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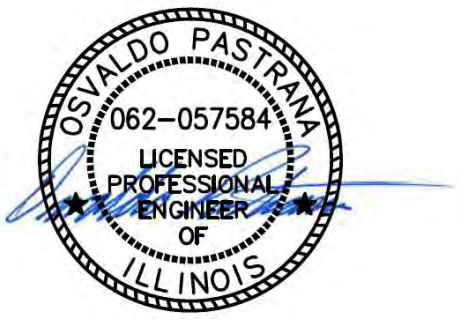
FINAL STORMWATER MANAGEMENT ANALYSIS
PROPOSED BANK DEVELOPMENT
630 W. NORTHWEST HIGHWAY
VILLAGE OF ARLINGTON HEIGHTS, IL 60004

Prepared: December 10, 2021



DATE: 12-10-2021
EXPIRES: 02-28-2022

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PART I - SUMMARY

INTRODUCTION

The Proposed Bank Development will be a new approximately 4,177 sf bank building and associated three drive-thru aisles and 15-space parking lot. The Project will be developed on a 0.554-acre parcel located in the southeast quarter of Section 30, Township 42 North, Range 11 East of the Third Principal Meridian in the Village of Arlington Heights, Cook County, IL. The common address of the property is 630 W. Northwest Highway, Arlington Heights, IL 60004. The parcel is generally bounded by Euclid Avenue to the north, commercial/retail to the east and west, a single residential lot also to the east, commercial/retail to the southeast and Northwest Highway to the southwest.

This report has been prepared for the purpose of providing a discussion of the methodology used and the design assumptions considered in managing the drainage across this site.

EXISTING CONDITIONS

As shown on Civil Engineering Plans (the Plans), the site currently consists of an existing 8,089 sf one story brick commercial building and 14-space parking lot. The building is currently vacant and was previously used as an auto repair facility. As a result of this prior usage, the site has a history of underground storage tank usage and LUST incidents. The site is currently 100 percent impervious surface and does not have any existing detention storage or storm collection structures on-site.

As further noted on the Plans and on exhibit "EDC – Existing Drainage Conditions" located in Part II of this report, the site currently drains un-detained in two directions. There is a summit at the approximate center of the site that sends runoff from 0.212 acres north towards Euclid Avenue and the remaining 0.342 acres are directed south towards Northwest Highway. Runoff from these areas is then collected in an existing underground storm sewer system along the roadways or continues off-site along existing overflow locations depending on the severity of the storm event.

As further noted on exhibit EDC, the calculated un-detained existing 100-yr runoff to Euclid Avenue is 2.49 CFS and 4.02 CFS to Northwest Highway.

PROPOSED CONDITIONS

As can be seen on the Plans and as previously described, in the proposed with-development conditions, the site will consist of a new approximately 4,177 sf bank building and associated three

drive-thru aisles and 15-space parking lot. Runoff from the proposed improvements will be collected in a new oversized underground storm sewer system and released via an outlet control structure with the Village's minimum allowed 2" restrictor orifice into the existing storm sewer along Northwest Highway.

The Village of Arlington Heights Stormwater Regulations require that detention be provided for all new development and re-development using an allowable release rate of 0.18 CFS/AC. As noted on the rational method calculation sheet located in Part II of this report, with an allowable release rate of 0.099 CFS the proposed improvements would require approximately 0.24 AC-FT (10,455 CF) of detention volume. The Village stormwater regulations limit the minimum restrictor size to 2". Based on the size of the site being just over half an acre, the restrictor necessary to provide the allowable release rate would be smaller than 2".

There are several site constraints that make it unfeasible to provide the required detention for this site. The previously mentioned environmental concerns caused by the historical UST's. Because of this prior possible contamination, site excavation and dirt movement should be minimized as much as possible which would not be the case by having to install a significant underground detention system. The site appears to be at a high spot in the Village and as such the storm sewer systems along Euclid and Northwest Highway that are available to connect to are very shallow. Because of how shallow the connection points are, it is not possible to provide an underground detention system with more than 2' of elevation change and still maintain appropriate cover over the system. This would require a shallow plastic pipe or arch system to be installed beneath the majority of the site, including the drive-aisles and parking areas. The Village requires that any detention storage system located under pavement must be designed to AASHTO HS-25 loading standard. Because of the shallow connection point and minimal cover over the systems that would result, it is not possible to find a pre-manufactured system that would be able to support that loading. A deep underground system with stormwater pumps would also not be possible for this site due to a relatively shallow ground elevation based on prior and recent soil borings.

As a result of the previously noted challenges, the design proposed to control the runoff in the following fashion: As noted on the plans and storm sewer calculations located in Part II of this report, the proposed storm sewer pipes have been upsized to provide as much volume storage as possible and maintain a minimum of 1' of cover over the pipes. This upsizing will result in available storage volume of 1,287 CF. This design also allows for the use of the minimum allowed 2" restrictor without surcharging the system or overtopping any of the structures. The 100-year storm would be fully collected and contained within the pipes and the release into the existing sewer along Northwest Highway would be controlled by the outlet control structure with the 2" restrictor. To prevent clogging of the restrictor, the outlet control structure design incorporates a perforated standpipe as noted on the detail on the plans. This standpipe configuration has been used successfully on many projects throughout Illinois to prevent clogging of small size restrictor configurations.

