7
APPENDIX

Public Process + Design Review Materials
Pedestrian Level Wind Tables
Annual Reflection Diagrams
Digital 3d Model

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PUBLIC PROCESS + DESIGN REVIEW MATERIALS

A. NEIGHBORHOOD MEETING #1

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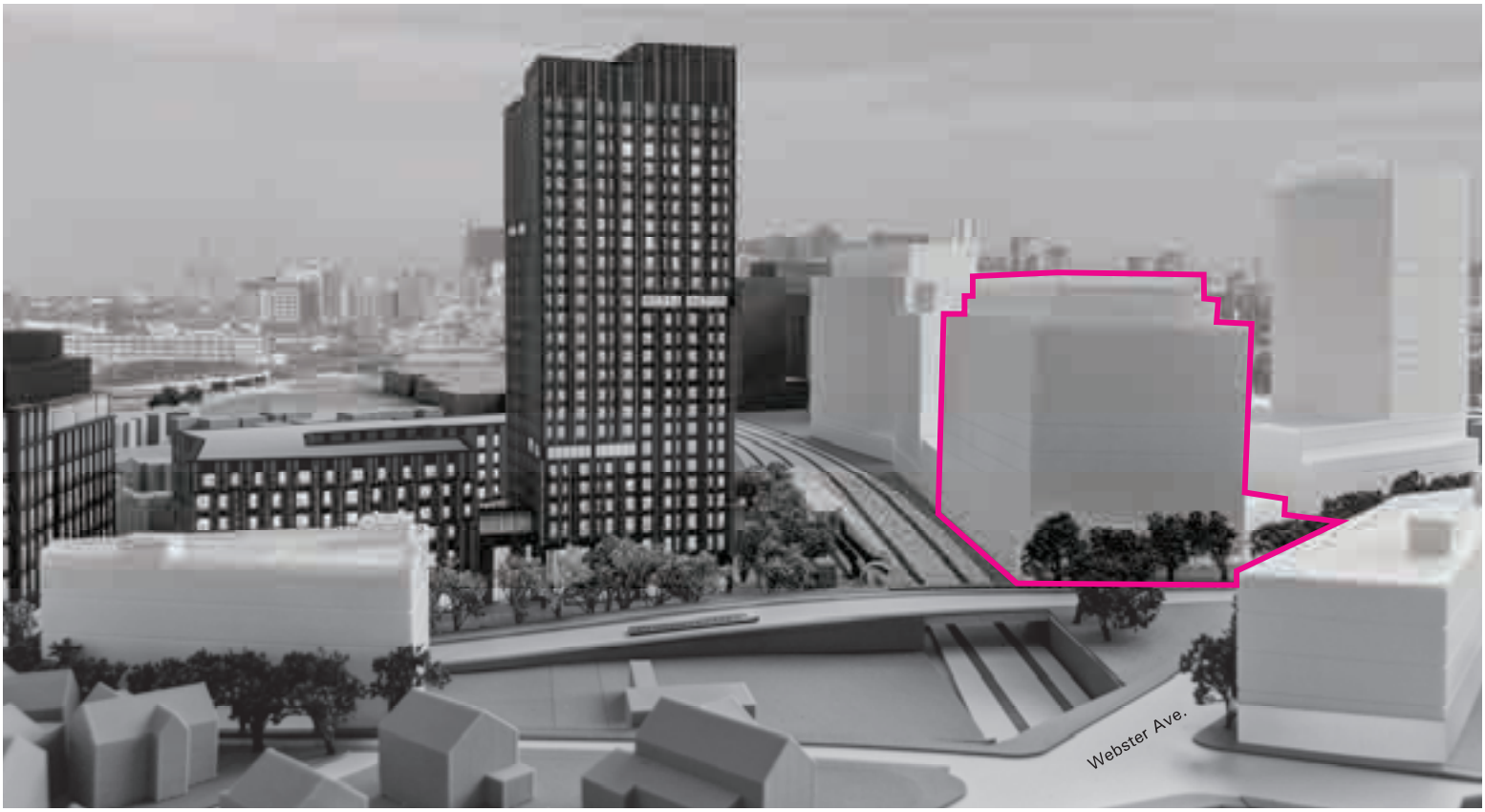


50 WEBSTER AVENUE (D3.1) | DESIGN AND SITE PLAN REVIEW
NEIGHBORHOOD MEETING #1
AUGUST 25, 2021

AGENDA

Announcements

Project Team

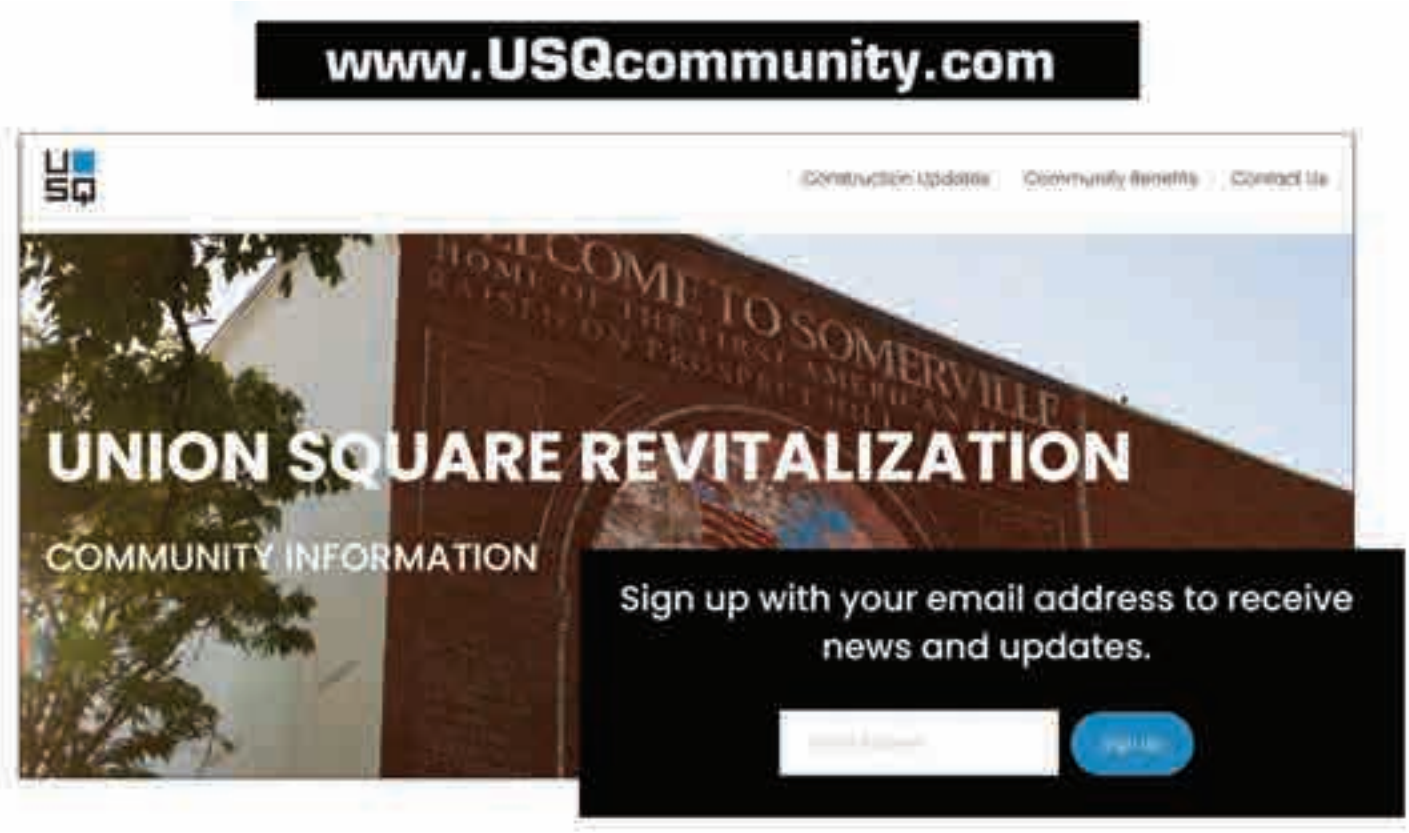
Public Process Review

Building Meeting #1

- Context / Site History
- Analysis & Exploration
- Ideas & Opportunities
- Questions & Discussion

Civic Space Meeting #1

- Context
- Analysis & Exploration
- Ideas & Opportunities
- Questions & Discussion



Neighborhood Meeting
Open House Format

- 600 Windsor Master Plan Special Permit
- 50 Webster Ave (D3.1) Site Plan Review
- Other aspects of the Union Square Revitalization

Where: Union Square Farmer's Market
Booth in the vicinity of Sally O'Briens

Date: Saturday, 8/28/2021

Time: 9:00 am – 1:00 pm
Stop by Anytime

Hope to see you there!

Note: **This Live Meeting is being recorded**

By participating in this meeting, you agree that your communications are being recorded, including Q&A that may arise. The purpose of this recording is to save and archive this presentation for those who are unable to participate in the live presentation.

Zoom Tips

Here are some tips on using Zoom for first-time users. Your controls should be available at the bottom of your screen. Clicking on these symbols activates different features.

Mute/unmute (you will remain muted until the Q&A begins)
If you joined the meeting by dialing from your phone, dial *6 to mute/unmute yourself

Turn video on/off

The Q&A feature may be used to provide written questions and comments during the presentation and questions and answer session

Raise hand to ask for audio permission at the end of presentation
If you joined the meeting by dialing in from your phone, dial *9 to raise your hand

Virtual Meeting Etiquette

- We want to ensure that this conversation is a pleasant experience for all, and that all community members are comfortable sharing their comments, questions, and feedback.
- Participants will be muted during the presentation to avoid background noise. However, you will be able to unmute yourself and ask questions during the Q&A.
- Please be respectful and mindful of each other's time when asking questions/ providing comments, so that all attendees are able to participate in the meeting.

Please email us at info@discoverUSQ.com to set up a conversation with us directly to further discuss the project and/or process.

