFICIENT C	SLOPE (FT/FT)	SCS [2] VELOCITY (FT/S)	Tt [3] (MIN)	TOTAL Tc [4] (MIN)	TOTAL Tc [4] (MIN)	INTENSITY [5] 5-YR (IN/HR)	INTENSITY [5] 100-YR (IN/HR)	PEAK FLOW Q5 [6] (CFS)	PEAK FLOW Q100 [6] (CFS)
OT1	OT1	0.30	0.080	0.350	100	0.06	10.3					0.0	10.3	10.3	4.09	6.86	0.10	0.72
T	T	1.80	0.627	0.757	100	0.05	5.0	295	20	0.011	2.10	2.3	7.3	7.3	4.60	7.72	5.19	10.52
OT1,T	**1**	**2.10**	**0.549**	**0.699**									7.3	7.3	4.60	7.72	**5.30**	**11.33**

1) OVERLAND FLOW Tco = (0.395*(1.1-RUNOFF COEFFICIENT)*(OVERLAND FLOW LENGTH^(0.5)/(SLOPE^(0.333))
2) SCS VELOCITY = C * ((SLOPE(FT/FT)^0.5)
C = 2.5 FOR HEAVY MEADOW
C = 5 FOR TILLAGE/FIELD
C = 7 FOR SHORT PASTURE AND LAWNS
C = 10 FOR NEARLY BARE GROUND
C = 15 FOR GRASSED WATERWAY
C = 20 FOR PAVED AREAS AND SHALLOW PAVED SWALES

3) MANNING'S CHANNEL TRAVEL TIME = L/V (WHEN CHANNEL VELOCITY IS KNOWN)
4) Tc = Tco + Tt
*** IF TOTAL TIME OF CONCENTRATION IS LESS THAN 5 MINUTES, THEN 5 MINUTES IS USED
5) INTENSITY BASED ON I-D-F EQUATIONS IN CITY OF COLORADO SPRINGS DRAINAGE CRITERIA MANUAL
$I_5 = -1.5 * \ln(Tc) + 7.583$
$I_{100} = -2.52 * \ln(Tc) + 12.735$
6) Q = CiA

ACADEMY MARTIAL ARTS
STORM INLET SIZING SUMMARY

	BASIN FLOW			INLET FLOW					
INLET	DP	Q5 FLOW (CFS)	Q100 FLOW (CFS)	INLET FLOW % OF BASIN	Q5 FLOW (CFS)	Q100 FLOW (CFS)	INLET CONDITION / TYPE	INLET SIZE	INLET CAPACITY (CFS)
T1.1	1	5.3	11.3	20	1.1	2.3	SUMP TYPE 13	SGL	4.4
T1.2	1	5.3	11.3	20	1.1	2.3	SUMP TYPE 13	SGL	4.4
T1.3	1	5.3	11.3	20	1.1	2.3	SUMP TYPE 16	SGL	6.5
T1.4	1	5.3	11.3	40	2.1	4.5	SUMP TYPE R	5'	6.5

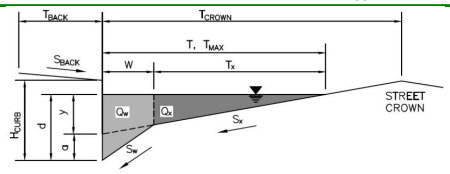
Version 4.05 Released March 2017

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

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

Project: Academy Martial Arts - Inlet T1.1-T1.2

Inlet ID: Inlet T1.1-T1.2



Gutter Geometry (Enter data in the blue cells)

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	20.0	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} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	0.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	30.0	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} =	30.0	30.0	ft
Warning 02 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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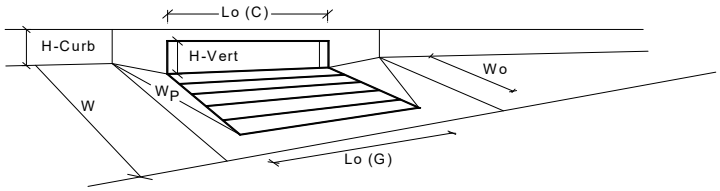


Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	CDOT/Denver 13 Valley Grate		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	8.7	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	3.00	3.00	feet
Width of a Unit Grate	W_o =	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	0.43	0.43	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	3.30	3.30	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	0.60	0.60	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	N/A	N/A	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	N/A	N/A	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	N/A	N/A	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	N/A	N/A	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p =	N/A	N/A	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C_f (C) =	N/A	N/A	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C_w (C) =	N/A	N/A	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	N/A	N/A	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	0.523	0.749	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	N/A	N/A	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	N/A	N/A	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	0.94	1.00	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**2.6**	**4.4**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.1	2.3	cfs

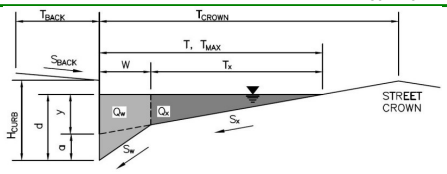
Version 4.05 Released March 2017

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

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

Project: Academy Martial Arts - Inlet T1.3

Inlet ID: Inlet T1.3



Gutter Geometry (Enter data in the blue cells)

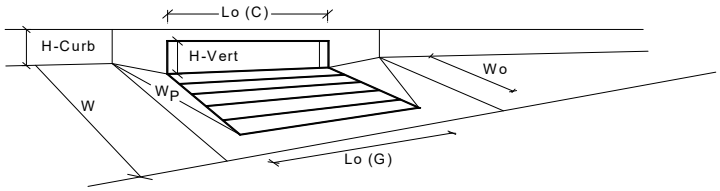
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	30.0	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} =	30.0	30.0	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

Version 4.05 Released March 2017



Design Information (Input)		MINOR	MAJOR	
Type of Inlet	Type =	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	6.0	8.7	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	3.00	3.00	feet
Width of a Unit Grate	W_o =	1.73	1.73	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	0.31	0.31	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	3.60	3.60	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	0.60	0.60	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	3.00	3.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	6.50	6.50	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	5.25	5.25	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	0.00	0.00	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) =	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.66	0.66	
Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	0.523	0.749	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.33	0.56	ft
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.94	1.00	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	1.00	1.00	
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	0.94	1.00	
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.9**	**6.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)	$Q_{PEAK\ REQUIRED}$ =	1.1	2.3	cfs

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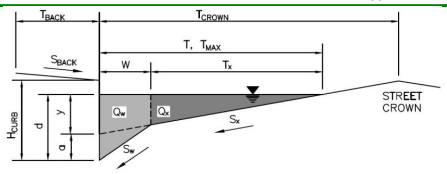
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: Academy Martial Arts - Inlet T1.4

Inlet ID: Inlet T1.4



Gutter Geometry (Enter data in the blue cells)

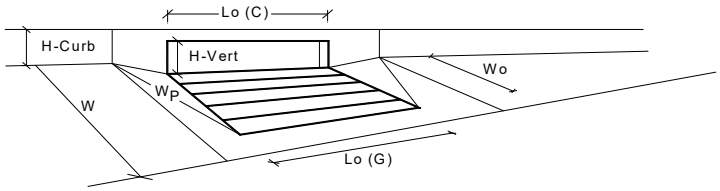
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.020	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	40.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.010	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} =	40.0	40.0	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

Version 4.05 Released March 2017



Design Information (Input)	CDOT Type R Curb Opening		MINOR	MAJOR	
Type of Inlet		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 =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	6.6	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) =	5.00	5.00	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	0.38	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.77	0.84	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	1.00	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 =**	**5.4**	**6.5**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	2.1	4.5	cfs

ACADEMY MARTIAL ARTS
STORM SEWER SIZING SUMMARY

	PIPE FLOW				PIPE CAPACITY		
PIPE	INLETS	Q5 FLOW (CFS)	Q100 FLOW (CFS)		PIPE SIZE (IN)	MIN. PIPE SLOPE	FULL PIPE CAPACITY (CFS)
T1.1	T1.1	1.1	2.3		12	1.0%	3.6
T1.2	T1.1,T1.2	2.1	4.5		12	1.6%	4.5
T1.3	T1.3	1.1	2.3		12	1.0%	3.6
T1.4	T1.1-T1.4	5.3	11.3		18	1.2%	11.5

ASSUMPTIONS:
1. STORM SEWER PIPE TO BE RCP OR HDPE

Hydraulic Analysis Report

Project Data

Project Title: Project - AMA

Designer: JPS

Project Date: Tuesday, August 2, 2022

Project Units: U.S. Customary Units

Notes:

