
1363 hollis

HOLLIS & BISHOP STREET DEVELOPMENT

EKISTICS PLANNING & DESIGN

KEY PLAN

08	SPA SUBMISSION	2016.09.08
07	SPA SUBMISSION	2016.09.01
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REVISIONS DATE

PROJECT

HOLLIS AND
BISHOP STREET
DEVELOPMENT

SITE PLAN APPROVAL APPLICATION

CLIENT

DEXEL DEVELOPMENTS INC.

SCALE	DATE	
1/16"=1'-0"	2016.09.08	
DRAWN BY	CHECKED	REVIEWED
CC		

APPROVED

CC

SEAL

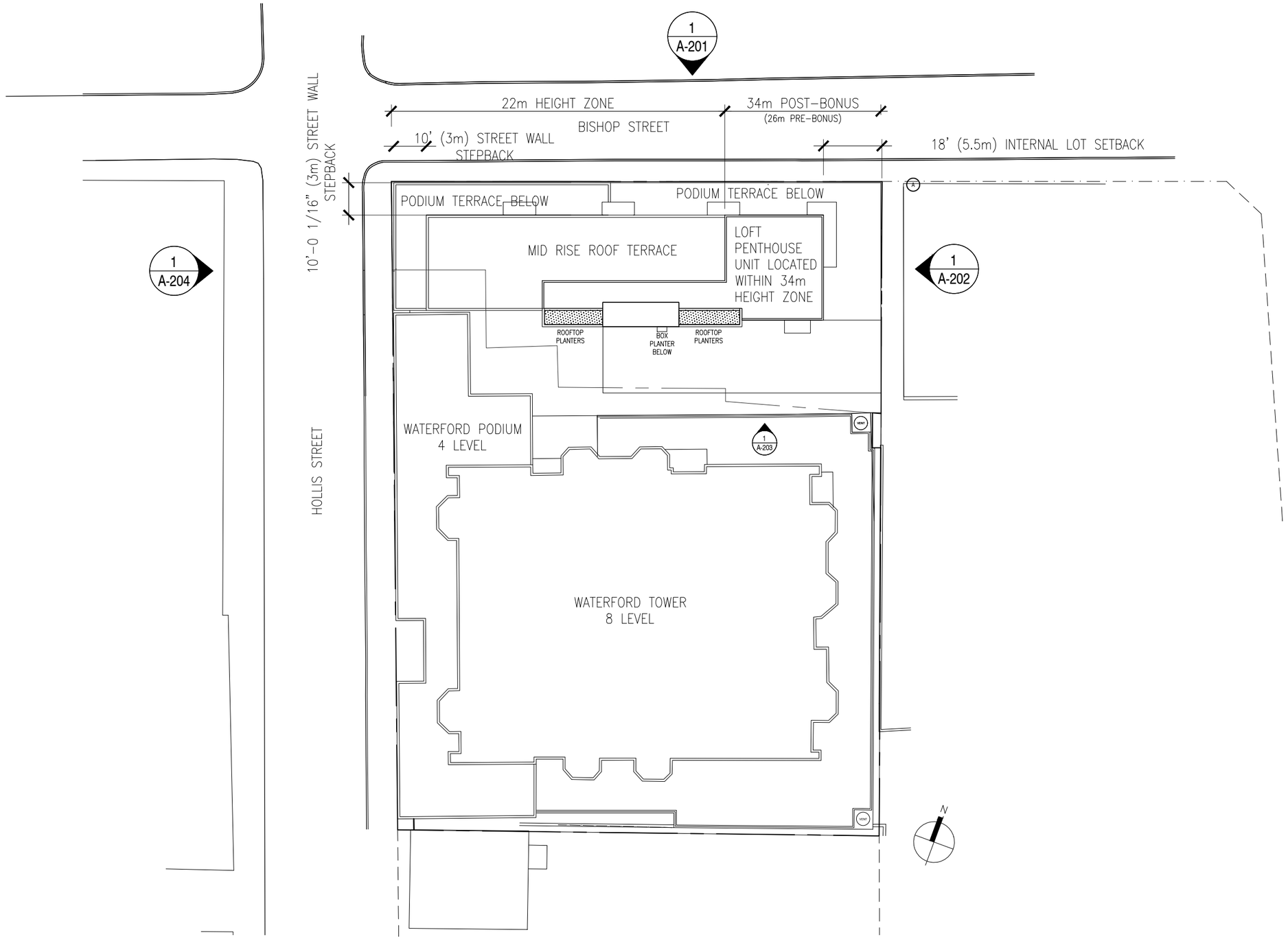
NOT FOR
CONSTRUCTION

DRAWING

COVER

DRAWING NO.

A-000



1/32"=1'-0" A-100 SITE PLAN

EKISTICS PLANNING & DESIGN

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SITE PLAN APPROVAL APPLICATION

CLIENT

DEXEL DEVELOPMENTS INC.

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1/16"=1'-0"	2016.09.08	
DRAWN BY	CHECKED	REVIEWED
CC		

APPROVED

CC

SEAL

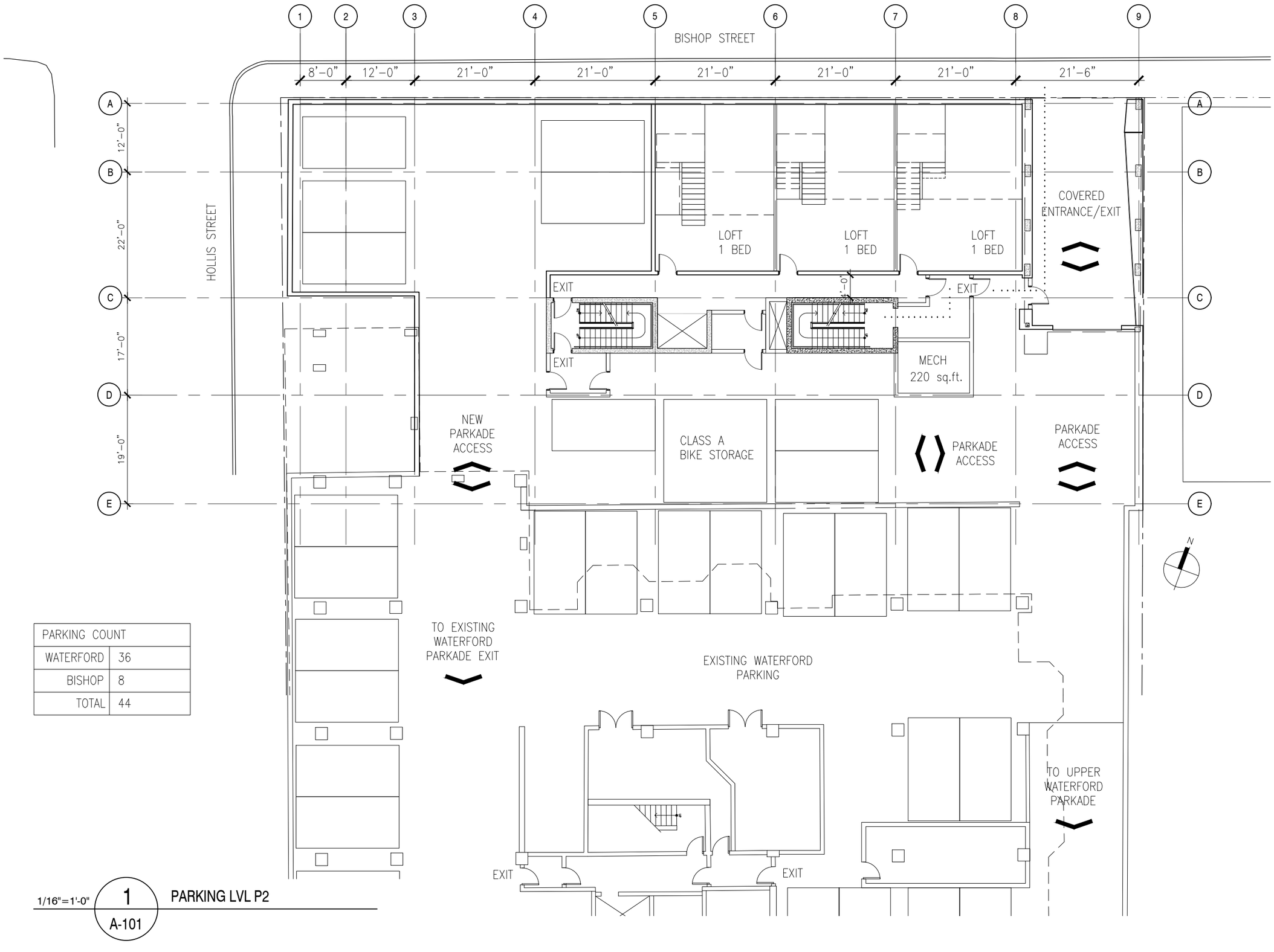
NOT FOR CONSTRUCTION

DRAWING

SITE_PLAN

DRAWING NO.

A-100



PARKING COUNT	
WATERFORD	36
BISHOP	8
TOTAL	44

1/16"=1'-0" 1 A-101 PARKING LVL P2

EKISTICS PLANNING & DESIGN

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HOLLIS AND BISHOP STREET DEVELOPMENT

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CLIENT

DEXEL DEVELOPMENTS INC.

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DRAWN BY	CHECKED	REVIEWED
CC		

APPROVED

CC

SEAL

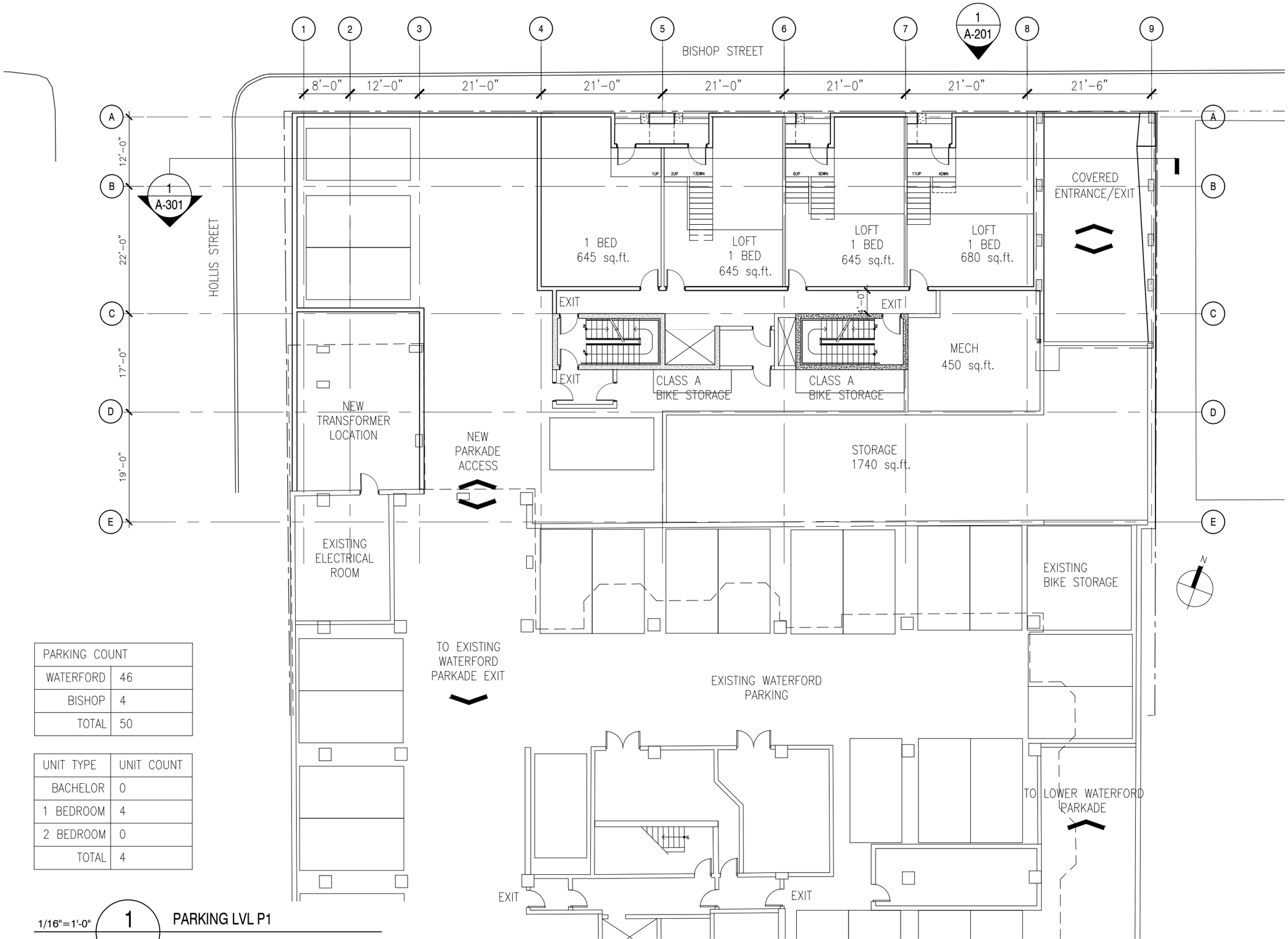
NOT FOR CONSTRUCTION

DRAWING

PARKING_LEVEL_2

DRAWING NO.

A-101



PARKING COUNT	
WATERFORD	46
BISHOP	4
TOTAL	50

UNIT TYPE	UNIT COUNT
BACHELOR	0
1 BEDROOM	4
2 BEDROOM	0
TOTAL	4

1/16"=1'-0" 1 A-102 PARKING LVL P1

EKISTICS PLANNING & DESIGN

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HOLLIS AND
BISHOP STREET
DEVELOPMENT

SITE PLAN APPROVAL APPLICATION

CLIENT

DEXEL DEVELOPMENTS INC.

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DRAWN BY	CHECKED	REVIEWED
CC		

APPROVED
CC

SEAL

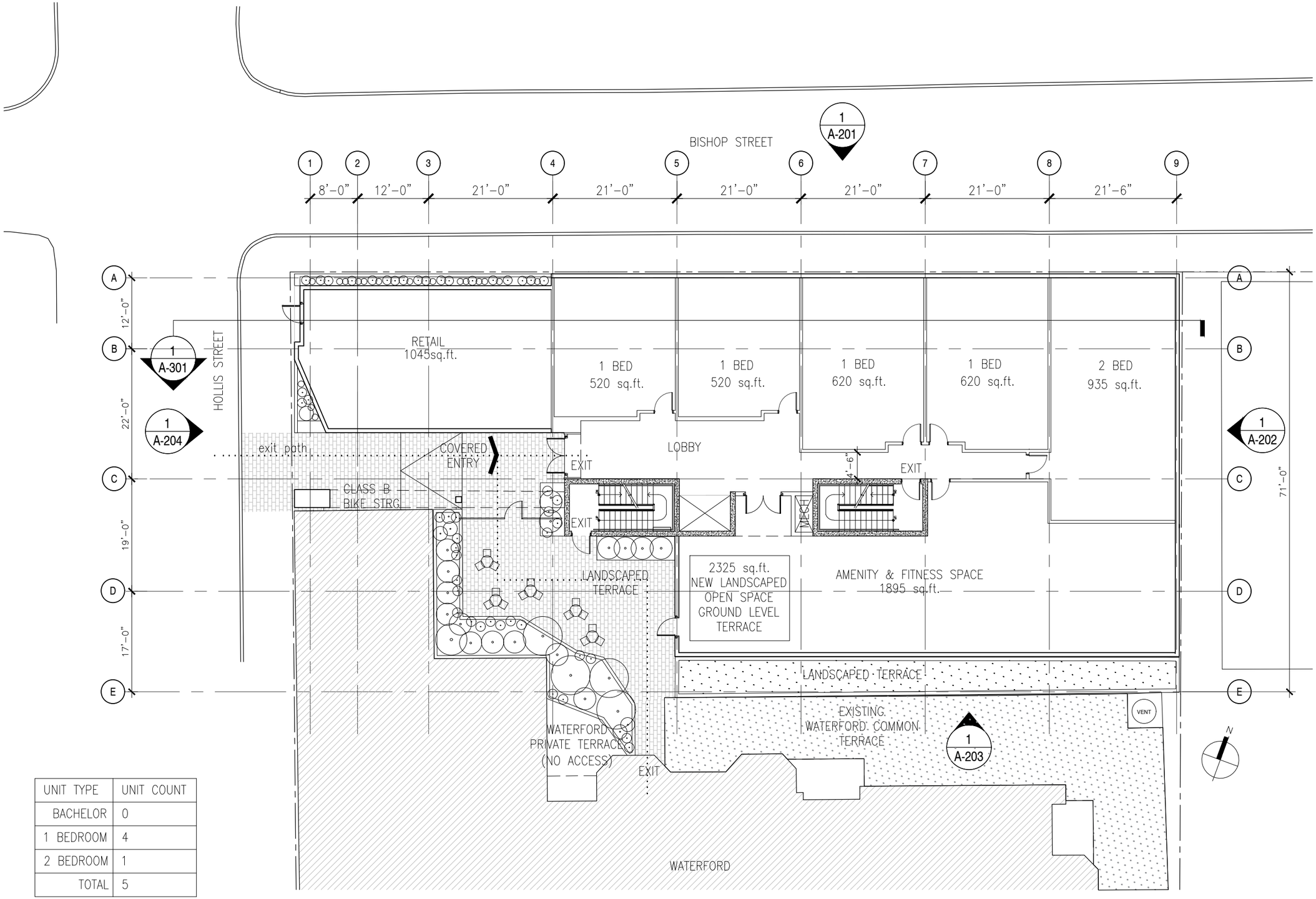
NOT FOR
CONSTRUCTION

DRAWING

PARKING_LEVEL_P1

DRAWING NO.

A-102



UNIT TYPE	UNIT COUNT
BACHELOR	0
1 BEDROOM	4
2 BEDROOM	1
TOTAL	5

1/16"=1'-0" 1 A-103 GROUND FLOOR PLAN

EKISTICS PLANNING & DESIGN

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HOLLIS AND
BISHOP STREET
DEVELOPMENT

SITE PLAN APPROVAL APPLICATION

CLIENT

DEXEL DEVELOPMENTS INC.

SCALE	DATE	
1/16"=1'-0"	2016.09.06	
DRAWN BY	CHECKED	REVIEWED
CC		

APPROVED
CC

SEAL

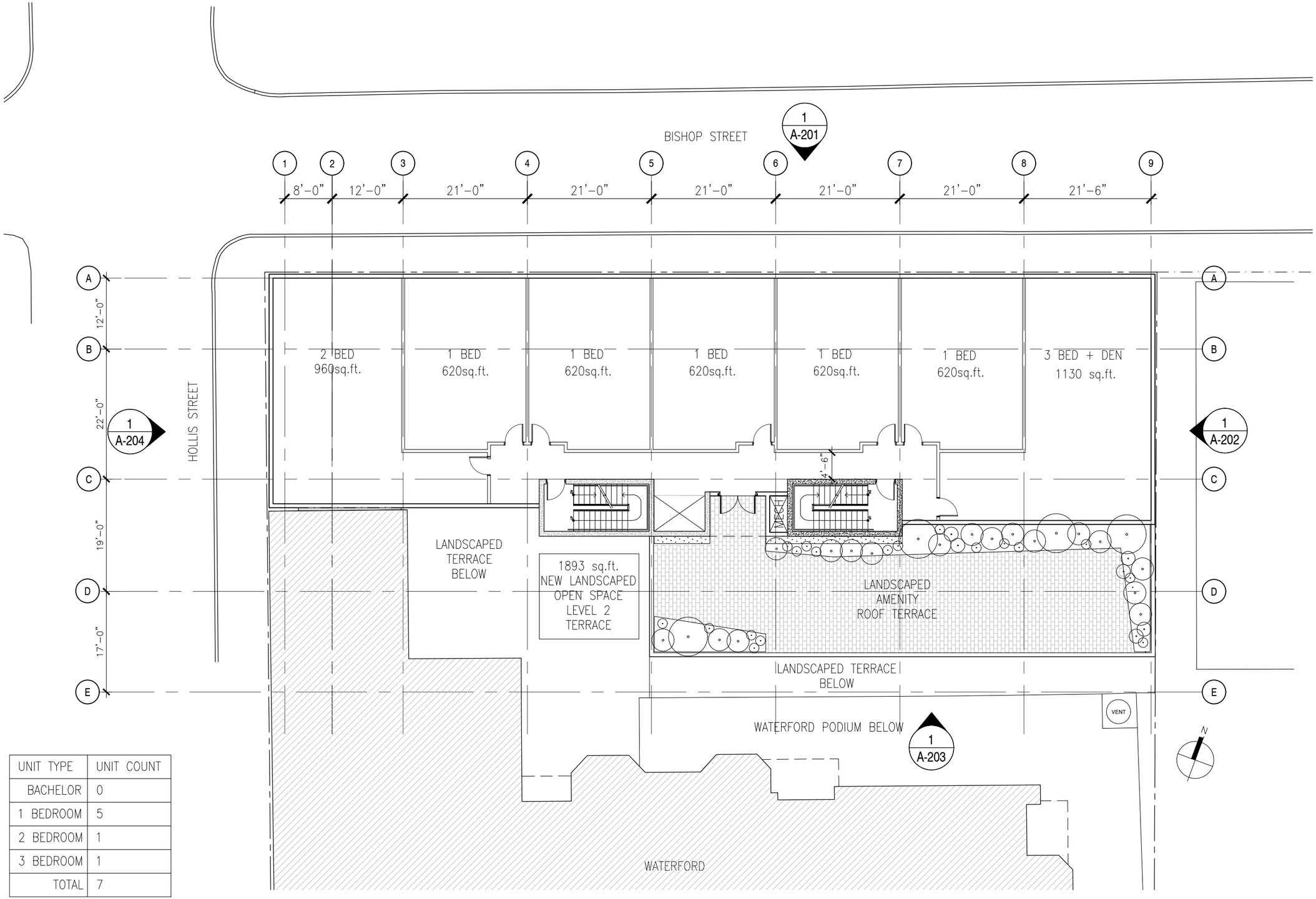
NOT FOR
CONSTRUCTION

DRAWING

GROUND_FLOOR_PLAN

DRAWING NO.

A-103



UNIT TYPE	UNIT COUNT
BACHELOR	0
1 BEDROOM	5
2 BEDROOM	1
3 BEDROOM	1
TOTAL	7

1/16"=1'-0" 1 A-104 FLOOR PLAN LVL 02,03

EKISTICS PLANNING & DESIGN

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HOLLIS AND BISHOP STREET DEVELOPMENT

SITE PLAN APPROVAL APPLICATION

CLIENT

DEXEL DEVELOPMENTS INC.

SCALE	DATE	
1/16"=1'-0"	2016.09.06	
DRAWN BY	CHECKED	REVIEWED
CC		

APPROVED

CC

SEAL

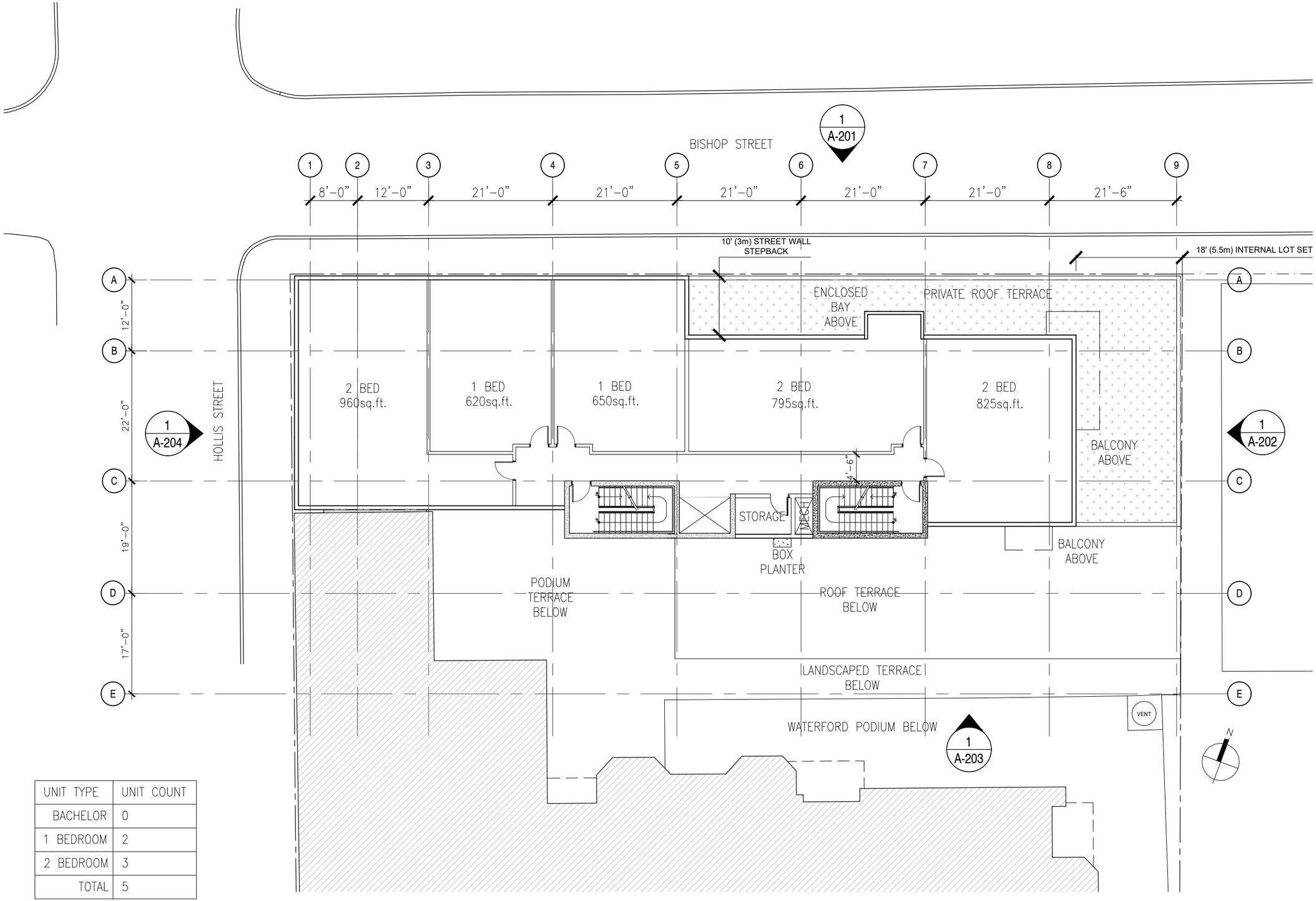
NOT FOR CONSTRUCTION

DRAWING

FLOOR_PLAN_LEVELS_02_03

DRAWING NO.

A-104



UNIT TYPE	UNIT COUNT
BACHELOR	0
1 BEDROOM	2
2 BEDROOM	3
TOTAL	5

1/16"=1'-0" 1 A-105 FLOOR PLAN LVL 04

EKISTICS PLANNING & DESIGN

KEY PLAN

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HOLLIS AND BISHOP STREET DEVELOPMENT

SITE PLAN APPROVAL APPLICATION

CLIENT

DEXEL DEVELOPMENTS INC.

SCALE	DATE
1/16"=1'-0"	2016.09.06

DRAWN BY	CHECKED	REVIEWED
CC		

APPROVED

CC

SEAL

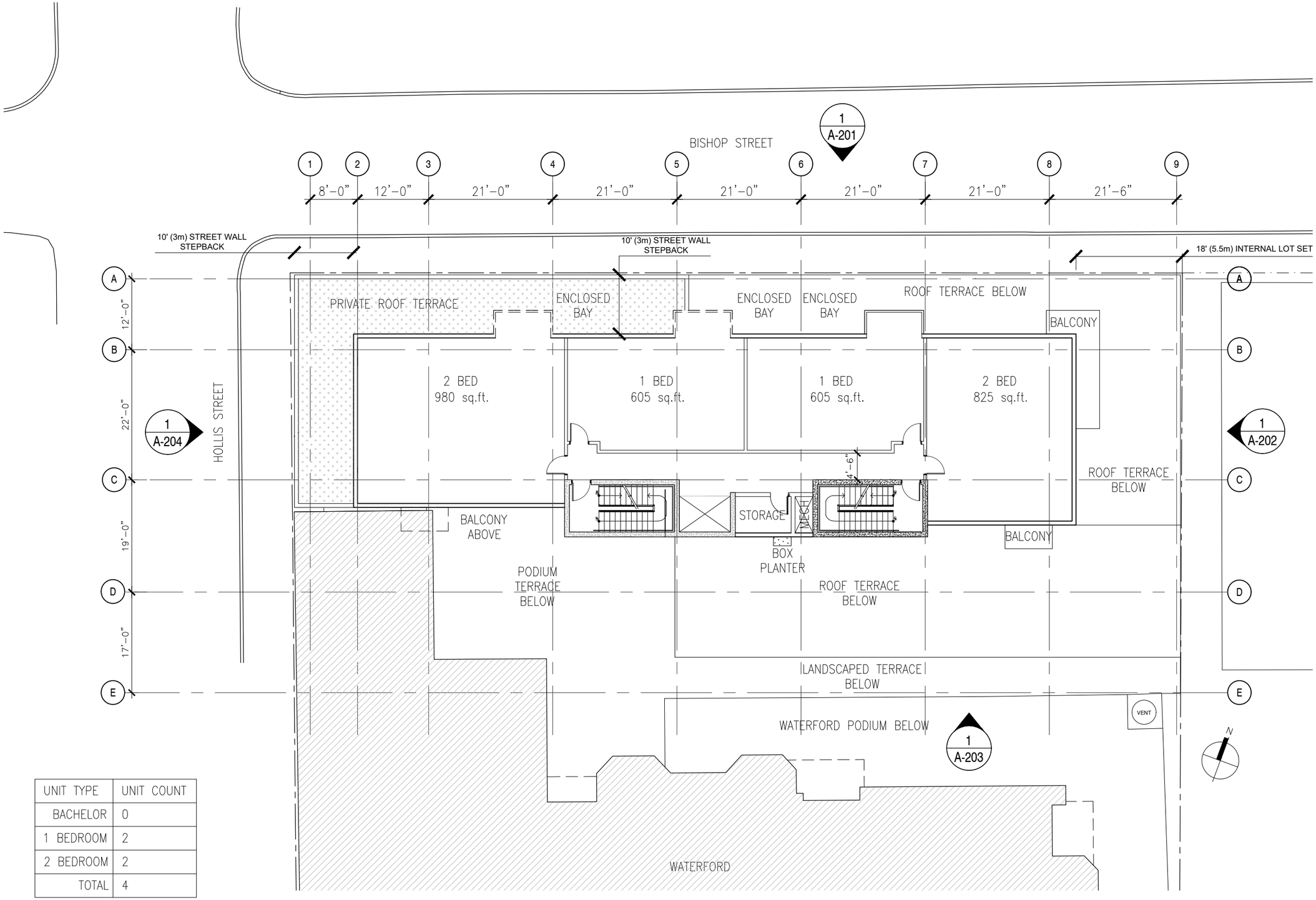
NOT FOR CONSTRUCTION

DRAWING

FLOOR_PLAN_LEVEL_04

DRAWING NO.