As noted on Exhibit PDC-Proposed Drainage Conditions, the final improvements will result in three separate sub-areas. Subarea-1 will be a very small area at the northeast corner that cannot be directed to the proposed storm sewer and would runoff undetained to Euclid Avenue. This small undetained drainage area will have a 100-YR flow to Euclid of 0.08 CFS which is significantly less than the 2.49 CFS flow under existing conditions. Subarea-2 includes the majority of the site (0.53 acres) which will be directed to and contained within the proposed underground storm sewer system. This system would release a 100-YR flow of 0.172 CFS through the 2" restrictor directly into the existing Northwest Highway storm sewer system. Subarea-3 would be a small undetained area that would sheet flow directly to Northwest Highway. This area will generate a 100-YR flow to Northwest Highway of 0.09 CFS. When combined with the controlled release, the total flow to Northwest Highway by the proposed improvement will be 0.262 CFS which is significantly less than the 4.02 CFS

Although the total calculated detention volume cannot be provided due to site constraints, the calculations show that the maximized amount of provided storage will be able to safely collect, contain and release the site runoff without surcharging or overtopping any structure or causing any detrimental impacts to downstream properties. As the calculations show the viability of the proposed design, the development team will request that the Village allow a variance for the reduced detention volume and consider a fee-in-lieu of amount for the remaining detention volume that cannot be provided.

UNDERGROUND STORM SEWER DESIGN

The proposed underground storm sewer system for the project was designed with enough capacity to collect, contain and pass the 100-year storm without overtopping any of the structures. Please refer to the storm sewer design spreadsheets included in Part II of this report for all calculations. All design rainfall events are based on the Illinois State Water Survey's Bulletin 75 values for Northeast Illinois.

Furthermore, as previously noted, because the runoff needs to be collected and stored within the proposed underground detention system, an analysis was performed to demonstrate that the storm sewer system with 2" restrictor will function properly without overtopping any of the structures during the 100-yr storm event.

WETLANDS

As shown in Exhibit WL-1 National Wetland Inventory Map included in Part II of this report, there do not appear to be any wetlands in the vicinity of the project location.

FLOODPLAIN

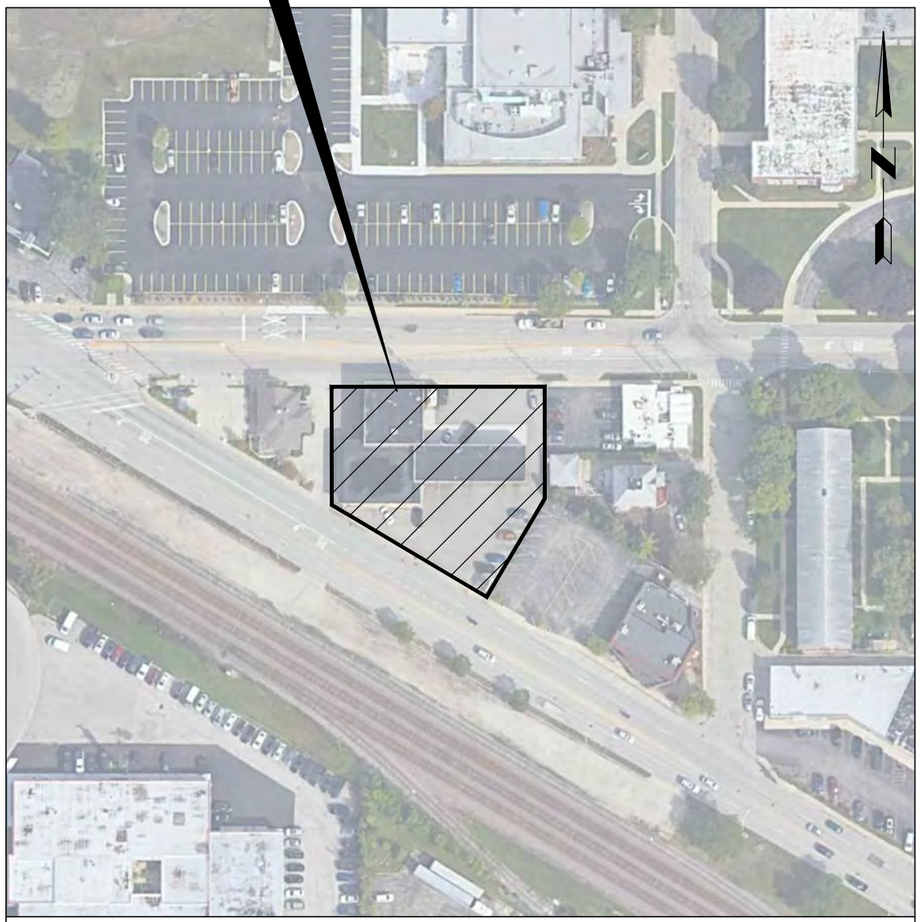
As shown on Exhibit FM-1 FEMA Flood Insurance Rate Map included in Part II of this report, in accordance with FIRM Panel 17031C0203J with effective date of August 19, 2008 there is no regulatory floodplain or floodway on the subject property.

CONCLUSION

The proposed drainage improvements, underground storm sewer and detention system for the Proposed Bank Development described in this report have been designed to collect, convey and manage accumulated runoff from the project in substantial accordance with the Stormwater Regulations. It is our professional opinion that this report and the exhibits and technical analyses presented herein demonstrate that this Proposed Bank Development, when fully constructed, will meet the intent of the current stormwater management requirements, will present no detrimental impacts downstream or to adjacent properties and should be granted approval.

