PRELIMINARY DRAINAGE STUDY

1620 Union Street

PTS#: **694291** DWG #: XXXXX-D

APN: 533-353-11

1620 Union Street
San Diego, CA 92101

Prepared By:

11/19/2021

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November 18, 2021

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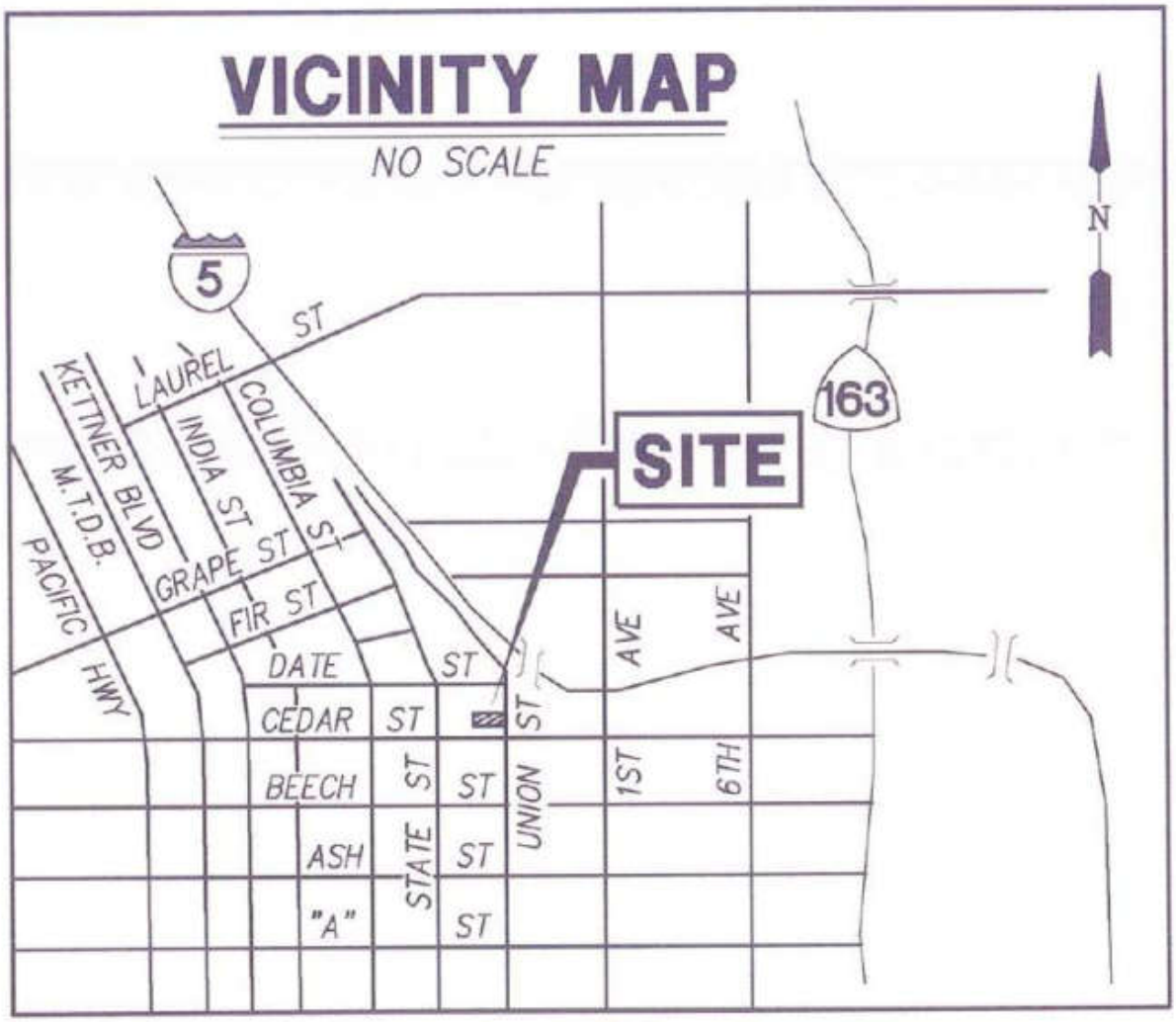

1. INTRODUCTION

Project Description

The 0.12 acre site is located on the west side of Union Street, between Beech Street and Date Street in San Diego, CA. The site exists today as a multi-family residence that has been converted to a hostel with roughly four units. The proposed project includes the relocation of the existing building, demolition off various on-site improvements and proposes a new multi-family residential building with a basement and automated parking system. The proposed project also includes new improvements around the building which include new curb and gutter, sidewalk, and a new driveway cut. The underlying zone is CCPD-R, or Complete Communities Planned District-Residential (muti-family).