PROJECT TEAM

US2
d/b/a US Union Square D3.1 Owner LLC

SGA
Architect

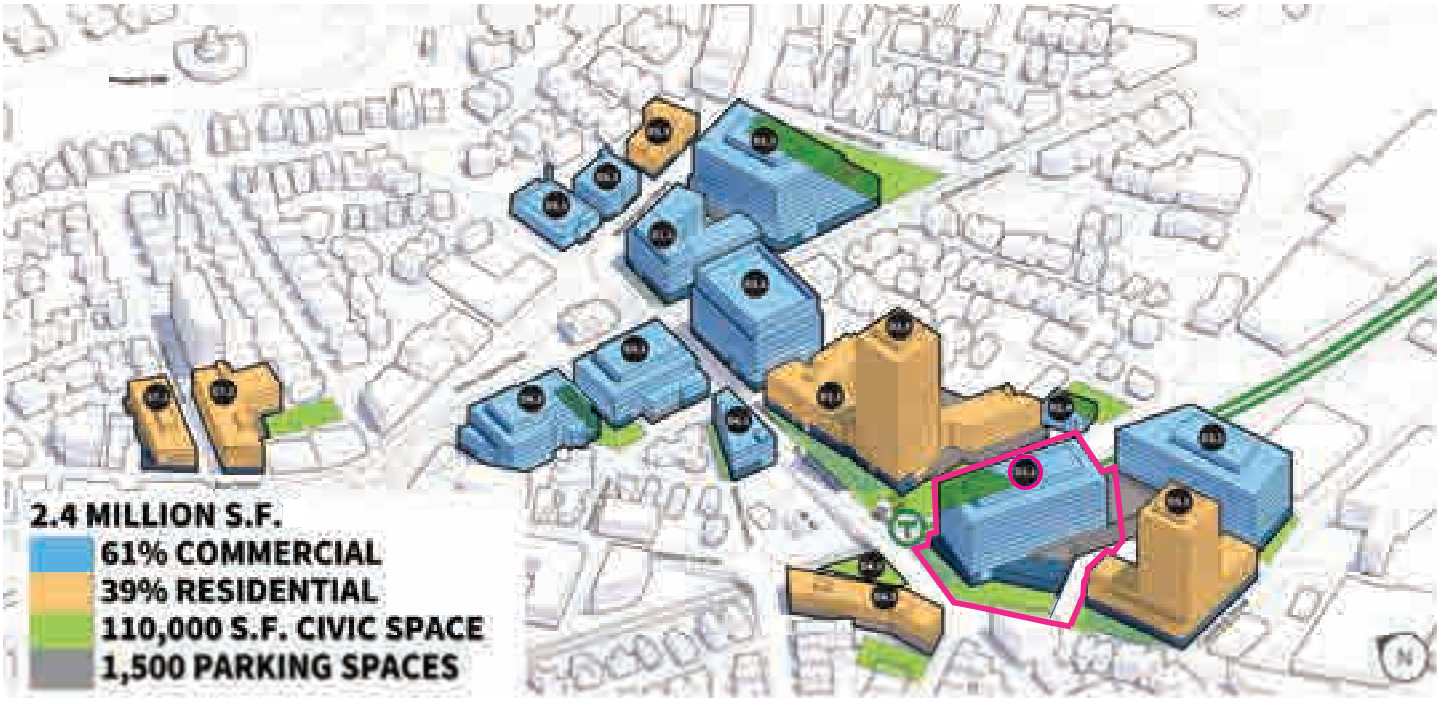
MARVEL DESIGN
Design Architect + Landscape Architect