Channel Analysis: SD-T1.1,T1.3

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Depth: 1.0000 ft

Result Parameters

Flow: 3.5628 cfs

Area of Flow: 0.7854 ft^2

Wetted Perimeter: 3.1416 ft

Hydraulic Radius: 0.2500 ft

Average Velocity: 4.5363 ft/s

Top Width: 0.0000 ft

Froude Number: 0.0000

Critical Depth: 0.8057 ft

Critical Velocity: 5.2542 ft/s

Critical Slope: 0.0103 ft/ft

Critical Top Width: 0.79 ft

Calculated Max Shear Stress: 0.6240 lb/ft^2

Calculated Avg Shear Stress: 0.1560 lb/ft^2

Channel Analysis: SD-T1.2

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.0000 ft

Longitudinal Slope: 0.0160 ft/ft

Manning's n: 0.0130

Depth: 1.0000 ft

Result Parameters

Flow: 4.5066 cfs

Area of Flow: 0.7854 ft^2

Wetted Perimeter: 3.1416 ft

Hydraulic Radius: 0.2500 ft

Average Velocity: 5.7380 ft/s

Top Width: 0.0000 ft

Froude Number: 0.0000

Critical Depth: 0.8867 ft

Critical Velocity: 6.1204 ft/s

Critical Slope: 0.0143 ft/ft

Critical Top Width: 0.63 ft

Calculated Max Shear Stress: 0.9984 lb/ft^2

Calculated Avg Shear Stress: 0.2496 lb/ft^2