A-105



UNIT TYPE	UNIT COUNT
BACHELOR	0
1 BEDROOM	2
2 BEDROOM	2
TOTAL	4

1/16"=1'-0" 1 A-106 FLOOR PLAN LVL 05,06,07

EKISTICS PLANNING & DESIGN

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HOLLIS AND BISHOP STREET DEVELOPMENT

SITE PLAN APPROVAL APPLICATION

CLIENT

DEXEL DEVELOPMENTS INC.

SCALE	DATE	
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DRAWN BY	CHECKED	REVIEWED
CC		

APPROVED

CC

SEAL

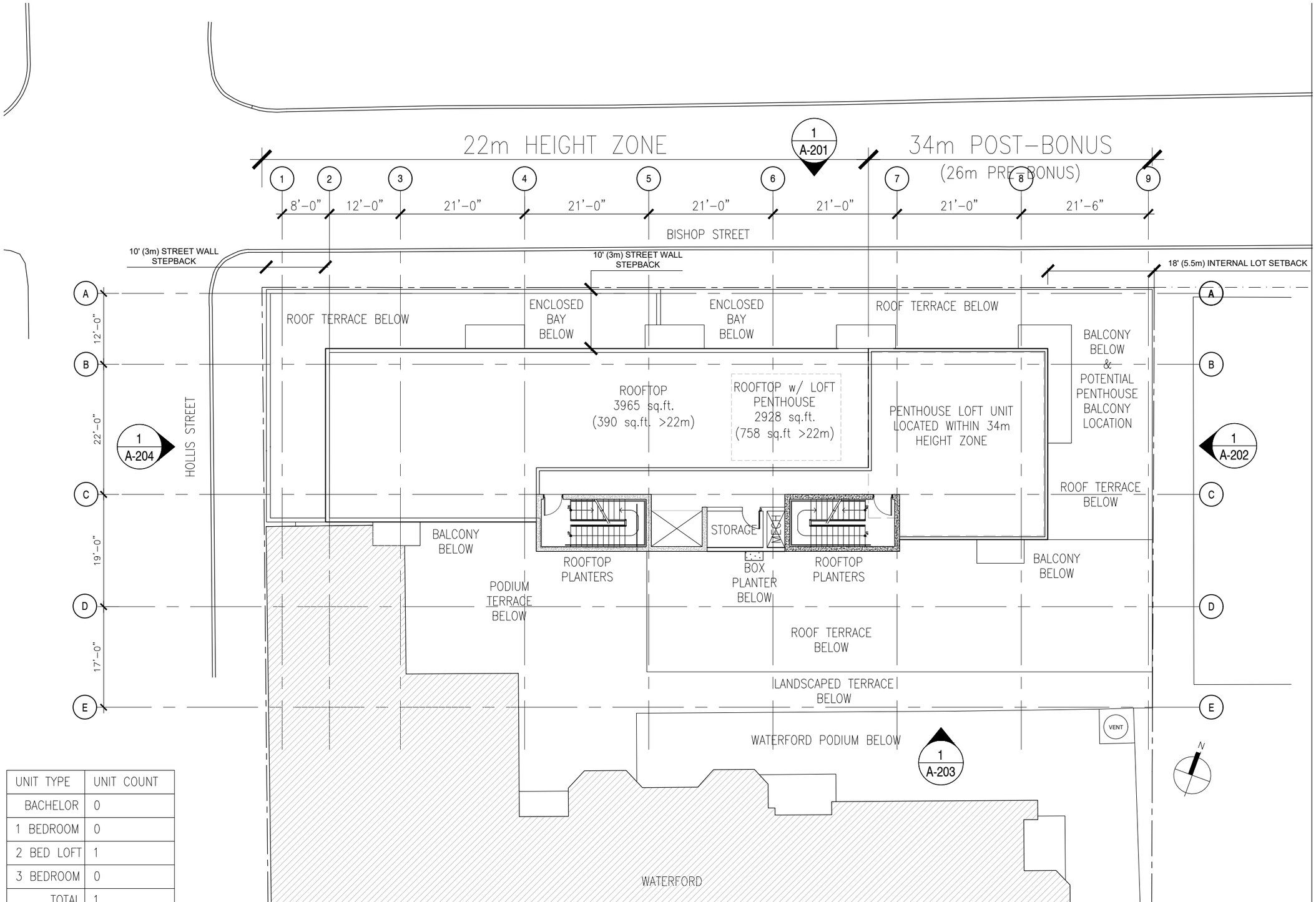
NOT FOR CONSTRUCTION

DRAWING

FLOOR_PLAN_LEVELS_05,06,07

DRAWING NO.

A-106



UNIT TYPE	UNIT COUNT
BACHELOR	0
1 BEDROOM	0
2 BED LOFT	1
3 BEDROOM	0
TOTAL	1

1/16"=1'-0" 1 A-107 PENTHOUSE LEVEL

EKISTICS PLANNING & DESIGN

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HOLLIS AND BISHOP STREET DEVELOPMENT

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CLIENT

DEXEL DEVELOPMENTS INC.

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DRAWN BY	CHECKED	REVIEWED
CC		

APPROVED

CC

SEAL

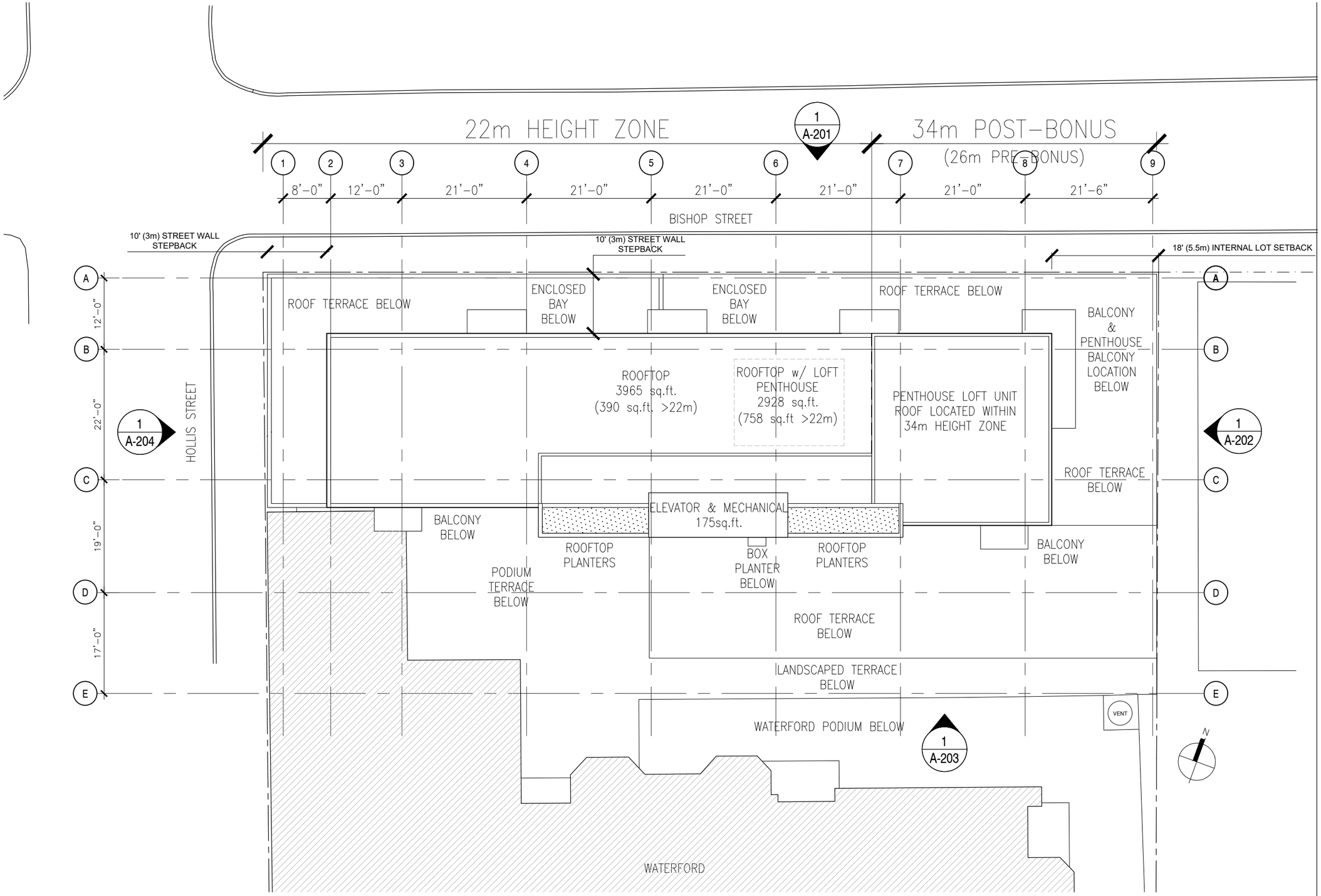
NOT FOR CONSTRUCTION

DRAWING

PENTHOUSE

DRAWING NO.

A-107



1/16"=1'-0" 1 A-108 ROOF PLAN

EKISTICS PLANNING & DESIGN

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HOLLIS AND BISHOP STREET DEVELOPMENT

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CLIENT

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DRAWN BY	CHECKED	REVIEWED
CC		

APPROVED

CC

SEAL

NOT FOR CONSTRUCTION

DRAWING

ROOF_PLAN

DRAWING NO.

A-108

EKISTICS PLANNING & DESIGN

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HOLLIS AND BISHOP STREET DEVELOPMENT

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DRAWN BY	CHECKED	REVIEWED
CC		

APPROVED

CC

SEAL

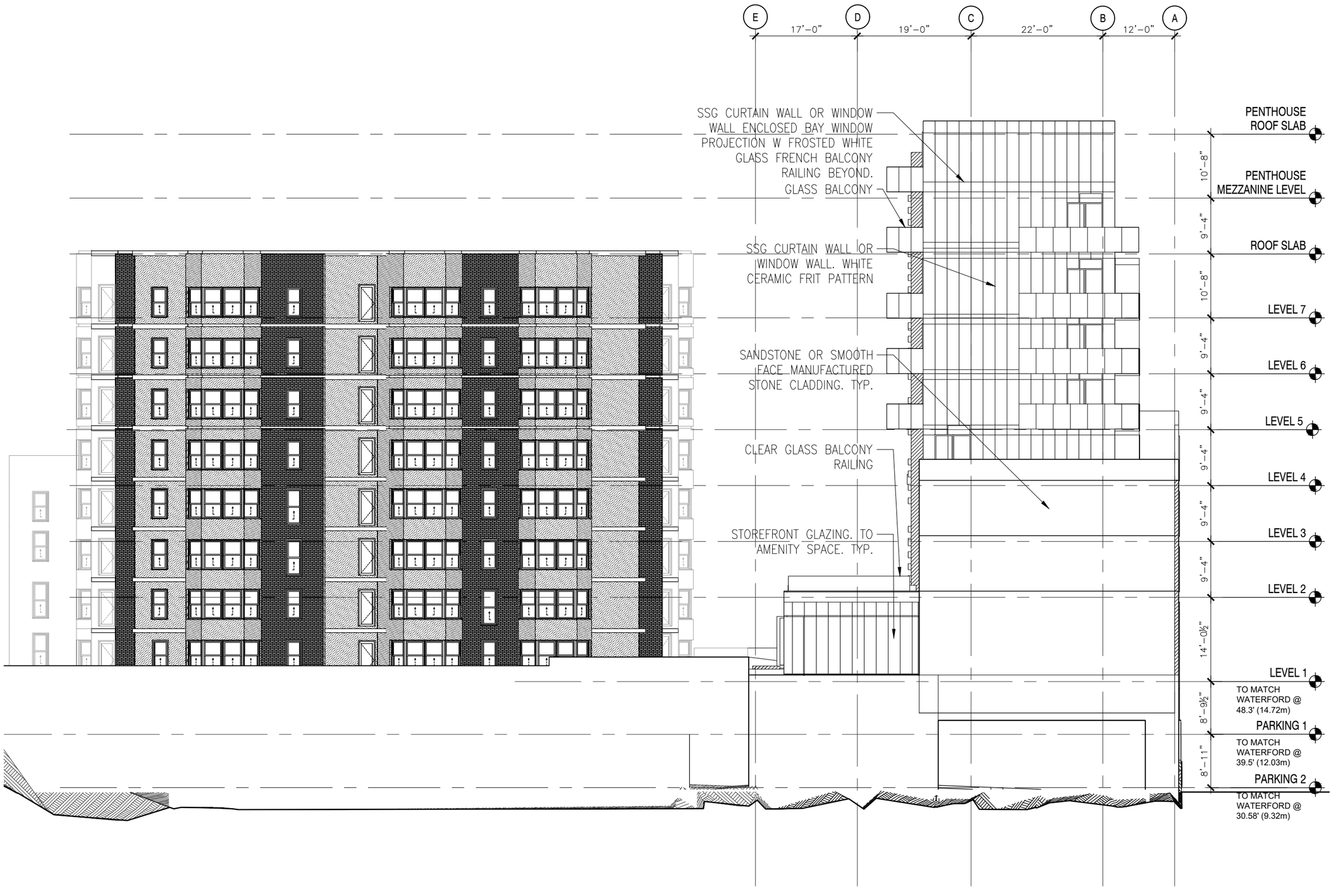
NOT FOR CONSTRUCTION

DRAWING

NORTH_ELEVATION

DRAWING NO.

A-201



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DRAWN BY	CHECKED	REVIEWED
CC		

APPROVED

CC

SEAL

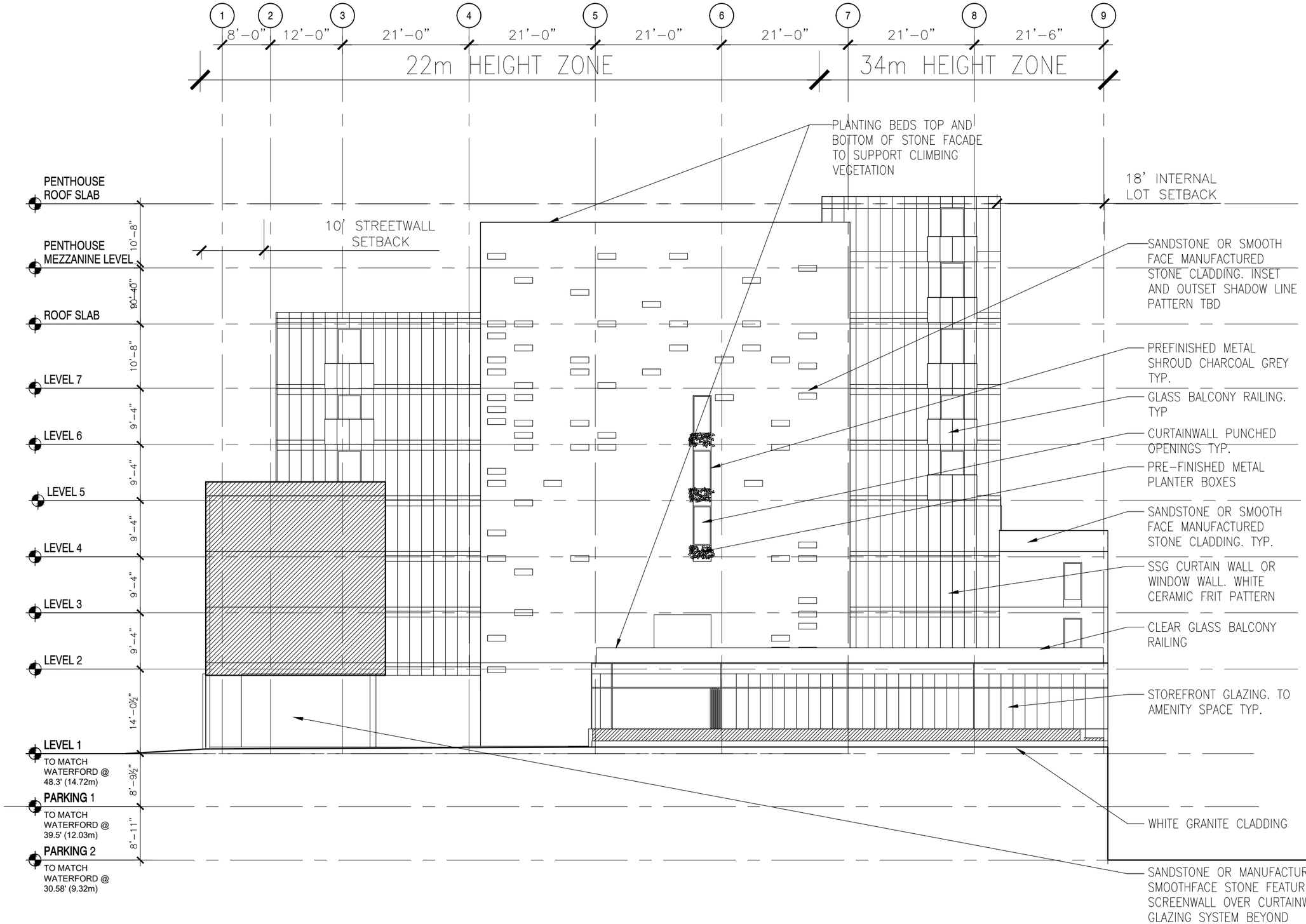
NOT FOR CONSTRUCTION

DRAWING

EAST_ELEVATION

DRAWING NO.

A-202



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CLIENT

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CC		

APPROVED

CC

SEAL

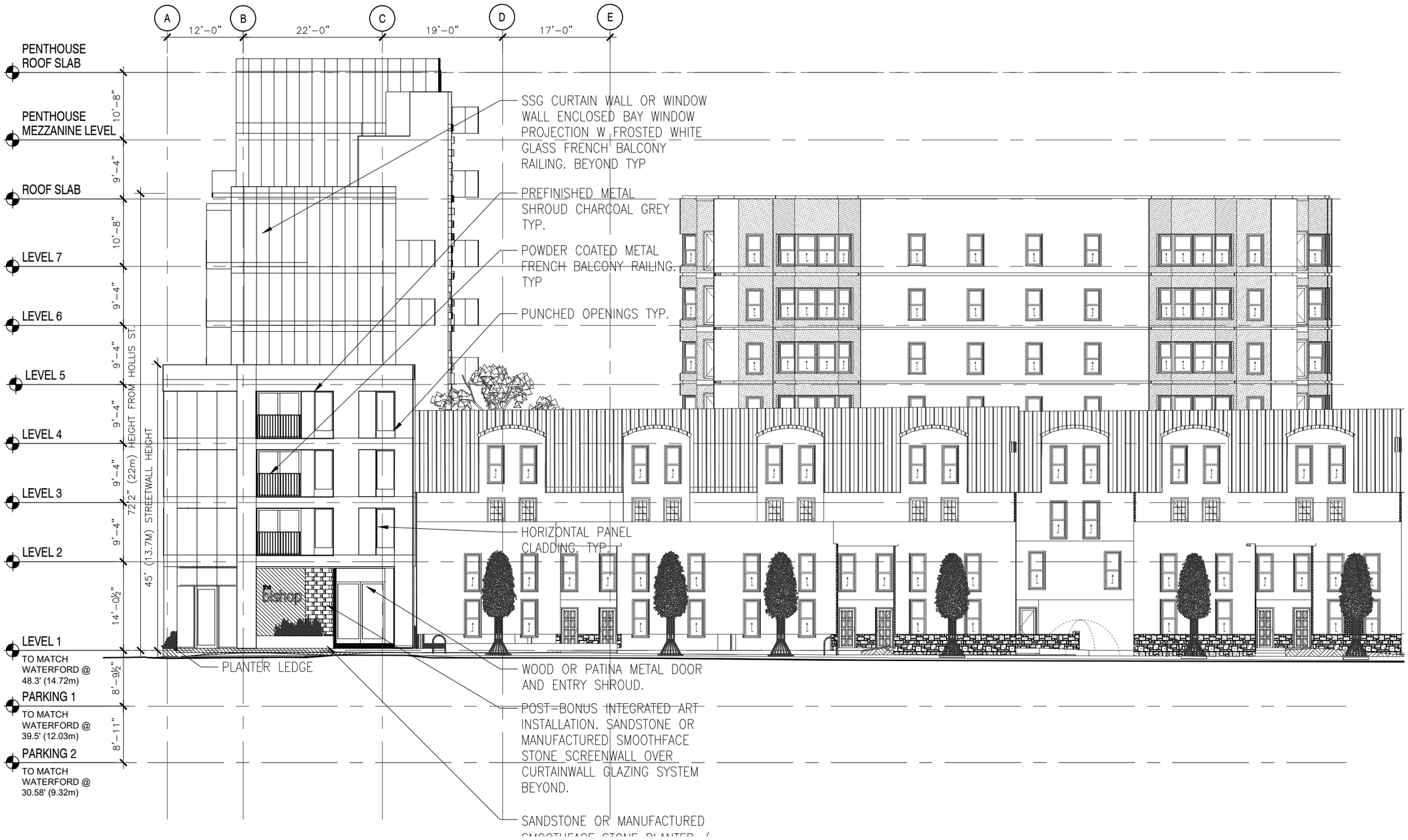
NOT FOR CONSTRUCTION

DRAWING

SOUTH_ELEVATION

DRAWING NO.

A-203



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CC		

APPROVED

CC

SEAL

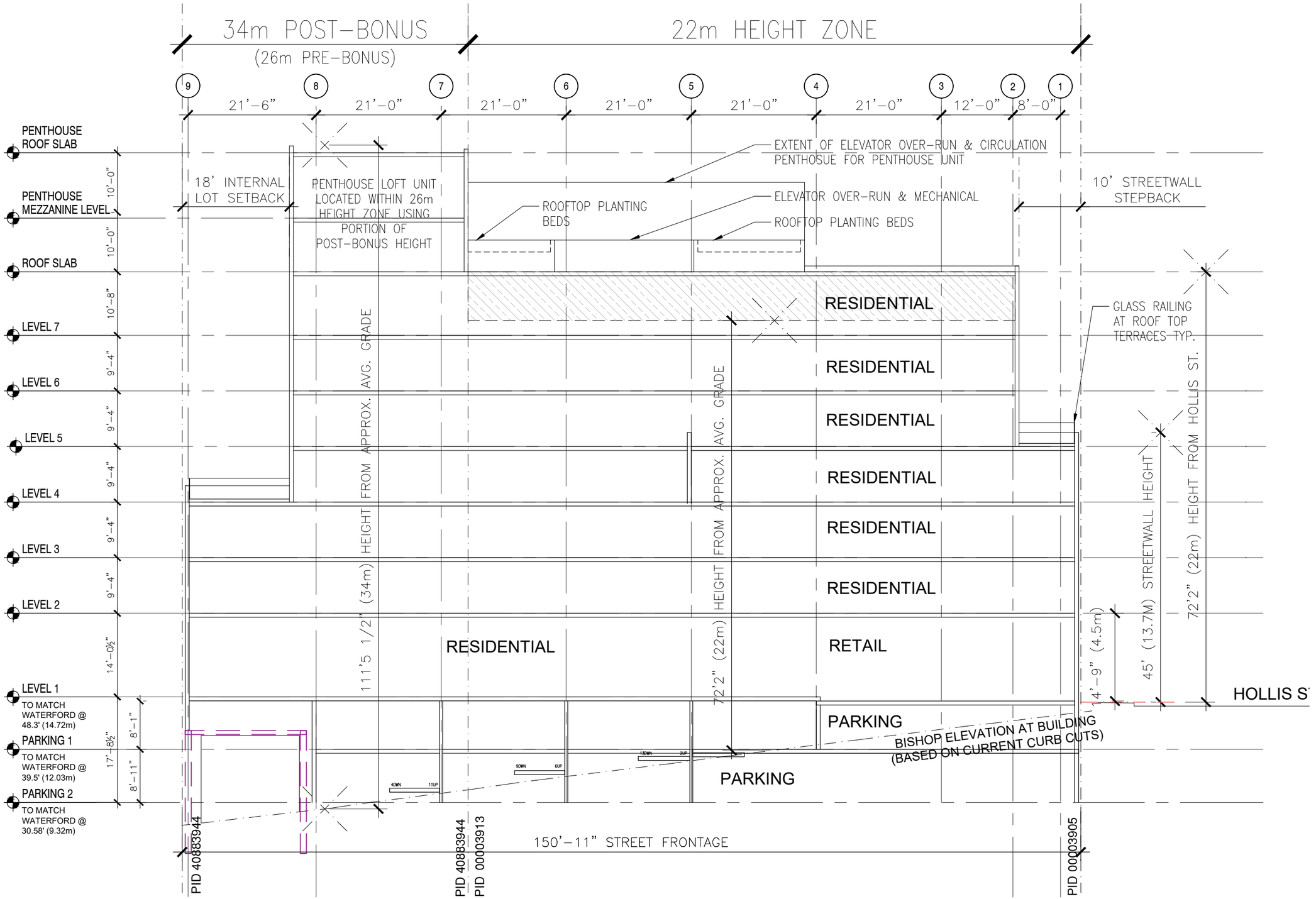
NOT FOR CONSTRUCTION

DRAWING

WEST_ELEVATION

DRAWING NO.

A-204



1/16"=1'-0" 1 A-301 BUILDING SECTION / ELEVATION

EKISTICS PLANNING & DESIGN

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SITE PLAN APPROVAL APPLICATION

CLIENT

DEXEL DEVELOPMENTS INC.

SCALE 1/16"=1'-0"

DATE 2016.09.06

DRAWN BY CC

CHECKED

REVIEWED

APPROVED CC

SEAL

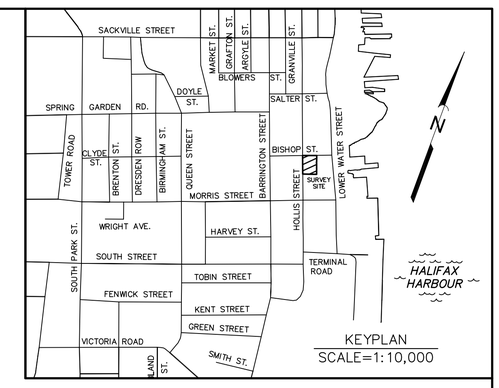
NOT FOR CONSTRUCTION

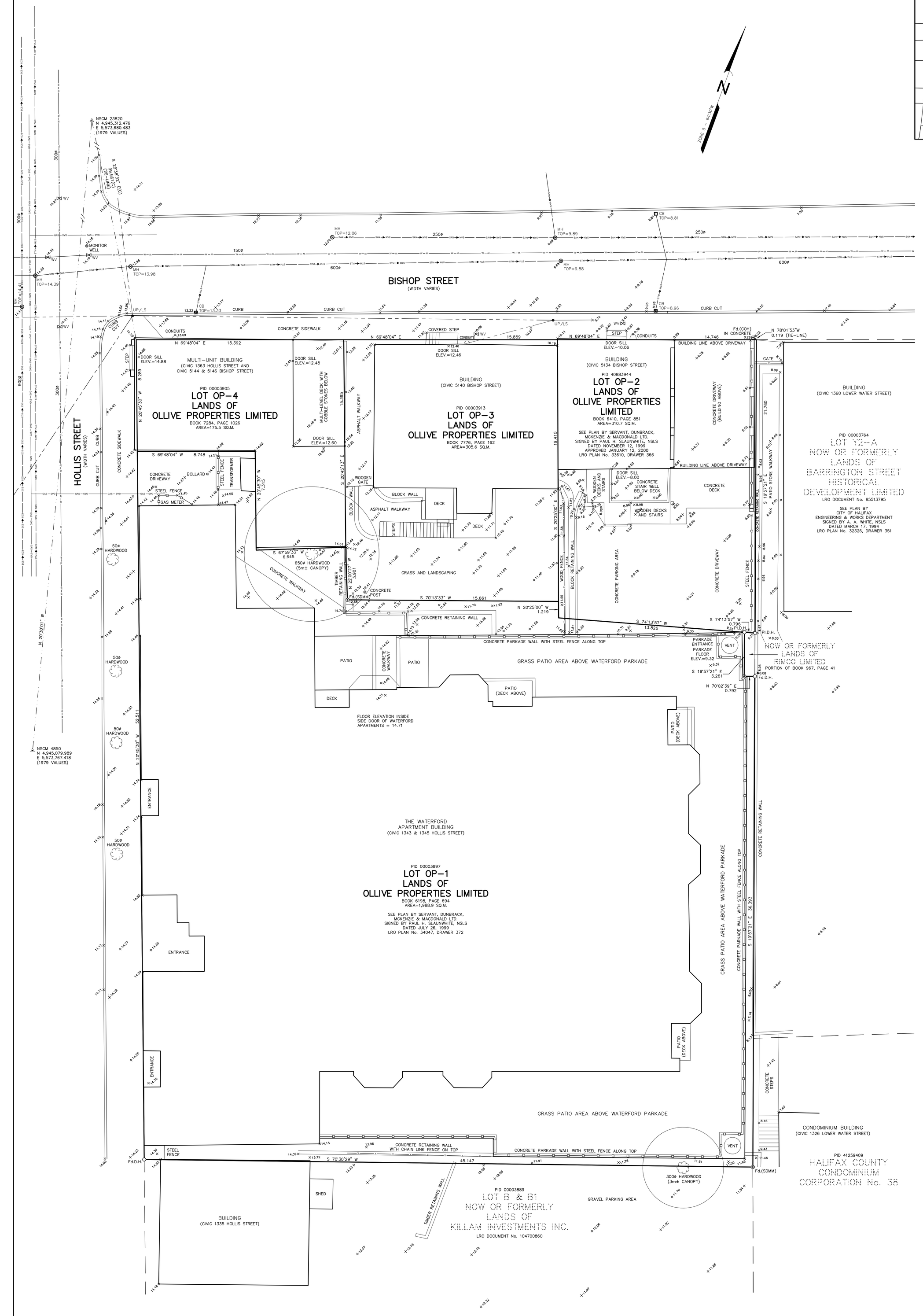
DRAWING

BISHOP_ST_SECTION

DRAWING NO.