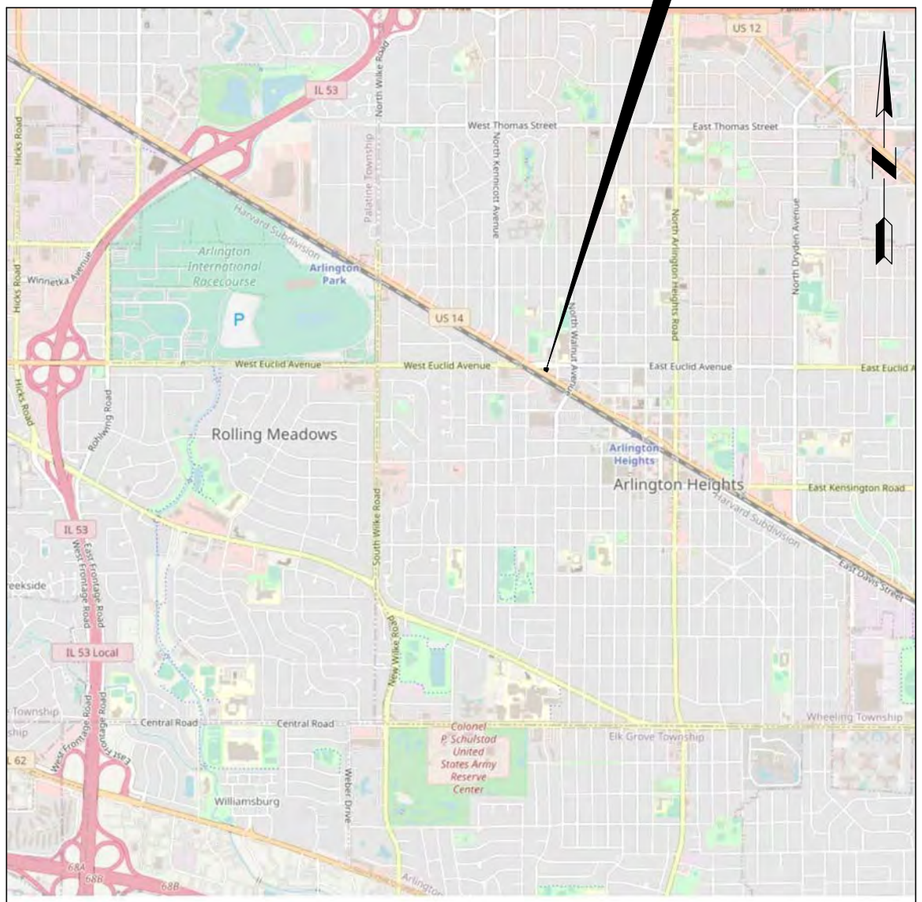
PART II – EXHIBITS

PROJECT LOCATION



AERIAL MAP N.T.S.

PROJECT LOCATION



VICINITY MAP N.T.S.

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SITE LOCATION MAPS

PROPOSED BANK DEVELOPMENT

630 W. NORTHWEST HIGHWAY, ARLINGTON HEIGHTS, IL

SHEET NO. SL-1

DRAWN BY:	OP	DATE:	12-10-2021	SCALE:	N.T.S.	PROJ. MGR.:	OP	PROJECT #:	21022

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USGS TOPOGRAPHIC SURVEY

PROPOSED BANK DEVELOPMENT

630 W. NORTHWEST HIGHWAY, ARLINGTON HEIGHTS, IL

SHEET NO. TS-1

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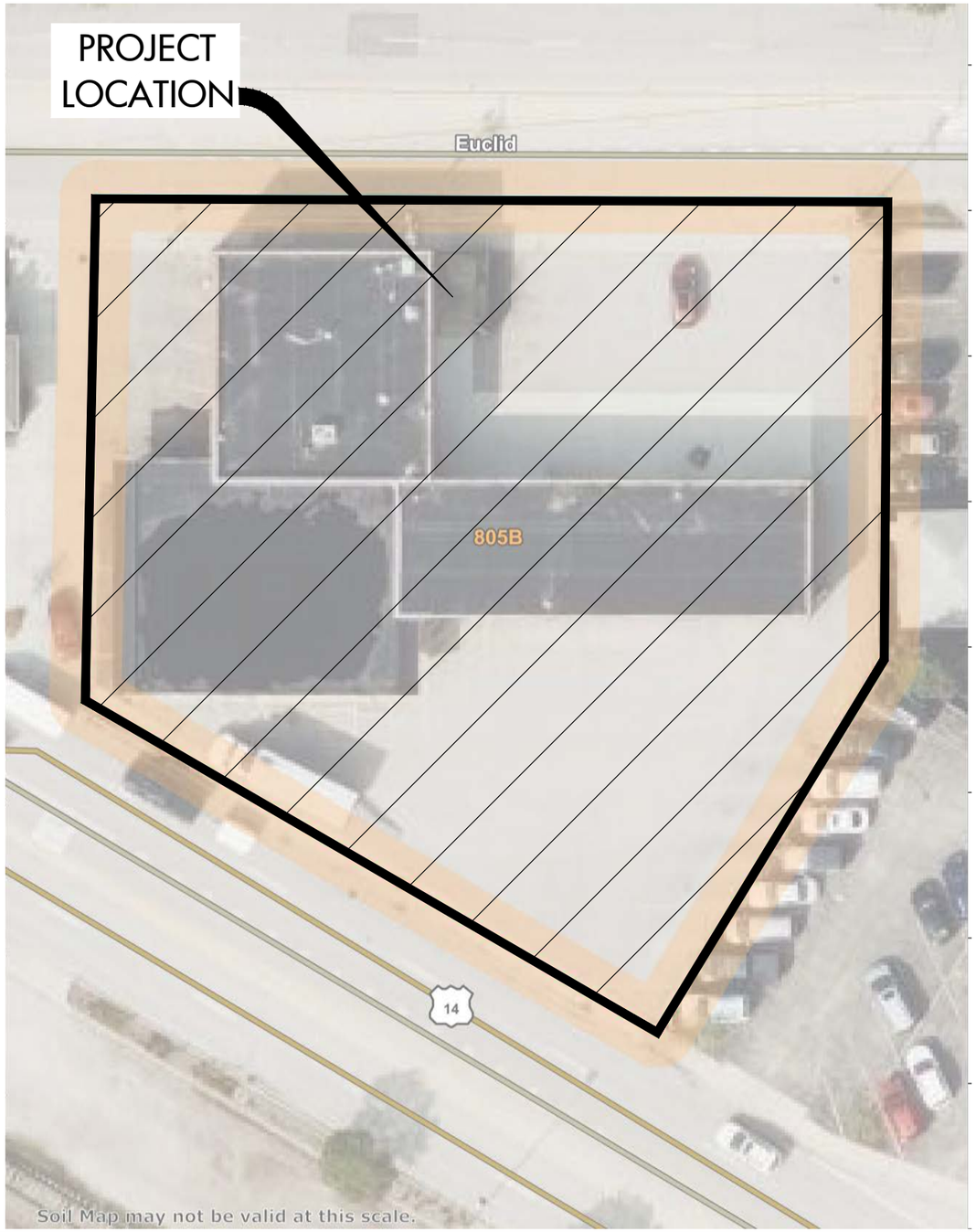