HOWARD STEIN HUDSON
Civil Engineer

MCNAMARA SALVIA
Structural Engineer

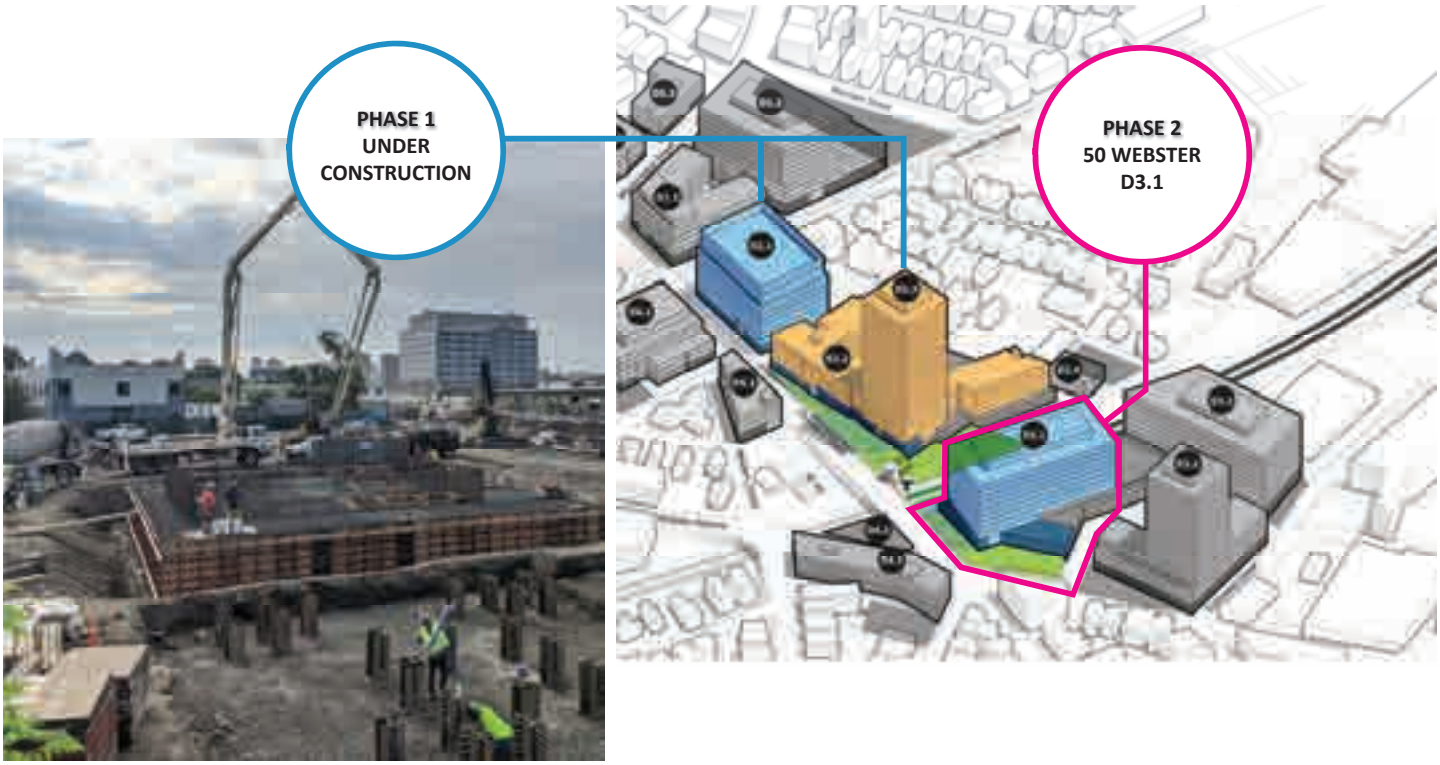
AHA
Mechanical Enginer

dbHMS
Sustainability Consultant

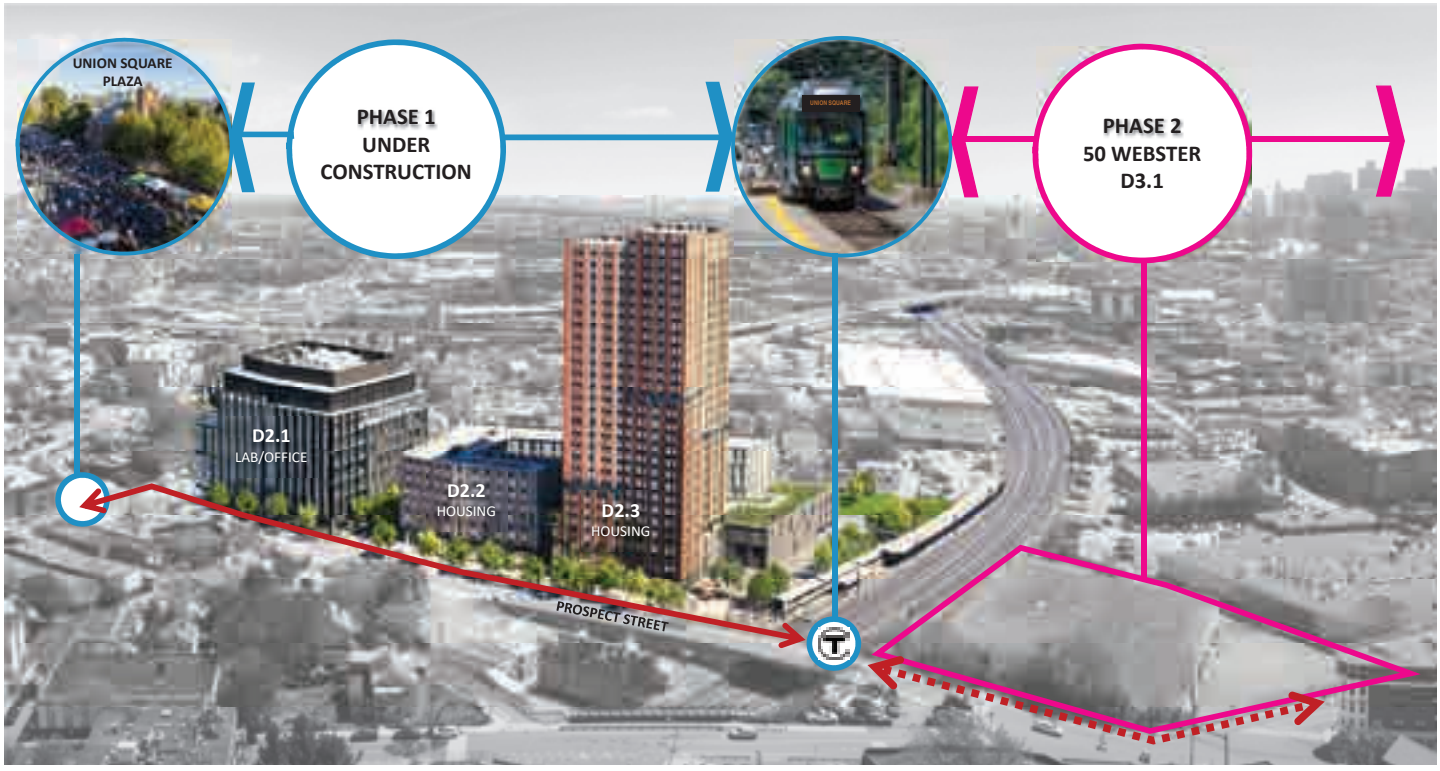


MASTER BLOCK AND LOT PLAN

50 WEBSTER AVENUE (D3.1) BLOCK AND LOT PLAN



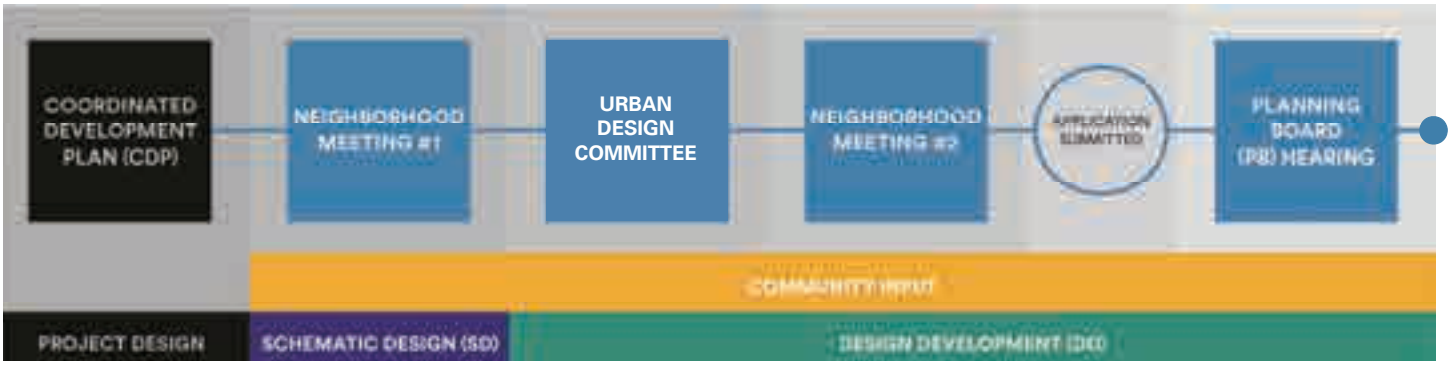
PUBLIC PROCESS REVIEW | PHASE TWO PLANNING BEGINS WITH 50 WEBSTER (D3.1)



PARALLEL PROCESSES FOR D3.1 CIVIC SPACE + D3.1 BUILDING

We Are Here

DEC 2017 **AUG 2021**



NEIGHBORHOOD MEETING #1
50 WEBSTER AVENUE | BUILDING LOT

Context / Site History
Analysis & Exploration
Ideas & Opportunities
Questions & Discussion

SITE HISTORY

SPECIAL THANKS TO THE

SITE HISTORY | UNION GLASS COMPANY

OPERATED AT 50 WEBSTER FOR 73 YEARS (1854 - 1927)

SPECIAL THANKS TO THE

SITE HISTORY | UNION GLASS COMPANY

HISTORY

SPECIAL THANKS TO THE

- Founded by Francis & Armory Houghton in 1854
- Sold to Thomas Dana in 1860
- Houghton subsequently founded the Corning Flint Glass Company in Corning, NY
- Julian deCordova took control in 1893 when his wife, Elizabeth Dana deCordova, inherited the company
- Shifted focus to cut-glass and art objects
- Produced the highest quality glass objects, rivaling the best companies at the time
- At peak, employed 200 workers
- Ceased operations in 1927

Francis Houghton

Julian DeCordova

SPECIAL THANKS TO THE

PRODUCTS

- Only produced flint (leaded) glass products
- Flint glass combined saltpeter, red lead, pearl ash and sand sourced from the Berkshires
- Initially focused on pressed tableware, globes and oil lamps
- As cut glass became popular, provided blanks and also sold cut glass in-house
- Produced the largest American cut-glass punchbowl in existence (30 gallon capacity, 150 lbs.)
- A popular line of vases were sold to florists
- Also produced, other glass art inspired by Venetian forms or the iridescent glass line, Kew

BUILDING
ANALYSIS & EXPLORATION

ANALYSIS & EXPLORATION | CONTEXTURAL HISTORIC ARCHITECTURE


PROSPECT HILL TOWER


HOUSING


HOUSING


HOUSING


HOUSING


SOMERVILLE HIGH SCHOOL

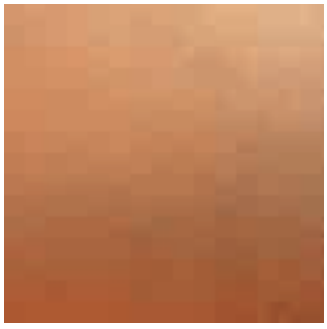
ANALYSIS & EXPLORATION | NEIGHBORHOOD MATERIALS


STONE


COBBLESTONE


BRICK


WOOD


STEEL


GLASS

ANALYSIS & EXPLORATION | CONTEXTURAL ARCHITECTURE CONTEMPORARY


EAST SOMERVILLE COMMUNITY SCHOOL


1060 BROADWAY


SOMERVILLE HIGH SCHOOL


10 PROSPECT (D2.1)


20- 50 PROSPECT (D2.3)


BOYNTON YARDS LAB

ANALYSIS & EXPLORATION | CONTEMPORARY BUILDING MATERIALS PALETTE

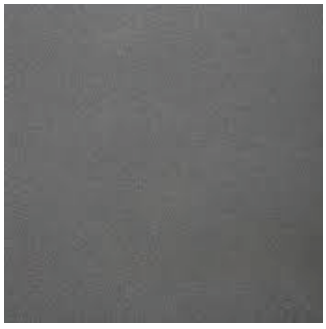

WOOD

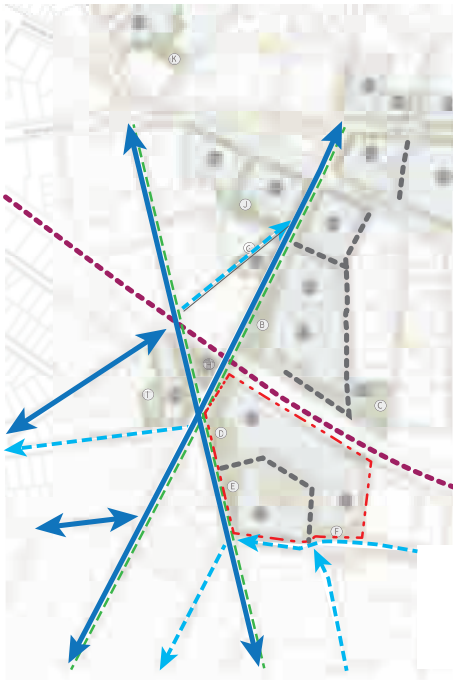

CONCRETE


BRICK


METAL PANEL


GLASS


STEEL



CIRCULATION

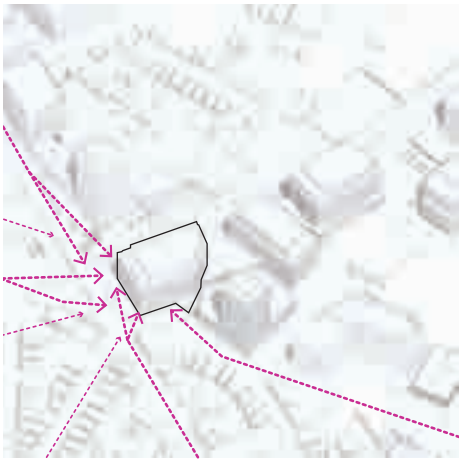
- TWO WAY ROAD W/BIKE LANE
- TWO WAY ROAD
- ONE WAY ROAD W/BIKE LANE
- TRAIN
- SERVICE ROADS

CIVIC SPACES & PEDESTRIAN PATH

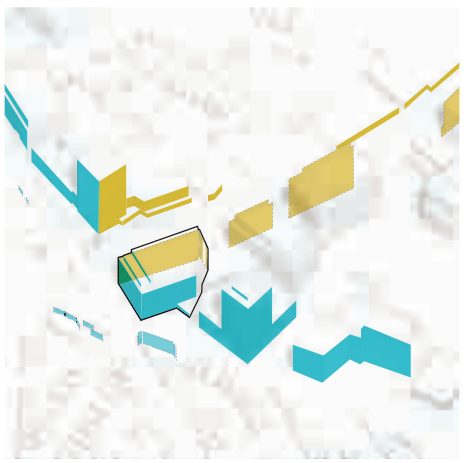
- PROPOSED CIVIC SPACE
- PEDESTRIAN PATH

SCALE

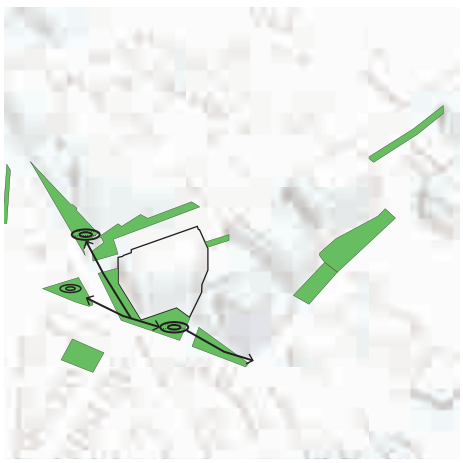
- MASTER PLAN BLDGS: 5 > LEVELS
- MASTER PLAN BLDGS: 4 - 5 LEVELS
- MASTER PLAN BLDGS: < 4 LEVELS
- EXISTING BLDGS: 4 - 5 LEVELS
- EXISTING BLDGS: < 4 LEVELS