A-301





LEGEND:

PLACED SURVEY MARKER	⊙
FOUND SURVEY MARKER	⊙ Fd.
FOUND DRILL HOLE	○ Fd.D.H.
PLACED DRILL HOLE	○ Pl.D.H.
NOVA SCOTIA CONTROL MONUMENT	NSCM
PLACED	PL.
FOUND	Fd.
CALCULATED ; MEASURED ; SET	(C) ; (M) ; (S)
PLAN OF PREVIOUS SURVEY ; DEED	(P) ; (D)
LANDS DEALT WITH BY THIS PLAN	
LAND REGISTRATION OFFICE	LRO
PROPERTY IDENTIFICATION NUMBER	PID
SQUARE METRES	SQ.M.
MONITORING WELL	M
LIGHT STANDARD	LS
MANHOLE	MH
CATCH BASIN	CB
WATER VALVE	WV
FIRE HYDRANT	FH
UTILITY POLE	UP
UTILITY POLE WITH UNDERGROUND CONDUIT	UP/UG
GUY WIRE	→
TREE	
SIGN	
DUCTILE IRON PIPE	DI
FENCE	—— x ——
OVERHEAD WIRES	
STORM LINE	-STM- ▶ PLS -
SANITARY LINE	-SAN- ▶ NVS -
COMBINED SANITARY AND STORM SYSTEM	-ECS- ▶ SCS -
WATER LINE	- W - M -
GAS LINE	- GAS — SVD -
CITY OF HALIFAX	(COH)
SERVANT, DUNBRACK, MCKENZIE & MACDONALD LTD.	(SDMM)

NOTES:

FIELD SURVEYS WERE CARRIED OUT DURING THE PERIOD FROM OCTOBER 27, 2015 TO JUNE 16, 2016.

BEARINGS ARE GRID DERIVED FROM THE LINE JOINING NSCM 4850 TO NSCM 23820 AND ARE REFERRED TO MERIDIAN 64° 30' W OF THE NOVA SCOTIA COORDINATE SURVEY SYSTEM.

FIELD MEASUREMENTS HAVE NOT BEEN ADJUSTED AND SCALE FACTOR HAS NOT BEEN APPLIED.

ELEVATIONS ARE GEODETIC AND ARE REFERENCED TO NSCM 23820 HAVING AN ELEVATION OF 12.510.

ELEVATIONS ARE SHOWN IN METRES.

PIPE SIZES ARE SHOWN IN MILLIMETRES UNLESS SHOWN OTHERWISE.

DESIGNATORS LOT OP-3 AND LOT OP-4 ORIGINATE WITH THIS PLAN.

CAUTION:

UNDERGROUND UTILITIES SHOWN HEREON HAVE BEEN COMPILED FROM FIELD SURVEYS, RECORD DRAWINGS AND UTILITY GIS MAPS. ALL UTILITY AND SERVICE LOCATIONS AND ELEVATIONS MUST BE CONFIRMED PRIOR TO CONSTRUCTION.

THE ASSOCIATION OF NOVA SCOTIA LAND SURVEYORS
FOUNDED 1951
EDWARD R. DAVISON N.S.L.S.
626
MEMBER

SURVEYOR'S CERTIFICATE:

I , EDWARD R. DAVISON, NOVA SCOTIA LAND SURVEYOR , HEREBY CERTIFY THAT THE SURVEY REPRESENTED BY THIS PLAN WAS CONDUCTED UNDER MY SUPERVISION AND THAT THE SURVEY AND PLAN WERE MADE IN ACCORDANCE WITH THE NOVA SCOTIA LAND SURVEYORS ACT AND THE REGULATIONS MADE THEREUNDER.

DATED THIS 31ST DAY OF AUGUST, 2016.

EDWARD R. DAVISON, N.S.L.S.

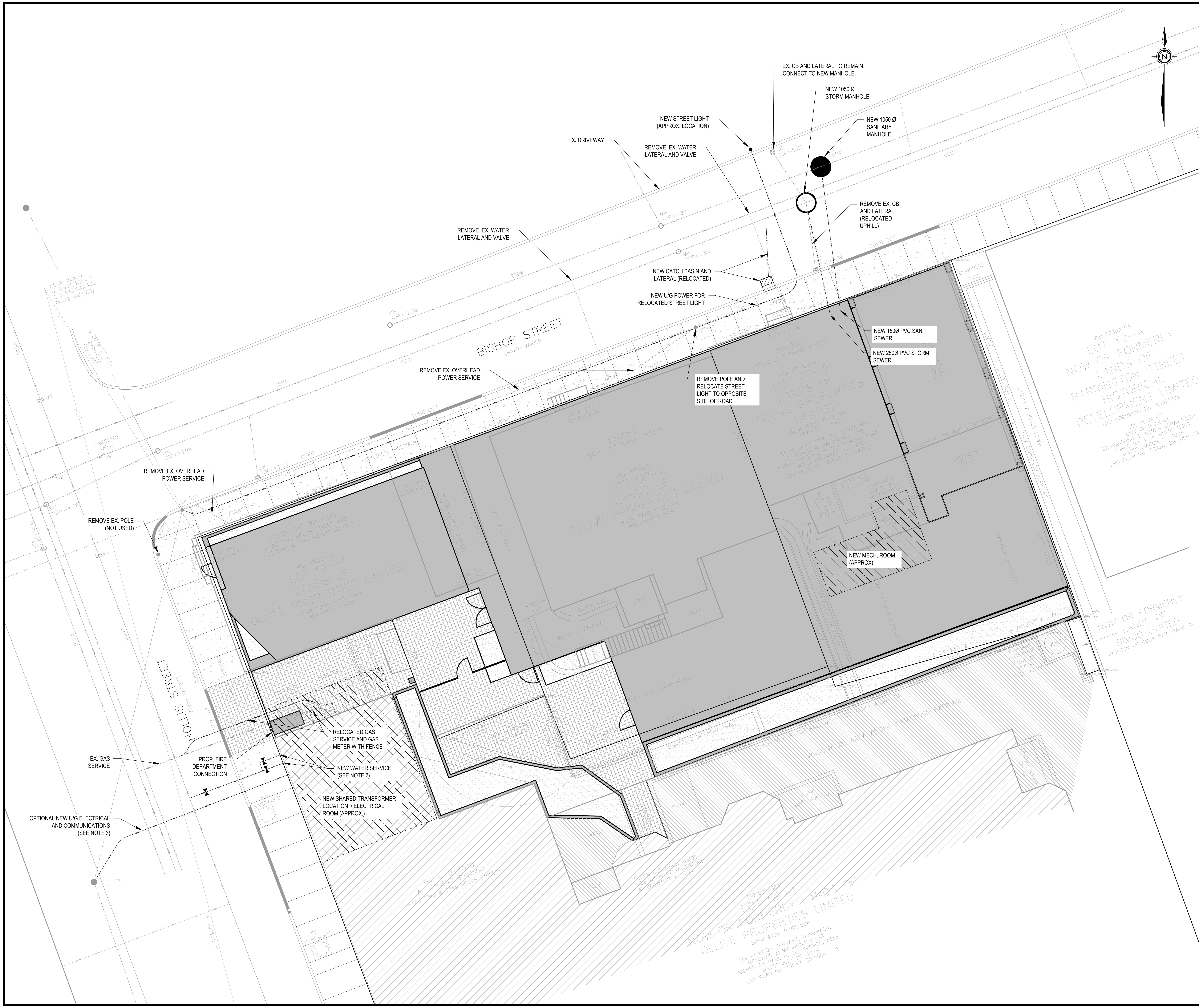
TOPOGRAPHICAL PLAN OF SURVEY OF LOT OP-1, LOT OP-2, LOT OP-3 AND LOT OP-4 LANDS OF OLLIVE PROPERTIES LIMTED

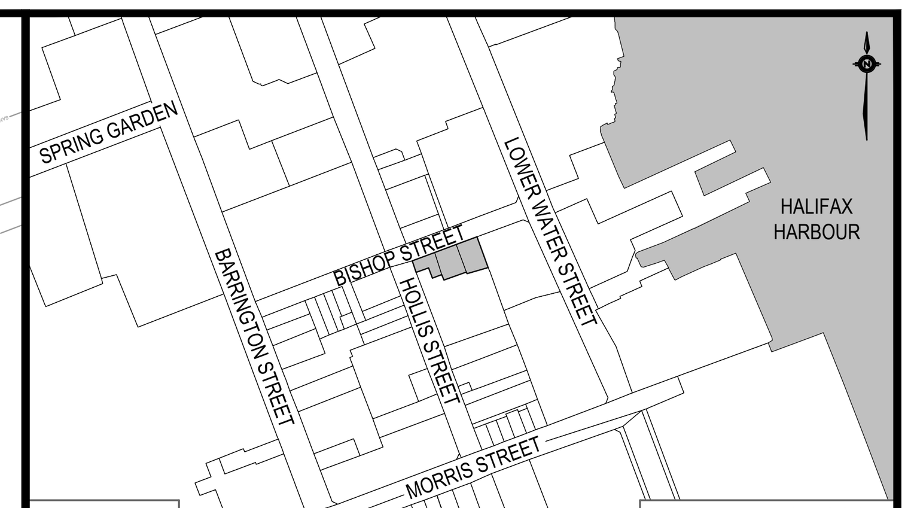
BISHOP STREET AND HOLLIS STREET
HALIFAX, HALIFAX COUNTY, NOVA SCOTIA

2 1 0 2 4 6 8 10

SCALE : 1/100 (METRIC)
AUGUST 31, 2016
DWG. NO.: 15-056-50

B.DAVISON
Surveying & Engineering Ltd.
1037 Avonview Drive, Hants Border, NS, B0P 1P0
p:902-352-2185 f:902-352-2186 c:902-240-9180
www.bdse.ca busterdavison@eastlink.ca





KEY PLAN SCALE = 1:5000

LEGEND

	PROPOSED	EXISTING		
CATCH BASIN				
PYRAMID CB				
HYDRANT				
SAN MANHOLE				
STM MANHOLE				
VALVE				
POWERPOLE				
CULVERT				
SANITARY				
STORM				
WATER				
FENCE				
SWALE / DITCH				
ELECT. OVERHEAD				
CONTOUR	0.0	0.0		
SPOT ELEVATION	0.00	0.0		
PROFILE GRADE				
SANITARY LATERAL		ALIANT PEDESTAL		
STORM LATERAL		NSP URD BOX		
WATER LATERAL		SIAMESE CONN.		
CATCH BASIN LEAD		ROCK / SURGE		
FORCE MAIN		END CAP		
EASEMENT		DRIVEWAY CUT		
RIGHT-OF-WAY		HEADWALL		
PROPERTY LINE		LIGHT STANDARD		
LOT LINE		UTILITY POLE		
GAS LINE		ROAD SIGN		
TOE/TOP OF BANK		STREET TREE		
CLEARING LIMIT		SIDEWALK		

NOTES:

1. CONTRACTOR TO CONFIRM LOCATION OF ALL UNDERGROUND SERVICES PRIOR TO CONSTRUCTION WITH RESPECTIVE UTILITIES.
2. PROPOSED WATER CONNECTION TO BE INSTALLED AS PER HWSD - 1220 OF DESIGN AND CONSTRUCTION SPECIFICATIONS FOR HALIFAX WATER, LATEST EDITION.
3. ELECTRICAL, COMMUNICATIONS AND WATER SERVICES MAY BE SHARED INTERNALLY WITH THE EXISTING WATERFORD DEVELOPMENT. SERVICE LOCATIONS ON HOLLIS STREET REPRESENT NEW SERVICE LOCATIONS SHOULD THEY BE REQUIRED.

0 2 4
1:100

NO.	DESCRIPTION	DATE
2	SPA FINAL SUBMISSION	SEPT. 6, 2016
1	ISSUED FOR DA APP	AUG. 26, 2016

ekistics plan+design
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Landscape Architecture | Engineering | Architecture

CLIENT
DEXEL DEVELOPMENTS

PROJECT
1363 HOLLIS STREET
5134 BISHOP STREET
5144-5146 BISHOP STREET
HALIFAX, NOVA SCOTIA

SHEET DESCRIPTION
SERVICING SCHEMATIC

SCALE	DATE	SHEET
1:100	2016/09/06	C1 OF 2

DRAWN	CHECKED	PROJECT NO.
RNB / DJH	RNB	

September 6, 2016

DATE: 2016/09/06 FILE: \\SERVER2\2\Ekistics\active projects\DEXEL HOLLIS AND BISHOP\06_Built\01 DWG\3 Schematic Design\Servicing Landscape Schematic\C1 SERVICING SCHEMATIC.dwg

Thursday, September 08, 2016

HRM Planning Services
Planning Applications
Alderney Gate
40 Alderney Drive, 2nd Floor
Dartmouth

To Whom it May Concern

RE: 1363 Hollis & Bishop Development Variance Requests

Ekistics, on behalf of Dexel Developments, is submitting a Site-Plan Approval Pre-Application for a residential/commercial mixed-use development at 1363 Hollis Street (PID 00003905 ; 175.5 sq.m.) and 5140 and 5134 Bishop Street (pids 00003913; 305.6 sq.m. & 40883944; 310.7 sq.m.). The project site is bounded by Bishop Street (north) and Hollis Street (west). The site is located within the zone DH-1 (Downtown Halifax) and falls within Precincts 1 and 2 as per Map 1 and 2, respectively, of the Downtown Halifax Land Use By-Law (LUB). The 3 properties occupy 791.8 sq.m and the existing buildings are 4-storeys, 2-storeys and 3 storeys respectively. They are not registered heritage buildings. To the east of the site, the property is bounded by a 5-storey mixed use building. Across the street, the 21-storey Alexander building is under construction. The developer is proposing a building that ranges from 7 storeys high on the Hollis Street end, to 10-storeys high on the north end over a 6.24m grade change down Bishop Street.

The developer has assembled these additional 3 lots and plans to annex his Waterford Apartment Building located at 1343 & 1345 Hollis Street (PID#00003897; 1,988.86 sq.m.). The developer plans to discharge the current DA on the Waterford property and create one large new property by removing the internal property lines. The developer will be submitting the DA discharge on PID# 00003897 (The Waterford) separate from this application in the following week. The total area of all 4 properties is 2,780.66 sq.m. The Waterford is a an 8 storey residential apartment building.

The building will include 40 units total; 12 of which are 2-bedroom, 2 are 3-bedroom and the remainder are 1 bedroom), and 12 parking spaces on 2 levels (the Waterford has 82 parking spaces on 2 levels). The site property areas are shown on the accompanying site survey. The building will preserve the current parking garage entrance into the Waterford building from Bishop Street. The building will add 12 new parking spaces to the 82 spaces located in the Waterford. The building will also include a private at-grade landscape podium off of Hollis Street (216.1 sq.m) and an amenity terrace on the 4th storey (176 sq.m.). The total proposed landscaped area is 392.1 sq.m which does not include any of the existing landscaped area provided by the Waterford.

The three properties on which the new building will be built straddle Precinct #1 (PID 40883944) and Precinct #2 (pids 00003913 and 00003905) making a single development slightly challenging in the interpretation of each precinct's requirements. Precinct #1 allows a 34m post bonus height and precinct 2 allows a 22m post-bonus height. There are no view planes over the site. Along Bishop Street the grade changes from 8.22m (at the north-east end of the site) to 14.46m (at Hollis Street), a delta of 6.24 m (20.5'). The developer intends to use the post-bonus height by providing a public benefit either by pub-

lic art at the entrance to the courtyard, or by undergrounding overhead infrastructure, providing affordable housing or investing in public transit. We will discuss the best public benefit with HRM prior to approval. While the developer is seeking the post-bonus height on the 34m portion, the developer will not be using the full 34m of height.

The proposed building satisfies all the LUB requirements (See compliance checklist attached) except 2 items that require a variance as described below

Variance #1: Precinct 1 - 22m height variance request.

As the project stretches across two different height zones (precinct 1 allows 34m and precinct 2 allows 22m), a variance is required for the 22m height zone due to the sloping site considerations across these two precincts. The elevation of north-east corner of the precinct 2 property is 10.14m and the elevation of Hollis Street is at 14.45m (a difference of 4.31m). The Precinct 1 post bonus height of 34m has been met.

As per policy 3.6.8 (Maximum height variance) of the Design Manual, a site plan variance is requested based on:
(a) the maximum height is consistent with the objectives and guidelines of the Design Manual; and
(c) the maximum building height is less than 1.5 metres below the View Plane or Rampart height requirements;

Variance Rationale:
This is a very narrow site (only 9m wide on Hollis Street) with a significant grade change across the precinct 2 properties. The current design is below the 22m height taken at Hollis Street (14.1m elevation) but not from the average grade across the two precinct 2 properties.

There are several policies in the design manual that speak to policy 3.6.8 (a) above. Policy 3.3.3 speaks to main building entrances being "emphasized with such architectural expression as height, massing, projection, shadow, punctuation and change of roof line. If the building used the average grade and lost 1 storey of height, the difference between the 34m portion of the site and the 22 m portion of the site would emphasize the middle of the building rather than it's important corner entrance. Similarly, policy 3.4.2 speaks to the visual prominence of corner sites with a provision for a change in building massing at the corner.

Furthermore, this site is not in the viewplane and will be surrounded by buildings which significantly exceed the 22m height (The Alexander across the street and the Waterford next door). The property right across the street to the north will also likely be seeking a full 7-storey development height consistent with the recently approved Bejamin Wier building.

Variance #2: Roof Height setback 3m from edge

Policy 8 (10) of the LUB states that roof features should be setback at least 3m from the outermost edge of the roof on which they are located. The proposed design shows an elevator and hallway access to the neighbouring 34m building portion. The elevator and hallway are less than the 30% of roof coverage but due to the narrow width of the site, the developer cannot achieve the 3m setback from the edge.

As per policy 8(11) of the LUB, the roof coverage can be relaxed where it is consistent with the design bylaw.

Variance Rationale:
As was mentioned previously, the width of this site is extremely narrow on Hollis Street with only about 9m of width stepping deeper moving to the north-west of the site. With the 3m stepback from Bishop Street there simply isn't enough space to stepback the elevator shaft a further 3m from the property line. Since the neighbouring property is owned by the same owner, there should not be any issue with neighbours. There has been a recent precedent for a

similar narrow width lot approval for an elevator shaft not stepping back on the property line for Case 20371, a Mixed-use Development at 1474 Brenton Street & 1469-73 South Park Street, Halifax.

Summary:

This is an extremely challenging property which crosses two downtown precincts, one allowing 22m and one allowing 34m of height. The width of the site ranges from 9m at it's narrowest on Hollis Street to 22m wide at the north-east corner of the site. There is a 6.24m grade change down Bishop Street fronting onto the property. We believe the architects and developer have taken every precaution to follow the intent of the Land Use Bylaw and Design Manual in designing this development and we believe the requested site plan variances are consistent with the intent of the Design Manual.

If you have any questions about this submission, please feel to drop me a line at your convenience. Thanks for your consideration.

Sincerely

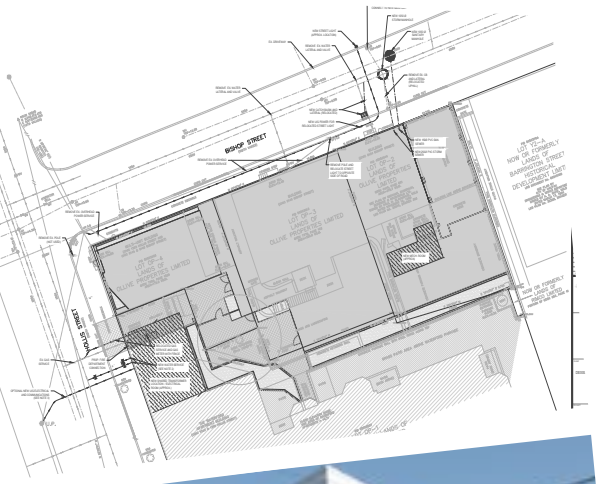
ORIGINAL SIGNED

Robert LeBlanc, MCIP, LPPNS
Ekistics Planning & Design

Bishop & Hollis Variance Checklist

SPA Submission 2016.09.06

Policy	Summary	Requirement	Actual	Met?
	Compliance with Viewplanes			N/A
	Compliance with Rampart Heights			Yes
p.18 (4a)	Dwelling Unit Mix - 1/3 two bedroom or more	40 units total: 12 units = 30%	14 units 35% 2+ bedroom	Yes
p.19 (10)	residential in precinct 2 shall contain 11.25m2 landscaped open space/unit	11.25m2 @ 29 units = 326.25m2/3512sqft	4218sqft	Yes
p.19 (6)	maximum 60% can be rooftop if rooftop is minimum 56m2/602sqft	maximum 60% rooftop = 2530sqft	2325sqft	Yes
p.24 (2)	One building per lot	1	1	Yes
p.24 (4)	non-registered Heritage in a Heritage District subject to 4.5/4.6 of Design Manual	heritage district?	no	Yes
p.24 (5)	Lot abutting heritage property	adjacent heritage?	no	Yes
p.24 (6)	maximum pre-bonus height	22m/72.12ft & 26m/85.30ft	meet 22m at Hollis St	No
p.24 (7&8)	maximum post-bonus height	none for precinct 2; 34ftm/111.55ft		N/A
	service elements exceeding height <30% of roof area	<30% of roof area exceeding height	<30% of roof area exceeding	Yes
p.24 (9). Appendix C	Prominent Visual Termini	termini site?	no	Yes
p.25 (10). Appendix C	setback features 3m from edge of roof	setback extra height 3m from roof edge	shall meet	No
p.25 (13)	Floor to Floor 4.5m on First Floor	>4.5m FF/14.76ft	4.5m/14.76ft	Yes
p.25 (17)	Building not visible from ramparts	Not visible from Ramparts	Not visible from Ramparts	Yes
p.25 (19)	Accessory buildings	accessory buildings?	No accessory buildings	Yes
p.26 (20)	Prohibited cladding materials	No prohibited materials	No prohibited materials	Yes
p.27 (2). App C	Streetwall Max	< 18.5m/60.7ft	< 18.5m/60.7ft	Yes
p.27 (5 & 6).	Streetwall full width no less than 80% width of lot	>80% abutting width	>80% abutting width	Yes
p.27 (7a)	min 3m stepback < 33.5m height	min 3m/10ft stepback	3m/10ft stepback	Yes
p.27 (7b)	min 4.5m stepback > 33.5m height		no portion >33.5m	N/A
p.28 (4)	>streetwall setback 5.5m from interior lot line or 10% lot frontage (< streetwall height)		5.5m setback	Yes
p.28 (7)	>33.5m height setback 11.5m from interior lot		no portion >33.5m	N/A
p.28 (8)	17m tower separation (>33.5m)		no portion >33.5m	N/A
p.28 (10)	Tower dimensions above 33.5m is 38x38m		no portion >33.5m	N/A
p.29 (13)	Balconies encroach into setbacks/stepbacks	2m for <50% horizontal	<50% horizontal	Yes
p.30 (1)	schedule W for precinct 1		not part of schedule W	N/A
p.37 (14-1)	no accessory surface parking	no accessory surface parking	no accessory surface parking	Yes
p.39 (15)	Pavilion: bike parking 0.5 per unit (80% A, 20% B)	.5(40units)=20 total; 16A, 4B	16A, 4B	Yes



Transportation Impact Study

DEXEL Developments
Bishop - 1363 Hollis Street

August 2016

Submitted by:
Ekistics Planning & Design

1 Starr Lane,
Dartmouth, NS, B2Y-4V7
ph: 902.461.2525

EKISTICS PLANNING & DESIGN


Speed Fines
Double in
Work Areas

TABLE OF CONTENTS

APPENDICIES

EKISTICS PLANNING & DESIGN

1. INTRODUCTION

This Transportation Impact Study follows HRM's Guidelines for the Preparation of Transportation Impact Studies, 8th Edition and general Traffic and Transportation Engineering principles for such studies. It is intended to address the transportation impacts that may be expected on the road and active transportation networks resulting from the:

HRM: Transportation Impact Studies are prepared to ensure developments are consistent with the objectives and policies of the Municipal Planning Strategies / Municipal Development Plans and the Regional Plan

- Construction of an 8 story residential apartment development as described in the table below:

Proposed Development	Bishop, 1363 Hollis Street, Halifax, Nova Scotia
Owner	DEXEL Developments
Location	Southeast quadrant of the Bishop / Hollis Intersection
Building Details	40 Residential Units 1,045 ft^2 Retail Space 1,895 ft^2 Amenity and Fitness
Parking	12 New Spaces at Bishop 82 Spaces in Existing Waterford New Bicycle Spaces

Table 1-1: Project Summary

Figure 1-1: Building Rendering

2. EXISTING CONDITIONS

2.1 Study Area

The Study Areas is defined by the area (roads, intersections and AT network) that may be reasonably expected to be impacted by the proposed development.

The proposed building is located in the southeast quadrant of the intersection of Bishop Street with Hollis Street as indicated by the yellow rectangle in the figure below. The primary study area for this analysis extends to the limits shown by the blue area, and generally includes the intersections of Hollis Street with Barrington Street and Lower Water Street.

The area is characterized by a variety of older style residential buildings that are generally have 3-4 floors and front directly onto Hollis and Bishop Street. A gravel surfaced parking lot is located directly north of the site across Bishop Street and the northwest quadrant of the intersection is part of the rear property of the Nova Scotia Government House.

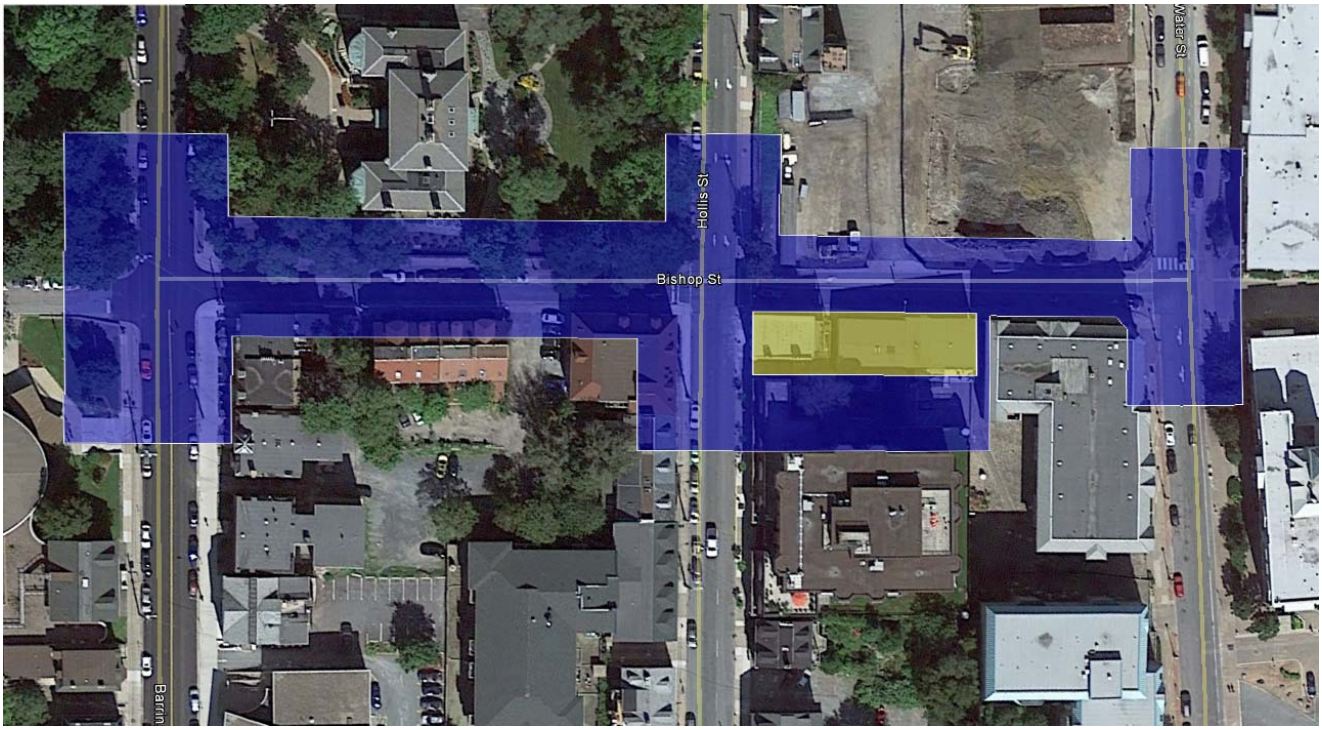


Figure 2-1: Study Area

2.2 Roadways

The following sections provide a brief summary of each of the key roadways in the study area that are relevant to this study.