Map Unit Legend	
805B	Orthents, clayey, undulating

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NRCS SOILS MAP

PROPOSED BANK DEVELOPMENT

630 W. NORTHWEST HIGHWAY, ARLINGTON HEIGHTS, IL

SHEET NO.

SM-1

DRAWN BY:	OP	DATE:	12-10-2021	SCALE:	N.T.S.	PROJ. MGR.:	OP	PROJECT #:	21022

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0203J

FIRM

FLOOD INSURANCE RATE MAP

COOK COUNTY, ILLINOIS

AND INCORPORATED AREAS

PANEL 203 OF 832

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ARLINGTON HEIGHTS, VILLAGE OF	170056	0203	J
MOUNT PROSPECT, VILLAGE OF	170129	0203	J

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

MAP NUMBER 17031C0203J

MAP REVISED AUGUST 19, 2008

Federal Emergency Management Agency

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FEMA FLOOD INSURANCE RATE MAP

PROPOSED BANK DEVELOPMENT

630 W. NORTHWEST HIGHWAY, ARLINGTON HEIGHTS, IL

SHEET NO. FM-1

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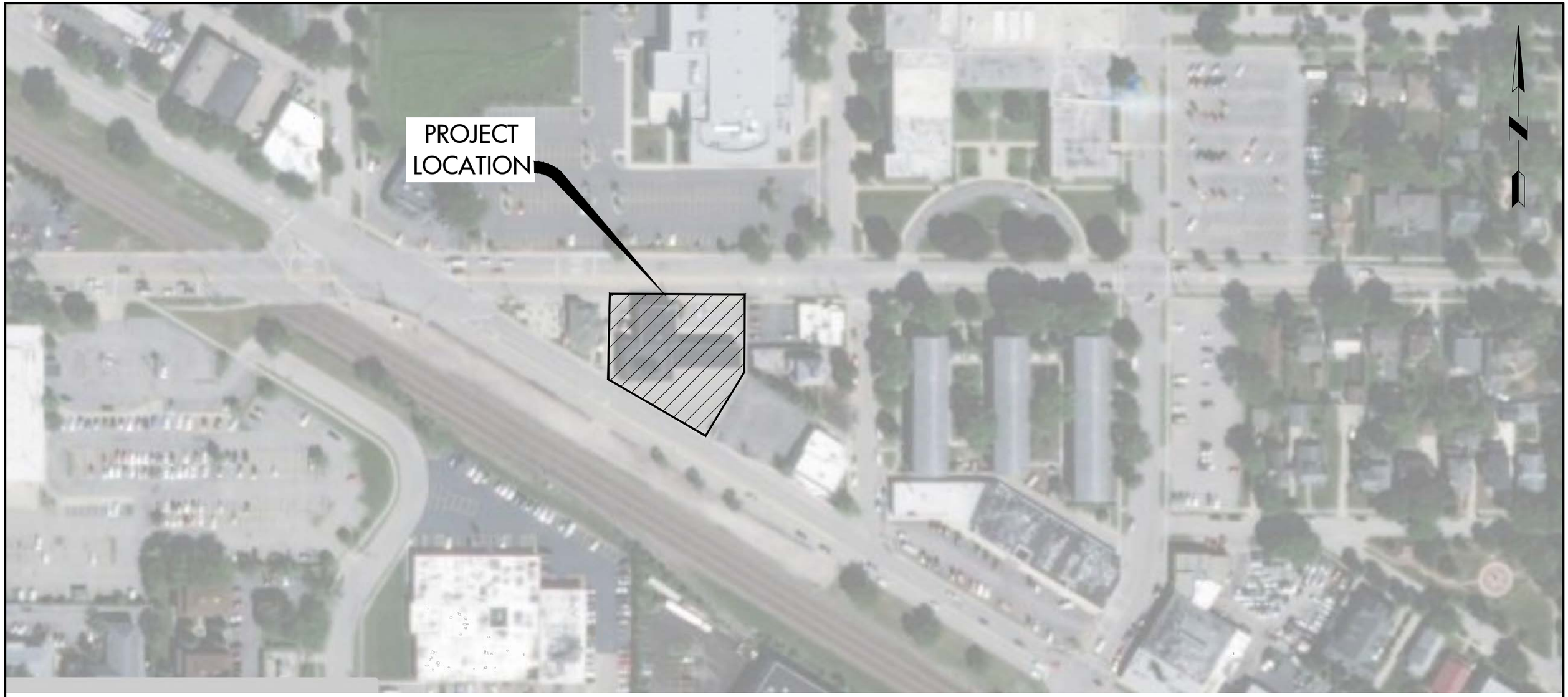