The project is designed in accordance with the January 2017 Edition of the Drainage Design Manual, the 2016 San Diego Storm Water Standards Manual and complies with the Regional Water Quality Control Board Region 9 MS4 Permit, Order No. R9-2015-0100. The project does not propose work adjacent regulated waters therefore 401 and 404 permits are not applicable.

Existing Conditions

The site is relatively flat and storm water runoff generally flows off-site from the project site to the south towards Cedar St. where it flows in the street gutter and continues west to State St. The storm water then continues south on State Street until it is collected by a public storm drain inlet located at the northeast curb return of State St. and W. Beech St. It then continues in a westerly direction and ultimately discharges to the San Diego Bay. The peak storm water run-off was calculated using the rational method equation (Q=CiA). The 4.4 in/hr intensity was determined from the City of San Diego Drainage Design Manual's Appendix H sing the minimum allowable time of concentration of 5 minutes. This resulted in a peak pre-project run-off for the site at Q= 0.36 CFS using a runoff coefficient of 0.70 based on multi-units from Table 1-A in the 2017 Storm Water Standards Manual.

Proposed Conditions

The project proposes the development of a new multi-family residential building and the surface improvements (i.e. concrete access paths) to support the proposed building. The proposed impervious areas will include concrete pacing, landscape areas and building roof area. The project is a standard development project, therefore site design measures for storm water runoff are proposed where feasible. The proposed project will result in a small increase of impervious area. The post project condition has been delineated by one (1) basin area (Basin-1) which is tributary to the proposed sidewalk underdrains. The roof runoff is collected and conveyed by the building plumbing and discharges to the sidewalk underdrains that outlet to Union Street and then runs south in the gutter down to Cedar Street in the same manner as the existing condition. The post project flow of 0.36 CFS was calculated using the Rational Method Q=CiA where the intensity was derived from the San Diego Drainage Design Manual assuming a 5-minute time of concentration (Tc) which is the shortest Tc allowable and the runoff coefficient of 0.70 comes from Table A-1 for multi-family residential. A table summarizing the pre-project and post-project peak flows is provided at the end of this study.

2. METHODOLOGY

The proposed project has been analyzed to determine the peak runoff flow for 100 year, 6 hour rainfall event using the Rational Method per the City of San Diego Drainage Design Manual (Section 1-102.3). The Runoff Coefficient, C, for the existing and proposed conditions were selected using Table 2 of page 82 of the City of San Diego Drainage Design Manual, Revised C Method. The time of concentration for all existing and proposed drainage areas were calculated using the minimum TC of 5 min which yields an intensity of 4.4 inches per hour.

The proposed LID best management practices have been sized and located such that all runoff will be directed to landscape planters or through pervious areas where feasible before ultimately discharging to the downstream storm drain system.

2.1 Rational Method

As mentioned above, runoff from the project site was calculated for the 100-year storm events. Runoff was calculated using the Rational Method which is given by the following equation:
$Q = C \times I \times A$

Where:
Q = Flow rate in cubic feet per second (cfs)
C = Runoff coefficient (Determined from Table 2, P. 82, City of San Diego Drainage Design Manual)
I = Rainfall Intensity in inches per hour (in/hr)
A = Drainage basin area in acres, (ac)
Rational Method calculations were performed using the City of San Diego Drainage Design Manual (Section 1-102.3)

2.2 Runoff Coefficient

The runoff coefficients for the project were used from Table A-1 from the City of San Diego Drainage Design Manual (January, 2017), using the Revised C Method for multi-unit land use condition which is 0.70.

2.3 Rainfall Intensity

Rainfall intensity was determined using the Rainfall Intensity Duration Frequency Curves from page 83 of the City of San Diego Drainage Design Manual (April, 1984). Based on a 5 min time of concentration, an intensity of 4.4 inches per hour is used.

2.4 Tributary Areas

Drainage basins are delineated in the Post-Project Hydrology Exhibit in Appendix 1 and graphically portray the tributary area for each drainage basin.