Bishop Street	Bishop is classified as an urban local roadway and consists of a single lane in each of the eastbound and westbound directions. There are sidewalks on both sides of the roadway directly abutting the curb and there are a number of driveways to parking lots and residential driveways. The downhill (eastbound) movement allows for a left turn on to northbound Lower Water Street (one way) or a through movement to the Bishops Landing parking lot. The uphill movement allows for a left turn only to southbound Hollis as Bishop is a one-way eastbound street on the opposite site of Hollis. 
	Hollis is a 3 lane urban arterial oriented as a one-way southbound street. Parking is permitted on both sides of the roadway during and sidewalks are present on both sides of the road between the curb line and the adjacent building faces. Hollis is a truck route providing access to the Halterm Container Terminal, VIA Rail Station, Pier 21, Cunnard Centre and other Port of Halifax destinations. 
Lower Water Street	Lower Water Street 2/3 lane urban arterial oriented as a one-way northbound street. Parking is the west side of the street except during the PM peak hour and sidewalks are present on both sides of the road directly on the back of the curb. Similar to Hollis, it is a truck route serving traffic existing the downtown core area. It is also a busy active transportation route being directly adjacent to the Halifax Waterfront. 

2.3 Vehicle Traffic

Recent and historical traffic counts were requested from HRM for all intersections in the study area and the counts were supplemented by automated traffic counts carried out at the intersections of Bishop Street with Barrington Street, Hollis Street and Lower Water Street. Information available from HRM was very limited therefore existing traffic volumes were built from the automated traffic count program completed for this study. The baseline counts used in this analysis are provided in Appendix A of this report.

2.4 Active Transportation (AT)

Peninsular Halifax has documented high cyclist and pedestrian activity (and other AT modes) and this study area is no exception with many local AT origins and destinations in the area. This includes the variety of businesses, restaurants and other facilities along the Halifax Harbour Waterfront, the Port of Halifax (including events and traffic associated with cruise ships), the Halifax Ferry Terminal, Dalhousie University and a wide variety of office and residential buildings in the downtown core.

As a result, there are high volume of active transportation users (pedestrians and cyclists) in both the north-south and east-west directions. Both Hollis Street and Lower Water Street have been promoted as cycling routes and the area is frequently used by tourists in the area. The area is also prone to active transportation uses associated with the downtown Halifax nightlife.

As a result, accommodating AT movements past/through the site, as well as connectivity to existing routes, is an important consideration for this development. The majority of routes and intersection crossings are already in place for this development and access points for the development easily connect to existing sidewalk infrastructure.

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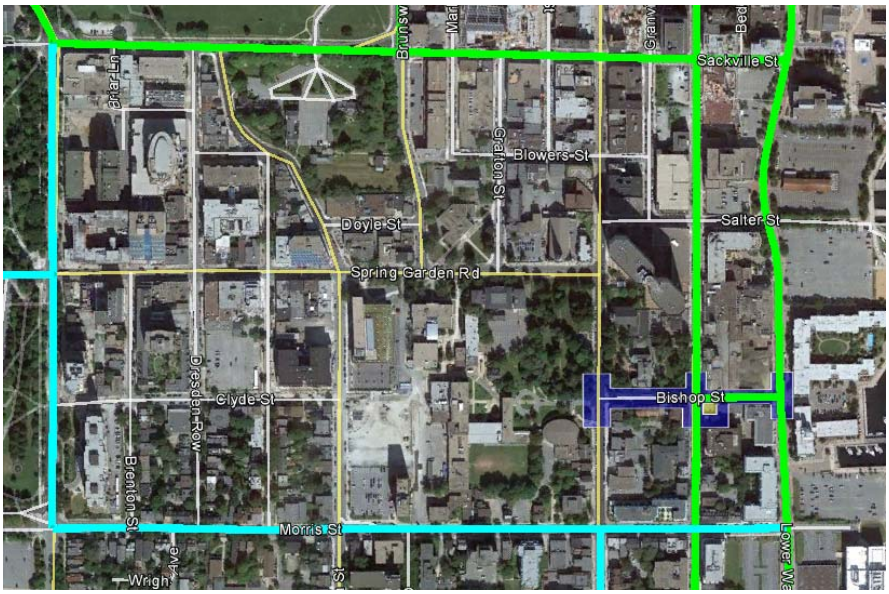
2.5 Transit

While Hollis Street and Lower Water Street only accommodate one transit route (Route 90), the existing Halifax Transit map shows very significant transit presence in and around the study area. With approximately 18 separate bus routes along Spring Garden Road and Barrington, 4 routes directly past the development site on Barrington Street, and close access to the Halifax Ferry Terminal, Water Street Bus Terminal and the Scotia Square Bus Terminal.

Figure 2-2: Transit Routes

2.6 Truck Routes

Halifax's By-Law T-400 "*Respecting the Establishment of Truck Routes for Certain Trucking Motor Vehicles within the HRM"* identifies Hollis Street, Lower Water Street and Sackville Street as **Full Time** truck routes (green). It also identifies the section of Bishop Road between Hollis and Lower Water Street as a full time route.



In addition, Morris Street and South Park Street are defined as **Daylight** routes between the hours of 7 AM and 9 PM (blue). These routes provide more than adequate access to the new development.

3. FUTURE CONDITIONS

3.1 Context

3.1.1 Analysis Time Horizon

Based on recommended HRM guidelines, the base year for this study has been established as 2016. The guidelines also suggest that the study should typically address a 5-year time horizon (2021), which in this study includes 5 years of background traffic growth and the full build-out of the development.

3.1.2 Background Traffic

Traditional background traffic growth rates used for traffic impact studies throughout HRM have been in the 1 – 2% range though actual growth is frequently less than this and even negative in some cases. For the purposes of this study, a 1% background traffic growth rate was considered reasonable and conservative.

3.1.3 Analysis Period

This area of Halifax is highly commuter oriented therefore, the weekday AM and PM peak hours are considered to be the critical periods for the analysis.

3.2 The Development Traffic

3.2.1 Trip Generation

Traffic from the development considers both the removal of the existing 11 residential units currently present on the site of the proposed development, plus the addition of 40 new residential units. The net increase is 29 new residential units plus just over 1,000 ft^2 of retail space. The addition of new traffic related to the development is summarized in the table below and a more detailed summary of the trip generation rates are provided in Appendix B of this report.

Table 3-1: Trip Generation Table

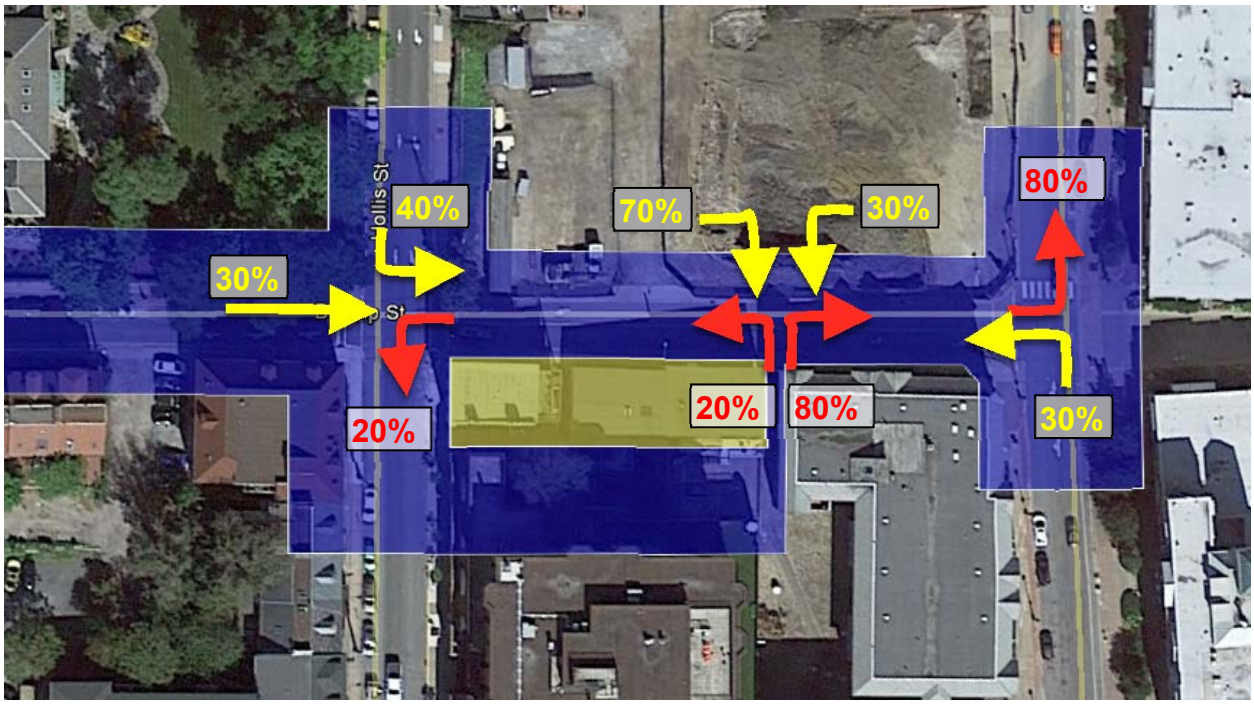
	ITE Land Use Type	AM Peak			PM Peak		
		Enter	Exit	Total	Enter	Exit	Total
Apartments	ITE 220	3	12	15	12	6	18
Total Volume to Adjacent Streets		3	12	15	12	6	18

The trip generation rates for the residential units have not been reduced from the ITE Trip Generation Rates, though it is likely that these rates overestimated the number of vehicles added to the road network due to an expected high level of Active Transportation and Transit user. The small retail component of the development is expected to primarily service the local community and is not expected to generate any additional traffic to and from the proposed development during the peak hours of traffic.

3.2.2 Trip Distribution and Assignment

It is assumed that traffic will distribute itself through the network in a similar manner to the existing traffic. Due to the location of the driveway to the development, the majority of resident vehicle traffic to and from the site will enter the driveway from Bishop Street fed by southbound Hollis and eastbound Bishop as well as northbound Lower Water Street.

Turn restrictions exiting the area limit the exit movements to a westbound right turn from Bishop to Hollis and an eastbound left turn from Bishop to Lower Water Street. The trip distribution assumptions are shown in the Figure below.



4. ANALYSIS

4.1 Transportation Modelling

A microscopic traffic model was prepared using the Synchro/SimTraffic platform for the AM and PM peak hours of analysis. The model extended along the Bishop Street corridor between Hollis Street and Lower Water Street. Areas beyond these intersections are not expected to experience any operational related impacts related to the proposed development.

The results of the modelling are shown in the following 4 tables that summarize the typical volumes, delays and volume to capacity ratios for each of the movements at the intersections in the study area. Additional detail is provided in the Synchro reports provided in Appendix C of this report.

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Figure 4-1: AM Peak Hour – Existing Conditions

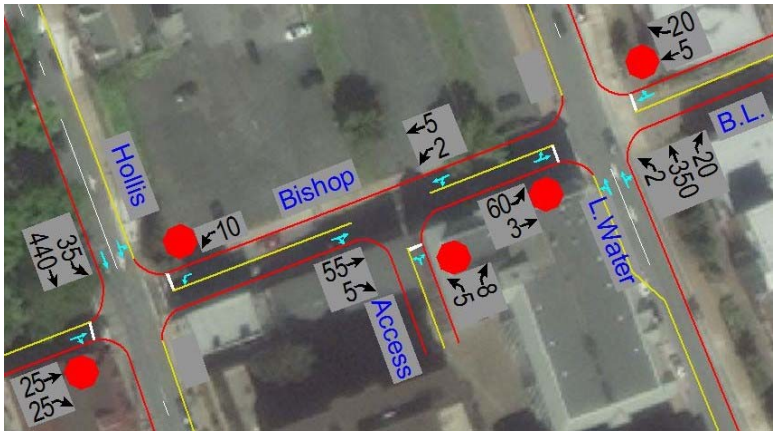
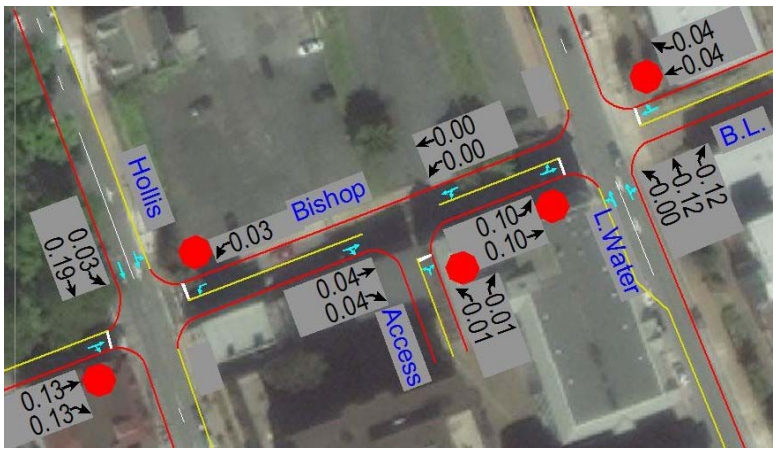
Volumes – Ex. AM Peak		The existing AM Peak scenario shows relatively low volumes on Bishop Street and the major volumes being the southbound through movement on Hollis Street and the northbound through movement on Lower Water Street.
V/C Ratio – Ex. AM Peak		Volume to capacity ratios do not exceed 20% at any of the intersection movements.
Delay – Ex. AM Peak		Delays are low for all intersection movements inncluding minor road left turn movements. The one-way nature of the road network limits the amount of traffic that opposes each of the turn movements.

Figure 4-2: AM Peak Hour – Future Conditions

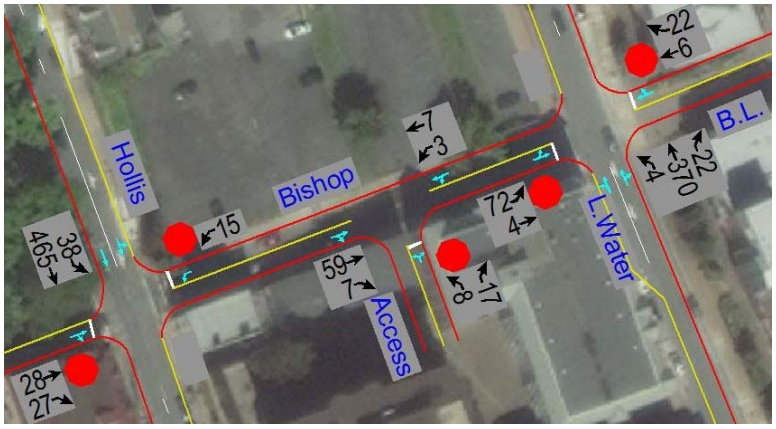
Volumes – Future AM Peak		Future volumes include 1% annual background traffic growth plus the addition of the development traffic based on the generation and distribution assumptions.
V/C Ratio – Future AM Peak		Volume to capacity ratios generally increase by less than 2% for all movements within the study area.
Delay - Future AM Peak		Similar to V/C ratios, there is very small increases in delay for each of the intersection movements. It should be noted that we have not included queue lengths in these summaries. Queue results are are shown in the detail Synchro output in Appendix C and generally show that 95% queue lengths are less than one vehicle length.

Figure 4-3: PM Peak Hour – Existing Conditions

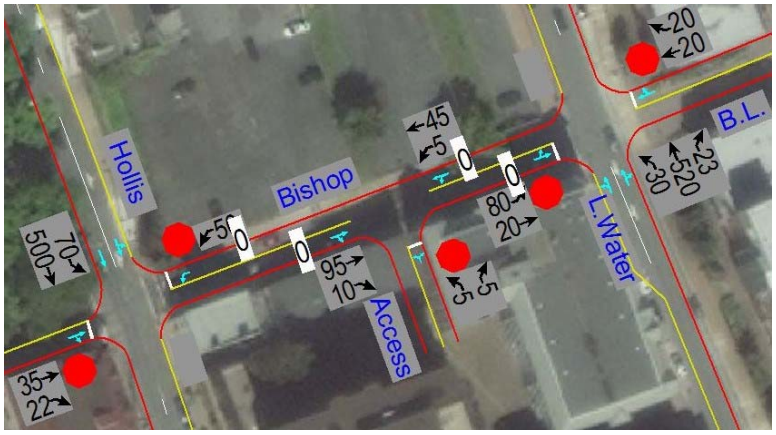
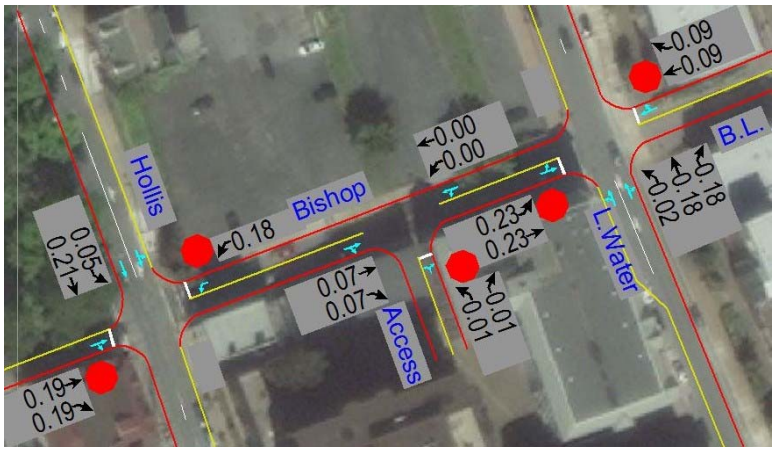
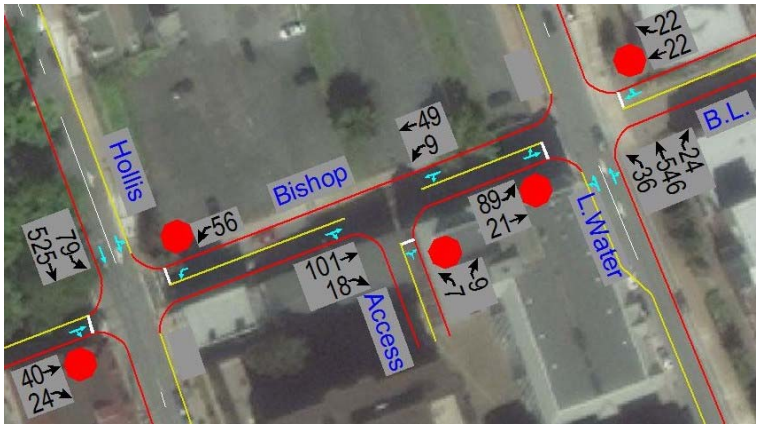
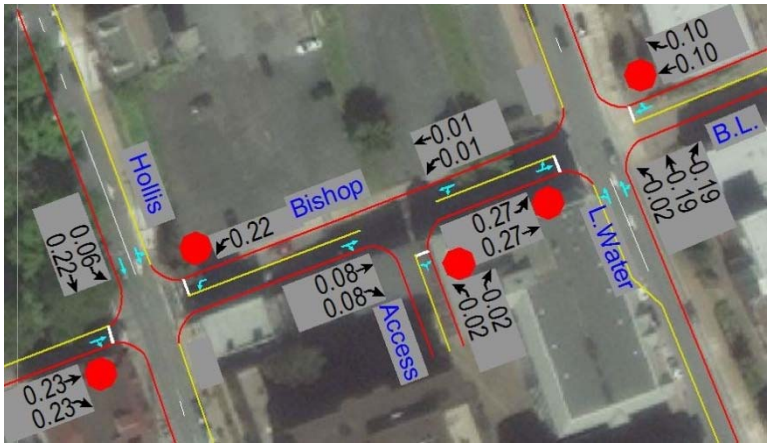
Volumes – Ex. PM Peak		Volumes are slightly higher during the PM peak than the AM peak, but similar network patterns are in place including the predominant volumes on the Hollis and Lower Water Street through movements.
V/C Ratio – Ex. PM Peak		V/C ratios are slightly higher in the PM peak scenario, though only increase to approximately one quarter of the intersection capacity at Lower Water Street and approximately 20% on Hollis and Lower Water, leaving significant excess capacity for this and other developments in the area.
Delay – Ex. PM Peak		Delays again are quite low for the PM peak secnario with the maximum delay experience on easbound Bishop Street at Hollis (approximately 19 seconds). These values are considered very good during peak traffic hours.

Figure 4-4: AM Peak Hour – Future Conditions

Volumes – Future PM Peak		The future PM peak includes the addition of 1% annual background growth plus the new development traffic to and from the site. While volumes are higher on Bishop Street, all operational parameters are acceptable based on typical HRM requirements.
V/C Ratio – Future PM Peak		V/C ratios approach 30% capacity at the Lower Water Street intersection, though the majority of movements are stop controlled right turns onto a one-way northbound street. There is little opposing left turn traffic from northbound Lower Water Street therefore these is little concern from capacity perspective.
Delay - Future PM Peak		Again, delays are relatively low at all intersection and are considered acceptable. 95% queue lengths as shown in Appendix C are generally less than 1 vehicle length with the exception of the eastbound Bishop right turn movements which has a 95% queue length of about 8 meters or just over 1 car length.

In general, the Synchro report results contained in Appendix C of this report show that there are only very minor impacts to volume to capacity (v/c ratios) at all intersections in the study area. There are no notable increases in delay or queue lengths as a result of the addition of the development. With respect to the overall magnitude of traffic added to the surrounding road network as a result of the development, volume increases on Lower Water Street and Hollis Street are in the range of 1 – 3% of total traffic through these intersections.

5. CONCLUSIONS

This development appears to be well suited to this location from a transportation perspective by integrating into a predominately residential neighbourhood that is already characterized by apartment complexes and commercial retail development that supports the community. It is near the intersection of a number of major transportation corridors meaning traffic can conveniently navigate to various parts of the city.

The development is well placed to take advantage of the high levels of local businesses, recreation venues and institutions (hospitals, schools, downtown Halifax business area, etc.), all of which are directly connected to robust Active Transportation and Halifax Transit networks immediately adjacent to the site. The parkade driveway to the site will remain at its existing location and other than the new grading on the driveways, traffic from this site does not warrant any modifications to existing roadway or active transportation infrastructure.

It should be noted that there are a number of other developments proposed in this area including the Alexander located across Bishop Street and "downstream" of the Bishop Development. In the overall context of the area, the Bishop development represents a very small portion of the overall traffic that may be added to this area and is not expected to have any significant impacts on those developments. As this study shows, there is significant capacity available for other area developments. As such, we have not addressed those developments in any greater detail in this study and expect that traffic studies prepared specifically for those developments will address their direct impact.

In summary, this development is expected to effectively integrate into the community with very minimal impacts to the existing transportation network.

We trust that this report satisfies the HRM requirements for the preparation of Transportation Impact Studies. Should there be any questions or comments regarding the content of the study, please do not hesitate to contact the undersigne.

Sincerely,

Original Signed

Roger N. Boychuk, P.Eng.

ekistics
www.ekistics.net

REGISTERED PROFESSIONAL ENGINEER
Sept. 08, 2016
DATE
R.N. Boychuk
7357
PROVINCE OF NOVA SCOTIA

EKISTICS PLANNING & DESIGN

APPENDIX A

Traffic Counts

Ekistics Plan + Design
1 Starr Lane

Dartmouth, Nova Scotia, Canada B2Y4V7
(902) 461-2525 roger@ekistics.net
Ekistics

Count Name: DEXEL - Bishop and Hollis - AM
Site Code:
Start Date: 11/04/2015

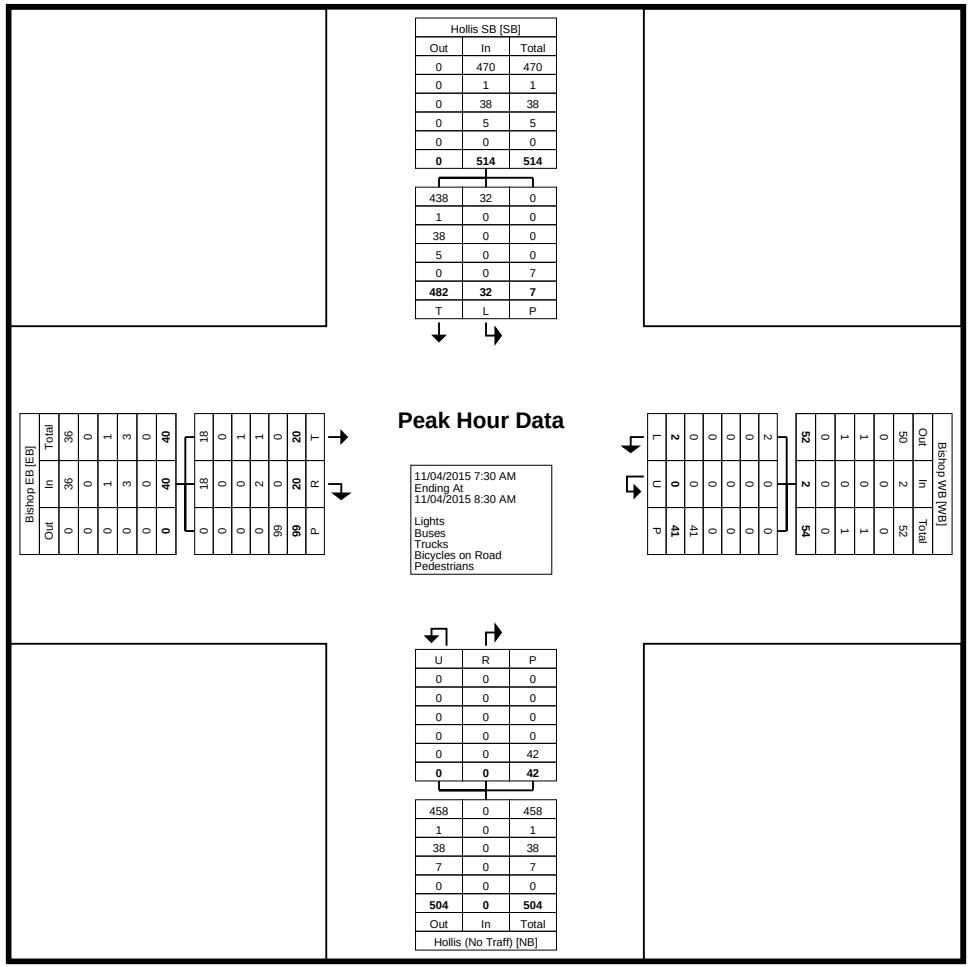
Turning Movement Peak Hour Data (7:30 AM)

Start Time	Hollis SB Southbound				Bishop WB Westbound				Hollis (No Traff) Northbound				Bishop EB Eastbound				
	Thru	Left	Peds	App. Total	Left	U-Turn	Peds	App. Total	Right	U-Turn	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
7:30 AM	108	5	0	113	1	0	10	1	0	0	8	0	4	5	20	9	123
7:45 AM	123	13	3	136	0	0	12	0	0	0	10	0	5	8	26	13	149
8:00 AM	111	6	3	117	0	0	9	0	0	0	13	0	2	2	25	4	121
8:15 AM	140	8	1	148	1	0	10	1	0	0	11	0	9	5	28	14	163
Total	482	32	7	514	2	0	41	2	0	0	42	0	20	20	99	40	556
Approach %	93.8	6.2	-	-	100.0	0.0	-	-	NaN	NaN	-	-	50.0	50.0	-	-	-
Total %	86.7	5.8	-	92.4	0.4	0.0	-	0.4	0.0	0.0	-	0.0	3.6	3.6	-	7.2	-
PHF	0.861	0.615	-	0.868	0.500	0.000	-	0.500	0.000	0.000	-	0.000	0.556	0.625	-	0.714	0.853
Lights	438	32	-	470	2	0	-	2	0	0	-	0	18	18	-	36	508
% Lights	90.9	100.0	-	91.4	100.0	-	-	100.0	-	-	-	-	90.0	90.0	-	90.0	91.4
Buses	1	0	-	1	0	0	-	0	0	0	-	0	0	0	-	0	1
% Buses	0.2	0.0	-	0.2	0.0	-	-	0.0	-	-	-	-	0.0	0.0	-	0.0	0.2
Trucks	38	0	-	38	0	0	-	0	0	0	-	0	0	1	-	1	39
% Trucks	7.9	0.0	-	7.4	0.0	-	-	0.0	-	-	-	-	0.0	5.0	-	2.5	7.0
Bicycles on Road	5	0	-	5	0	0	-	0	0	0	-	0	2	1	-	3	8
% Bicycles on Road	1.0	0.0	-	1.0	0.0	-	-	0.0	-	-	-	-	10.0	5.0	-	7.5	1.4
Pedestrians	-	-	7	-	-	-	41	-	-	-	42	-	-	-	99	-	-
% Pedestrians	-	-	100.0	-	-	-	100.0	-	-	-	100.0	-	-	-	100.0	-	-