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

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NATIONAL WETLAND INVENTORY MAP

PROPOSED BANK DEVELOPMENT

630 W. NORTHWEST HIGHWAY, ARLINGTON HEIGHTS, IL

SHEET NO. WL-1

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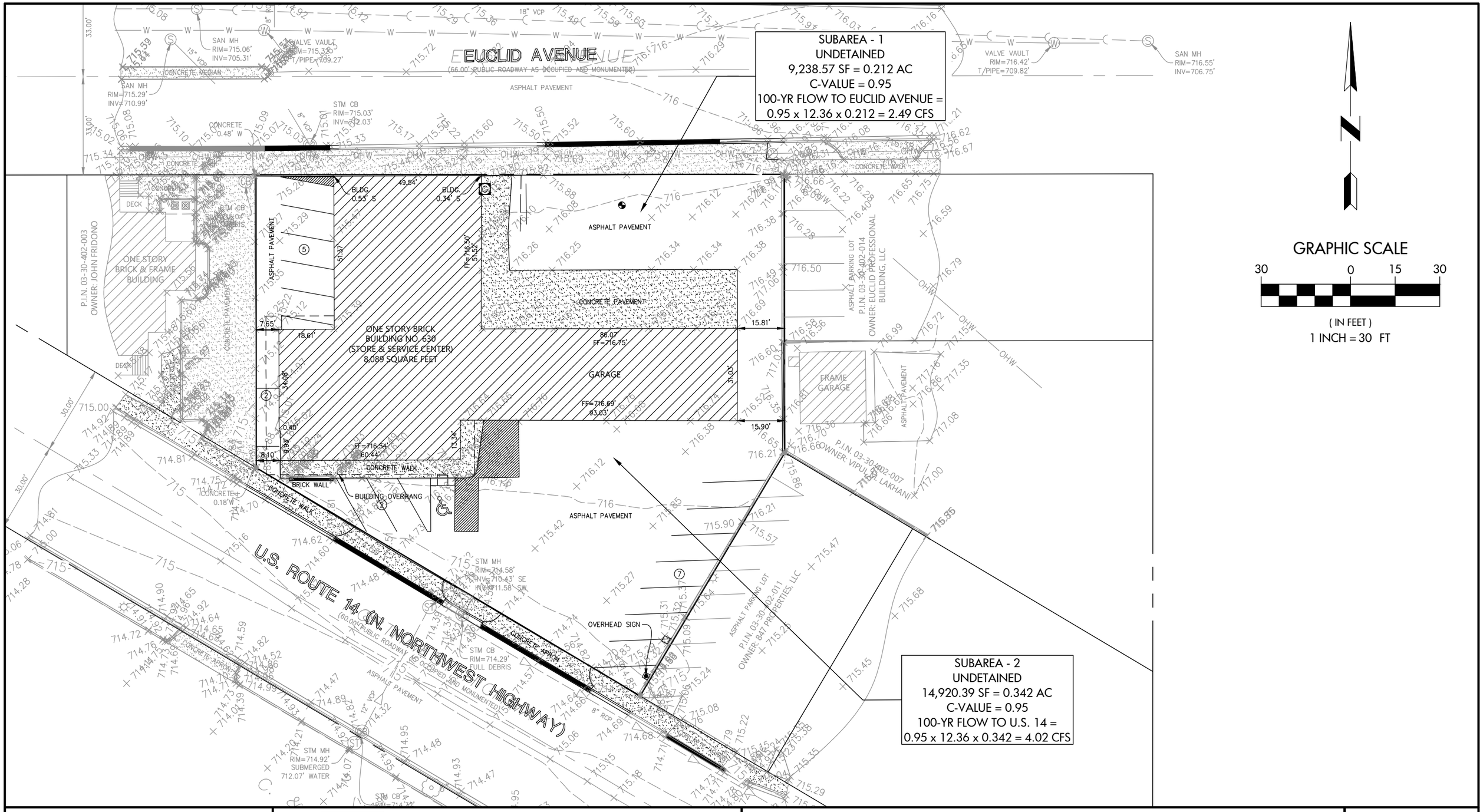

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EXISTING DRAINAGE CONDITIONS