Channel Analysis: SD-T1.4

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 ft

Longitudinal Slope: 0.0120 ft/ft

Manning's n: 0.0130

Depth: 1.5000 ft

Result Parameters

Flow: 11.5069 cfs

Area of Flow: 1.7671 ft^2

Wetted Perimeter: 4.7124 ft

Hydraulic Radius: 0.3750 ft

Average Velocity: 6.5116 ft/s

Top Width: 0.0000 ft

Froude Number: 0.0000

Critical Depth: 1.2935 ft

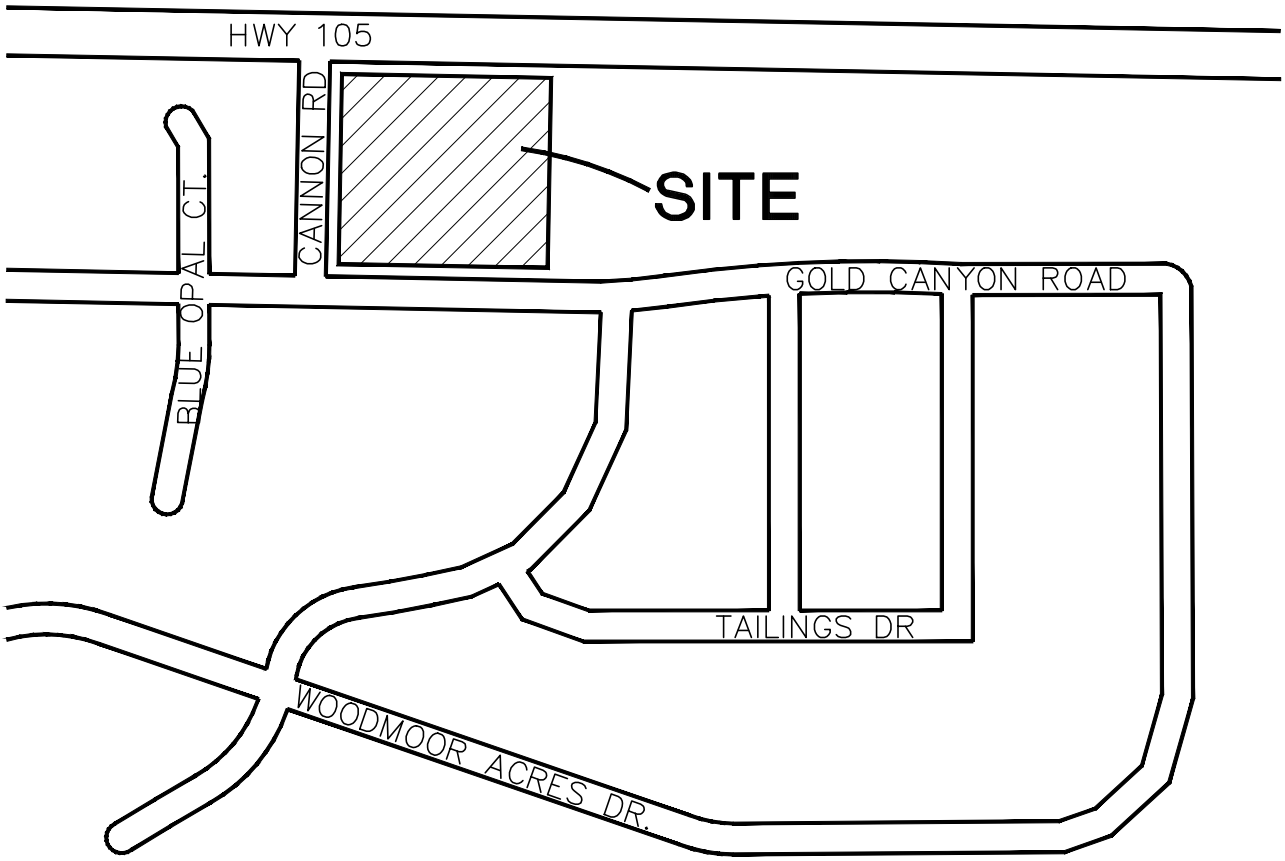
Critical Velocity: 7.1015 ft/s

Critical Slope: 0.0111 ft/ft

Critical Top Width: 1.03 ft

Calculated Max Shear Stress: 1.1232 lb/ft^2

Calculated Avg Shear Stress: 0.2808 lb/ft^2



N

NTS

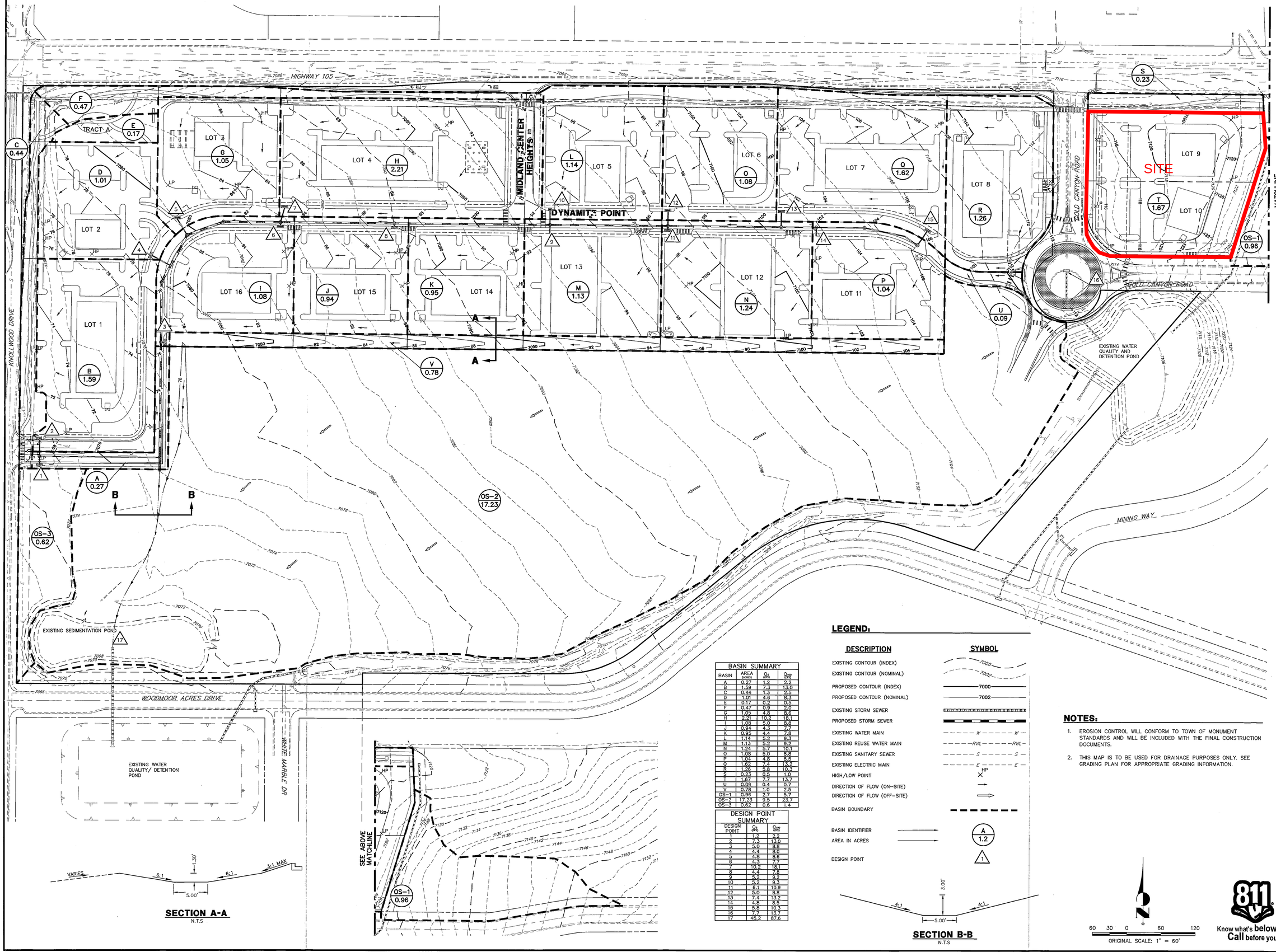
VICINITY MAP

JPS ENGINEERING

ACADEMY MARTIAL ARTS

FIGURE A1

JPS PROJ NO. 062202



SECTION A-A
N.T.S

BASIN SUMMARY			
BASIN	AREA (acres)	Q_5 (cfs)	Q_{100} (cfs)
A	0.27	1.2	2.2
B	1.59	7.3	13.0
C	0.44	1.3	2.5
D	1.01	4.6	8.3
E	0.17	0.2	0.5
F	0.47	0.9	2.0
G	1.05	4.8	8.6
H	2.21	10.2	18.1
I	1.08	5.0	8.8
J	0.94	4.3	7.7
K	0.95	4.4	7.8
L	1.14	5.2	9.3
M	1.13	5.2	9.2
N	1.24	5.7	10.1
O	1.08	5.0	8.8
P	1.04	4.8	8.5
Q	1.62	7.5	13.2