Ekistics Plan + Design
1 Starr Lane

Dartmouth, Nova Scotia, Canada B2Y4V7
(902) 461-2525 roger@ekistics.net
Ekistics

Count Name: DEXEL - Bishop and Hollis - AM
Site Code:
Start Date: 11/04/2015



Turning Movement Peak Hour Data Plot (7:30 AM)

Ekistics Plan + Design
1 Starr Lane

Dartmouth, Nova Scotia, Canada B2Y4V7
(902) 461-2525 roger@ekistics.net
Ekistics

Count Name: DEXEL - Bishop and Hollis - PM
Site Code:
Start Date: 11/03/2015

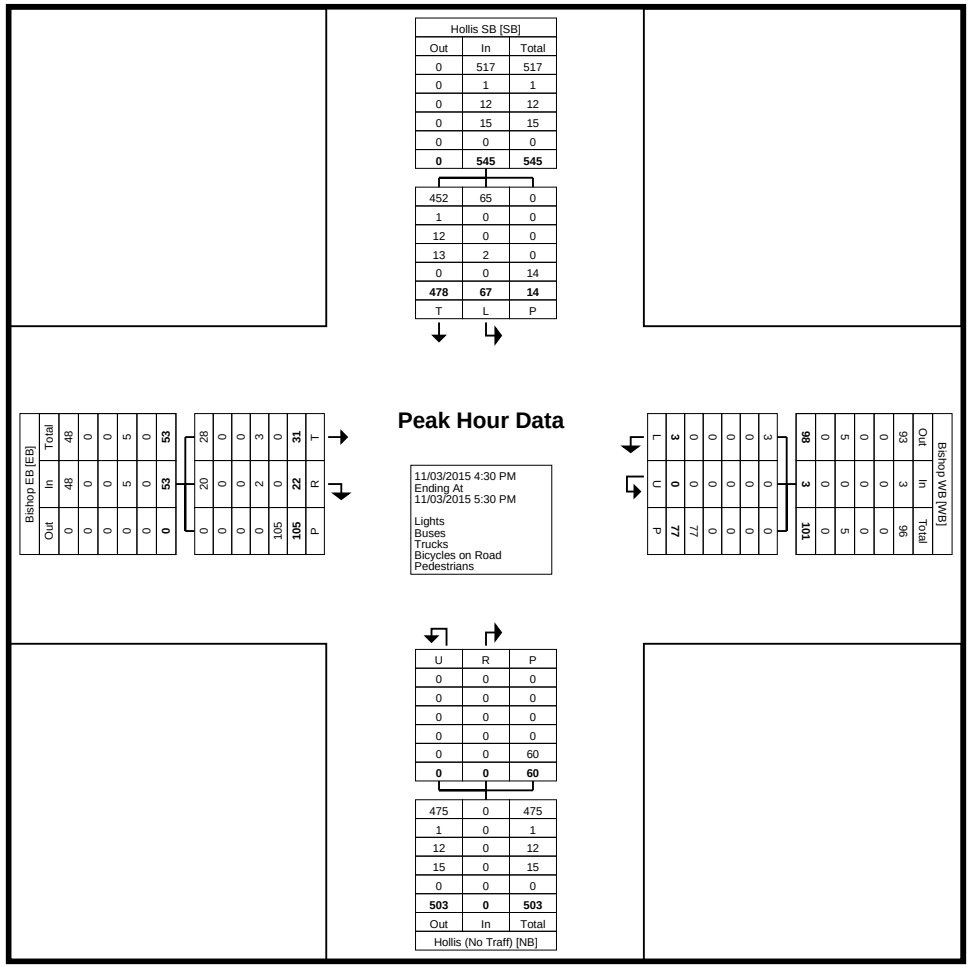
Turning Movement Peak Hour Data (4:30 PM)

Start Time	Hollis SB Southbound				Bishop WB Westbound				Hollis (No Traff) Northbound				Bishop EB Eastbound				
	Thru	Left	Peds	App. Total	Left	U-Turn	Peds	App. Total	Right	U-Turn	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
4:30 PM	131	23	6	154	0	0	24	0	0	0	21	0	4	11	28	15	169
4:45 PM	114	13	1	127	1	0	15	1	0	0	17	0	5	9	27	14	142
5:00 PM	121	9	6	130	2	0	26	2	0	0	8	0	5	10	33	15	147
5:15 PM	112	22	1	134	0	0	12	0	0	0	14	0	8	1	17	9	143
Total	478	67	14	545	3	0	77	3	0	0	60	0	22	31	105	53	601
Approach %	87.7	12.3	-	-	100.0	0.0	-	-	NaN	NaN	-	-	41.5	58.5	-	-	-
Total %	79.5	11.1	-	90.7	0.5	0.0	-	0.5	0.0	0.0	-	0.0	3.7	5.2	-	8.8	-
PHF	0.912	0.728	-	0.885	0.375	0.000	-	0.375	0.000	0.000	-	0.000	0.688	0.705	-	0.883	0.889
Lights	452	65	-	517	3	0	-	3	0	0	-	0	20	28	-	48	568
% Lights	94.6	97.0	-	94.9	100.0	-	-	100.0	-	-	-	-	90.9	90.3	-	90.6	94.5
Buses	1	0	-	1	0	0	-	0	0	0	-	0	0	0	-	0	1
% Buses	0.2	0.0	-	0.2	0.0	-	-	0.0	-	-	-	-	0.0	0.0	-	0.0	0.2
Trucks	12	0	-	12	0	0	-	0	0	0	-	0	0	0	-	0	12
% Trucks	2.5	0.0	-	2.2	0.0	-	-	0.0	-	-	-	-	0.0	0.0	-	0.0	2.0
Bicycles on Road	13	2	-	15	0	0	-	0	0	0	-	0	2	3	-	5	20
% Bicycles on Road	2.7	3.0	-	2.8	0.0	-	-	0.0	-	-	-	-	9.1	9.7	-	9.4	3.3
Pedestrians	-	-	14	-	-	-	77	-	-	-	60	-	-	-	105	-	-
% Pedestrians	-	-	100.0	-	-	-	100.0	-	-	-	100.0	-	-	-	100.0	-	-

Ekistics Plan + Design
1 Starr Lane

Dartmouth, Nova Scotia, Canada B2Y4V7
(902) 461-2525 roger@ekistics.net
Ekistics

Count Name: DEXEL - Bishop and Hollis - PM
Site Code:
Start Date: 11/03/2015



Turning Movement Peak Hour Data Plot (4:30 PM)

HALIFAX REGIONAL MUNICIPALITY
TRANSPORTATION & PUBLIC WORKS
TRAFFIC & RIGHT OF WAY

CODE NO. 14-TM-102

MANUAL TRAFFIC COUNTS

INTERSECTION: BISHOP STREET AT LOWER WATER STREET AND BISHOP LANDING DRIVEWAY

WEATHER: OVERCAST
RECORDER: JB

DAY	DATE	MONTH	YEAR
TUESDAY	2	SEPT	2014

STREET:		BISHOP'S LANDING			BISHOP STREET			LOWER WATER STREET			LOWER WATER STREET			
TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
04:00:00 PM	04:15:00 PM	0	1	4	20	8	0	0	0	0	10	113	3	159
04:15:00 PM	04:30:00 PM	0	2	5	20	7	0	0	0	0	7	107	5	153
04:30:00 PM	04:45:00 PM	0	3	3	19	4	0	0	0	0	6	126	1	162
04:45:00 PM	05:00:00 PM	0	2	7	22	3	0	0	0	0	7	124	9	174
TOTAL		0	8	19	81	22	0	0	0	0	30	470	18	648
PEAK			27			103			0			518		
15 MIN PEAK			36			112			0			560		
PEAK HOUR FACTOR			0.75			0.92			0			0.93		PEAK HR
TWO WAY TOTALS			67			141			570			518		FACTOR
														1
														648

DAY	DATE	MONTH	YEAR
TUESDAY	2	SEPT	2014

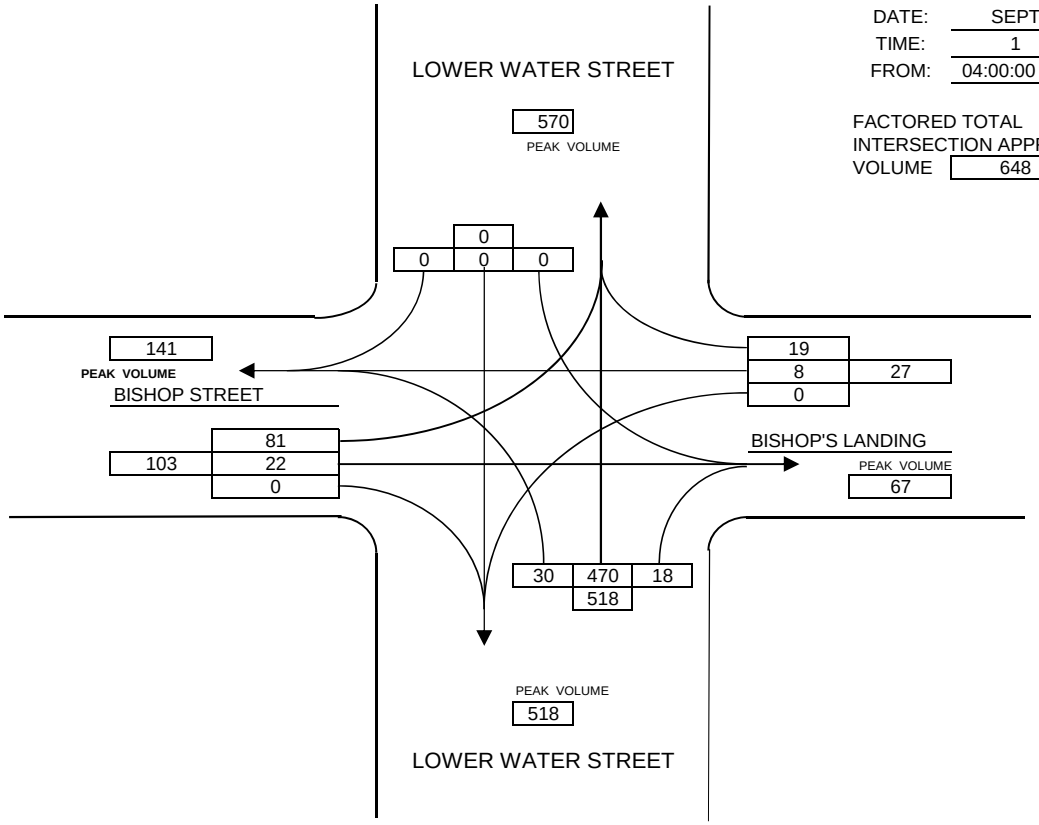
TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
05:00:00 PM	05:15:00 PM	0	5	3	22	5	0	0	0	0	14	137	6	192
05:15:00 PM	05:30:00 PM	0	8	5	22	4	0	0	0	0	6	127	6	178
05:30:00 PM	05:45:00 PM	0	6	6	23	5	0	0	0	0	7	124	7	178
05:45:00 PM	06:00:00 PM	0	4	3	17	3	0	0	0	0	7	115	4	153
TOTAL		0	23	17	84	17	0	0	0	0	34	503	23	701
PEAK			40			101			0			560		
15 MIN PEAK			52			112			0			628		
PEAK HOUR FACTOR			0.77			0.9			0			0.89		PEAK HR
TWO WAY TOTALS			80			158			604			560		FACTOR
														1
														701

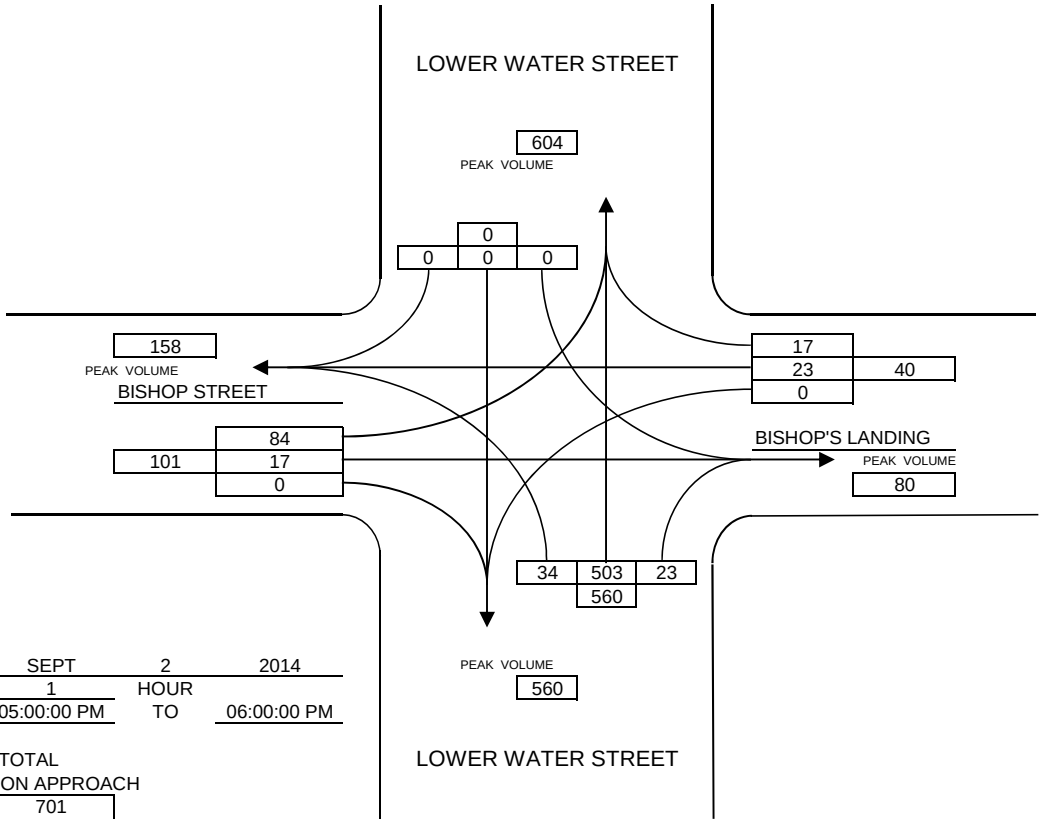
VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION : BISHOP STREET AT LOWER WATER STREET AND BISHOP LANDING DRIVEWAY

DATE: SEPT 2 2014
TIME: 1 HOUR
FROM: 04:00:00 PM TO 05:00:00 PM

FACTORED TOTAL INTERSECTION APPROACH VOLUME: 648





DATE: SEPT 2 2014
TIME: 1 HOUR
FROM: 05:00:00 PM TO 06:00:00 PM

FACTORED TOTAL INTERSECTION APPROACH VOLUME: 701

HALIFAX REGIONAL MUNICIPALITY
TRANSPORTATION & PUBLIC WORKS
TRAFFIC & RIGHT OF WAY

CODE NO. 14-TM-243

MANUAL TRAFFIC COUNTS

INTERSECTION: HOLLIS STREET AT MORRIS STREET

WEATHER: CLEAR
RECORDER: MIO

DAY	DATE	MONTH	YEAR
WED.	15	OCT.	2014

STREET:		MORRIS STREET			MORRIS STREET			HOLLIS STREET			HOLLIS STREET			
TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
7:00:00 AM	7:15:00 AM	1	1			14	13	8	77	24				138
7:15:00 AM	7:30:00 AM	1	2			17	17	8	94	24				163
7:30:00 AM	7:45:00 AM	3	1			23	34	11	101	23				196
7:45:00 AM	8:00:00 AM	1	6			30	18	9	117	26				207
TOTAL		6	10	0	0	84	82	36	389	97	0	0	0	704
PEAK			16			166			522			0		
15 MIN PEAK			28			228			608			0		
PEAK HOUR FACTOR			0.57			0.73			0.86			0		PEAK HR
TWO WAY TOTALS			136			273			522			477		FACTOR
														0.98
														690

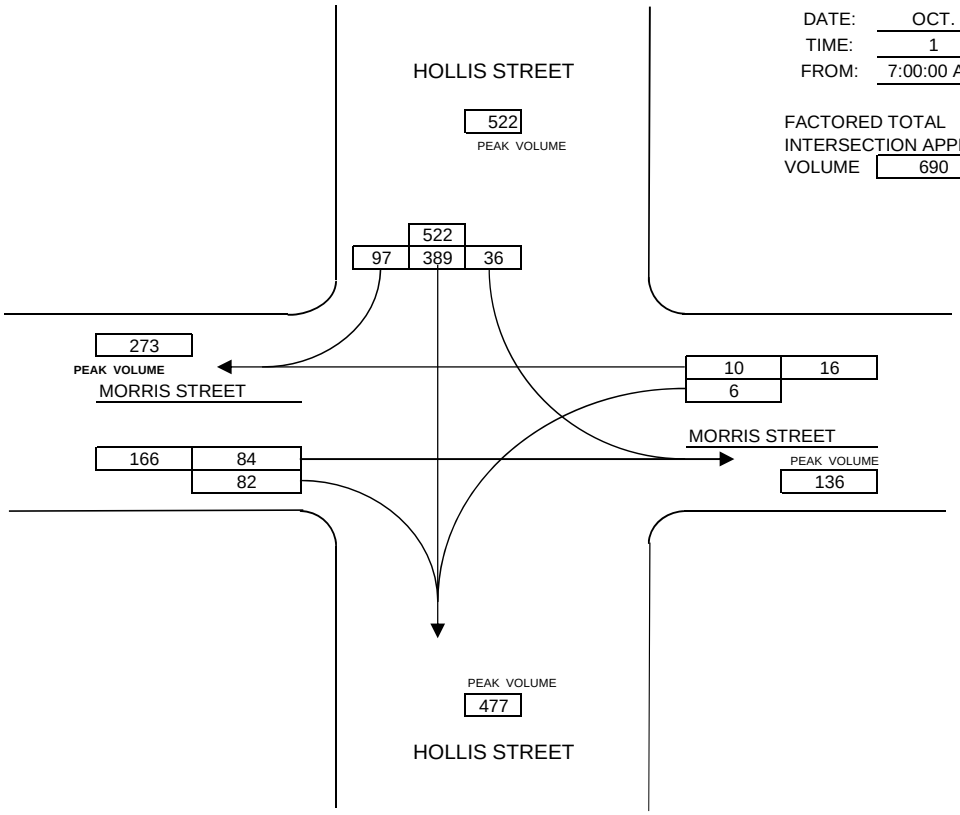
DAY	DATE	MONTH	YEAR
WED.	15	OCT.	2014

TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
8:00:00 AM	8:15:00 AM	4	7			25	16	16	108	39				215
8:15:00 AM	8:30:00 AM	2	1			17	15	14	108	30				187
8:30:00 AM	8:45:00 AM	3	3			18	10	14	102	23				173
8:45:00 AM	9:00:00 AM	3	3			16	17	16	115	25				195
TOTAL		12	14	0	0	76	58	60	433	117	0	0	0	770
PEAK			26			134			610			0		
15 MIN PEAK			44			164			652			0		
PEAK HOUR FACTOR			0.59			0.82			0.94			0		PEAK HR
TWO WAY TOTALS			162			265			610			503		FACTOR
														0.98
														755

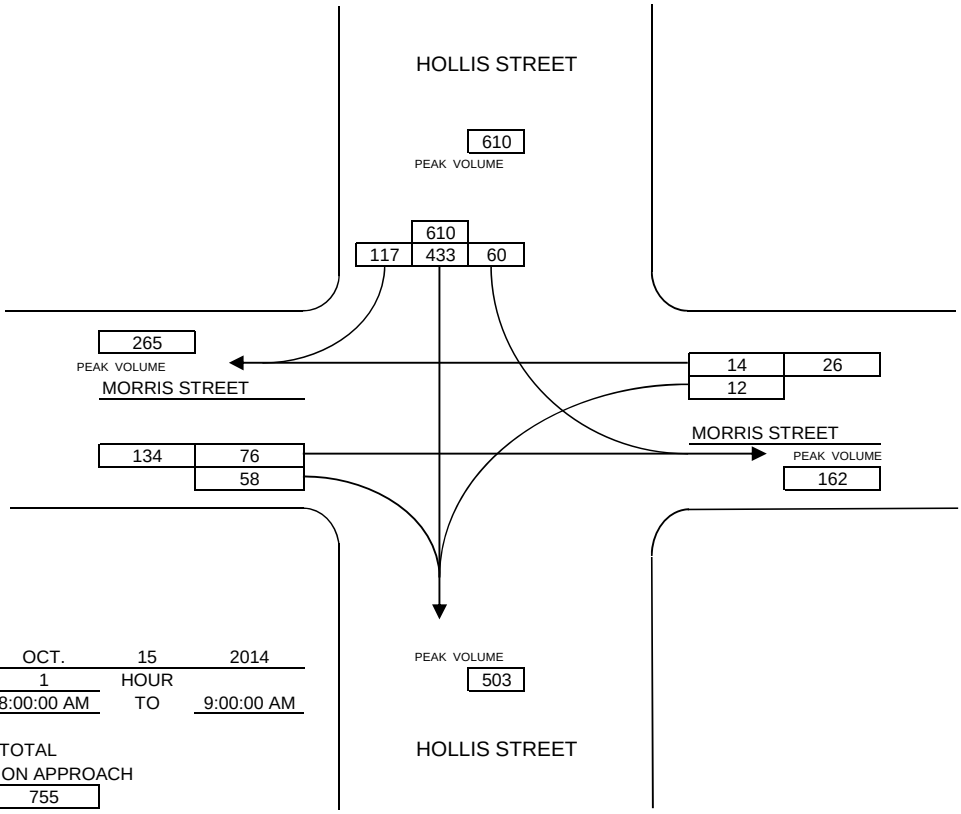
VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION : HOLLIS STREET AT MORRIS STREET

DATE: OCT. 15 2014
TIME: 1 HOUR
FROM: 7:00:00 AM TO 8:00:00 AM



FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 690



DATE: OCT. 15 2014
TIME: 1 HOUR
FROM: 8:00:00 AM TO 9:00:00 AM

FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 755

HALIFAX REGIONAL MUNICIPALITY
TRANSPORTATION & PUBLIC WORKS
TRAFFIC & RIGHT OF WAY

CODE NO. 14-TM-243

MANUAL TRAFFIC COUNTS

INTERSECTION: HOLLIS STREET AT MORRIS STREET

WEATHER: CLEAR
RECORDER: MIO

DAY	DATE	MONTH	YEAR
WED.	15	OCT.	2014

STREET:		MORRIS STREET			MORRIS STREET			HOLLIS STREET			HOLLIS STREET			
TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
11:00:00 AM	11:15:00 AM	3	9			15	15	7	78	28				155
11:15:00 AM	11:30:00 AM	4	7			15	7	12	93	22				160
11:30:00 AM	11:45:00 AM	3	10			11	8	9	78	18				137
11:45:00 AM	12:00:00 PM	8	11			8	9	12	88	32				168
TOTAL		18	37	0	0	49	39	40	337	100	0	0	0	620
PEAK			55			88			477			0		
15 MIN PEAK			76			120			528			0		
PEAK HOUR FACTOR			0.72			0.73			0.9			0		PEAK HR
TWO WAY TOTALS			144			225			477			394		FACTOR
														0.98
														608

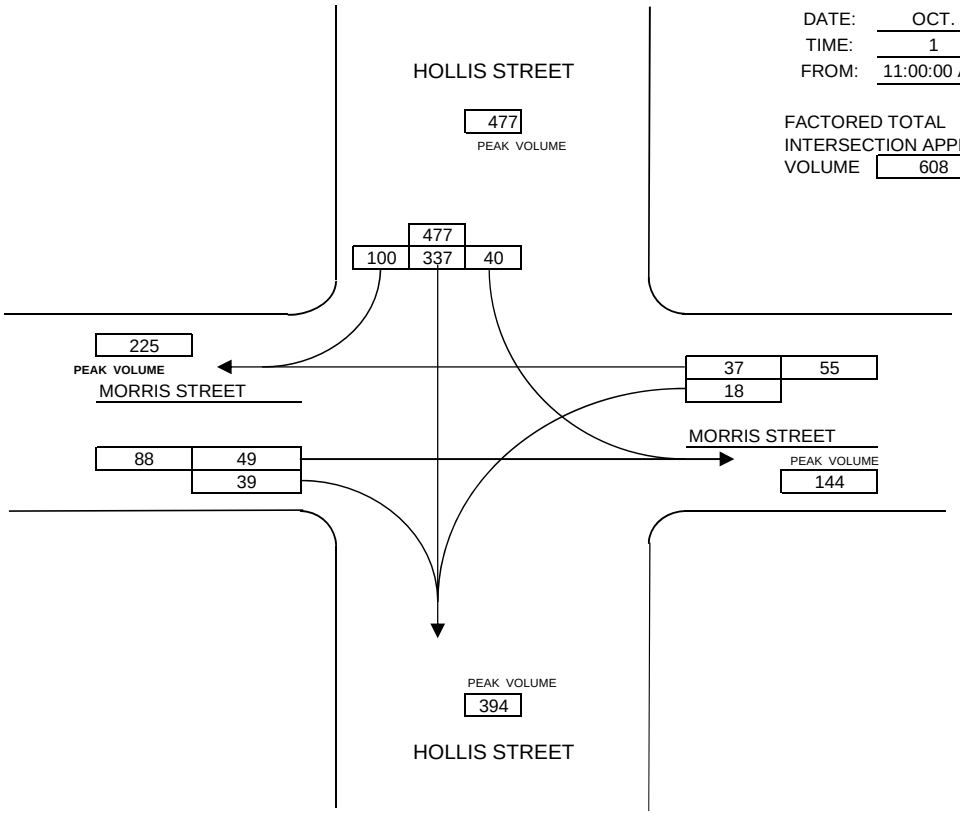
DAY	DATE	MONTH	YEAR
WED.	15	OCT.	2014

TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
12:00:00 PM	12:15:00 PM	5	9			17	8	8	76	29				152
12:15:00 PM	12:30:00 PM	1	8			16	13	5	76	30				149
12:30:00 PM	12:45:00 PM	3	7			11	12	2	64	39				138
12:45:00 PM	1:00:00 PM	2	9			18	7	6	67	28				137
TOTAL		11	33	0	0	62	40	21	283	126	0	0	0	576
PEAK			44			102			430			0		
15 MIN PEAK			56			116			452			0		
PEAK HOUR FACTOR			0.79			0.88			0.95			0		PEAK HR
TWO WAY TOTALS			127			261			430			334		FACTOR
														0.98
														564

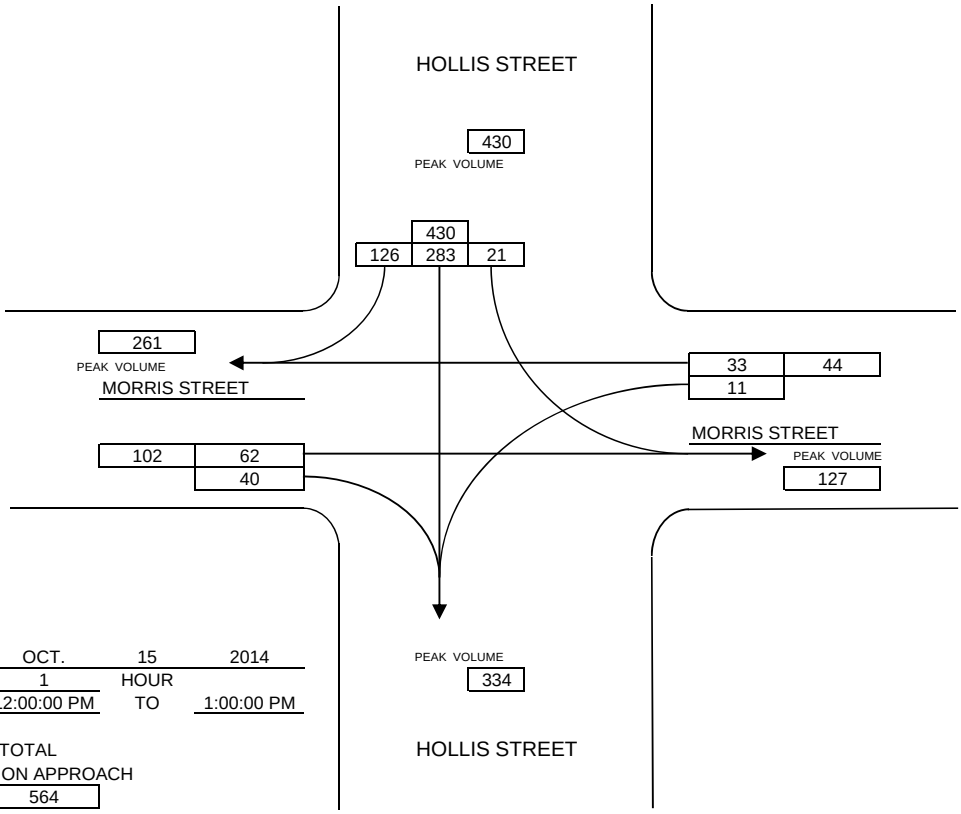
VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION : HOLLIS STREET AT MORRIS STREET