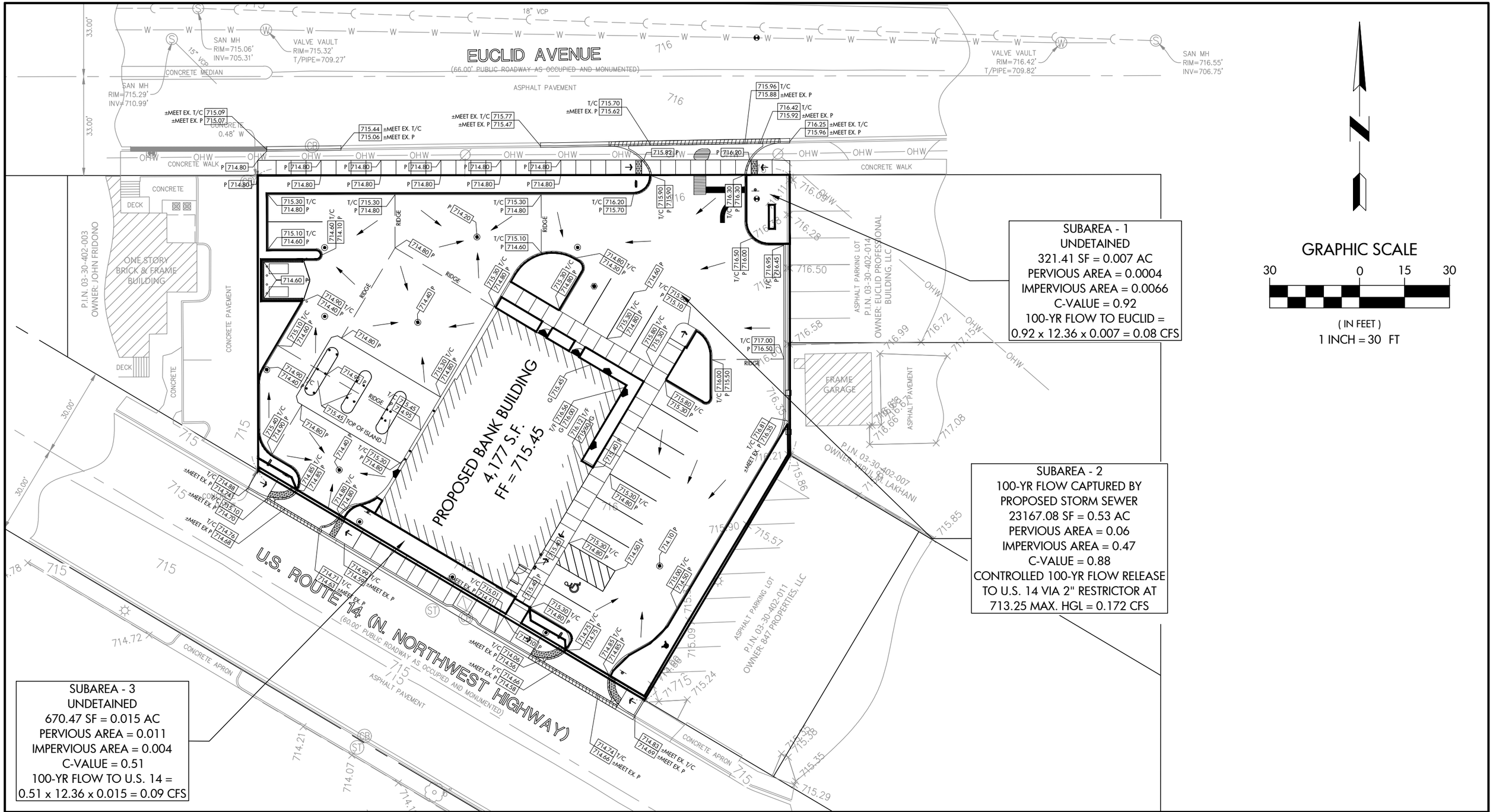
PROPOSED BANK DEVELOPMENT

630 W. NORTHWEST HIGHWAY, ARLINGTON HEIGHTS, IL

EXHIBIT NO.

EDC

DRAWN BY:	OP	DATE:	12-10-21	SCALE:	1"=30'	PROJ. MGR.:	OP	PROJECT #:	21022



SUBAREA - 1
UNDETAINED
321.41 SF = 0.007 AC
PERVIOUS AREA = 0.0004
IMPERVIOUS AREA = 0.0066
C-VALUE = 0.92
100-YR FLOW TO EUCLID =
0.92 x 12.36 x 0.007 = 0.08 CFS

SUBAREA - 2
100-YR FLOW CAPTURED BY
PROPOSED STORM SEWER
23167.08 SF = 0.53 AC
PERVIOUS AREA = 0.06
IMPERVIOUS AREA = 0.47
C-VALUE = 0.88
CONTROLLED 100-YR FLOW RELEASE
TO U.S. 14 VIA 2" RESTRICTOR AT
713.25 MAX. HGL = 0.172 CFS

SUBAREA - 3
UNDETAINED
670.47 SF = 0.015 AC
PERVIOUS AREA = 0.011
IMPERVIOUS AREA = 0.004
C-VALUE = 0.51
100-YR FLOW TO U.S. 14 =
0.51 x 12.36 x 0.015 = 0.09 CFS

GRAPHIC SCALE
30 0 15 30
(IN FEET)
1 INCH = 30 FT

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PROPOSED DRAINAGE CONDITIONS

PROPOSED BANK DEVELOPMENT

630 W. NORTHWEST HIGHWAY, ARLINGTON HEIGHTS, IL

EXHIBIT NO.
PDC

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CIVWORKS Consulting, LLC

PROJECT # 21022
DATE: 12/10/2021

PROPOSED BANK DEVELOPMENT
630 W. NORTHWEST HIGHWAY, ARLINGTON HEIGHTS , IL
RATIONAL METHOD CALCULATION SHEET
PROPOSED CONDITIONS

A = TRIBUTARY AREA: 0.55 ACRES

RUNOFF COEFFICIENT CALCULATIONS

IMPERVIOUS AREA:	**0.48 X 0.95**	**0.46**	**C = TOTAL / A = 0.89**
GRASS AREA:	**0.07 X 0.50**	**0.04**	
WET DETENTION:	**0 X 1.00**	**0**	
	TOTAL =	**0.49**	

RELEASE RATES

ALLOWABLE RELEASE RATES: 0.18 CFS/AC x TRIBUTARY AREA = 0.099 CFS

STORAGE VOLUME (CALCULATED USING CURRENT BULLETIN 75 RAINFALL DATA)