SIGHTLINES



BUILDING FACES



PUBLIC SPACES AND CONNECTIONS

ANALYSIS & EXPLORATION | CONTEXT ANALYSIS URBAN FABRIC FIGURE GROUND

ANALYSIS & EXPLORATION | NOTABLE AREA ADJACENCIES

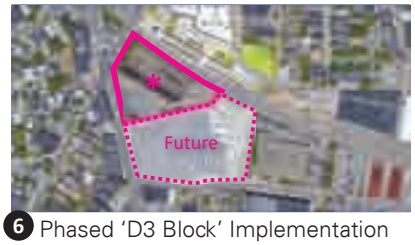
1 D2 Projects

4 5 Way Intersection

2 Green Line Extension

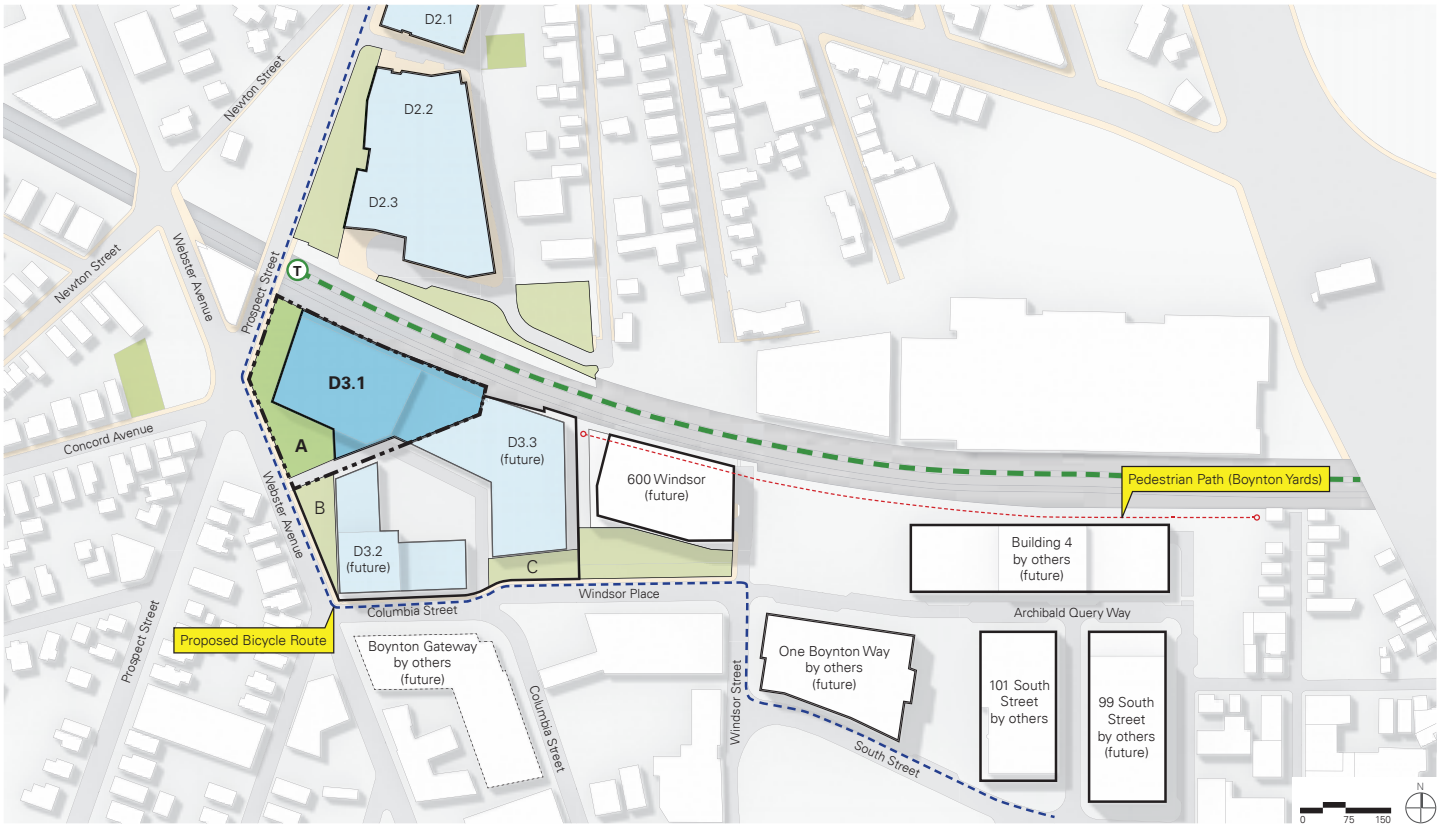
5 Grade Changes

3 Commuter Rail ROW

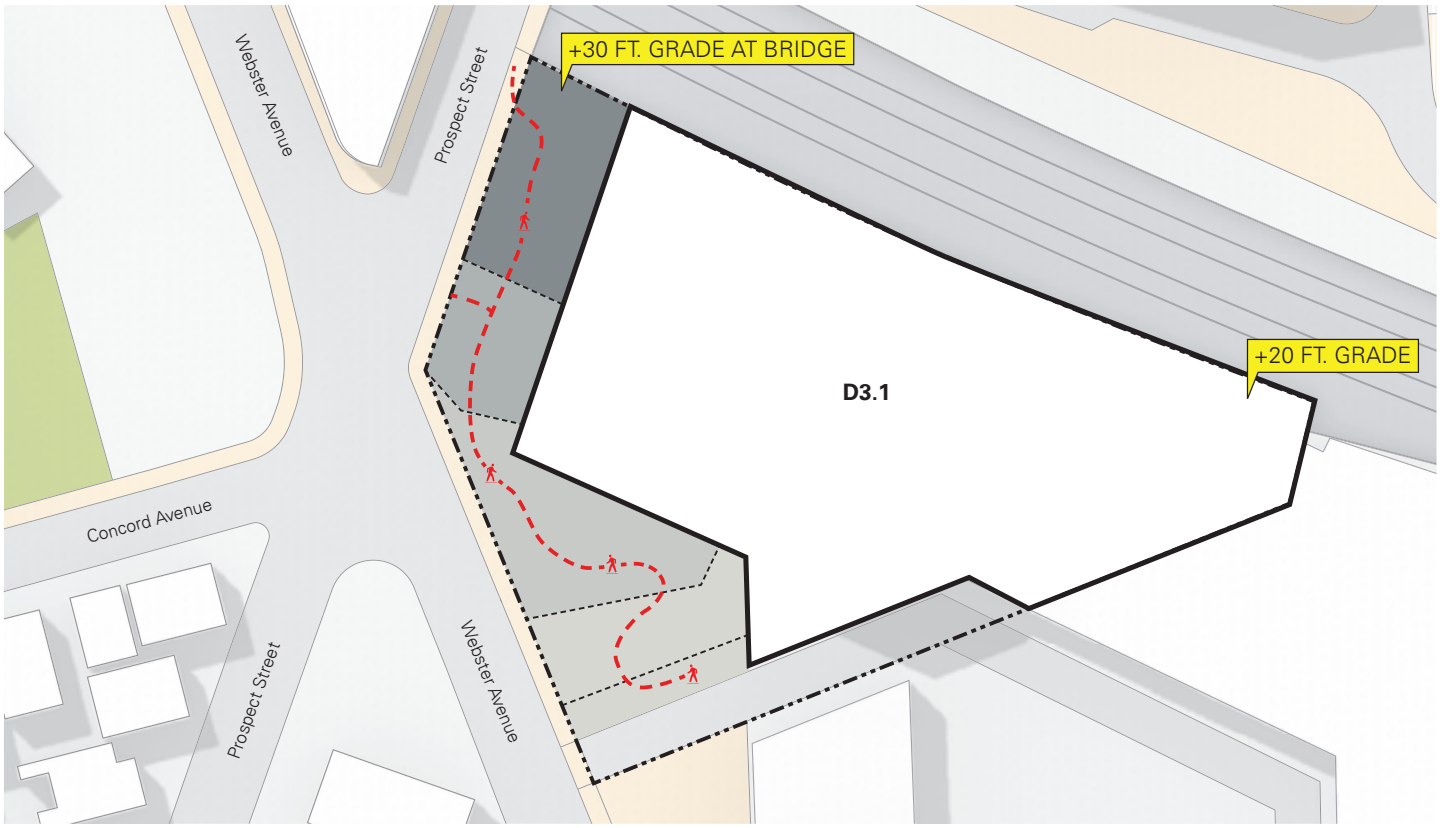


6 Phased 'D3 Block' Implementation

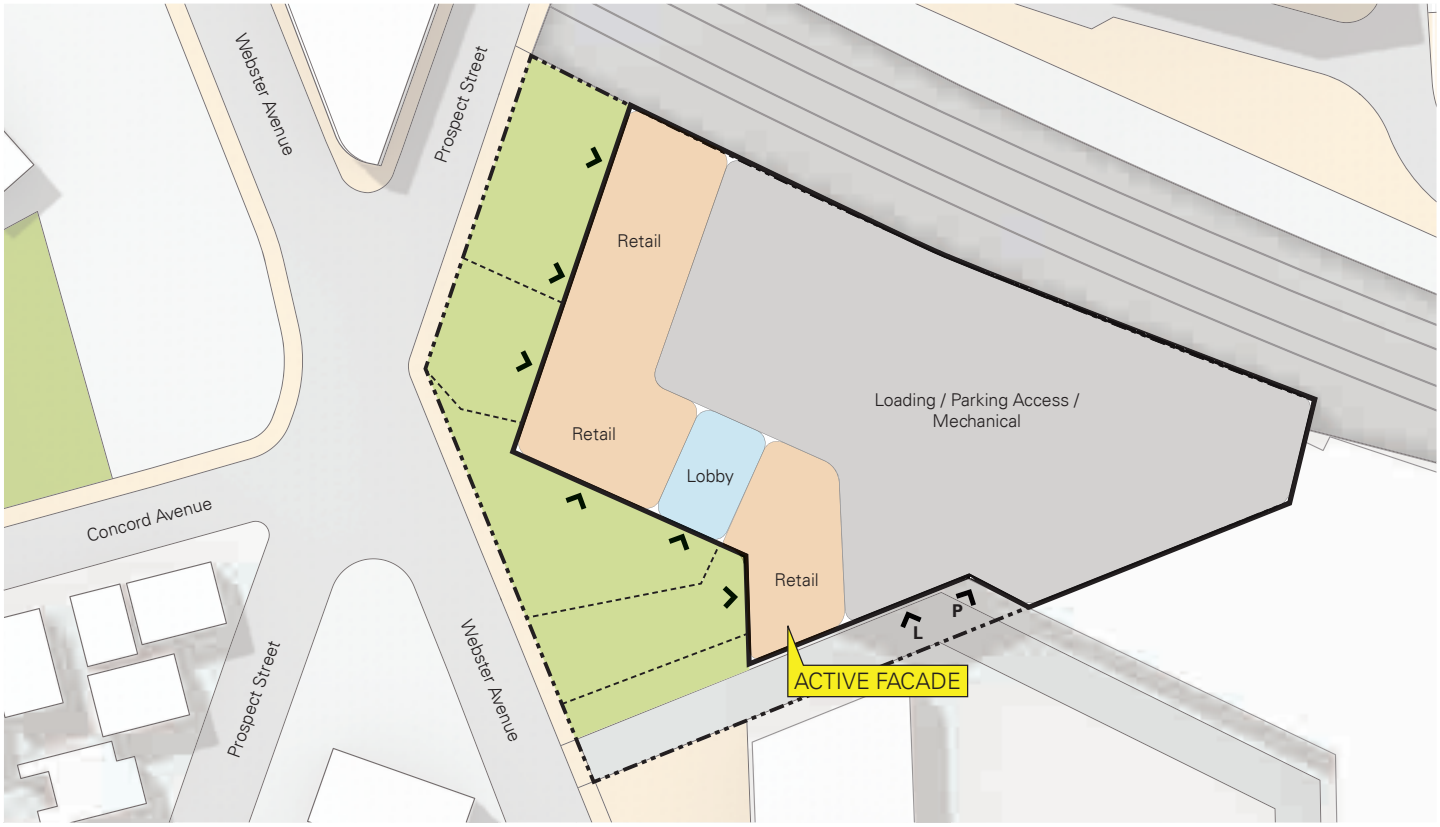
ANALYSIS & EXPLORATION | SITE CONTEXT



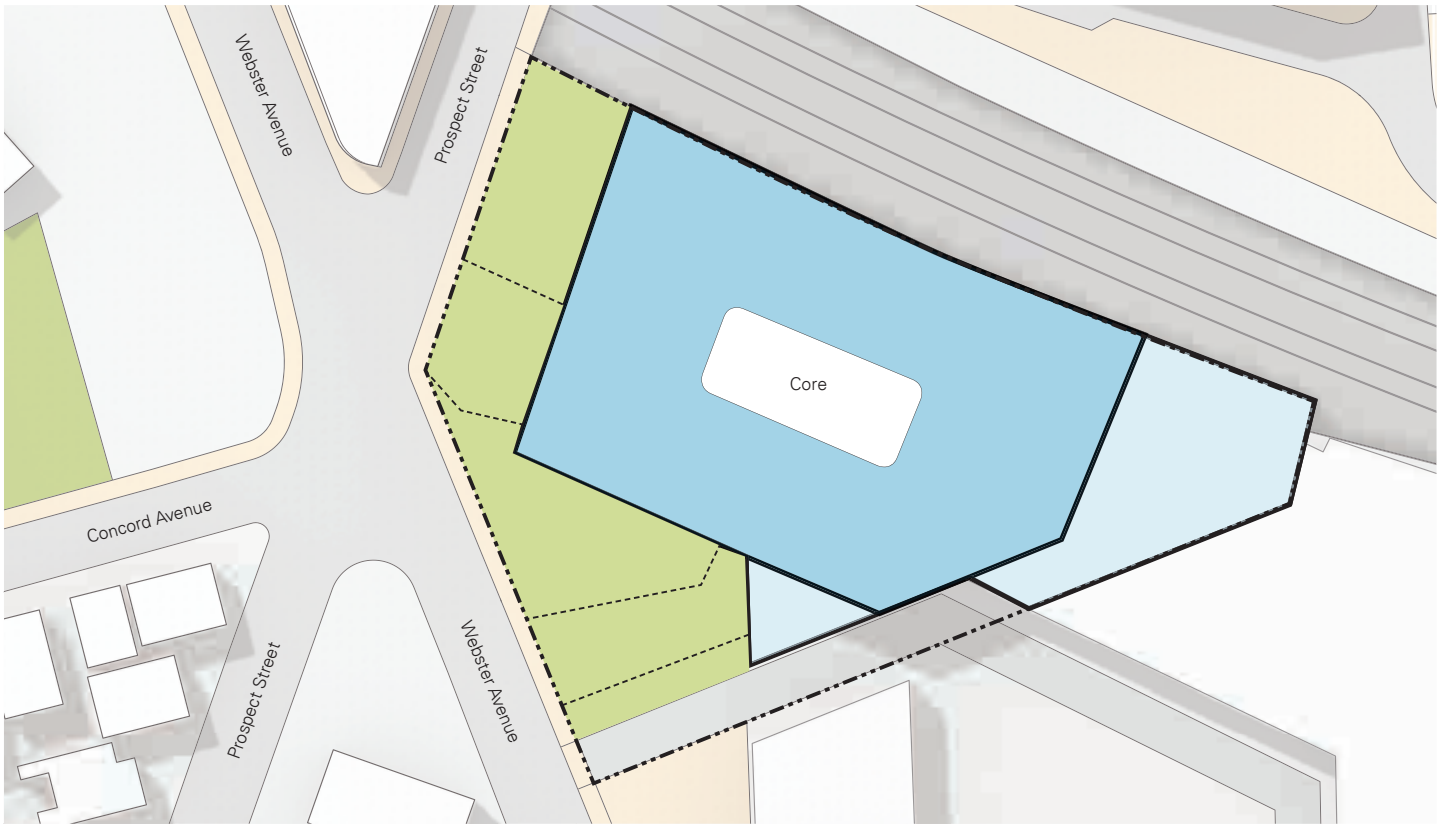
ANALYSIS & EXPLORATION | GROUND FLOOR GRADING

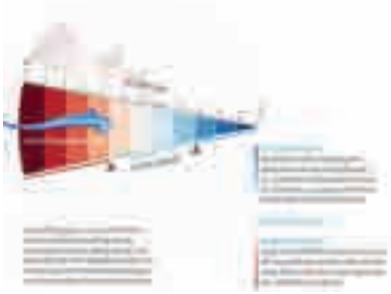


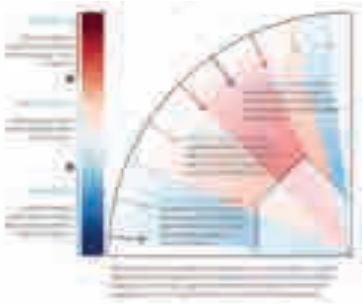