DATE: OCT. 15 2014
TIME: 1 HOUR
FROM: 11:00:00 AM TO 12:00:00 PM



FACTORED TOTAL INTERSECTION APPROACH VOLUME 608



DATE: OCT. 15 2014
TIME: 1 HOUR
FROM: 12:00:00 PM TO 1:00:00 PM

FACTORED TOTAL INTERSECTION APPROACH VOLUME 564

HALIFAX REGIONAL MUNICIPALITY
TRANSPORTATION & PUBLIC WORKS
TRAFFIC & RIGHT OF WAY

CODE NO. 14-TM-243

MANUAL TRAFFIC COUNTS

INTERSECTION: HOLLIS STREET AT MORRIS STREET

WEATHER: CLEAR
RECORDER: MIO

DAY	DATE	MONTH	YEAR
WED.	15	OCT.	2014

STREET:		MORRIS STREET			MORRIS STREET			HOLLIS STREET			HOLLIS STREET			
TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
4:00:00 PM	4:15:00 PM	4	34			13	8	6	86	46				197
4:15:00 PM	4:30:00 PM	1	19			23	5	4	85	35				172
4:30:00 PM	4:45:00 PM	2	23			20	8	8	112	51				224
4:45:00 PM	5:00:00 PM	2	14			20	7	13	78	50				184
TOTAL		9	90	0	0	76	28	31	361	182	0	0	0	777
PEAK			99			104			574			0		
15 MIN PEAK			152			112			684			0		
PEAK HOUR FACTOR			0.65			0.93			0.84			0		PEAK HR
TWO WAY TOTALS			206			376			574			398		FACTOR
														0.98
														761

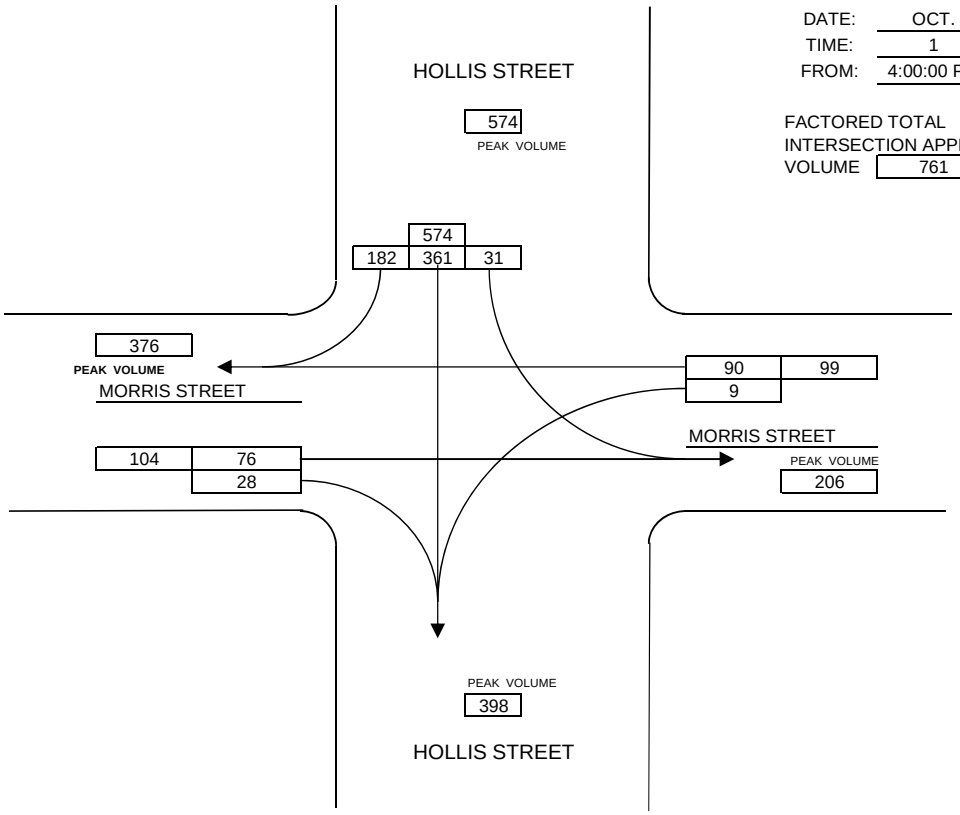
DAY	DATE	MONTH	YEAR
WED.	15	OCT.	2014

TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
5:00:00 PM	5:15:00 PM	5	32			19	8	8	94	56				222
5:15:00 PM	5:30:00 PM	2	11			12	11	10	94	43				183
5:30:00 PM	5:45:00 PM	3	16			25	4	8	64	25				145
5:45:00 PM	6:00:00 PM	3	14			14	13	15	73	36				168
TOTAL		13	73	0	0	70	36	41	325	160	0	0	0	718
PEAK			86			106			526			0		
15 MIN PEAK			148			116			632			0		
PEAK HOUR FACTOR			0.58			0.91			0.83			0		PEAK HR
TWO WAY TOTALS			197			339			526			374		FACTOR
														0.98
														704

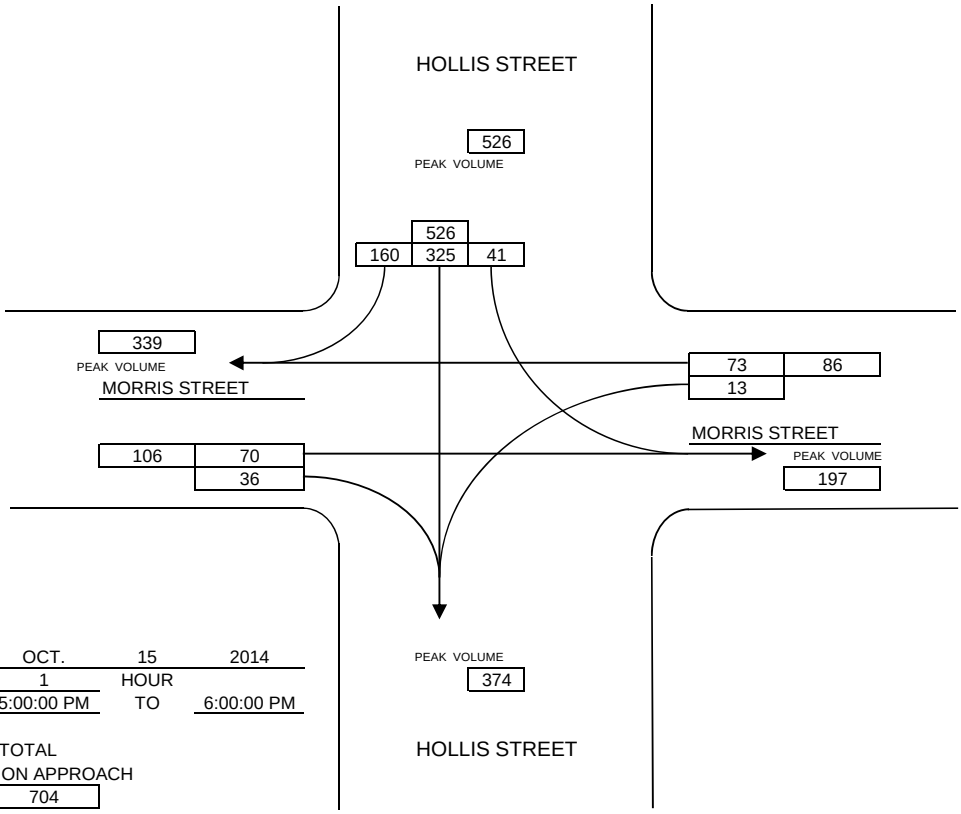
VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION : HOLLIS STREET AT MORRIS STREET

DATE: OCT. 15 2014
TIME: 1 HOUR
FROM: 4:00:00 PM TO 5:00:00 PM



FACTORED TOTAL INTERSECTION APPROACH VOLUME 761



DATE: OCT. 15 2014
TIME: 1 HOUR
FROM: 5:00:00 PM TO 6:00:00 PM

FACTORED TOTAL INTERSECTION APPROACH VOLUME 704

HALIFAX REGIONAL MUNICIPALITY
TRANSPORTATION & PUBLIC WORKS
TRAFFIC & RIGHT OF WAY

CODE NO. 14-TM-245

MANUAL TRAFFIC COUNTS

INTERSECTION: HOLLIS STREET AT SACKVILLE STREET

WEATHER: CLEAR
RECORDER: MIO

DAY	DATE	MONTH	YEAR
WED.	15	OCT.	2014

STREET:		SACKVILLE STREET			SACKVILLE STREET			HOLLIS STREET			HOLLIS STREET			
TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
7:00:00 AM	7:15:00 AM					22	31	12	134					199
7:15:00 AM	7:30:00 AM					14	43	11	142					210
7:30:00 AM	7:45:00 AM					18	24	16	168					226
7:45:00 AM	8:00:00 AM					21	39	17	217					294
TOTAL		0	0	0	0	75	137	56	661	0	0	0	0	929
PEAK			0			212			717			0		
15 MIN PEAK			0			240			936			0		
PEAK HOUR FACTOR			0			0.88			0.77			0		PEAK HR
TWO WAY TOTALS			131			212			717			798		FACTOR
														0.98
														910

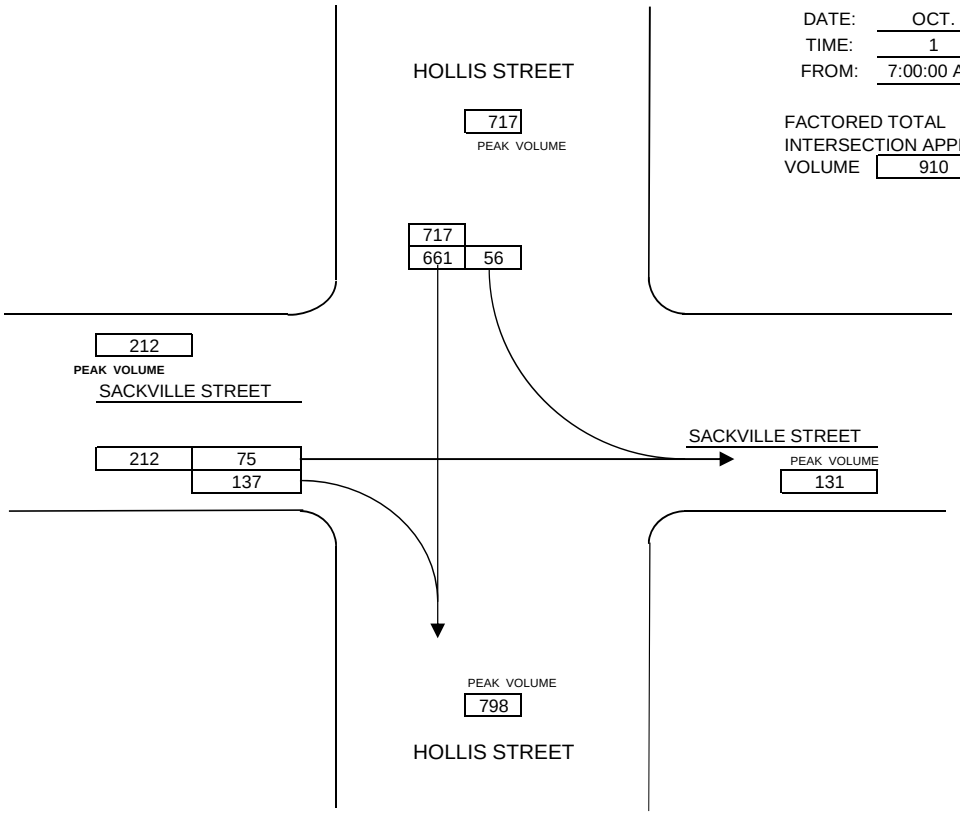
DAY	DATE	MONTH	YEAR
WED.	15	OCT.	2014

TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
8:00:00 AM	8:15:00 AM					26	30	28	220					304
8:15:00 AM	8:30:00 AM					22	50	26	195					293
8:30:00 AM	8:45:00 AM					25	38	18	205					286
8:45:00 AM	9:00:00 AM					24	42	15	209					290
TOTAL		0	0	0	0	97	160	87	829	0	0	0	0	1173
PEAK			0			257			916			0		
15 MIN PEAK			0			288			992			0		
PEAK HOUR FACTOR			0			0.89			0.92			0		PEAK HR
TWO WAY TOTALS			184			257			916			989		FACTOR
														0.98
														1150

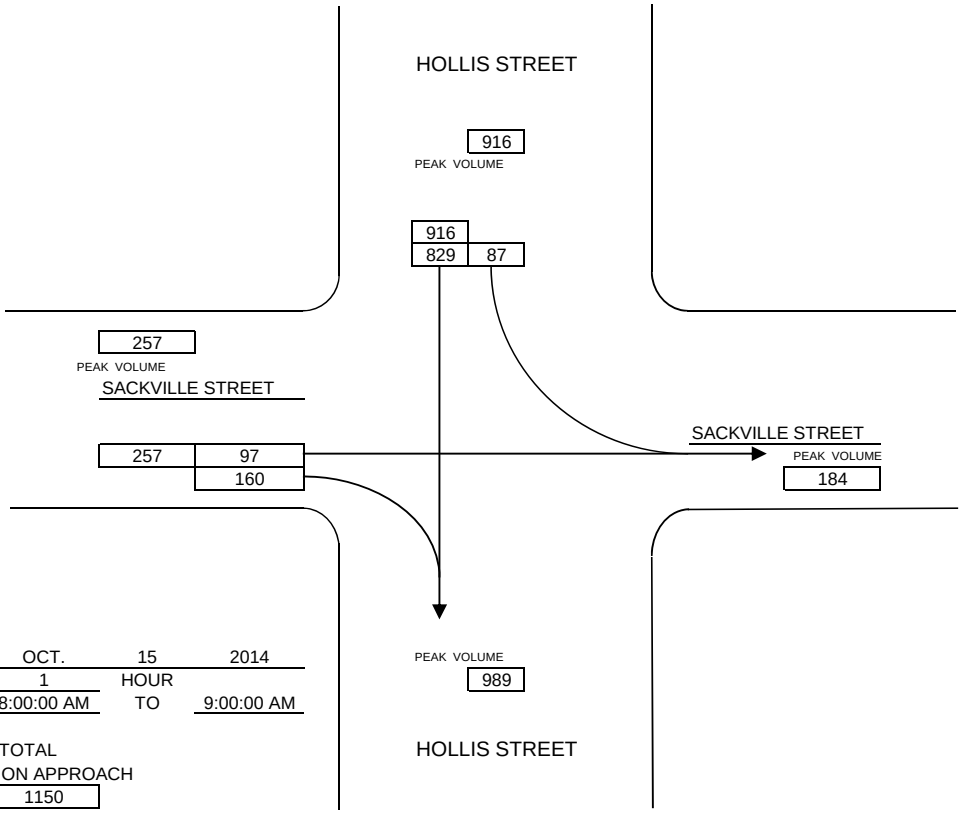
VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION : HOLLIS STREET AT SACKVILLE STREET

DATE: OCT. 15 2014
TIME: 1 HOUR
FROM: 7:00:00 AM TO 8:00:00 AM



FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 910



DATE: OCT. 15 2014
TIME: 1 HOUR
FROM: 8:00:00 AM TO 9:00:00 AM

FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 1150

HALIFAX REGIONAL MUNICIPALITY
TRANSPORTATION & PUBLIC WORKS
TRAFFIC & RIGHT OF WAY

CODE NO. 14-TM-245

MANUAL TRAFFIC COUNTS

INTERSECTION: HOLLIS STREET AT SACKVILLE STREET

WEATHER: CLEAR
RECORDER: MIO

DAY	DATE	MONTH	YEAR
WED.	15	OCT.	2014

STREET:		SACKVILLE STREET			SACKVILLE STREET			HOLLIS STREET			HOLLIS STREET			
TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
11:00:00 AM	11:15:00 AM					28	23	16	109					176
11:15:00 AM	11:30:00 AM					35	20	24	130					209
11:30:00 AM	11:45:00 AM					29	22	16	110					177
11:45:00 AM	12:00:00 PM					22	22	35	121					200
TOTAL		0	0	0	0	114	87	91	470	0	0	0	0	762
PEAK			0			201			561			0		
15 MIN PEAK			0			220			624			0		
PEAK HOUR FACTOR			0			0.91			0.9			0		PEAK HR
TWO WAY TOTALS			205			201			561			557		FACTOR
														0.98
														747

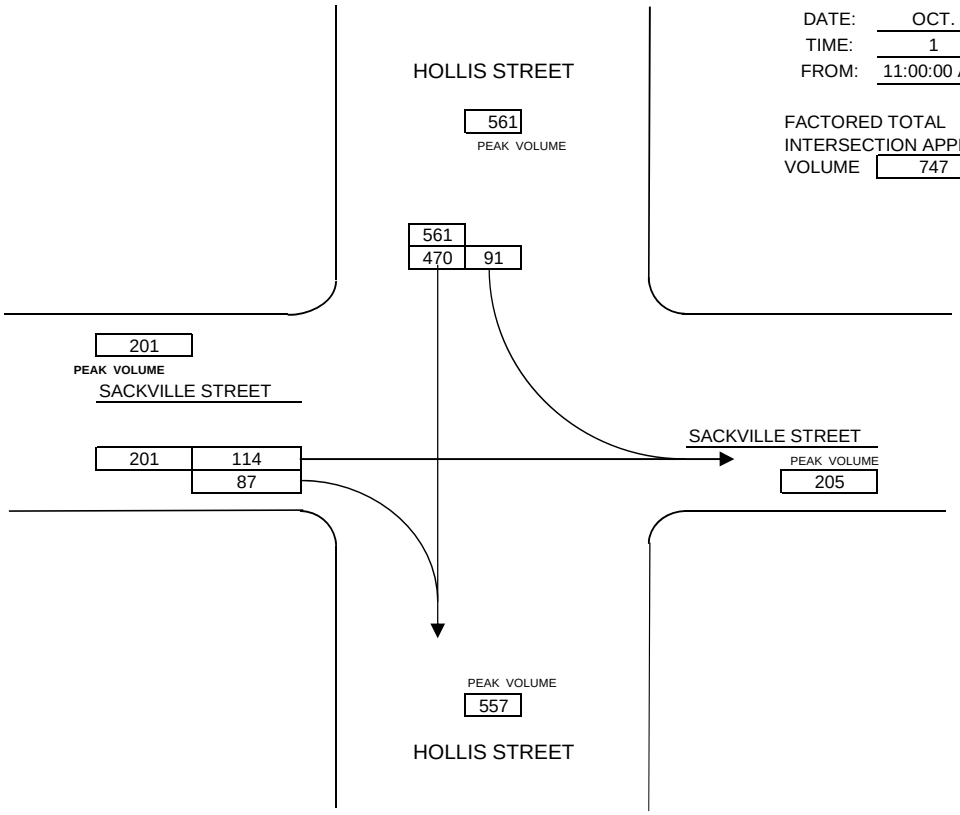
DAY	DATE	MONTH	YEAR
WED.	15	OCT.	2014

TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
12:00:00 PM	12:15:00 PM					20	21	20	105					166
12:15:00 PM	12:30:00 PM					23	27	26	106					182
12:30:00 PM	12:45:00 PM					22	23	21	112					178
12:45:00 PM	1:00:00 PM					31	21	22	93					167
TOTAL		0	0	0	0	96	92	89	416	0	0	0	0	693
PEAK			0			188			505			0		
15 MIN PEAK			0			208			532			0		
PEAK HOUR FACTOR			0			0.9			0.95			0		PEAK HR
TWO WAY TOTALS			185			188			505			508		FACTOR
														0.98
														679

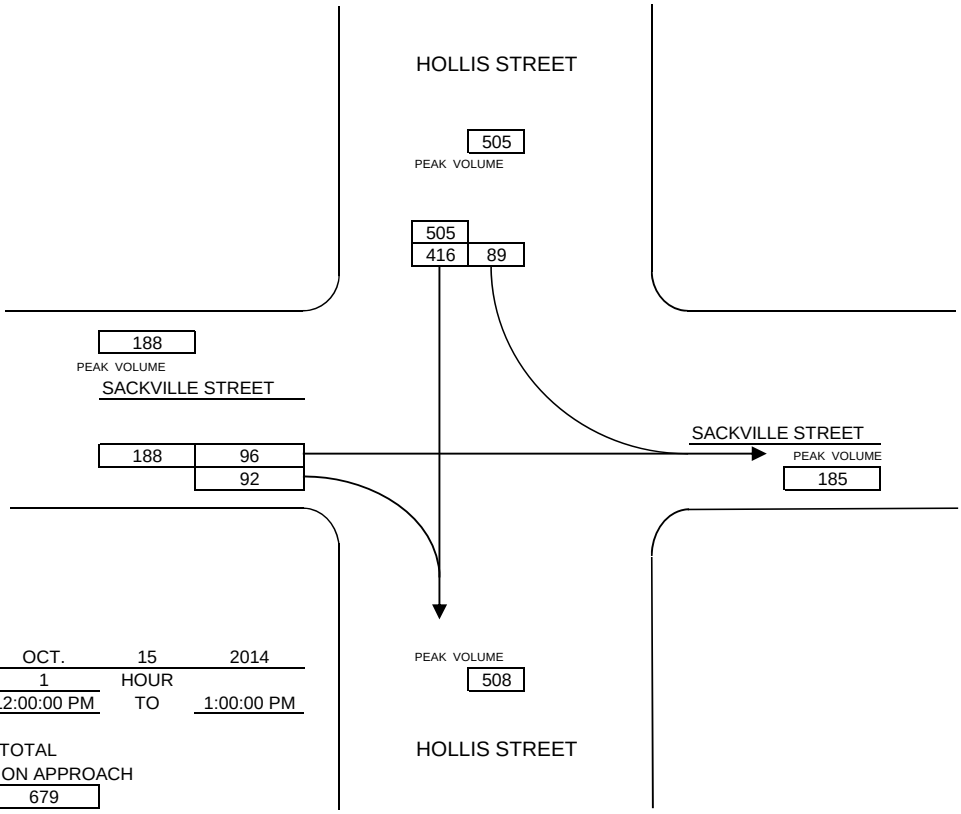
VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION : HOLLIS STREET AT SACKVILLE STREET

DATE: OCT. 15 2014
TIME: 1 HOUR
FROM: 11:00:00 AM TO 12:00:00 PM



FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 747



DATE: OCT. 15 2014
TIME: 1 HOUR
FROM: 12:00:00 PM TO 1:00:00 PM

FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 679

HALIFAX REGIONAL MUNICIPALITY
TRANSPORTATION & PUBLIC WORKS
TRAFFIC & RIGHT OF WAY

CODE NO. 14-TM-245

MANUAL TRAFFIC COUNTS

INTERSECTION: HOLLIS STREET AT SACKVILLE STREET

WEATHER: CLEAR
RECORDER: MIO

DAY	DATE	MONTH	YEAR
WED.	15	OCT.	2014

STREET:		SACKVILLE STREET			SACKVILLE STREET			HOLLIS STREET			HOLLIS STREET			
TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
4:00:00 PM	4:15:00 PM					28	23	16	109					176
4:15:00 PM	4:30:00 PM					35	20	24	130					209
4:30:00 PM	4:45:00 PM					29	22	16	110					177
4:45:00 PM	5:00:00 PM					22	22	35	121					200
TOTAL		0	0	0	0	114	87	91	470	0	0	0	0	762
PEAK			0			201			561			0		
15 MIN PEAK			0			220			624			0		
PEAK HOUR FACTOR			0			0.91			0.9			0		PEAK HR
TWO WAY TOTALS			205			201			561			557		FACTOR
														0.98
														747

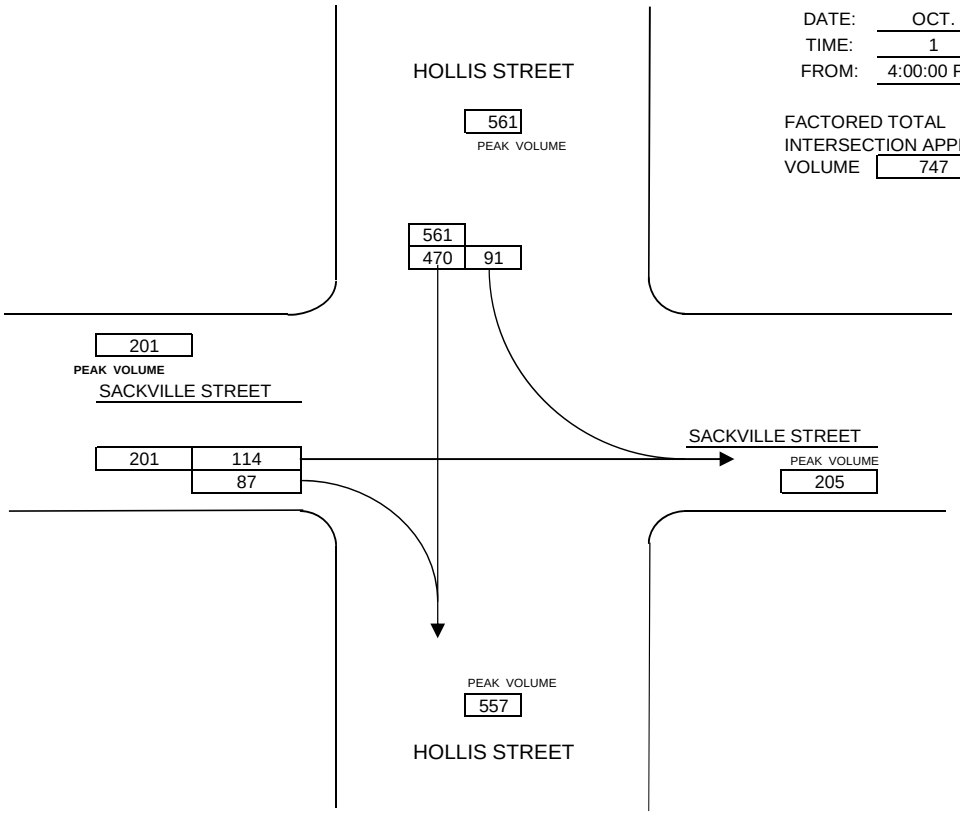
DAY	DATE	MONTH	YEAR
WED.	15	OCT.	2014

TIME:		FROM THE EAST			FROM THE WEST			FROM THE NORTH			FROM THE SOUTH			TOTAL
15 MIN INTERVALS		L	S	R	L	S	R	L	S	R	L	S	R	
5:00:00 PM	5:15:00 PM					20	21	20	105					166
5:15:00 PM	5:30:00 PM					23	27	26	106					182
5:30:00 PM	5:45:00 PM					22	23	21	112					178
5:45:00 PM	6:00:00 PM					31	21	22	93					167
TOTAL		0	0	0	0	96	92	89	416	0	0	0	0	693
PEAK			0			188			505			0		
15 MIN PEAK			0			208			532			0		
PEAK HOUR FACTOR			0			0.9			0.95			0		PEAK HR
TWO WAY TOTALS			185			188			505			508		FACTOR
														0.98
														679

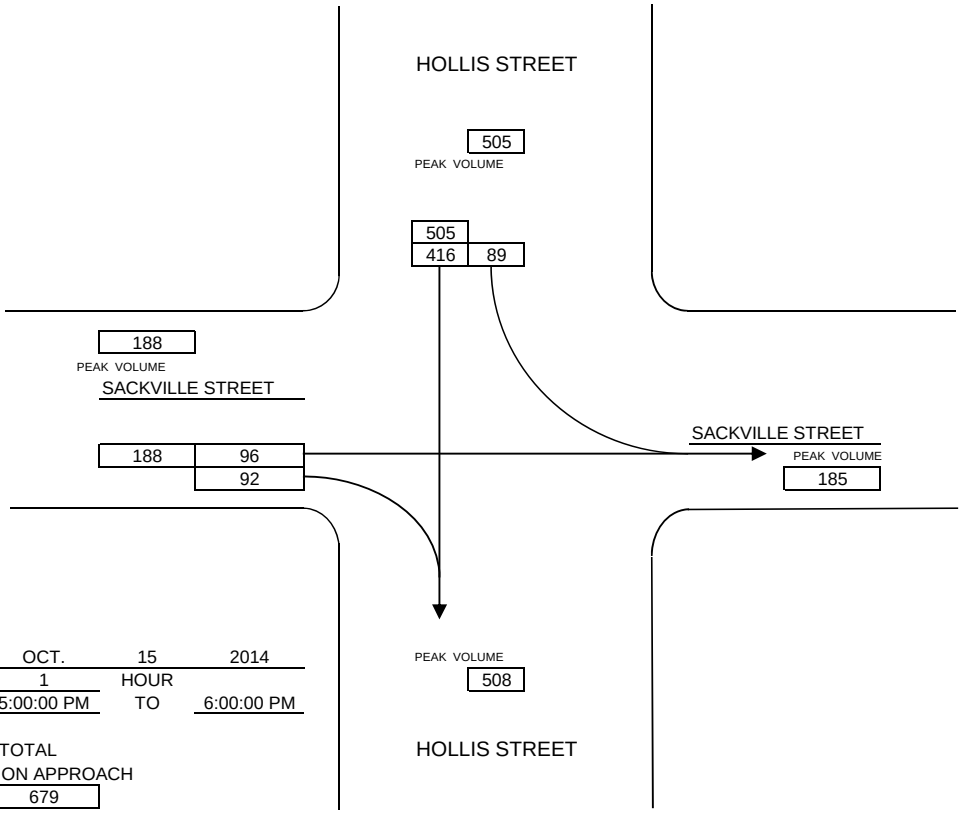
VEHICULAR GRAPHIC SUMMARY SHEET

INTERSECTION : HOLLIS STREET AT SACKVILLE STREET

DATE: OCT. 15 2014
TIME: 1 HOUR
FROM: 4:00:00 PM TO 5:00:00 PM



FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 747



DATE: OCT. 15 2014
TIME: 1 HOUR
FROM: 5:00:00 PM TO 6:00:00 PM

FACTORED TOTAL
INTERSECTION APPROACH
VOLUME 679

EKISTICS PLANNING & DESIGN

APPENDIX B

Trip Generation

Trip Generation Summary

Alternative: Alternative 1
Phase:
Project: Bishop and Hollis

Open Date: 2016-08-26
Analysis Date: 2016-08-26

ITE	Land Use		Weekday Average Daily Trips			Weekday AM Peak Hour of Adjacent Street Traffic			Weekday PM Peak Hour of Adjacent Street Traffic		
		*	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
220	Apartments		97	96	193	3	12	15	12	6	18
	29 Dwelling Units										
Unadjusted Volume			97	96	193	3	12	15	12	6	18
Internal Capture Trips			0	0	0	0	0	0	0	0	0
Pass-By Trips			0	0	0	0	0	0	0	0	0
Volume Added to Adjacent Streets			97	96	193	3	12	15	12	6	18

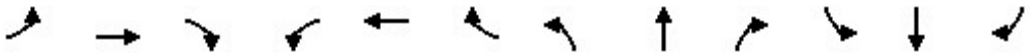
Total Weekday Average Daily Trips Internal Capture = 0 Percent
Total Weekday AM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent
Total Weekday PM Peak Hour of Adjacent Street Traffic Internal Capture = 0 Percent

* - Custom rate used for selected time period.