R	1.26	5.8	10.3
S	0.23	0.5	1.0
T	1.67	7.7	13.7
U	0.09	0.4	0.7
V	0.78	1.0	2.5
OS-1	0.96	2.7	5.7
OS-2	17.23	9.5	23.7
OS-3	0.62	0.6	1.4

DESIGN POINT SUMMARY		
DESIGN POINT	Q_5 (cfs)	Q_{100} (cfs)
1	1.2	2.2
2	7.3	13.0
3	5.0	8.8
4	4.4	8.0
5	4.8	8.6
6	4.3	7.7
7	10.2	18.1
8	4.4	7.8
9	5.2	9.2
10	5.2	9.3
11	6.1	10.9
12	5.0	8.8
13	7.4	13.2
14	4.8	8.5
15	5.8	10.3
16	7.7	13.7
17	45.2	87.6

LEGEND:

DESCRIPTION	SYMBOL
EXISTING CONTOUR (INDEX)	7000
EXISTING CONTOUR (NOMINAL)	7002
PROPOSED CONTOUR (INDEX)	7000
PROPOSED CONTOUR (NOMINAL)	7002
EXISTING STORM SEWER	
PROPOSED STORM SEWER	
EXISTING WATER MAIN	W
EXISTING REUSE WATER MAIN	RWL
EXISTING SANITARY SEWER	S
EXISTING ELECTRIC MAIN	E
HIGH/LOW POINT	HP
DIRECTION OF FLOW (ON-SITE)	
DIRECTION OF FLOW (OFF-SITE)	
BASIN BOUNDARY	
BASIN IDENTIFIER	A
AREA IN ACRES	1.2
DESIGN POINT	1

SECTION B-B
N.T.S

NOTES:

1. EROSION CONTROL WILL CONFORM TO TOWN OF MONUMENT STANDARDS AND WILL BE INCLUDED WITH THE FINAL CONSTRUCTION DOCUMENTS.
2. THIS MAP IS TO BE USED FOR DRAINAGE PURPOSES ONLY. SEE GRADING PLAN FOR APPROPRIATE GRADING INFORMATION.