3. CALCULATIONS/RESULTS

3.1 Pre & Post Development Peak Flow Comparison

Below are a series of tables which summarize the calculations provided in the Appendix of this report.

SITE IMPERVIOUS AREA COMPOSITION					
	TOTAL IMPERVIOUS AREA (ACRES)	TOTAL PERVIOUS AREA (ACRES)	TOTAL PROJECT AREA (ACRES)	% IMPERVIOUS SURFACES	RUNOFF COEFFICIENT "C"
Existing	0.12	0.02	0.10	80%	0.70
Proposed	0.12	0.01	0.11	93%	0.70

Table 1. Runoff Coefficient "C" Comparison

The table above shows the difference in the runoff coefficient, "C", between the existing and proposed condition.

EXISTING DRAINAGE FLOWS			
DRAINAGE AREA	DRAINAGE AREA (ACRES)	Q_{100} (CFS)	I_{100} (IN/HR)
EX-1	0.12	0.36	4.4

Table 2. Existing Condition Peak Drainage Flow Rates

Table 2 above lists the peak flow rates for the project site in the existing condition for the respective rainfall events.

Table 3. Proposed Condition Peak Drainage Flow Rates

PROPOSED DRAINAGE FLOWS			
DRAINAGE AREA	DRAINAGE AREA (ACRES)	Q_{100} (CFS)	I_{100} (IN/HR)
BASIN-1	0.12	0.36	4.4

The table above lists the peak flow rates for the project site for the proposed condition for the respective rainfall events.

Table 4. Proposed Condition Peak Drainage Flow Rates

PEAK DRAINAGE FLOW COMPARISON				
CONDITION	DRAINAGE AREA (ACRES)	Q_{100} (CFS)	VOL_{100} (CU-FT)	C
Existing	0.12	0.36	731	0.70
Proposed	0.12	0.36	731	0.70

Table 4 above shows a comparison between the peak flow rates and precipitation volume for the proposed condition and the existing condition.

As shown in Table 4, the project does not increase the peak runoff rate or runoff volume for the design storms analyzed when comparing the pre-project condition to the post-project condition because the proposed development is consistent with the land use of the existing condition.

3.2 Storm Water Quality

The project's runoff will be treated for storm water quality by site design and source control measures where applicable and feasible. The project is a "Standard" Development project therefore, low impact design is implemented where feasible.

4. CONCLUSION

As discussed previously, the proposed project's peak runoff flow and volume do no change from the existing condition, therefore, the project will not negatively affect downstream facilities since the overall peak flow rate will remain the same. The project does not negatively impact adjacent properties. It is my professional opinion that the storm drain systems as proposed in this report and on the grading plans herein is adequate to intercept, contain and convey Q100 and will not create negative impacts to the downstream system.

