PRELIMINARY STORM WATER MANAGEMENT CALCULATIONS
FOR

NUVO MARGATE SELF STORAGE

MARGATE, FLORIDA
MMA #15-25

June 24, 2016
Revised:
N/A

McLeod • McCarthy & Associates
1655 Palm Beach Lakes Blvd, Suite 712
West Palm Beach, FL 33401
p 561.689.9500 | f 561.689.8080
www.mcleodmccarthy.com
CA No. 30535

McLEOD • McCARTHY
& Associates, P.A.
CIVIL ENGINEERS

TODD N. MCLEOD, P.E.
Florida License No. 69188
6/24/2016
Date

McLeod • McCarthy & Associates, P.A.
Civil Engineers

June 24, 2016

Re: Drainage Statement for Nuvo Margate Self Storage
State Road 7, Margate, Florida (MMA #16-010)

Site Description

The Riverside Storage site is located at the northeast corner of State Road 7 and SW 8th Court in the City of Margate, Florida. The subject site is 2.80 acres and is currently vacant. A dry swale providing drainage for State Road 7 occupies the western 0.48 acres of the site and is within an FDOT drainage easement. The site generally slopes from north to south with existing topography ranging between elevations 9.00 and 12.00 NAVD.

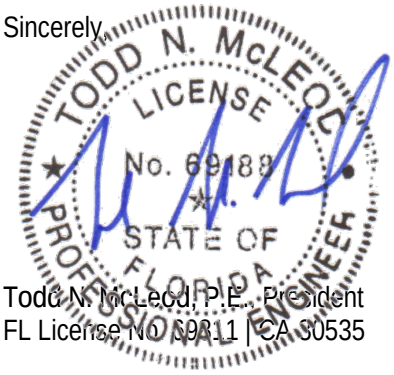
Site Drainage

The site is within the boundaries of the South Florida Water Management District (SFWMD) C-14 Basin. The site will be developed to support a mix of self storage (Phase I) and commercial uses (Phase II). The site development will include excavation of a dry retention area and installation of exfiltration trench. For the purposes of the enclosed stormwater management calculations, the 0.48 acres encompassed by the FDOT drainage ditch has been classified as non-contributing area as it will not connect to the proposed on-site stormwater management system. Drainage design will address the following criteria:

- Collection, conveyance, and treatment of stormwater runoff for the project area via a network of inlets, culverts, exfiltration trench and dry retention.
- Water Quality Treatment in accordance with SFWMD, FDOT, City and County requirements
- Perimeter Berms meeting 25 year – 3 day flood criteria with no increase in post-development stages
- Finished Floor Elevations for all buildings set above the 100 year – 3 day (zero discharge) stage
- Parking Lots set above 5 year – 1 day flood stage

If you have any questions regarding this application, feel free to contact me at 561.689.9500 or todd@mcleodmccarthy.com.

Sincerely,



Todd N. McLeod, P.E., President
FL License No. 69811 | CA 30535

The Forum III | 1655 Palm Beach Lakes Blvd, Suite 712 | West Palm Beach, FL 33401
T 561 689 9500 | F 561 689 8080
todd@mcleodmccarthy.com • www.mcleodmccarthy.com

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Engineer: TNM
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LAND USE BREAKDOWN

PROPOSED

Site Area = 2.80 ac
Non-Contributing Area = 0.48 ac (SR 7 Swale & Sidewalk)
Basin Area = 2.32 ac

		Acres	%	Grading From	Grading To
Impervious Area					
	Building	0.65 ac	(28%)	12.50	
	Pavement	0.68 ac	(29%)	11.00	12.00
Pervious Area					
	Green Space	0.67 ac	(29%)	9.50	12.00
	Dry Detention	0.21 ac	(9%)	8.50	
	Detention Banks	0.11 ac	(5%)	8.50	11.00
Subtotal Impervious Areas		1.33 ac	(57%)		
Subtotal Pervious Areas		0.99 ac	(43%)		