ORIGINAL SCALE: 1" = 60'

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

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE APPROPRIATE REVIEWING AGENCIES, J.R. ENGINEERING APPROVES THEIR USE FOR CONSTRUCTION PURPOSES DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR
MAG II MONUMENT, LLC
721 EMERSON ROAD, SUITE 100
ST. LOUIS, MO 63141
ATTN: LEE WIELANSKY
(314) 576-8600

J·R ENGINEERING
A Westrian Company
7200 S. Alton Way, Suite C100, • Centennial, CO 80112
303-740-2888 • Fax 303-721-8019
www.jrengineering.com

No.	REVISION	BY	DATE
1	REVISED PER SUBMITTAL COMMENTS	GLY	01/20/10
2	REVISED PER SUBMITTAL COMMENTS	GLY	03/08/10

H-SCALE	1"=60'
V-SCALE	N/A
DATE	08/13/08
DESIGNED BY	GLY
DRAWN BY	GLY
CHECKED BY	

VILLAGE CENTER FILING NO. 4

PROPOSED CHARACTERISTICS DRAINAGE MAP

SHEET 1 OF 1
JOB NO. 29949.04

X:\29XXXXX.##\29949##\Drawings\Sheet Dwgs\Drainage Maps\29949##Map01.dwg, 30x42 CivilArchitect, 8/8/2013 12:55:19 PM, yanfang

BENCHMARK:
PK NAIL IN STORM INLET
ELEV.=7113.02'

PROPOSED TYPE 16
STORM INLET T1.3
GR EL=7115.4

HWY 105
(ROW VARIES)

MVEA EASEMENT 210713065
OVERLAPS EASEMENT
REC. NO. 207088683

EL PASO COUNTY PERMANENT
EASEMENT REC. NO.
220094585

EXCEPTION: TO EL PASO
COUNTY REC. NO.:
2220094584

FOUND NO.5 PIN
W/RPC 38064

PEDESTRIAN
RAMP, REFER
TO CIVIL PLAN
DETAILS

NEW 5'-0"
DETACHED
SIDEWALK

CURB &
GUTTER

END CURB &
GUTTER

STORM
INLET

STORM
INLET TYPE C
GRATE ELEV. =7118.79'
30" RCP S. I.E. =7114.95'

168 LF 12" HDPE
STORM SEWER T1.3

NEW 5'-0"
ATTACHED
SIDEWALK

ASPHALT

TRASH
ENCLOSURE
SEE DTL 8/12

4'-0"
CONCRETE
SIDE WALK

SIGN

PROPOSED
BUILDING
9,000 SF
(10,380 SF-GROSS)
FF=7118.0
4,560 SF

LOT 9

T
1.8
AC.

(VACANT)

HANDICAP
SIGN, TYP. SEE
DTL 3/12

1,440 SF | 1,500 SF | 1,500 SF

BIKE RACK
SEE DTL
6/12

PROPOSED
TYPE 13
STORM INLET T1.1
GR EL=7116.7

PROPOSED
4' CROSSPAN

PROPOSED
12" HDPE STORM
SEWER T1.1

PROPOSED
TYPE 13
STORM INLET T1.2
GR EL=7116.7

PROPOSED
4' CROSSPAN

12" HDPE STORM
SEWER T1.2

PEDESTRIAN
RAMP, TYP. SEE
DTL 7/12

LOT 10

PROPOSED
4' CROSSPAN

PROPOSED 5' TYPE R
STORM INLET T1.4

NEW 5'-0"
ATTACHED
SIDEWALK

SANITARY MANHOLE
RIM ELEV.= 7115.63'
8" PVC N/S I.E.=7106.38'

FIBER OPTIC
CONDUIT

ASPHALT

ASPHALT

END CURB &
GUTTER

PEDESTRIAN
RAMP

18" HDPE STORM
SEWER T1.4

NEW 5'-0"
ATTACHED
SIDEWALK

NEW 5'-0"
ATTACHED
SIDEWALK

Δ=89°30'24"
R=82.00'
L=128.10'

GOLD CANYON ROAD
(60'-0" WIDE)

PEDESTRIAN
RAMP, REFER
TO CIVIL PLAN
DETAILS

PROPOSED 6'
CROSSPAN

SIDEWALK
W/RAMPS

EXISTING PUBLIC
STORM INLET

EXISTING 8" PVC
PUBLIC WW MAIN

SANITARY MANHOLE
RIM ELEV.=
7114.46'
8" PVC W/N
I.E.=7103.68'