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APPENDIX 1

PRE-PROJECT & POST-PROJECT

HYDROLOGY CALCULATIONS

AIR SPACE-1620 UNION ST
J-3771
11/18/2021

ON-SITE PRE-PROJECT HYDROLOGY

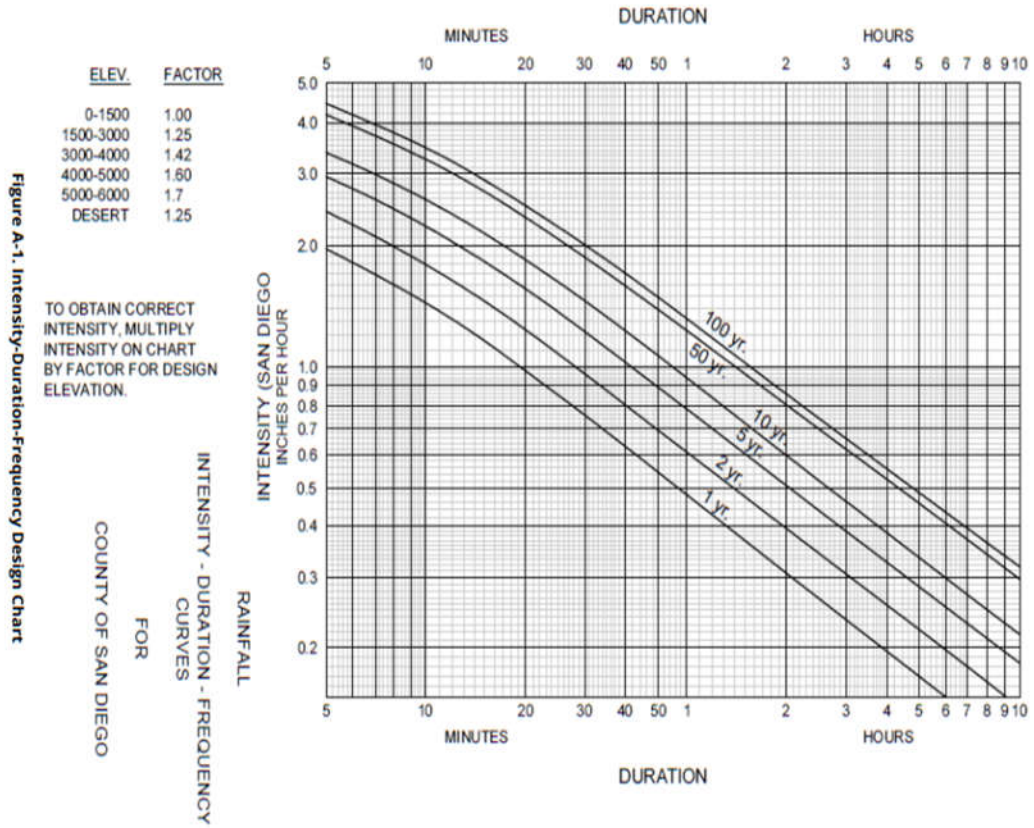
Drainage Area	Area Description	Total Area (Ac)	Total Area (sq-ft)	Total Impervious Area (Sq-Ft)	% Impervious	% Pervious	Weighted Runoff Coefficient	Peak Runoff Q: (CFS)	Peak Runoff Volume: (cu-ft)
EX-1	EX ON-SITE	0.12	5013	4010	80%	20%	0.70	0.36	731
	TOTAL	**0.12**	**5013**	**4010**	**80%**	**20%**	**0.70**	**0.36**	**731**

ON-SITE POST-PROJECT HYDROLOGY

BMP Location	Basin Description	Total Area (Ac)	Total Area (sq-ft)	Total Impervious Area (Sq-Ft)	% Impervious	% Pervious	Weighted Runoff Coefficient	Peak Runoff Q: (CFS)	Peak Runoff Volume: (cu-ft)
BASIN-1	ON-SITE ROOF DRAINAGE	0.12	5013	4664	93%	7%	0.70	0.36	731
Totals:		**0.12**	**5013**	**4664**	**93%**	**7%**	**0.70**	**0.36**	**731**

100 Yr Storm at 5 Min TC		
Intensity:	4.40	in/hr
Precip:	2.50	in

Runoff Coefficient	
Multi-Family	0.70



APPENDIX A: RATIONAL METHOD AND MODIFIED RATIONAL METHOD

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APPENDIX A: RATIONAL METHOD AND MODIFIED RATIONAL METHOD

Table A-1. Runoff Coefficients for Rational Method

Land Use	Runoff Coefficient (C)
	Soil Type [1]
Residential:	
Single Family	0.55
Multi-Units	0.70
Mobile Homes	0.65
Rural (lots greater than ½ acre)	0.45
Commercial [2]	
80% Impervious	0.85
Industrial [2]	
90% Impervious	0.95

Note:
[1] Type D soil to be used for all areas.
[2] Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%
Tabulated imperviousness = 80%
Revised C = (50/80) x 0.85 = 0.53