Source: Institute of Transportation Engineers, Trip Generation Manual 9th Edition, 2012

APPENDIX C

Synchro Output



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	25	25	10	0	0	0	0	0	35	440	0
Future Volume (Veh/h)	0	25	25	10	0	0	0	0	0	35	440	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	27	27	11	0	0	0	0	0	38	478	0
Pedestrians		99			41			42			7	
Lane Width (m)		3.6			3.6			0.0			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		8			3			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	660	694	380	438	694	48	577			41		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	660	694	380	438	694	48	577			41		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	92	95	97	100	100	100			97		
cM capacity (veh/h)	288	319	572	388	319	977	923			1513		

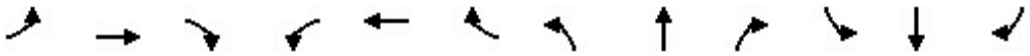
Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	54	11	197	319
Volume Left	0	11	38	0
Volume Right	27	0	0	0
cSH	409	388	1513	1700
Volume to Capacity	0.13	0.03	0.03	0.19
Queue Length 95th (m)	3.6	0.7	0.6	0.0
Control Delay (s)	15.1	14.6	1.6	0.0
Lane LOS	C	B	A	
Approach Delay (s)	15.1	14.6	0.6	
Approach LOS	C	B		

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	31.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	55	5	2	5	5	8
Future Volume (Veh/h)	55	5	2	5	5	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	5	2	5	5	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)	57			37		
pX, platoon unblocked						
vC, conflicting volume			65		72	62
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			65		72	62
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	99
cM capacity (veh/h)			1537		931	1002

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	65	7	14
Volume Left	0	2	5
Volume Right	5	0	9
cSH	1700	1537	976
Volume to Capacity	0.04	0.00	0.01
Queue Length 95th (m)	0.0	0.0	0.3
Control Delay (s)	0.0	2.1	8.7
Lane LOS		A	A
Approach Delay (s)	0.0	2.1	8.7
Approach LOS			A

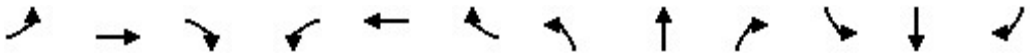
Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	3	0	0	5	20	2	350	20	0	0	0
Future Volume (Veh/h)	60	3	0	0	5	20	2	350	20	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	65	3	0	0	5	22	2	380	22	0	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	218	406	0	396	395	201	0			402		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	218	406	0	396	395	201	0			402		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	99	100	100	99	97	100			100		
cM capacity (veh/h)	694	532	1084	535	540	806	1622			1153		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	68	27	192	212
Volume Left	65	0	2	0
Volume Right	0	22	0	22
cSH	684	739	1622	1700
Volume to Capacity	0.10	0.04	0.00	0.12
Queue Length 95th (m)	2.6	0.9	0.0	0.0
Control Delay (s)	10.8	10.1	0.1	0.0
Lane LOS	B	B	A	
Approach Delay (s)	10.8	10.1	0.0	
Approach LOS	B	B		

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	27.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	28	27	15	0	0	0	0	0	38	465	0
Future Volume (Veh/h)	0	28	27	15	0	0	0	0	0	38	465	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	30	29	16	0	0	0	0	0	41	505	0
Pedestrians		99			41			42			7	
Lane Width (m)		3.6			3.6			0.0			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		8			3			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	693	727	394	462	727	48	604			41		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	693	727	394	462	727	48	604			41		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	90	95	96	100	100	100			97		
cM capacity (veh/h)	272	304	561	367	304	977	902			1513		

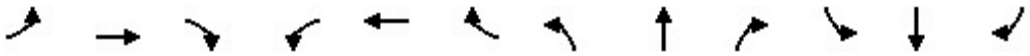
Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	59	16	209	337
Volume Left	0	16	41	0
Volume Right	29	0	0	0
cSH	393	367	1513	1700
Volume to Capacity	0.15	0.04	0.03	0.20
Queue Length 95th (m)	4.2	1.1	0.7	0.0
Control Delay (s)	15.8	15.3	1.6	0.0
Lane LOS	C	C	A	
Approach Delay (s)	15.8	15.3	0.6	
Approach LOS	C	C		

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	31.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	59	7	3	7	8	17
Future Volume (Veh/h)	59	7	3	7	8	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	64	8	3	8	9	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			72		82	68
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			72		82	68
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	98
cM capacity (veh/h)			1528		918	995

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	72	11	27
Volume Left	0	3	9
Volume Right	8	0	18
cSH	1700	1528	968
Volume to Capacity	0.04	0.00	0.03
Queue Length 95th (m)	0.0	0.0	0.7
Control Delay (s)	0.0	2.0	8.8
Lane LOS		A	A
Approach Delay (s)	0.0	2.0	8.8
Approach LOS			A

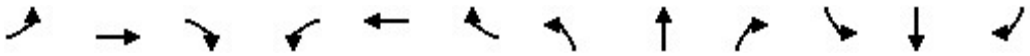
Intersection Summary			
Average Delay		2.4	
Intersection Capacity Utilization		13.5%	ICU Level of Service
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	72	4	0	0	6	22	4	370	22	0	0	0
Future Volume (Veh/h)	72	4	0	0	6	22	4	370	22	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	78	4	0	0	7	24	4	402	24	0	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	236	434	0	424	422	213	0			426		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	236	434	0	424	422	213	0			426		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	88	99	100	100	99	97	100			100		
cM capacity (veh/h)	669	512	1084	510	520	792	1622			1130		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	82	31	205	225
Volume Left	78	0	4	0
Volume Right	0	24	0	24
cSH	659	709	1622	1700
Volume to Capacity	0.12	0.04	0.00	0.13
Queue Length 95th (m)	3.4	1.1	0.1	0.0
Control Delay (s)	11.2	10.3	0.2	0.0
Lane LOS	B	B	A	
Approach Delay (s)	11.2	10.3	0.1	
Approach LOS	B	B		

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	28.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	35	22	50	0	0	0	0	0	70	500	0
Future Volume (Veh/h)	0	35	22	50	0	0	0	0	0	70	500	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	38	24	54	0	0	0	0	0	76	543	0
Pedestrians		99			41			42			7	
Lane Width (m)		3.6			3.6			0.0			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		8			3			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	801	835	412	550	835	48	642			41		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	801	835	412	550	835	48	642			41		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	85	96	82	100	100	100			95		
cM capacity (veh/h)	224	257	545	302	257	977	874			1513		

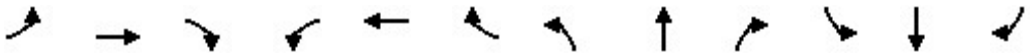
Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	62	54	257	362
Volume Left	0	54	76	0
Volume Right	24	0	0	0
cSH	324	302	1513	1700
Volume to Capacity	0.19	0.18	0.05	0.21
Queue Length 95th (m)	5.6	5.1	1.3	0.0
Control Delay (s)	18.7	19.5	2.5	0.0
Lane LOS	C	C	A	
Approach Delay (s)	18.7	19.5	1.0	
Approach LOS	C	C		

Intersection Summary				
Average Delay	3.9			
Intersection Capacity Utilization	33.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	95	10	5	45	5	5
Future Volume (Veh/h)	95	10	5	45	5	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	11	5	49	5	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			114		168	108
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			114		168	108
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	99
cM capacity (veh/h)			1475		820	945

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	114	54	10
Volume Left	0	5	5
Volume Right	11	0	5
cSH	1700	1475	878
Volume to Capacity	0.07	0.00	0.01
Queue Length 95th (m)	0.0	0.1	0.3
Control Delay (s)	0.0	0.7	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	0.7	9.1
Approach LOS			A

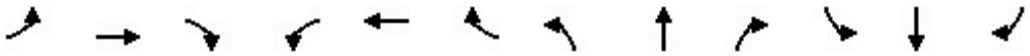
Intersection Summary			
Average Delay		0.7	
Intersection Capacity Utilization		16.5%	ICU Level of Service
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	20	0	0	20	20	30	520	23	0	0	0
Future Volume (Veh/h)	80	20	0	0	20	20	30	520	23	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	22	0	0	22	22	33	565	25	0	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	382	656	0	654	644	295	0			590		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	382	656	0	654	644	295	0			590		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	94	100	100	94	97	98			100		
cM capacity (veh/h)	502	376	1084	331	382	701	1622			982		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	109	44	316	308
Volume Left	87	0	33	0
Volume Right	0	22	0	25
cSH	470	495	1622	1700
Volume to Capacity	0.23	0.09	0.02	0.18
Queue Length 95th (m)	7.1	2.3	0.5	0.0
Control Delay (s)	14.9	13.0	0.9	0.0
Lane LOS	B	B	A	
Approach Delay (s)	14.9	13.0	0.5	
Approach LOS	B	B		

Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	34.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	40	24	56	0	0	0	0	0	79	525	0
Future Volume (Veh/h)	0	40	24	56	0	0	0	0	0	79	525	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	43	26	61	0	0	0	0	0	86	571	0
Pedestrians		99			41			42			7	
Lane Width (m)		3.6			3.6			0.0			3.6	
Walking Speed (m/s)		1.2			1.2			1.2			1.2	
Percent Blockage		8			3			0			1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	849	883	426	588	883	48	670			41		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	849	883	426	588	883	48	670			41		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	82	95	78	100	100	100			94		
cM capacity (veh/h)	205	240	534	273	240	977	853			1513		

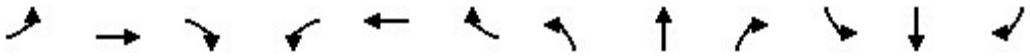
Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total	69	61	276	381
Volume Left	0	61	86	0
Volume Right	26	0	0	0
cSH	303	273	1513	1700
Volume to Capacity	0.23	0.22	0.06	0.22
Queue Length 95th (m)	6.9	6.7	1.4	0.0
Control Delay (s)	20.4	22.0	2.7	0.0
Lane LOS	C	C	A	
Approach Delay (s)	20.4	22.0	1.1	
Approach LOS	C	C		

Intersection Summary				
Average Delay	4.4			
Intersection Capacity Utilization	34.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	101	18	9	49	7	9
Future Volume (Veh/h)	101	18	9	49	7	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	110	20	10	53	8	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			130		193	120
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			130		193	120
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	99
cM capacity (veh/h)			1455		790	931

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	130	63	18
Volume Left	0	10	8
Volume Right	20	0	10
cSH	1700	1455	863
Volume to Capacity	0.08	0.01	0.02
Queue Length 95th (m)	0.0	0.2	0.5
Control Delay (s)	0.0	1.2	9.3
Lane LOS		A	A
Approach Delay (s)	0.0	1.2	9.3
Approach LOS			A

Intersection Summary			
Average Delay		1.2	
Intersection Capacity Utilization		19.7%	ICU Level of Service
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	89	21	0	0	22	22	36	546	24	0	0	0
Future Volume (Veh/h)	89	21	0	0	22	22	36	546	24	0	0	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	97	23	0	0	24	24	39	593	26	0	0	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	410	697	0	696	684	310	0			619		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	410	697	0	696	684	310	0			619		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	79	94	100	100	93	97	98			100		
cM capacity (veh/h)	473	355	1084	306	361	686	1622			957		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	120	48	336	322
Volume Left	97	0	39	0
Volume Right	0	24	0	26
cSH	444	473	1622	1700
Volume to Capacity	0.27	0.10	0.02	0.19
Queue Length 95th (m)	8.7	2.7	0.6	0.0
Control Delay (s)	16.1	13.5	1.0	0.0
Lane LOS	C	B	A	
Approach Delay (s)	16.1	13.5	0.5	
Approach LOS	C	B		

Intersection Summary				
Average Delay	3.5			
Intersection Capacity Utilization	36.3%	ICU Level of Service	A	
Analysis Period (min)	15			

EKISTICS PLANNING & DESIGN

August 25, 2016

Louie Lawen
DEXEL Developments

RE: Hollis and Bishop Wind Impact Qualitative Assessment

Louie,

The 7-storey development proposed by Dexel Developments is located at 1363 Hollis Street and 5144, 5146, 5140, and 5134 Bishop Street beside the Waterford. The development would replace three 3-storey buildings with a 7-storey development. This block will be undergoing significant development over the next few years with the Benjamin Wier Addition, the 21-storey Alexander Tower and another 7 storey application right across the street for submission in the fall of 2016. Government House is situated kity corner across Hollis Street, to the west of the site. Northwest of the site, approximately 100 metres away, sits the 20-storey Maritime Centre notable for the challenging wind conditions that have resulted from its design. In fact, corner of Hollis and Bishop Street takes the full brunt of the winter north-westerly winds that result from Maritime Centre. To the north of the site, the 21-storey Alexander Tower is currently under construction which will impact the east side of this development during the winter.

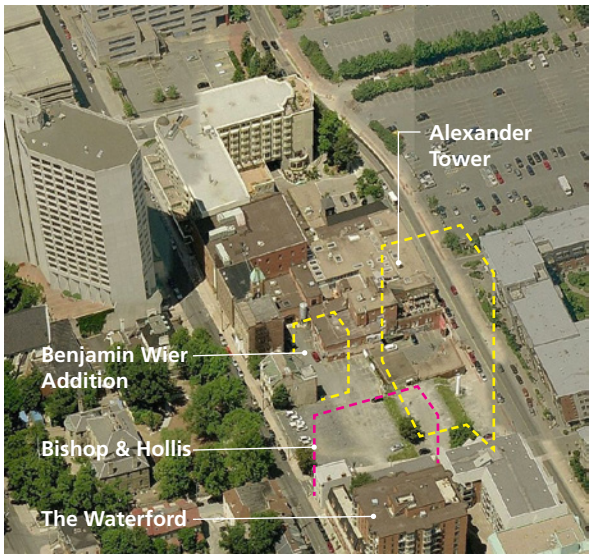


Figure 1. Site Location and context

Steep terrain east of the site, sloping down to the Halifax Harbour also contributes to variation in surrounding building heights, and their subsequent influences on wind patterns.

The following assessment looks to interpret the probable impacts to existing wind speed intensity and turbulence on surrounding properties and sidewalks as a direct result of this development. To this end, wind data recorded at the local Shearwater Airport between 1953 and 2000 was assembled and analyzed using Windrose Pro 2.3 to understand the intensity, frequency, and direction of winds at the proposed site.

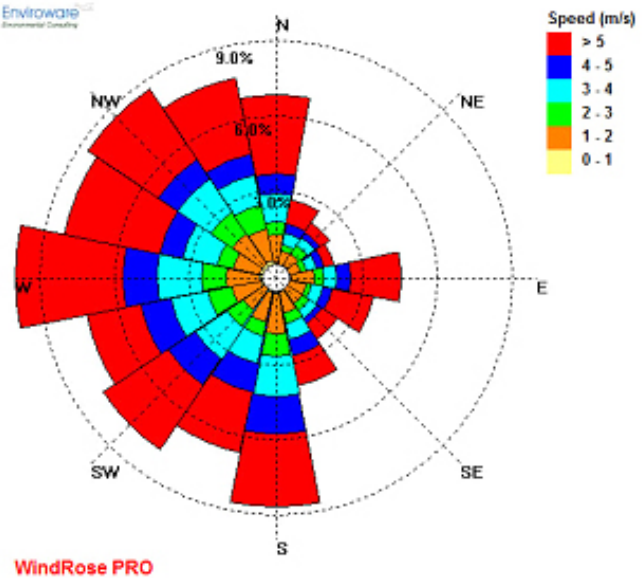


Figure 2. Wind Rose for Shearwater Airport.
Diagram shows winds in the FROM direction.

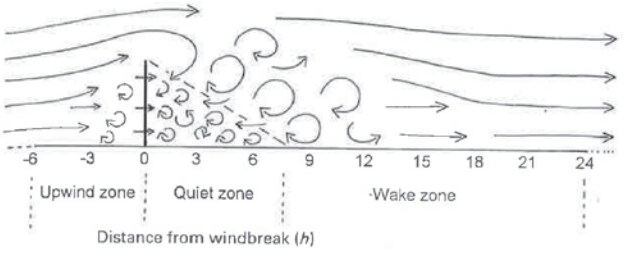
The resulting diagram (Fig. 2) shows that the highest and most frequent wind speeds come **from** the west and south. During fall and winter months wind primarily blows from the north-west to west. Throughout the spring and summer south and south-westerly winds prevail. The relative distribution of higher wind speeds are somewhat constant from the north, north-west, and south-west. High winds from the north-east, east,

Figure 3. Wind Rose overlain on top of the proposed addition site. Red numbers denote building stories.

and south-east are substantially infrequent when compared to other directions. Fig. 3 illustrates these implications for the given site.

Urban Windbreak Impacts

As shown in Fig. 3 the new building will impact sidewalk conditions differently at different times of the year. In the winter, Hollis Street is aligned with winds from the north and north-west. The proposed development could have a modest increase in wind conditions on the Hollis street sidewalk (south of Bishop Street) in the winter. It will have little to no impact on the Bishop Street sidewalk. The 3m stepback at the 4th storey will significantly reduce wind shear from the upper storeys at the sidewalk. Since there is an existing 3 storey building on the corner, there will only be a very modest increase in wind speed resulting from the additional storey. Westerly winds (which are common in the winter) position the Hollis Street sidewalk in the upwind zone of the site resulting in very little change in wind.

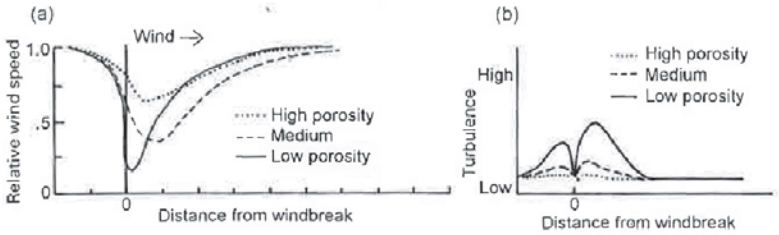


Zones with altered airflow caused by a windbreak. Vertical dimension is magnified for illustration. Vertical line indicates windbreak; h = height of windbreak. Large eddies = strong turbulence. Uninterrupted airflow in the open is to the left of the upwind zone, and to the right of the wake zone. Widths of zones are approximate. Based on several sources.

Figure 4. Windbreak Diagram

On Bishop Street these winter westerly winds will only have a very slight impact on windspeed since the 3 storey building is being replaced with a 4 storey stepback. The 21-storey Alexander will have significantly more impact on the Bishop Street sidewalk (and Lower Water Street) when the winds come from the west. Wind sheer at the southern edge of the Alexander will create significant pressure and wind differentials on this development when winds come from the west.

Wake zones for zero porosity structures can extend 8-30 times the height of a structure. A 7-storey building can generate increased wind speeds between 48-180 metres on the lee side (see Fig. 4). Beyond the wake zone, there is typically more turbulence and eddies as a result of more turbulent air.



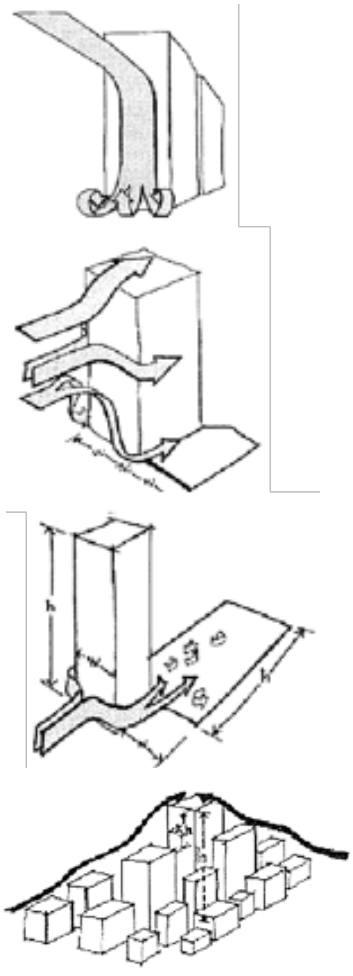
Effect of windbreak porosity on **streamline and turbulent airflows.** (a) Streamline airflow based on treebelts **of different foliage densities;** wind measurements at 1.4 m height. From **Heisler & DeWalle (1988) with** permission of Elsevier Science Publishers. (b) **Generalized expected turbulence** pattern based on Robinette (1972), Rosenberg *et al.* (1983), Heisler & DeWalle (1988), McNaughton (1988).

Figure 5. Porosity Diagram

Wind Impacts from tall Buildings

Tall buildings (>4-5 storeys) can have noticeable impacts on their surroundings as a result of several factors. Essentially, winds are slowed down upwind and downwind of the new structure but are sped up around the edges, between openings, and as a result of down-drafts (Figure 4). The types of wind impacts from tall buildings can be classified as:

1. Downwash: Wind speed increases with height of the building as the volume of wind displaced by the building is compressed into a smaller area. So when a tower is exposed to wind, the pressure differential between the top and the bottom of tower forces the high pressure at the top down the windward face increasing pedestrian wind speeds. The taller the exposed face is, the higher the wind speed will be at the base. The stepback at the 4th storey of the buildings will receive some of this downwash rather than the sidewalks receiving the full brunt of the wind. A 20+ storey building can cause up to 100% increase in wind speeds at the base unless the stepback reduces some of the downwash.
2. The corner effect: on the upwind corners of buildings there can be unexpected increases in wind speeds as wind forces around the windward corners from high pressure on the windward face to low pressure on the lee side. Some of the ways to decrease this impact is to create pyramidal steps which increases the surface area of the edges.
3. The Wake Effect: Wake is generally caused by both the downwash and corner effect. The greatest impact area occurs within an area of direct proportion to the tower height and width on the downwind side of the wind. Impacts are minimized by creating a stepback base on the building.
4. Building Groups: The effects that occur individually around buildings cannot be applied directly to groups of buildings. The cumulative effect of many clustered tall buildings, like in this situation, can create a wide range of different wind scenarios that must be modelled as a group to understand the cumulative impacts.



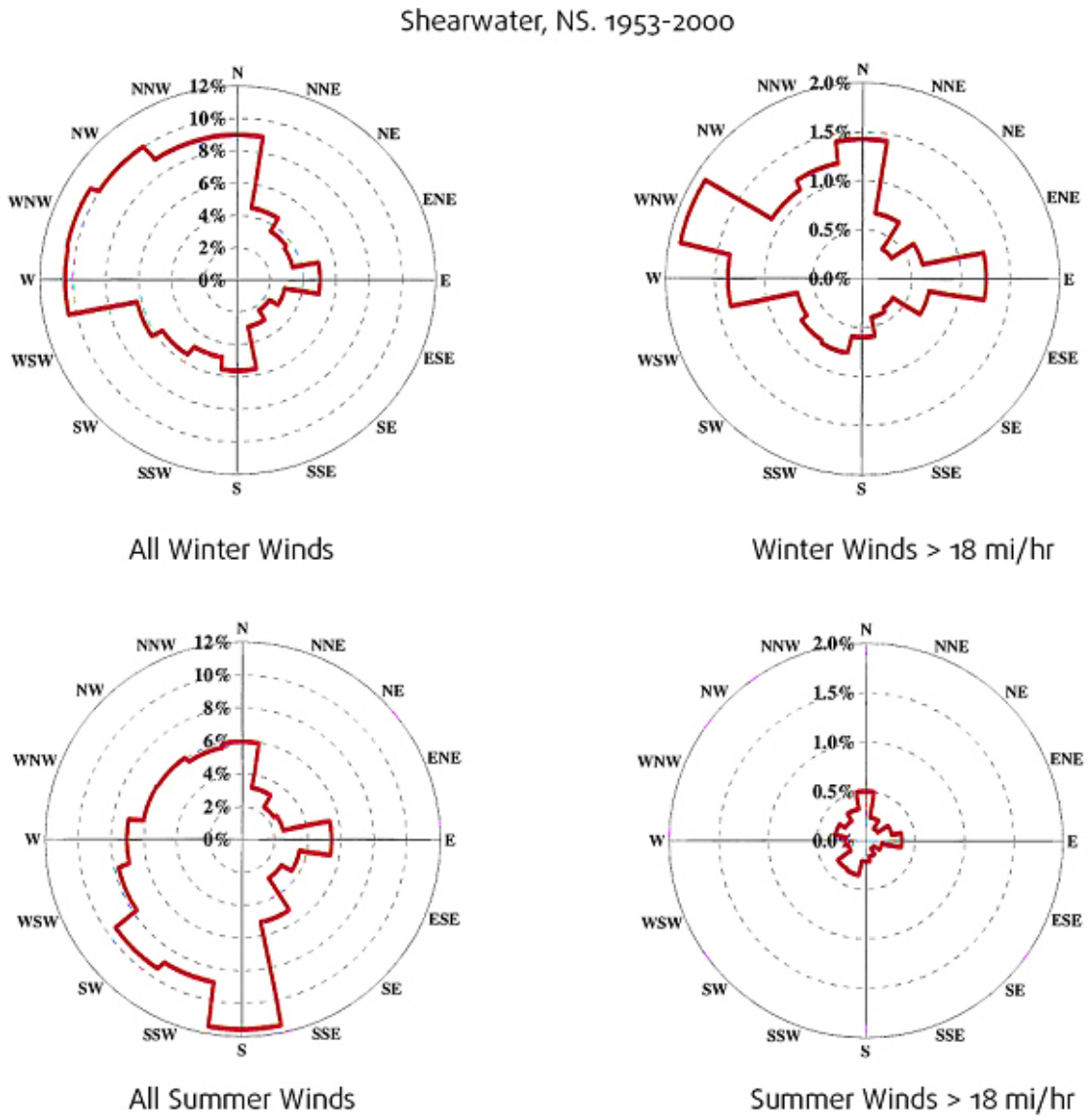


Figure 6. Seasonal Wind Direction for Shearwater Airport

Local Impacts

The proposed development is north of the 8-storey Waterford Tower (which is also owned by Dexel). A public terrace is planned between the two buildings which would be in a very wind protected area for most of the year. The reduced wind speeds in this terrace area could result in some drifting snow in the public terrace area. The downwind impacts as a result of this new 7-storey building will be masked by the impacts of the existing Waterford Tower which is 1 storey higher and has larger tower dimensions than the proposed building. There will be very little impact on the Hollis Street sidewalk in both the winter and the summer as the sidewalk is primarily in the upwind zone throughout the year. In the summer, when the wind swings from the south the Bishop Street sidewalk will have minimally increased wind speeds as a result of the development. The funneling of southern wind on Bishop Street as a result the 21-storey Alexander will

significantly outweigh any impacts which may result from a 4-storey development with an additional 3 storeys setback 3m from the stepback. If the building across the street from Bishop is constructed to its permitted height of 7 storeys there could be a slightly larger funnelling effect that could be felt on Hollis Street. The stepbacks at the 4th storey on both new buildings will significantly reduce sidewalk impacts.

The proposed development is also located within the wake zone that is created by the Maritime Centre, and is therefore already located in an area of accelerated and turbulent winds. Currently, the corner of Bishop and Hollis Street is frequently impacted by the wake zone of the Maritime Centre when the winds come from the north and north west.

In the summer, the wind comes from the southwest most of the time. On Hollis Street, opposite the proposed development is a 4 and 3-storey wall of buildings which provide some shelter for the west and east side of Hollis Street.

While wind turbulence is generated by structures on the downwind side, wind speed is reduced. Low porous or no porous structures such as buildings will reduce wind speeds immediately downwind of the structure but will increase wind speeds on the edges of the buildings (Fig. 5).