Find Curve Number:

Avg. Pervious Ground El. = 10.16
Control EL. = 7.50
Depth to Water Table = 2.66
Soil Type = Flatwoods

Soil Storage Table

(SFWMD's Vol. IV, Basis of Review, page E-2)

Depth to W.T. (ft)	Coastal Storage (in)	Flatwoods Storage (in)	Depression Storage (in)
1.0	0.6	0.6	0.6
2.0	2.5	2.5	2.1
3.0	6.6	5.4	4.4
4.0	10.9	9.0	6.8

Pervious Area = 0.99 ac
Storage from Table = 3.31 in (w/ 25% compaction)
Avail Soil Storage = 0.27 af
Soil Moisture Storage (S) = 1.41 in
Curve Number = 88

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STAGE -STORAGE CALCULATIONS

PROPOSED

Starting Stage	7.50
Ending Stage	13.50
Stage Increment	0.50

Name	Pavement	Green Space	Dry Detention	Detention Banks	Trench	
Area	0.68	0.67	0.21	0.11	0.28 (AF)	
Start Elev	11.00	9.50	8.50	8.50	7.50	
End Elev	12.00	12.00	0.00	11.00	9.50	
Stage Feet NAVD	Linear Storage Ac-ft	Linear Storage Ac-ft	Vert Storage Ac-ft	Linear Storage Ac-ft	Linear Storage Ac-ft	Total Storage Ac-ft
7.50	0.00	0.00	0.00	0.00	0.00	0.00
8.00	0.00	0.00	0.00	0.00	0.07	0.07
8.50	0.00	0.00	0.00	0.00	0.14	0.14
9.00	0.00	0.00	0.11	0.01	0.21	0.32
9.50	0.00	0.00	0.21	0.02	0.28	0.51
10.00	0.00	0.03	0.32	0.05	0.28	0.68
10.50	0.00	0.13	0.42	0.09	0.28	0.92
11.00	0.00	0.30	0.53	0.14	0.28	1.24
11.50	0.09	0.54	0.63	0.19	0.28	1.72
12.00	0.34	0.84	0.74	0.25	0.28	2.44
12.50	0.68	1.17	0.84	0.30	0.28	3.28
13.00	1.02	1.51	0.95	0.36	0.28	4.11
13.50	1.36	1.84	1.05	0.41	0.28	4.95

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POST-DEVELOPMENT RUNOFF (ZERO DISCHARGE CALCULATIONS)

Soil Moisture Storage (S_{prop})	1.41 in	
5 Year, 1 Day Rainfall Amount (P):	7.0 in	Figure C-3
25 Year, 3 Day Rainfall Amount (P):	14.0 in	Figure C-8
100 Year, 3 Day Rainfall Amount (P):	18.0 in	Figure C-9

PARKING LOT: 5-YEAR, 1-DAY RUNOFF CALCULATIONS (PER SFWMD):

Proposed:

Q = (P-(0.2XS))2 / (P+(0.8*S))

= 5.5 in

Volume = Q x Site Area x 1'/12"

= 5.5 in X 2.32 X 1'/12" = 1.07 AF

PERIMETER BERM: 25-YEAR, 3-DAY RUNOFF CALCULATIONS:

Proposed:

Q = (P-(0.2XS))2 / (P+(0.8*S))

= 12.4 in

Volume = Q x Site Area x 1'/12"

= 12.4 in X 2.32 X 1'/12" = 2.40 AF

FINISHED FLOORS: 100-YEAR, 3-DAY RUNOFF CALCULATIONS:

Proposed:

Q = (P-(0.2XS))2 / (P+(0.8*S))

= 16.4 in

Volume = Q x Site Area x 1'/12"

= 16.4 in X 2.32 X 1'/12" = 3.17 AF

RAINFALL/ ROUTING SUMMARY (See attached CASCADE routings)