ANALYSIS & EXPLORATION | GROUND FLOOR ACTIVATION

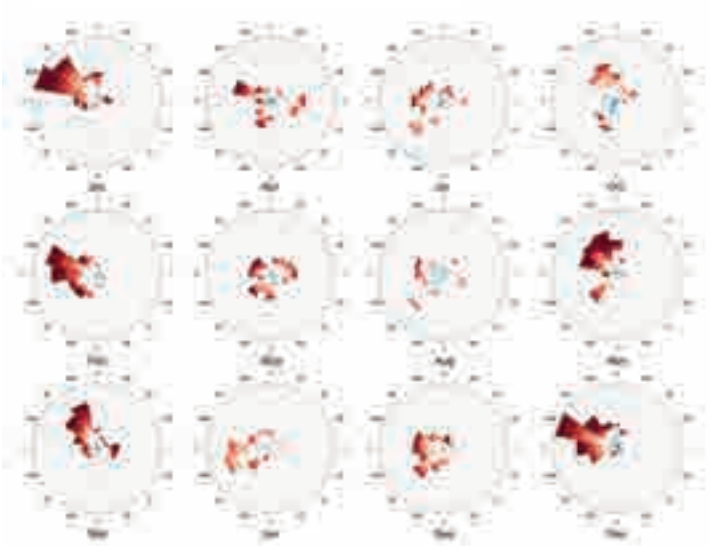


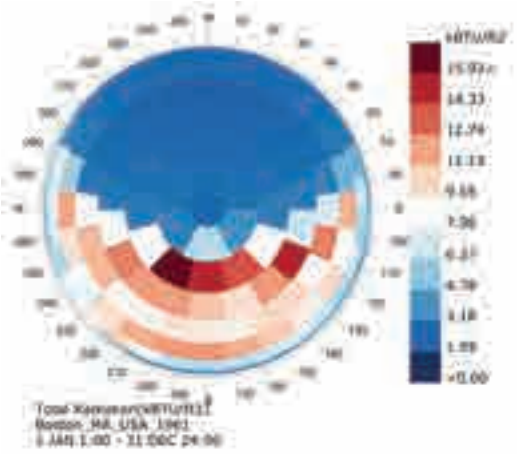
ANALYSIS & EXPLORATION | TYPICAL UPPER FLOOR











BUILDING
IDEAS & OPPORTUNITIES


RESPECT HISTORY AND COMMUNITY
BE CONTEXTUAL
TIMELESS
SUSTAINABLE
EXPERIENCES THAT CONNECT
PEDESTRIAN / TRANSIT ORIENTED
VIBRANT CIVIC SPACE
ACCESIBLE AND EQUITABLE
USQ
50 WEBSTER AVE.
(D3.1)

IDEAS & OPPORTUNITIES | CONTEXTUAL CONNECTIONS

IDEAS & OPPORTUNITIES | SITE ANALYSIS

IDEAS & OPPORTUNITIES | GROUND LEVEL ACTIVATION

- ACTIVATED BUILDING PROGRAM
- HIGH PERCENTAGE OF STOREFRONT GLAZING
- MULTIPLE ACCESIBLE PATHWAYS
- PLACES TO SIT AND SEE
- ADDED GREEN
- SHADED COMFORT