STORM DURATION HOURS	RAINFALL INTENSITY IN/HR	RUNOFF RATE CFS	RELEASE RATE CFS	STORAGE RATE CFS	STORAGE REQUIRED MAXIMUM VALUE ACRE-FOOT
t	I	Q=C*I*A	Qr	Qs=Q-Qr	Qs*t/12
0.5	6.34	3.11	0.099	3.01	0.13
1	4.03	1.98	0.099	1.88	0.16
1.5	3.26	1.60	0.099	1.50	0.19
2	2.485	1.22	0.099	1.12	0.19
3	1.83	0.90	0.099	0.80	0.20
4	1.58	0.78	0.099	0.68	0.23
5	1.32	0.65	0.099	0.55	0.23
6	1.07	0.53	0.099	0.43	0.21
7	0.995	0.49	0.099	0.39	0.23
8	0.92	0.45	0.099	0.35	0.24
9	0.845	0.41	0.099	0.32	0.24
10	0.77	0.38	0.099	0.28	0.23
11	0.695	0.34	0.099	0.24	0.22
12	0.62	0.30	0.099	0.21	0.21
13	0.59	0.29	0.099	0.19	0.21
14	0.56	0.27	0.099	0.18	0.21
15	0.535	0.26	0.099	0.16	0.20
16	0.507	0.25	0.099	0.15	0.20
17	0.478	0.23	0.099	0.14	0.19
18	0.45	0.22	0.099	0.12	0.18

REQUIRED STORAGE VOLUME: 0.24 AC-FT

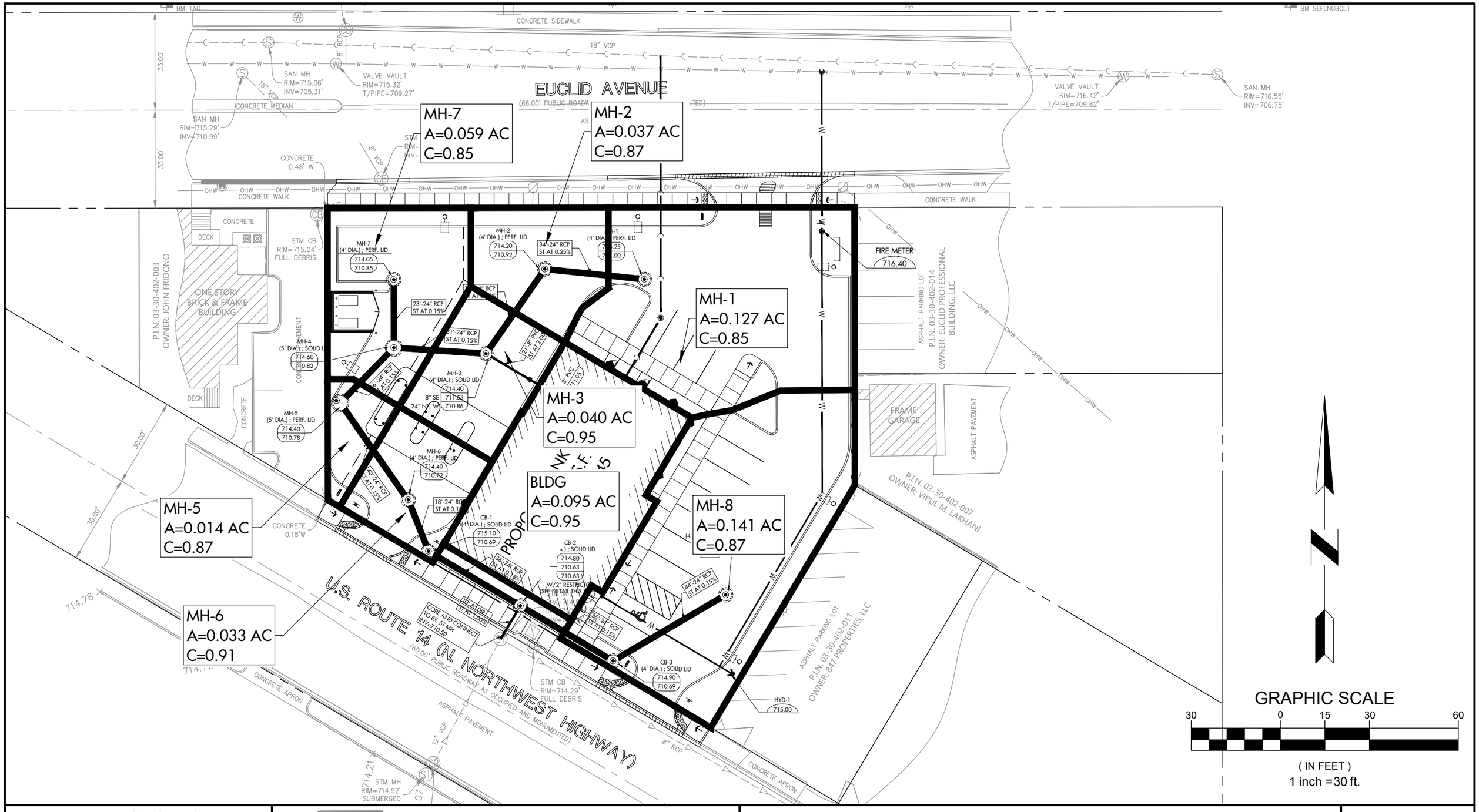
CIVWORKS Consulting, LLC

PROJECT # 21022
DATE: 12/10/2021

PROPOSED BANK DEVELOPMENT
630 W. NORTHWEST HIGHWAY, ARLINGTON HEIGHTS , IL
RESTRICTOR CALCULATIONS

Basin Area	0.55 acres	Restrictor Data:		
Curve Number		Orifice Coef	0.61	
Time of Conc.		Bottom Orifice Elevation	710.63	(invert)
		Diameter	2.00	inches
Maximum 2yr	N/A	Top Orifice Elevation		(invert)
Release Rate	N/A cfs	Diameter		inches
Maximum 100yr				
Release Rate	0.0990 cfs	2-yr HWL	N/A	
		100-yr HWL	713.25	