Interpolated from Stage vs. Storage Table

Storm Event	Rainfall (in)	Peak Stage (ft-NAVD)	Peak Discharge (cfs)	Design Criteria	Prop Stage (ft-NAVD)
5-yr, 1-day =	7.0	10.75	0.00	Min. Parking Lot Grade	11.00
25-yr, 3-day =	14.0	11.95	0.00	Min. Perimeter Grade	12.00
100-yr, 3-day =	18.0	12.40	0.00	Finished Floors - Zero Discharge	12.50

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WATER QUALITY CALCULATIONS

1-inch Over the Project Area

(Treated Volume) 1-inch * 1-ft/12-in * 2.32 (PROJECT AREA (AC)) = 0.19 (TREATED VOLUME) ac-ft

2.5-inches Times the Percent Impervious

(Site Area) 2.32 (PROJECT AREA (AC)) - (0.00 (LAKES (AC)) + 0.65 (ROOFS (AC))) = 1.67 (SITE AREA) ac

(Impervious Area) 1.67 (SITE AREA (AC)) - 0.99 (PERVIOUS AREA (AC)) = 0.68 (IMPERVIOUS AREA) ac

(% Impervious) IMPERVIOUS AREA * 100% / SITE AREA (AC) = 40.72%

(2.5-in * % Imp.) 2.5-inches * 40.72% (PERCENT IMPERVIOUS) = 1.02 (INCHES TO BE TREATED) in

(Treated Volume) 1.02 (TREATED (IN)) * 1-ft/12-in * 2.32 (PROJECT AREA - LAKES (AC)) = 0.20 (TREATED VOLUME) ac-ft

THEREFORE 2.5-INCHES X %IMP GOVERNS

Required WQ Treatment = 0.20 ac-ft

Required Retention (50% credit) = 0.10 ac-ft

Provided WQ Treatment (Via Retenion @ TOB EL. 11.00) = 1.24 ac-ft

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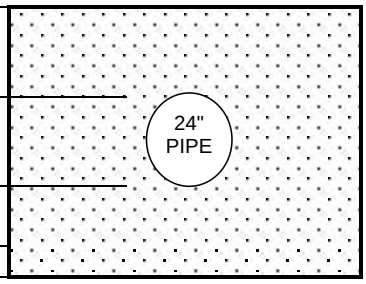
EXFILTRATION TRENCH DESIGN

Minimum Ground Elevation = 11.00
Weir Elevation = 11.00
Trench Top Elevation = 9.50
Pipe Overt Elevation = 9.00
Pipe Invert Elevation = 7.00
CWE (SFWMD Files) = 7.50
Trench Bottom Elevation = 5.50



Standard Formula

$L = V/(K(H_2*W+2*H_2*Du-Du^{\wedge 2}+2*H_2*Ds)+(1.39*10^{\wedge -4})*W*Du)$

<=== INPUT ONLY IN GRAY CELLS

V	Volume Treated (acre-in) (3 Yr - Hr Vol.)	7.42	(Max. Allow. Vol. = 2.32 x 3.2")
W	Trench Width (feet)	8	
K	Hydraulic Conductivity (cfs/ft^2-ft.head)	7.05E-05	
H_2	Depth to Water Table (feet)	3.50	<=== H_2 can extend no lower than the CWE
Du	Non Saturated Trench Depth (feet)	2.00	
Ds	Saturated Trench Depth (feet)	2.00	

L Maximum Length of Trench Allowed 1260

$V = L*(K(H_2*W+2*H_2*Du-Du^{\wedge 2}+2*H_2*Ds)+(1.39*10^{\wedge -4})*W*Du)$

<=== INPUT ONLY IN GRAY CELLS

L	Length of Trench Provided	572
W	Trench Width (feet)	8
K	Hydraulic Conductivity (cfs/ft^2-ft.head)	7.05E-05
H_2	Depth to Water Table (feet)	3.5
Du	Non Saturated Trench Depth (feet)	2
Ds	Saturated Trench Depth (feet)	2

V Volume Treated (acre-in) 3.37
Volume Treated (acre-ft) 0.28