IDEAS & OPPORTUNITIES | GROUND FLOOR ACTIVATION | PRECEDENTS

GATHERING

PEOPLE WATCHING

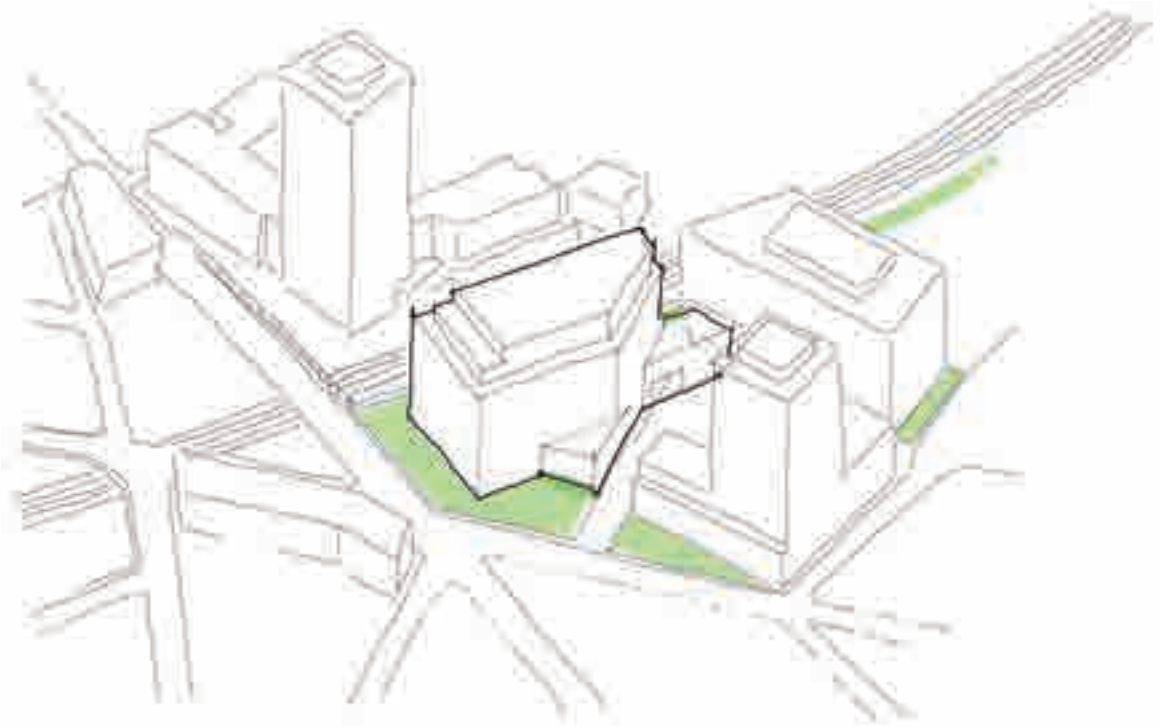
EQUITY

VERDENT

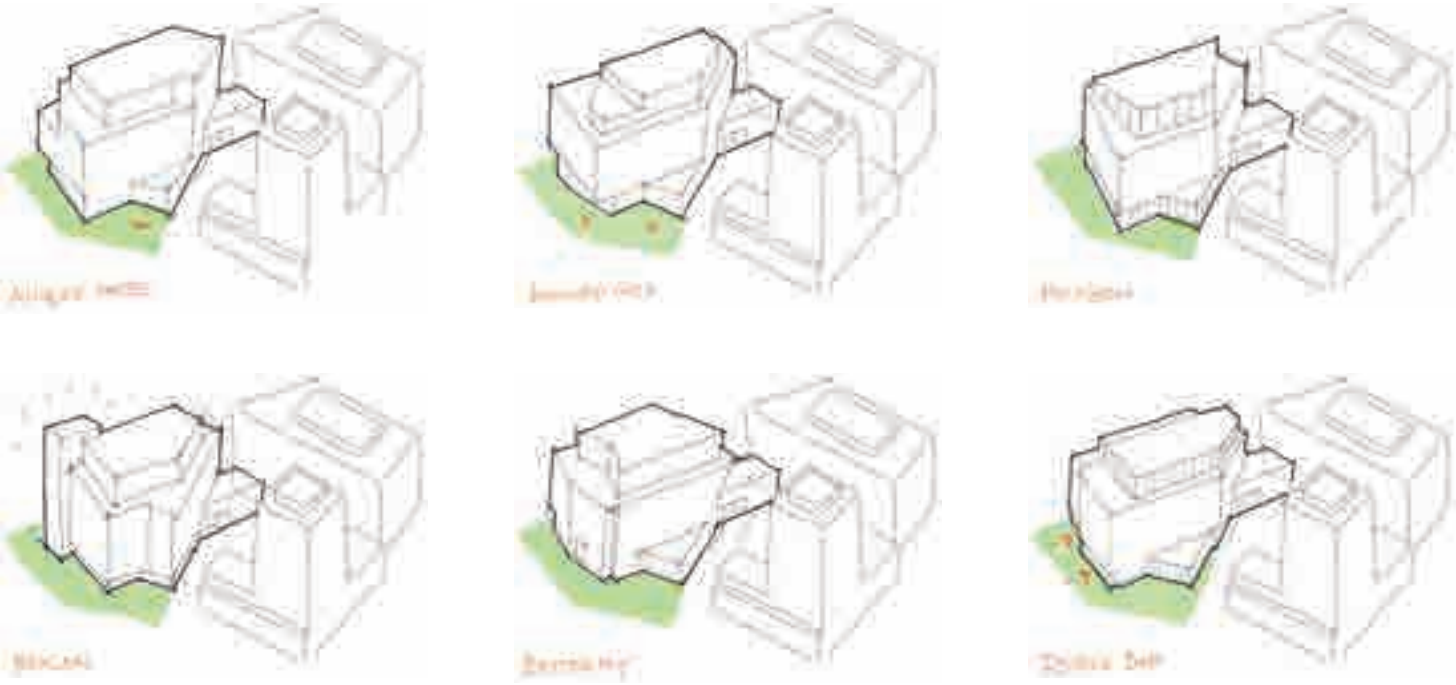
ACTIVATE

RESPITE

ANALYSIS & EXPLORATION | CDSP MASSING



ANALYSIS & EXPLORATION | INITIAL MASSING STUDIES



ANALYSIS & EXPLORATION | BUILDING PRECEDENTS



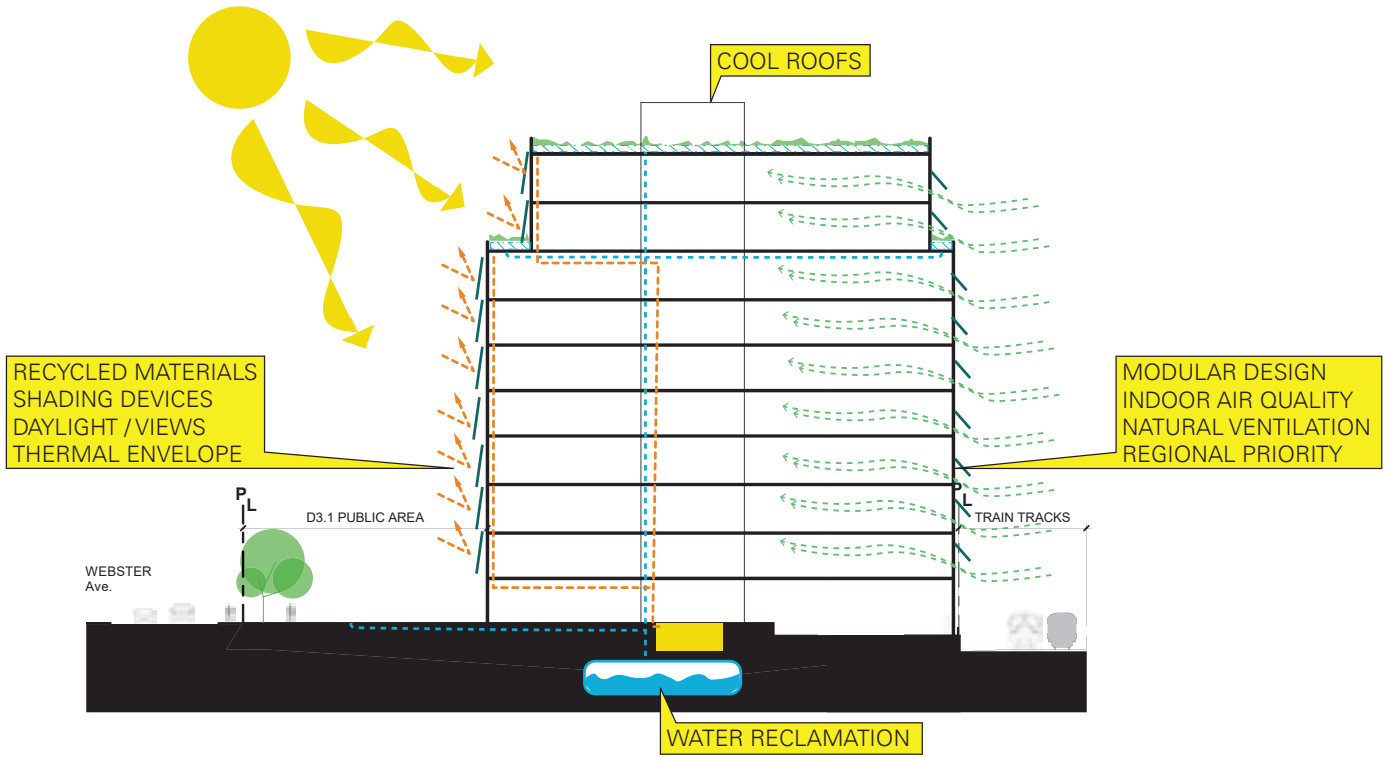



ANALYSIS & EXPLORATION | FACADE PRECEDENTS







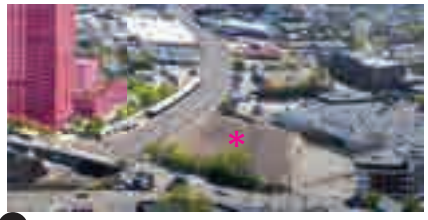

COOL ROOFS
RECYCLED MATERIALS
SHADING DEVICES
DAYLIGHT / VIEWS
THERMAL ENVELOPE
MODULAR DESIGN
INDOOR AIR QUALITY
NATURAL VENTILATION
REGIONAL PRIORITY
P L
D3.1 PUBLIC AREA
L
TRAIN TRACKS
WEBSTER
Ave.
WATER RECLAMATION

BUILDING
QUESTIONS & DISCUSSIONS

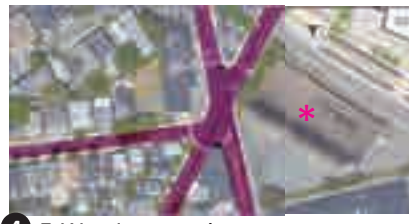
NEIGHBORHOOD MEETING #1
50 WEBSTER AVENUE | CIVIC SPACE A

Context
Analysis & Exploration
Ideas & Opportunities
Questions & Discussion

CONTEXT | NOTABLE AREA ADJACENCIES



1 D2 Projects



4 5 Way Intersection

2 Green Line Extension

5 Grade Changes

3 Commuter Rail ROW

6 Phased 'D3 Block' Implementation

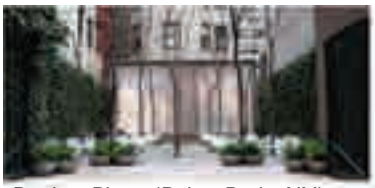
CONTEXT | EXISTING SITE PHOTOS

CONTEXT | MASTER CIVIC SPACE PLAN - D3 POTENTIAL 'TYPE' ASSIGNMENTS

Pocket Park (Stone Place Park)