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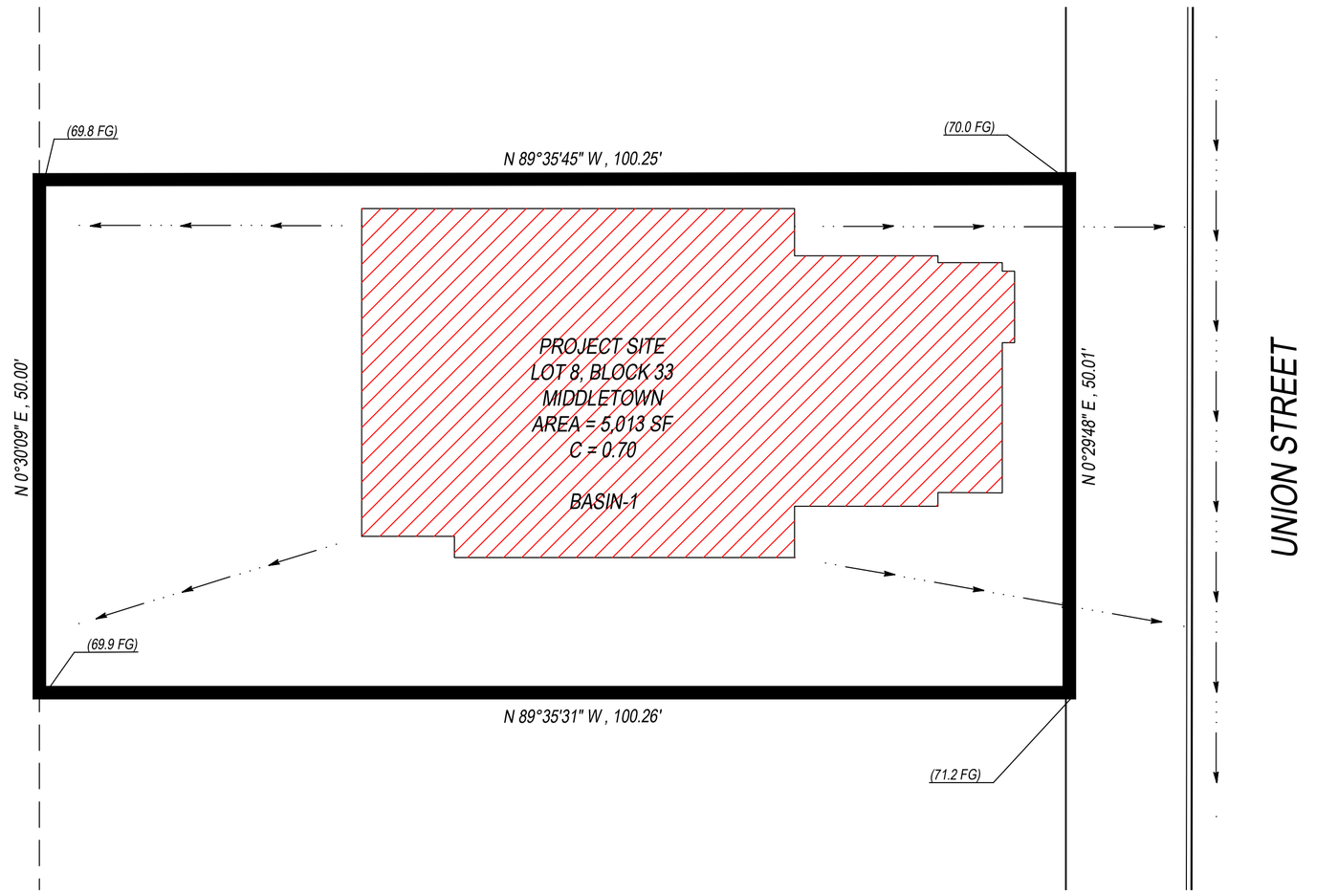
APPENDIX 2

PRE-PROJECT & POST-PROJECT

HYDROLOGY EXHIBITS

EXISTING & PROPOSED HYDROLOGY EXHIBIT

1620 UNION STREET
AIR SPACE TOWER



PLAN VIEW - PRE-DEVELOPMENT MAP

SCALE: 1" = 10'