Elevation	Volume (acre-ft)	Head on Bottom Restrictor	Head on Top Restrictor	Discharge (cfs)
710.63	0.000	0.00	0.00	0.0000
711.63	0.009	0.92	0.00	0.1023
712.63	0.170	1.92	0.00	0.1479
713.63	0.025	2.92	0.00	0.1824
714.10	0.029	3.39	0.00	0.1965



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STORM SEWER CATCHMENT AREAS

PROPOSED BANK DEVELOPMENT

630 W. NORTHWEST HIGHWAY, ARLINGTON HEIGHTS, IL

SHEET NO.

STC-1

DRAWN BY:	OP	DATE:	12-10-2021	SCALE:	1"=30'	PROJ. MGR.:	OP	PROJECT #:	21022

CivWorks Consulting, LLC

ON-SITE STORM SEWER

Date: 12/10/2021 — 100-YEAR STORM ANALYSIS

Storm Sewer Computation Sheet

Project: PROPOSED BANK DEVELOPMENT

By: OP — Check: — Mannings N-Value used = 0.13

630 W. NORTHWEST HIGHWAY - ARLINGTON HEIGHTS, IL

Pipe Location		Tributary Area				Intensity			Runoff	Pipe Design									Profile			
From	To	Area (acre)	C	AC (acre)	SAC (acre)	Inlet Tc (min)	Tc (min)	I (100yr) (in/hr)	Flow (cfs)	Pipe Length (feet)	Pipe Dia. (inch)	Pipe Slope %	Hyd. Slope %	$Q_{(full)}$ (cfs)	$V_{(full)}$ (fps)	$V_{(design)}$ (fps)	Depth of Flow %	Time in Pipe (min)	Rim Elevation	Water Surface Elev Up Stream	Water Surface Elev Down Stream	Pipe Invert Elev. Up Stream	Pipe Invert Elev. Down Stream
MH-1	MH-2	0.127	0.85	0.11	0.11	5	5.00	12.36	1.33	34'	24''	0.25%	0.00%	11.31	3.60	2.47	Pressure	0.23	714.30 P	713.08	713.07	711.00	710.92
MH-2	MH-3	0.037	0.87	0.03	0.14		5.23	12.29	1.72	35'	24''	0.15%	0.01%	8.76	2.79	2.37	Pressure	0.25	714.20 P	713.07	713.07	710.92	710.86
BLDG	MH-3	0.095	0.95	0.09	0.09	5	5.00	12.36	1.12	21'	8''	2.00%	0.85%	1.71	4.89	5.57	Pressure	0.06	715.45 P	713.25	713.07	711.95	711.53
MH-3	MH-4	0.04	0.95	0.04	0.27		5.48	12.21	3.28	31'	24''	0.15%	0.02%	8.76	2.79	2.82	Pressure	0.18	714.40 P	713.07	713.07	710.86	710.82
MH-7	MH-4	0.059	0.85	0.05	0.05	5	5.00	12.36	0.62	23'	24''	0.15%	0.00%	8.76	2.79	1.46	Pressure	0.26	714.10 P	713.07	713.07	710.85	710.82
MH-4	MH-5	0	0	0.00	0.32		5.66	12.15	3.87	26'	24''	0.15%	0.03%	8.76	2.79	2.93	Pressure	0.15	714.60 P	713.07	713.06	710.82	710.78
MH-5	MH-6	0.014	0.87	0.01	0.33		5.81	12.11	4.00	40'	24''	0.15%	0.03%	8.76	2.79	2.95	Pressure	0.23	714.30 P	713.06	713.05	710.78	710.72
MH-6	CB-1	0.033	0.91	0.03	0.36		6.03	12.04	4.34	18'	24''	0.15%	0.04%	8.76	2.79	3.00	Pressure	0.10	714.40 P	713.05	713.04	710.72	710.69
CB-1	CB-2	0	0	0.00	0.36		6.13	12.01	4.33	36'	24''	0.15%	0.04%	8.76	2.79	2.99	Pressure	0.20	715.10 P	713.04	713.03	710.69	710.63
MH-8	CB-3	0.141	0.87	0.12	0.12	5	5.00	12.36	1.52	44'	24''	0.25%	0.00%	11.31	3.60	2.62	Pressure	0.28	714.20 P	713.03	713.03	710.80	710.69
CB-3	CB-2	0	0	0.00	0.12		5.28	12.27	1.51	36'	24''	0.15%	0.00%	8.76	2.79	2.25	Pressure	0.27	714.90 P	713.03	713.03	710.69	710.63
CB-2	RESTR	0	0	0.00	0.48		6.33	11.94	5.77	0.0'	2.0''	0.10%	########	0.01	0.43	264.66	Pressure	0.00	714.80 G	713.03	711.17	710.63	710.63
RESTR	EX-MH	0	0	0.00	0.48		6.33	11.94	0.172	13'	8''	1.00%	1.00%	1.21	3.47	2.59	29%	0.08	714.58 P	711.17	711.17	710.63	710.50