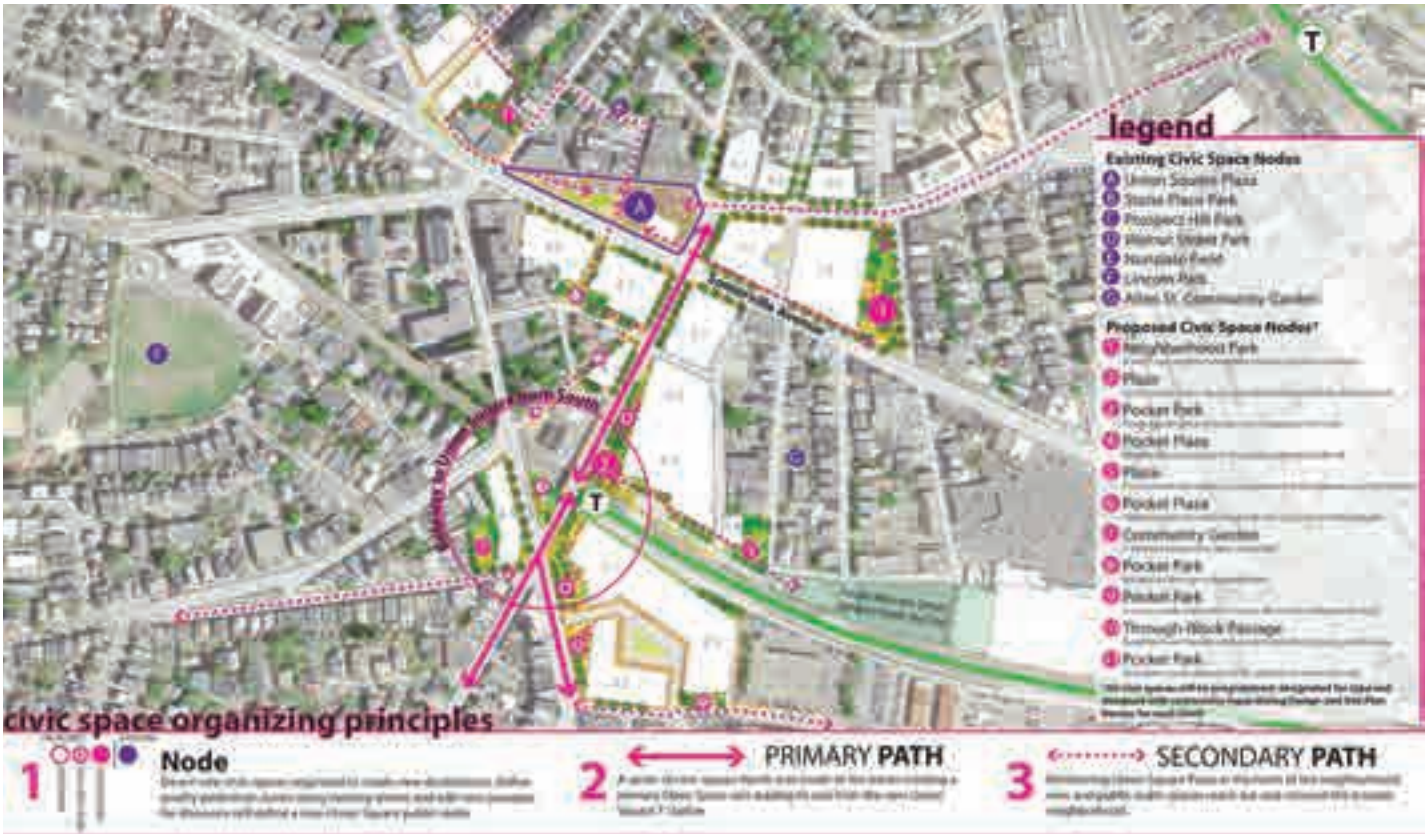
Plaza (Statue Plaza)

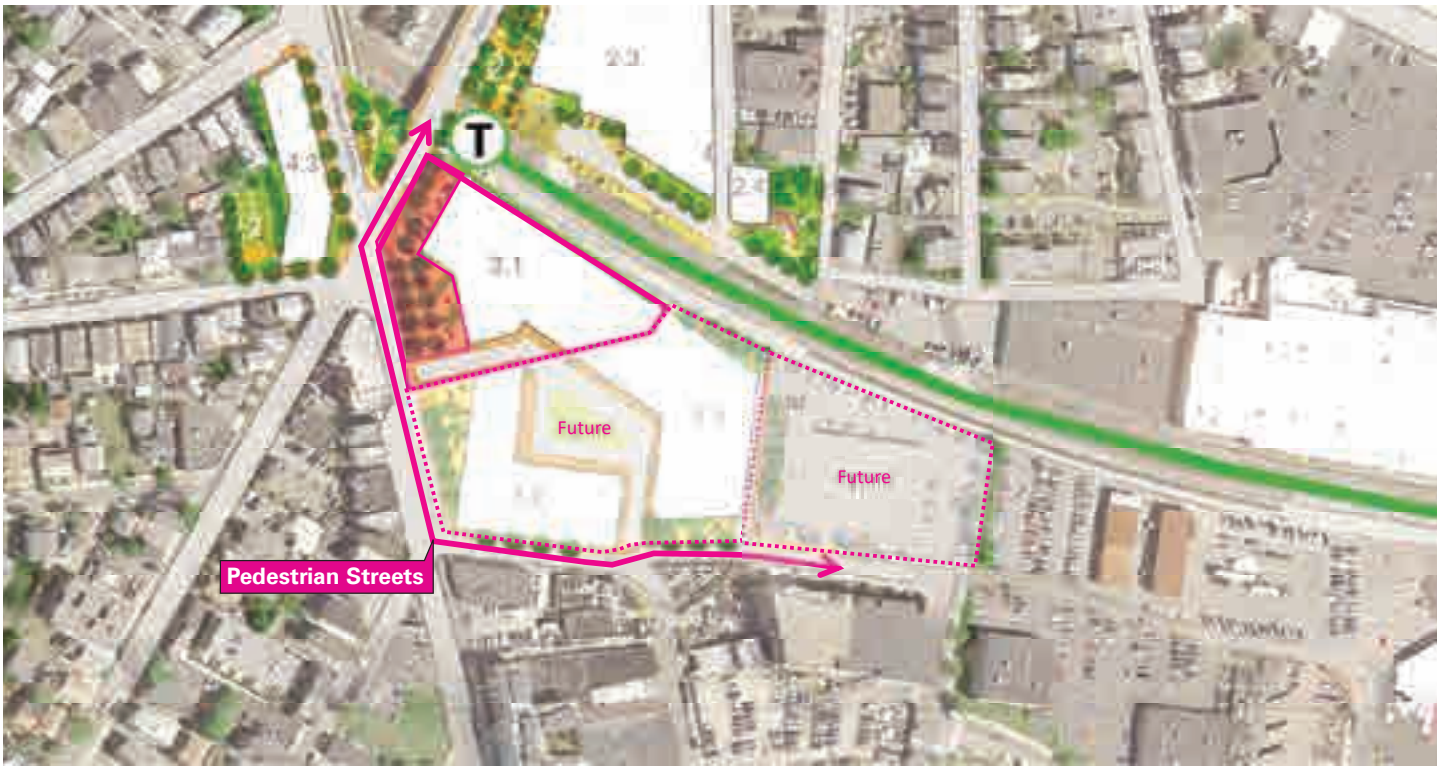
Green (Winthrop Square Park)



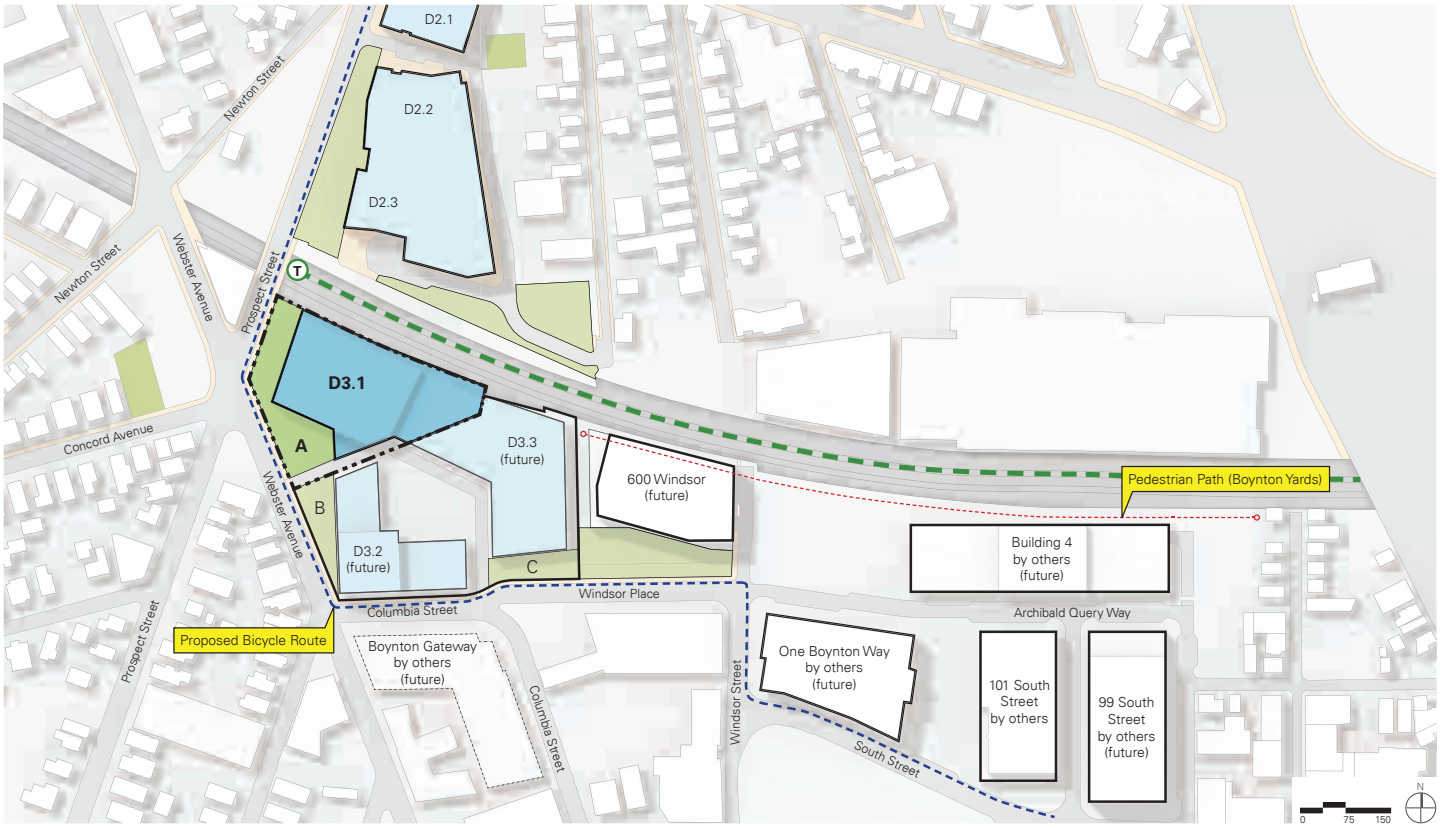
Pocket Plaza (Paley Park, NY)