We would expect virtually no wind impact on Government House at any time of year as a result of this building and very little impact on the Waterford as a result of this development. The new Alexander Tower, if it has no stepbacks or wind breaks on the west side, could cause significant gusting and wind conditions on the eastern side of this proposed development.

Seasonal Wind Impacts

Looking at the seasonal wind impacts (Fig. 6), in the winter the northwest prevailing winds are the dominant occurrence. Approximately 48% of all winds come from the northwest. Winter winds are also stronger than those in the summer, with around 15% of all winds reaching speeds above 29 kph. The proposed development will create a 7-storey upwind zone within the wake zone of the Maritime Centre.

During the summer the majority of winds come from the southwest quadrant, approximately 46%, with the remaining spread amongst the other three ordinal directions: roughly 20% from the southeast, 24% from the northwest, and 10% originating out of the northeast quadrant. Overall, the winds are mild, with just over two percent of all winds reaching speeds over 29 kph. Summer winds may mildly impact the Bishop Street street frontage but in comparison to the impacts that will be caused by the Alexander, they will be negligible. It will be important that if the site is developed across the street from Bishop, for it too will have a 4 storey stepback to reduce wind funneling in the winter.

Wind Comfort Assessment

The potential for accelerated winds and increased turbulence along the Hollis Street sidewalk may cause marginal increased discomfort during winter months, compared to the existing 3 storey structures that occupy the site. Bishop Street will similarly be marginally windier in the summer as a result of the addition of a 4-strey stepback compared to the existing 3 storey buildings. Relative to the impacts that will come from the 21-storey

Alexander, the impacts from this new development will not even be noticeable.

Changes in wind speed as a result of buildings vary depending on wind direction and building morphology. On Hollis Street 'streamlines' can occur where the wind is accelerated through the street between the Maritime Centre and the Alexander. The stepback of the building at the 4th storey will all but eliminate most wind impacts on both Bishop and Hollis Street. Similarly, very little impacts will be felt on the Waterford or other surrounding blocks as a result of this proposed development. We do not anticipate 'uncomfortable' conditions from this new building along sidewalk relative to today's conditions.

Summary

This proposed building is a modest change from the existing 3 storey buildings. The stepback of the 5th storey will reduce impacts that might be felt at the sidewalk. The building will have very little impact on wind patterns or human thermal comfort along Hollis or Bishop Street. Any small impacts that this building may have had on sidewalk wind speed will be dwarfed by the impacts that will be caused by the Alexander Centre.

The following wind studies have been prepared in Autodesk Flow to demonstrate the wind findings described in this report.

If you have any questions, please contact me at your convenience.

Sincerely,

ORIGINAL SIGNED

Robert LeBlanc, President
Ekistics Planning & Design

AutoDesk Flow Wind Simulations

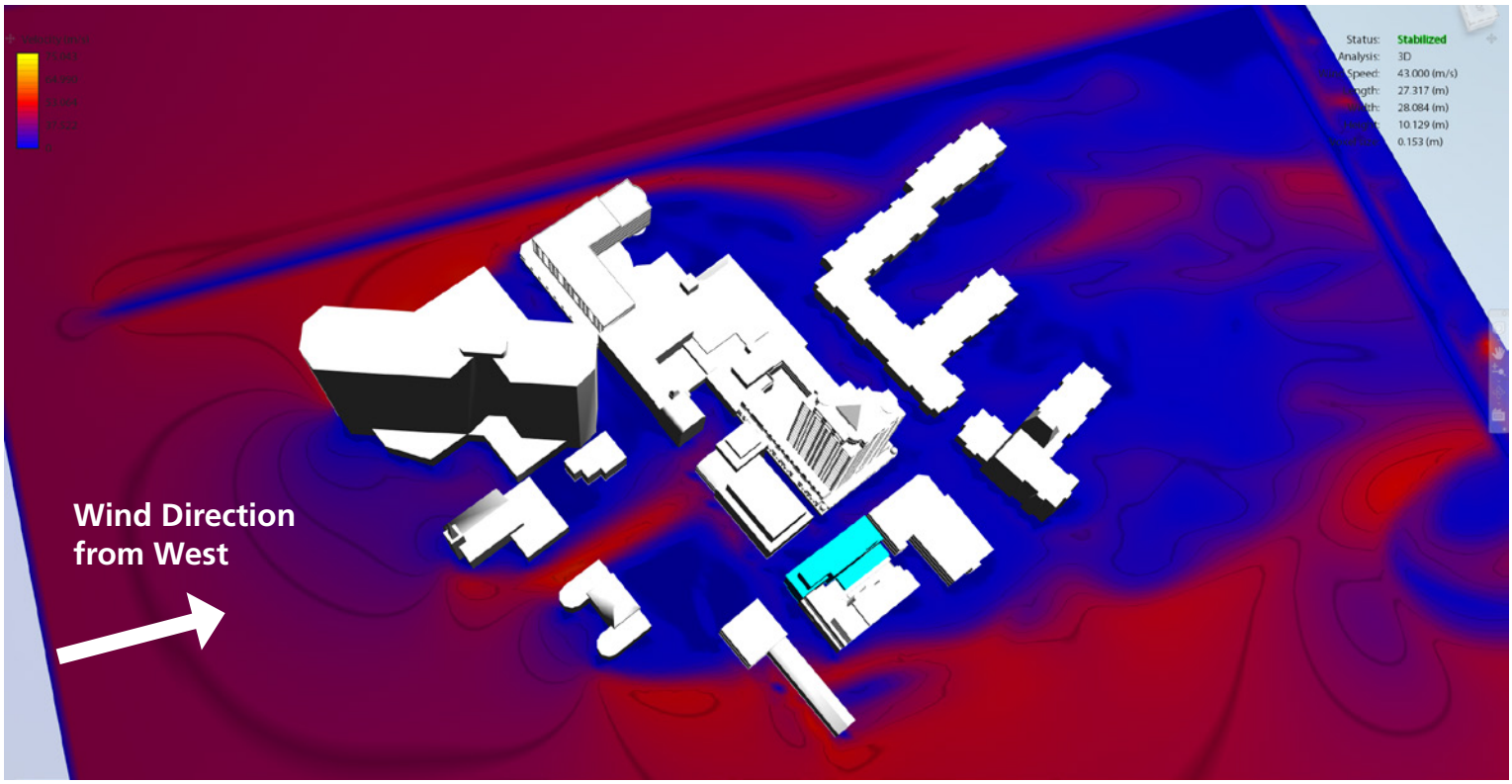


Fig 7. Westerley wind directions with starting wind speed at 30 m/s. Blue shows areas of calm (<30 m/s), while orange and yellow shows areas of increased wind speed (>30 m/s).

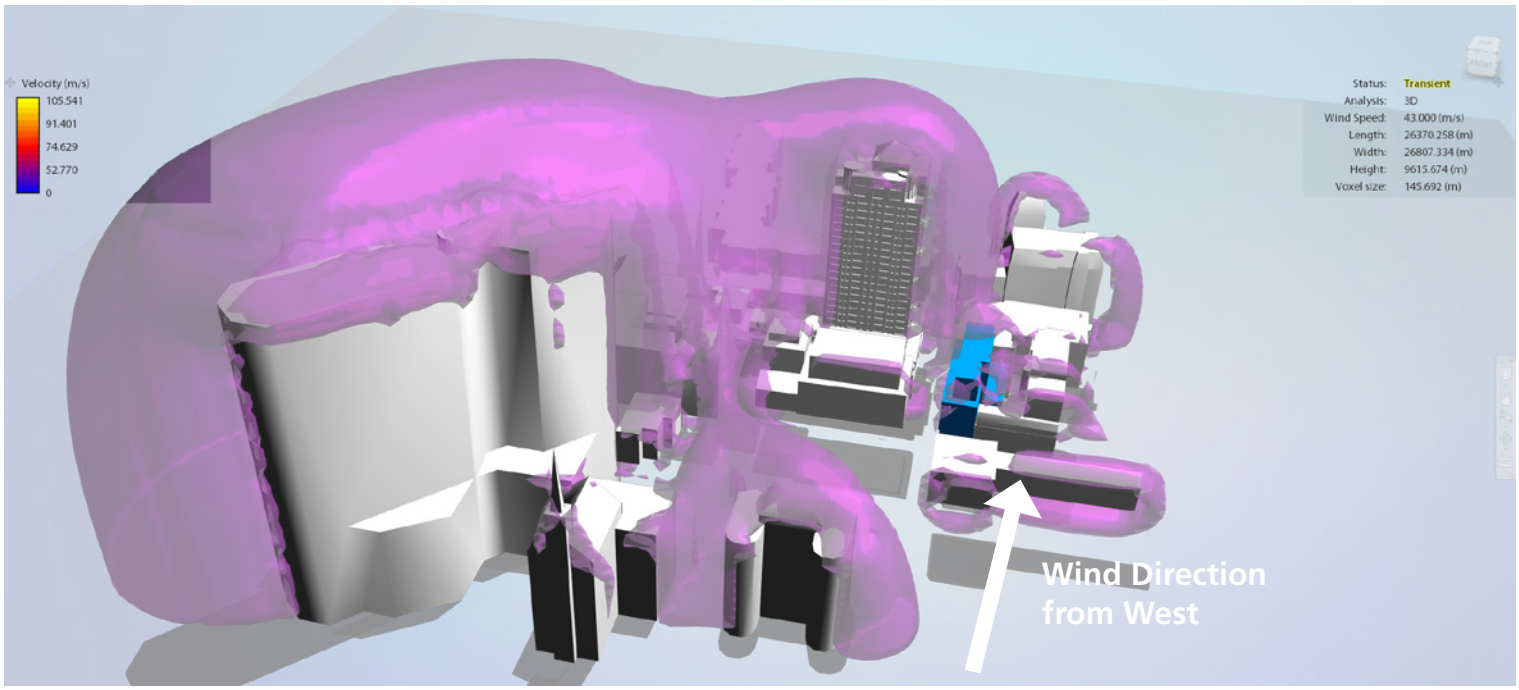


Fig 8. Westerley wind directions iso-surfaces. This purple surface shows a 50m/s wind zone resulting from a starting wind speed of 30 m/s.

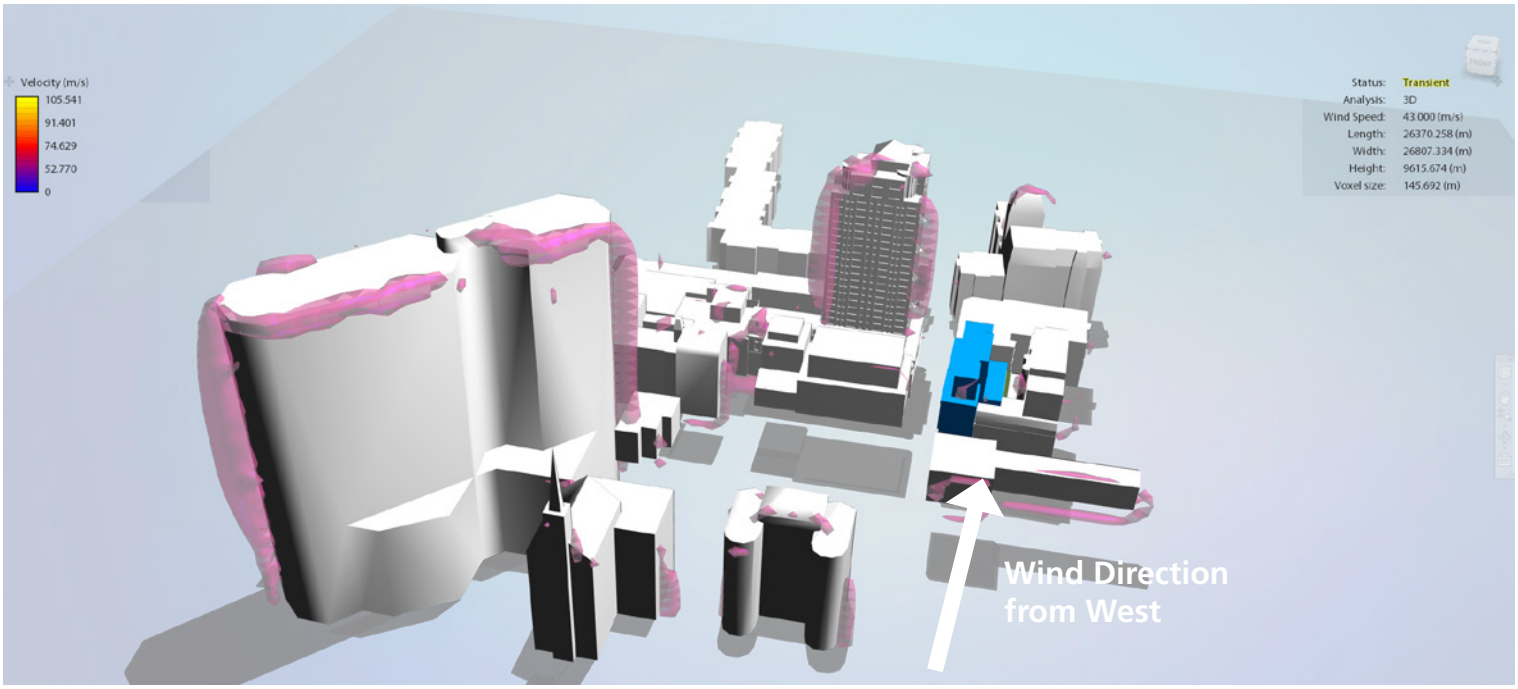


Fig 8. Westerley wind direction iso-surfaces. This purple surface shows a 60m/s wind zone resulting from a starting wind speed of 30 m/s.

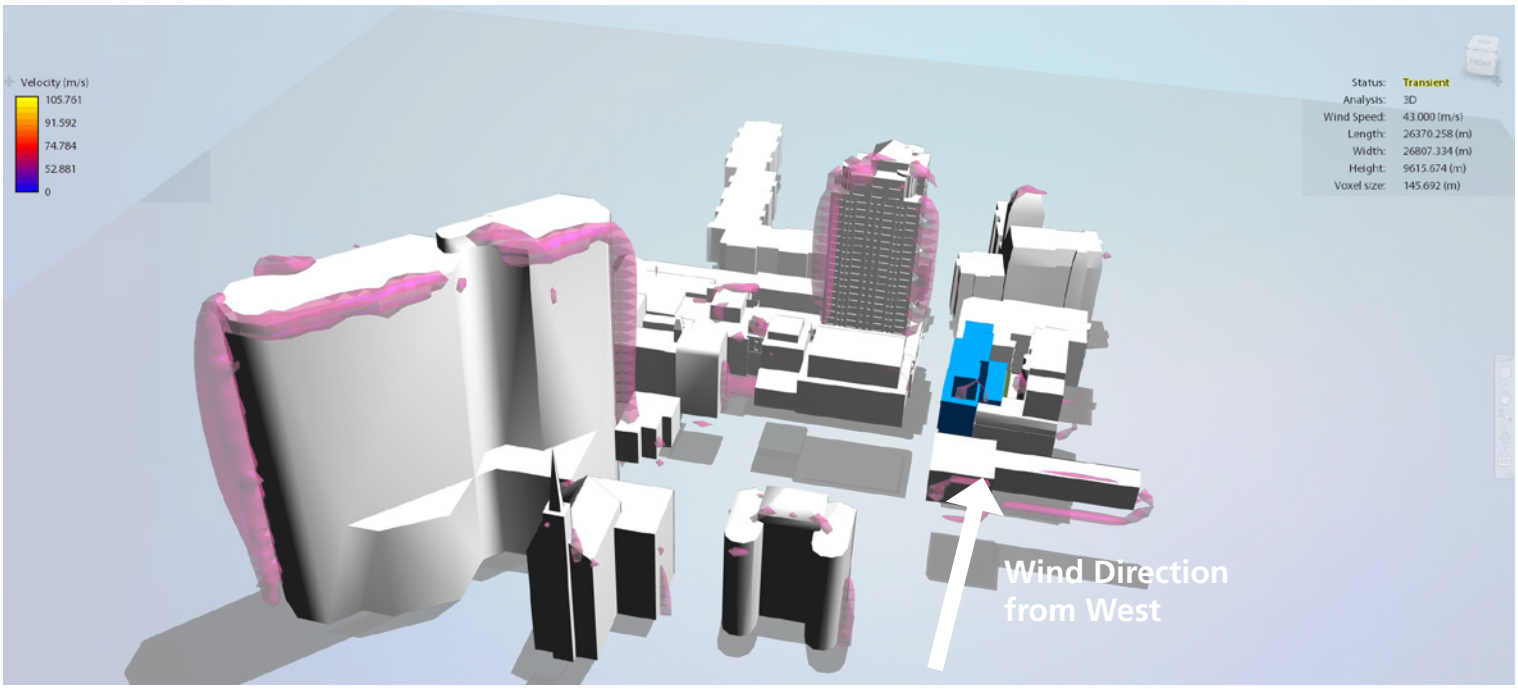
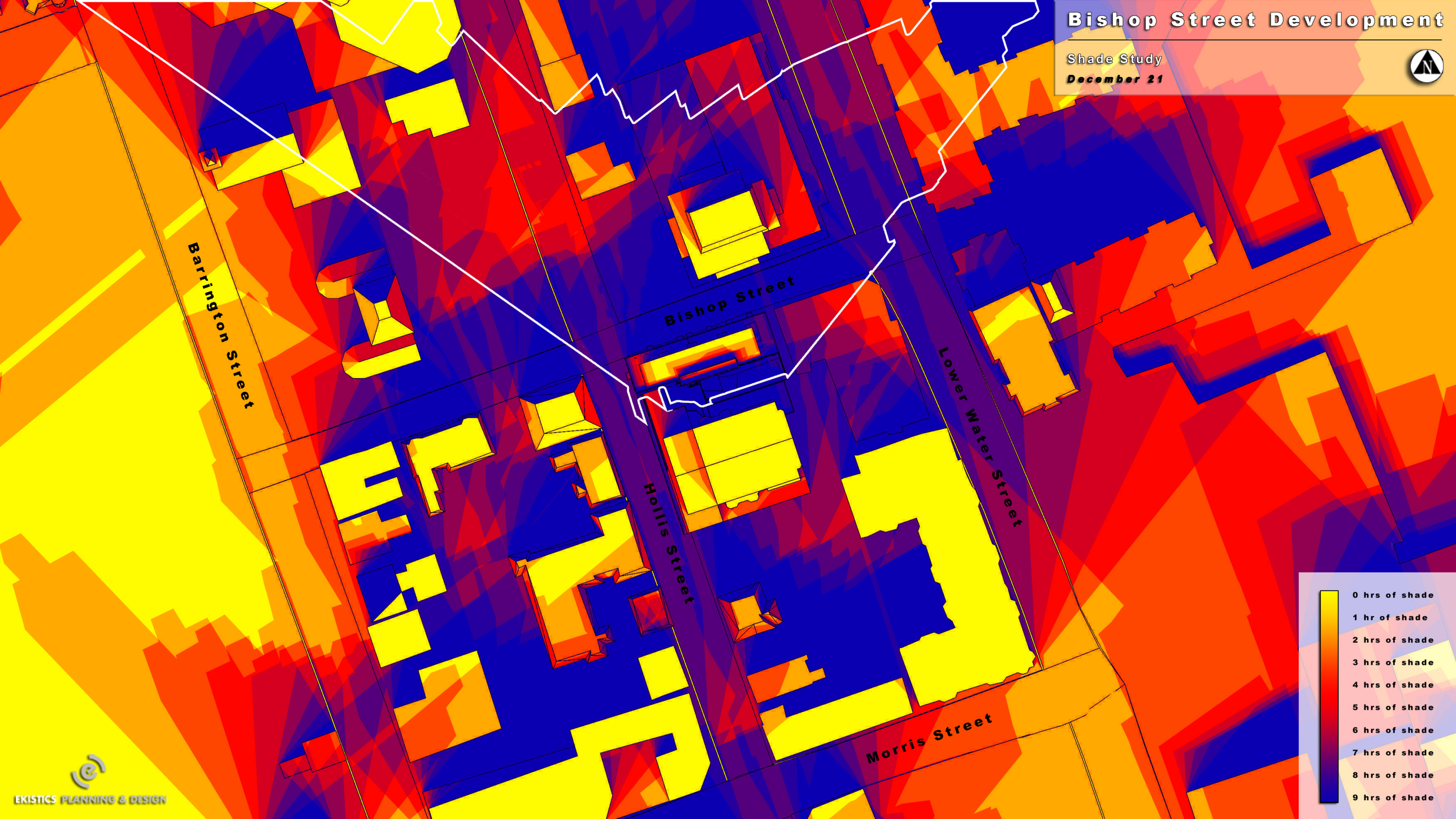
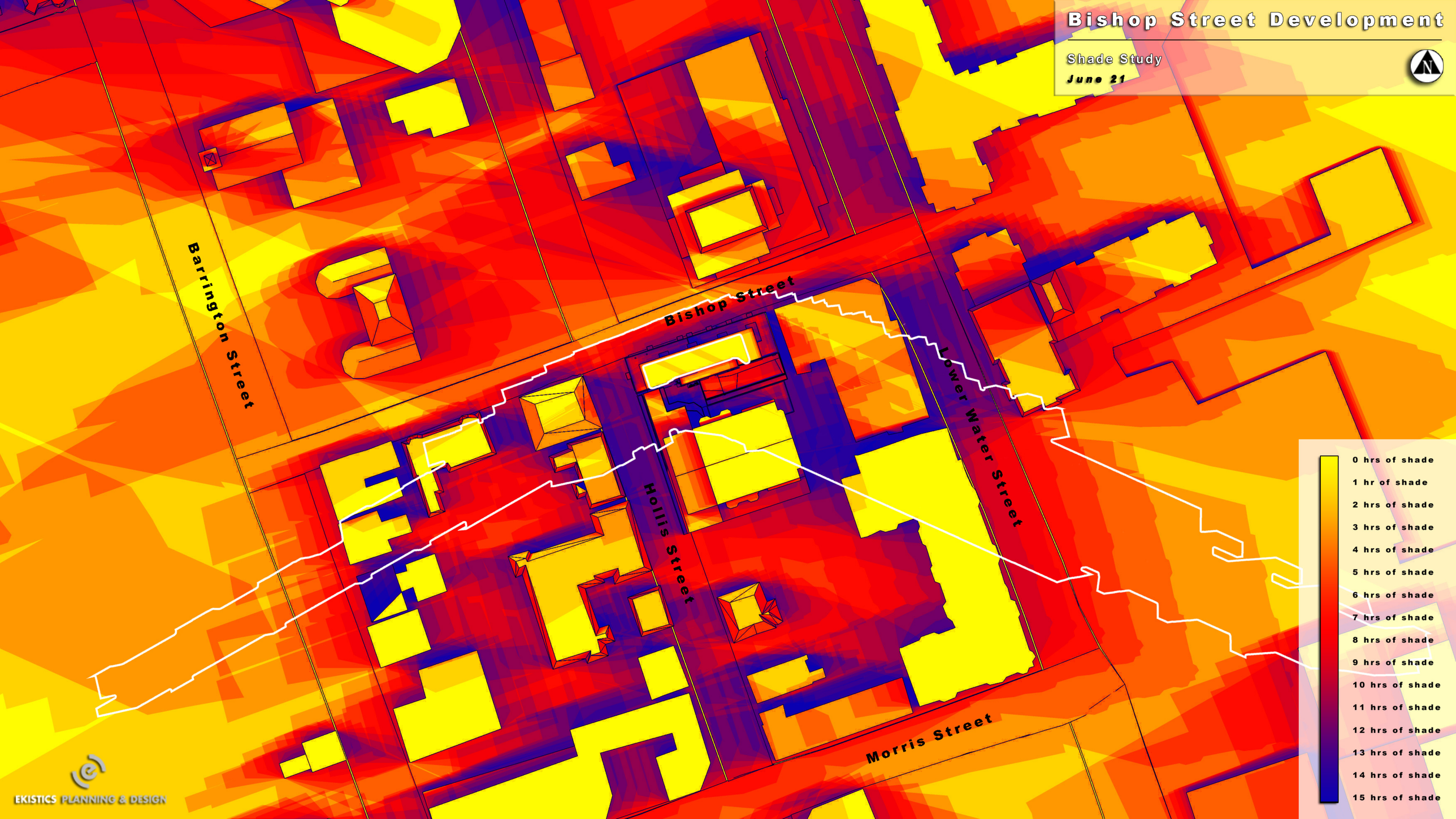


Fig 8. Westerley wind direction iso-surfaces. This purple surface shows a 70m/s wind zone resulting from a starting wind speed of 30 m/s.


Bishop Street Development
Shade Study
December 21
Barrington Street
Bishop Street
Hollis Street
Lower Water Street
Morris Street
0 hrs of shade
1 hr of shade
2 hrs of shade
3 hrs of shade
4 hrs of shade
5 hrs of shade
6 hrs of shade
7 hrs of shade
8 hrs of shade
9 hrs of shade
EKISTICS PLANNING & DESIGN


Bishop Street Development
Shade Study
June 21
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Bishop Street
Hollis Street
Lower Water Street
Morris Street
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1 hr of shade
2 hrs of shade
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4 hrs of shade
5 hrs of shade
6 hrs of shade
7 hrs of shade
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9 hrs of shade
10 hrs of shade
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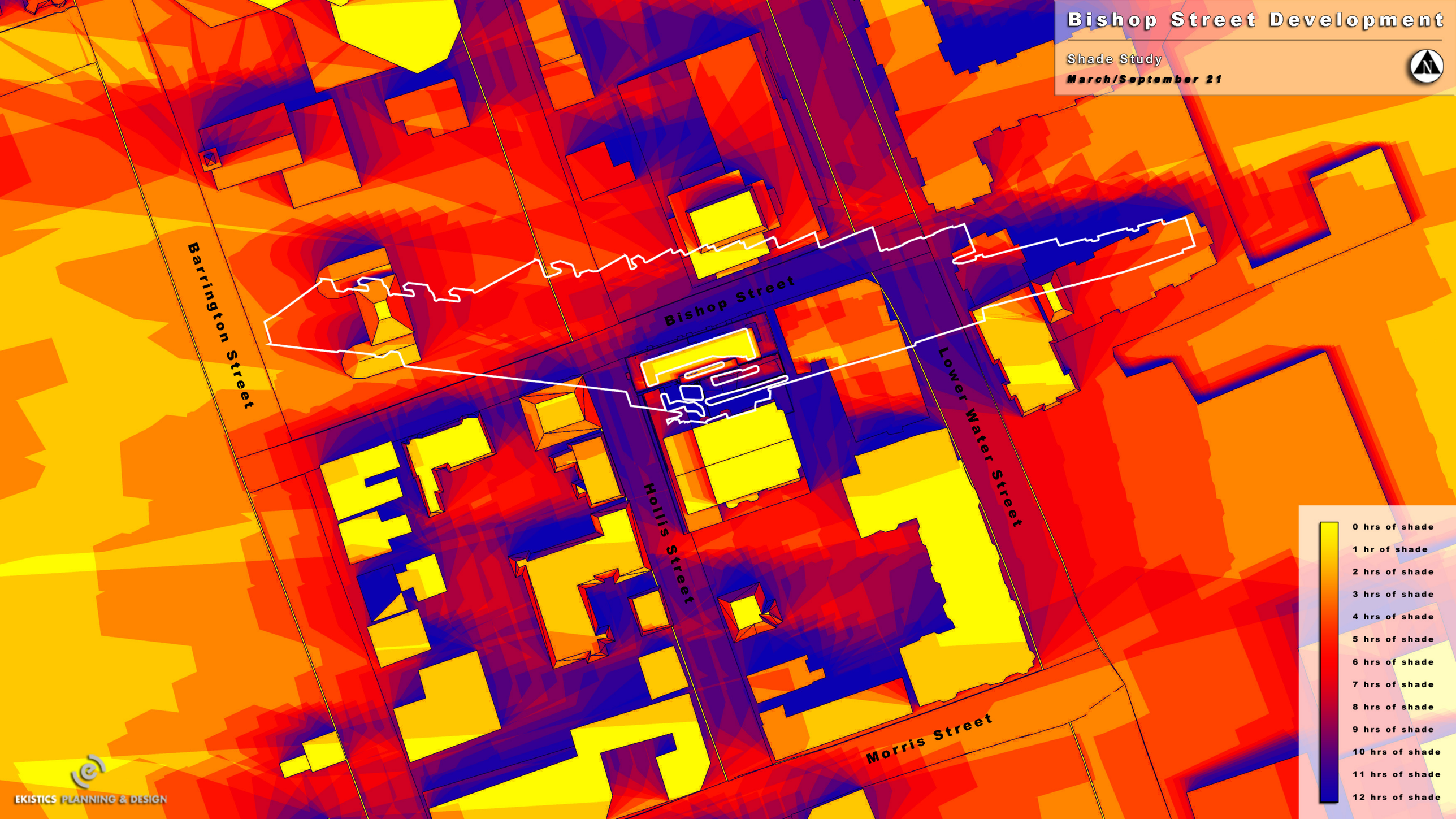
12 hrs of shade
13 hrs of shade
14 hrs of shade
15 hrs of shade
EKISTICS PLANNING & DESIGN


Bishop Street Development
Shade Study
March/September 21
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Bishop Street
Hollis Street
Lower Water Street
Morris Street
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4 hrs of shade
5 hrs of shade
6 hrs of shade
7 hrs of shade
8 hrs of shade
9 hrs of shade
10 hrs of shade
11 hrs of shade
12 hrs of shade
EKISTICS PLANNING & DESIGN