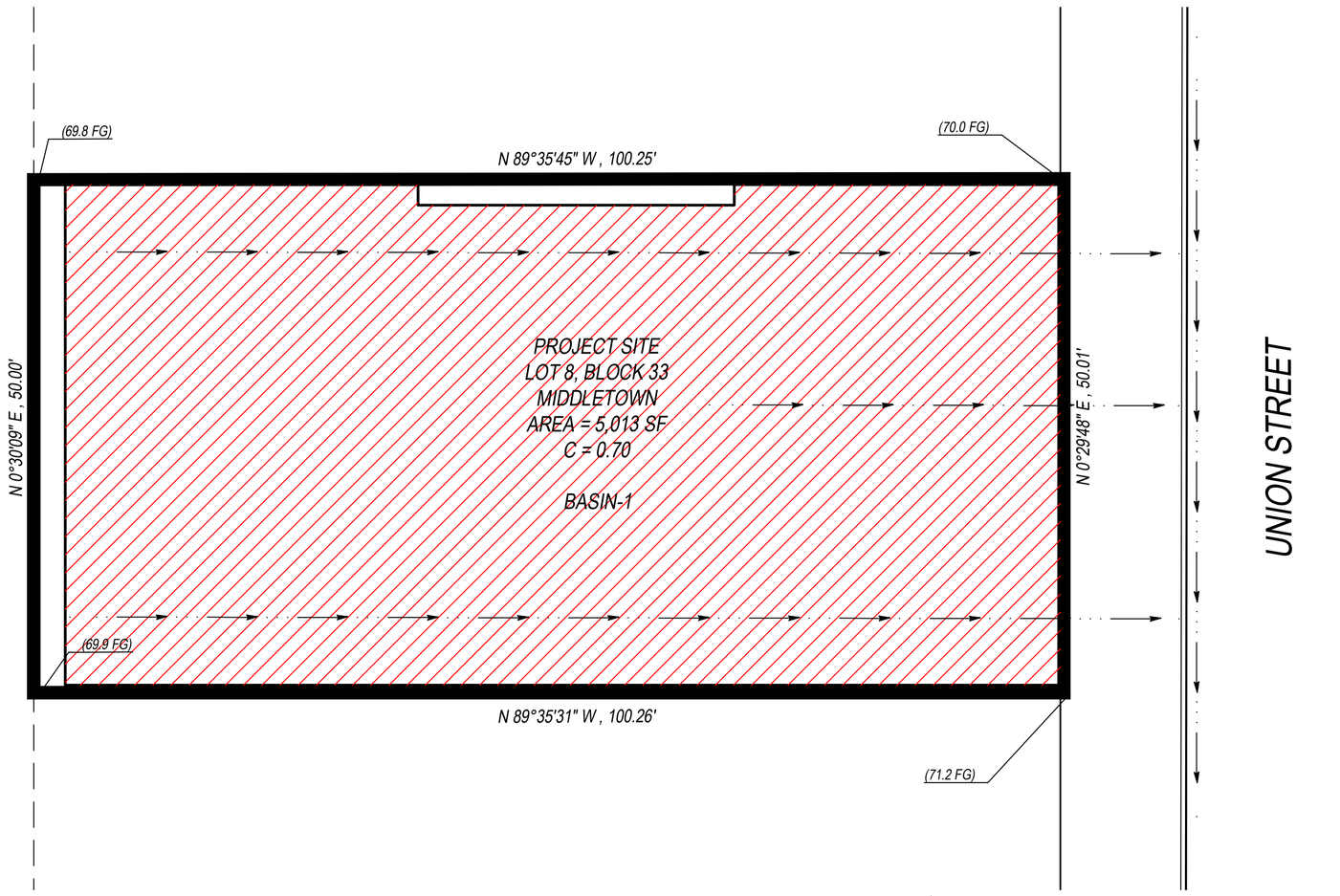
GRAPHIC SCALE 1" = 10'

10 0 10 20 30

N

BASIN AREA CALCULATIONS

TOTAL SITE AREA	5,013 SF (0.115 AC)
BASIN IMPERVIOUS AREA	4,010 SF (0.092 AC)
BASIN PERVIOUS AREA	1,003 SF (0.023AC)
% IMPERVIOUS	80%
C (TABLE A-1-MULTIFAMILY)	0.70
Q100	0.36 CFS



PLAN VIEW - POST DEVELOPMENT MAP

SCALE: 1" = 10'

GRAPHIC SCALE 1" = 10'

10 0 10 20 30

N

BASIN AREA CALCULATIONS

TOTAL SITE AREA	5,013 SF (0.115 AC)
BASIN IMPERVIOUS AREA	4,664 SF (0.107 AC)
BASIN PERVIOUS AREA	349 SF (0.008 AC)
% IMPERVIOUS	93%
C (TABLE A-1-MULTIFAMILY)	0.70
Q100	0.36 CFS

LEGEND

- PROPERTY BOUNDARY
- CENTERLINE OF ROAD
- ADJACENT PROPERTY LINE / RIGHT-OF-WAY
- EXISTING CONTOUR LINE — 64 —
- PROPOSED CONTOUR LINE — 64 —
- PROPOSED DRAINAGE PATH
- PROPOSED IMPERVIOUS AREA
- MAJOR DRAINAGE BASIN BOUNDARY

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