SITE BENCHMARK
PK NAIL IN CURB HEAD
ELEV.=7130.55'

SITE BENCHMARK
PK NAIL IN
STORM INLET
ELEV.=7113.02'

EXTEND TO DAYLIGHT IN
EXISTING DETENTION
POND W/ 18" FES &
RIPRAP APRON

MORNING CANYON ROAD
(60'-0" WIDE)

FOUND NO.5 PIN
W/RPC 38064

20.0'
DRAINAGE
AND TRAIL
EASEMENT
REC. NO.
206712452

20.0'
DRAINAGE
EASEMENT

20' DRAINAGE AND TRAIL
EASEMENT REC NO 206712452

40' DRAINAGE AND TRAIL EASEMENT

OT1
0.3
AC.

PHILLIP W TATE
17935 BLUE OPAL CT
PARCEL NO: 71133-07-003
ZONE: PUD
USE: SINGLE FAMILY RESIDENT

LEE SANTILLAN
17921 BLUE OPAL CT
PARCEL NO: 71133-07-002
ZONE: PUD
USE: SINGLE FAMILY RESIDENT

JOSEPH HERRERA
17907 BLUE OPAL CT
PARCEL NO: 71133-07-001
ZONE: PUD
USE: SINGLE FAMILY RESIDENT

METRO DIST VILLAGE CENTER
14837 BLUE OPAL CT.
PARCEL NO: 71133-03-047
ZONE: PUD
USE: POLITICAL SUBDIVISION

TOWN OF MONUMENT
907 GOLD CANYON RD
PARCEL NO: 71133-03-001
ZONE: PUD
USE: POLITICAL SUBDIVISION

JEREMY C. POWELL
17886 MINING WAY
PARCEL NO: 71133-03-019
ZONE: PUD
USE: SINGLE FAMILY RESIDENT

TOWN OF MONUMENT
888 GOLD CANYON RD
PARCEL NO: 71133-01-079
ZONE: PUD
USE: POLITICAL SUBDIVISION

VICINITY MAP
NTS

20' 0 20' 40'
ORIGINAL SCALE: 1"=20' (24"x36" SHEET)
CONTOUR INTERVAL: 1'

LEGEND

- FEMA 100-YEAR FLOODWAY
- FEMA 100-YR FLOODPLAIN
- PROPERTY BOUNDARY
- DRAINAGE BASIN BOUNDARY
- 7140 PROPOSED CONTOUR
- 7140 EXISTING CONTOUR
- FLOWLINE
- FLOW DIRECTION ARROW
- 1 DESIGN POINT
- A / 1.3 AC. BASIN DESIGNATION
- BASIN AREA (ACRES)

IMPERVIOUS AREA CALCULATIONS:
TOTAL BASIN T AREA = 1.8 AC.

SURFACE TYPE	AREA
SIDEWALK	5,296 SF
BUILDING	9,000 SF
ASPHALT	36,068 SF
TOTAL IMPERVIOUS AREA	50,364 SF = 1.2 AC

= 67%

SUMMARY HYDROLOGY TABLE

DESIGN POINT	Q5 (CFS)	Q100 (CFS)
1	5.3	11.3

NOTE: ALL PROPOSED DRAINAGE FACILITIES ARE PRIVATE UNLESS NOTED OTHERWISE.

ACADEMY MARTIAL ARTS
LOTS 9-10, VILLAGE CENTER AT WOODMOOR FILING NO. 4
DEVELOPED DRAINAGE PLAN

JPS ENGINEERING
19 E. Willamette Ave.
Colorado Springs, CO
80903
PH: 719-477-9429
FAX: 719-471-0766
www.jpsengr.com

CALL UTILITY NOTIFICATION CENTER OF COLORADO
1-800-922-1987
CALL 2 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

NO.	REVISION	BY	DATE

HORZ. SCALE: 1"=20'	DRAWN: PV
VERT. SCALE: N/A	DESIGNED: JPS
SURVEYED: RIDGELINE	CHECKED: JPS
CREATED: 06/07/22	LAST MODIFIED: 08/25/22
PROJECT NO: 062202	MODIFIED BY: PV

SHEET: D1