CONTEXT | ORGANIZING PRINCIPLES



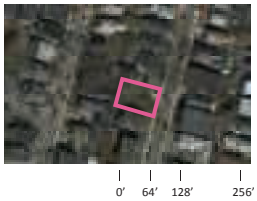


CIVIC SPACE
ANALYSIS & EXPLORATION


D2.1
D2.2
D2.3
D3.1
A
B
C
D3.2
(future)
D3.3
(future)
600 Windsor
(future)
Building 4
by others
(future)
Pedestrian Path (Boynton Yards)
Newton Street
Webster Avenue
Prospect Street
Concord Avenue
Columbia Street
Windsor Place
Archibald Query Way
Proposed Bicycle Route
Boynton Gateway
by others
(future)
One Boynton Way
by others
(future)
101 South
Street
by others
99 South
Street
by others
(future)
Windsor Street
South Street
0
75
150
N

5,000 - 6,000 SQUARE FEET

QUINCY STREET PARK, SOMERVILLE, MA
5,100 SF

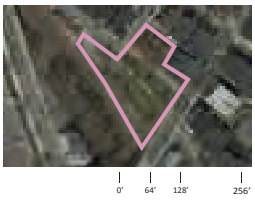


STONE PLACE PARK, SOMERVILLE, MA
6,100 SF

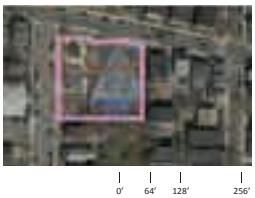
ALLEN STREET COMMUNITY GARDEN, SOMERVILLE, MA
5,100 SF

25,000 - 35,000 SF

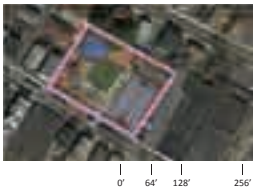
EDWARD LEATHERS PARK, SOMERVILLE, MA
32,300 SF



KELLY-MORSE PARK, SOMERVILLE, MA
27,000 SF



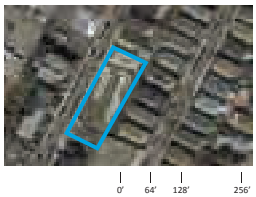
ALBION STREET PARK, SOMERVILLE, MA
30,000 SF



ANALYSIS & EXPLORATION | SCALE COMPARISON

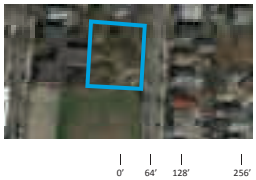
14,000 - 17,000 SF

CHUCKIE HARIRIS PARK, SOMERVILLE, MA
14,400 SF



UNION SQUARE PLAZA, SOMERVILLE, MA
16,300 SF

SOMERVILLE COMMUNITY GARDEN CENTER, SOMERVILLE, MA
15,500 SF



CIVIC SPACE = ~16,000 SF

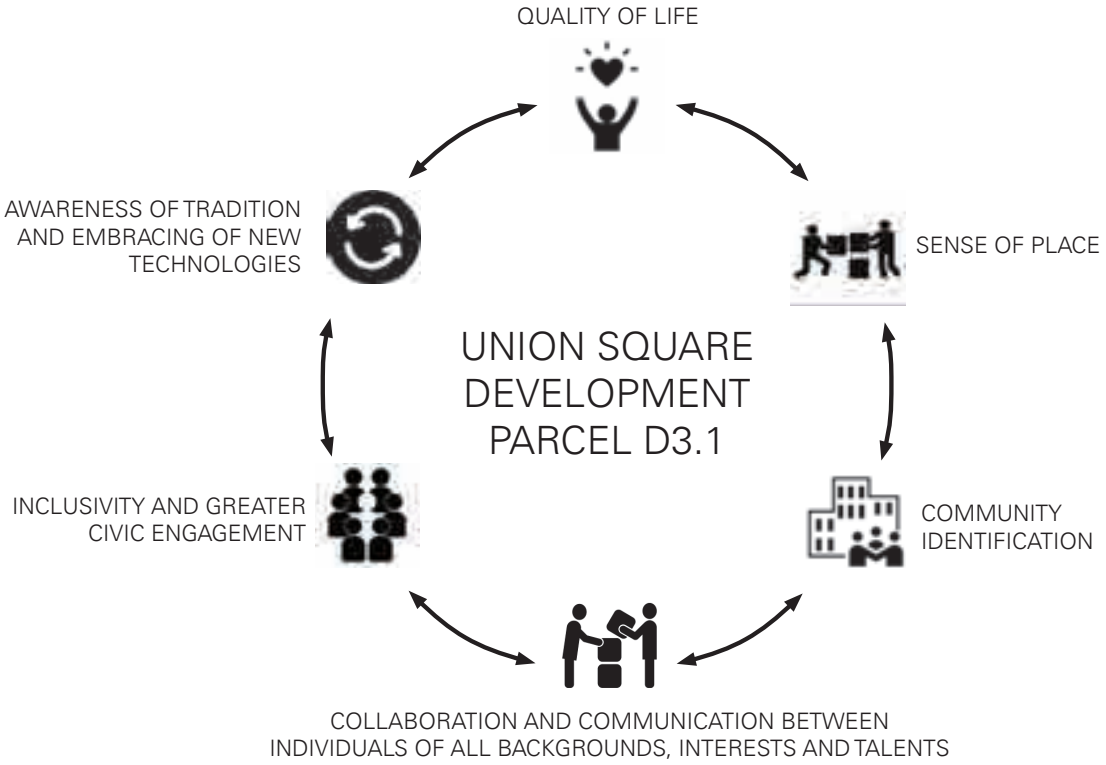
GREEN

POCKET PARK

PLAZA

PLAYSPACE

CIVIC SPACE
IDEAS & OPPORTUNITIES



SPACE TO OBSERVE / RELAX

CIRCULATION AND MOVEMENT

IDEAS & OPPORTUNITIES | VARIED INTENSITY OF USE

SPACE FOR SOLACE / SAFETY

MAINTAIN SPACE FOR FREE FLOW

IDEAS & OPPORTUNITIES | CREATE A PERFORMATIVE ENVIRONMENT

ECOLOGICAL PERFORMANCE

HUMAN PERFORMANCE

FEATURE LIGHTING ELEMENTS

INTERACTIVE WATER FEATURE

STRONG GEOMETRIES

SINUOUS PATHS

EMMERSIVE PLANTING EXPERIENCE

PROTECTIVE PLANTING EXPERIENCE

CREATING DENSE CANOPY

CAPTURING STORMWATER

REFLECT HISTORY & COMMUNITY

MAKE USEFUL CIVIC SPACE

CONNECT SPACES

OFFSET HEAT ISLAND EFFECT

SAFE AND EQUITABLE


Webster Avenue
Prospect Street
Retail
Retail
Lobby
Retail
Loading / Parking Access / Mechanical
Concord Avenue
Prospect Street
Webster Avenue


BACK OF HOUSE
RETAIL
LOBBY
RETAIL
PROSPECT
WEBSTER

CIVIC SPACE
QUESTIONS & DISCUSSIONS

PUBLIC PROCESS + DESIGN REVIEW MATERIALS

B. DESIGN REVIEW COMMITTEE PRESENTATIONS

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50 WEBSTER AVENUE (D3.1)

URBAN DESIGN COMMISION SUBMISSION 10/19/21

BUILDING

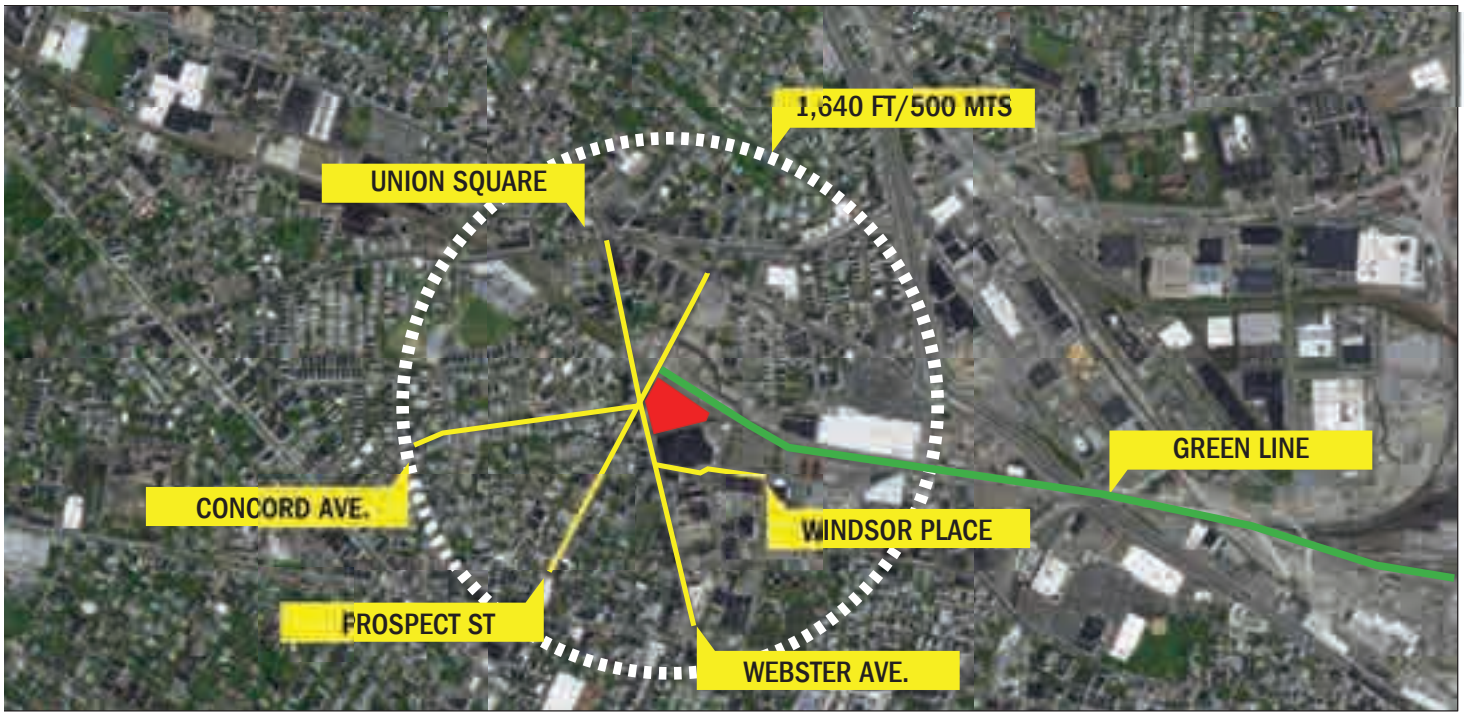
M/ SGA US2

PROJECT TEAM

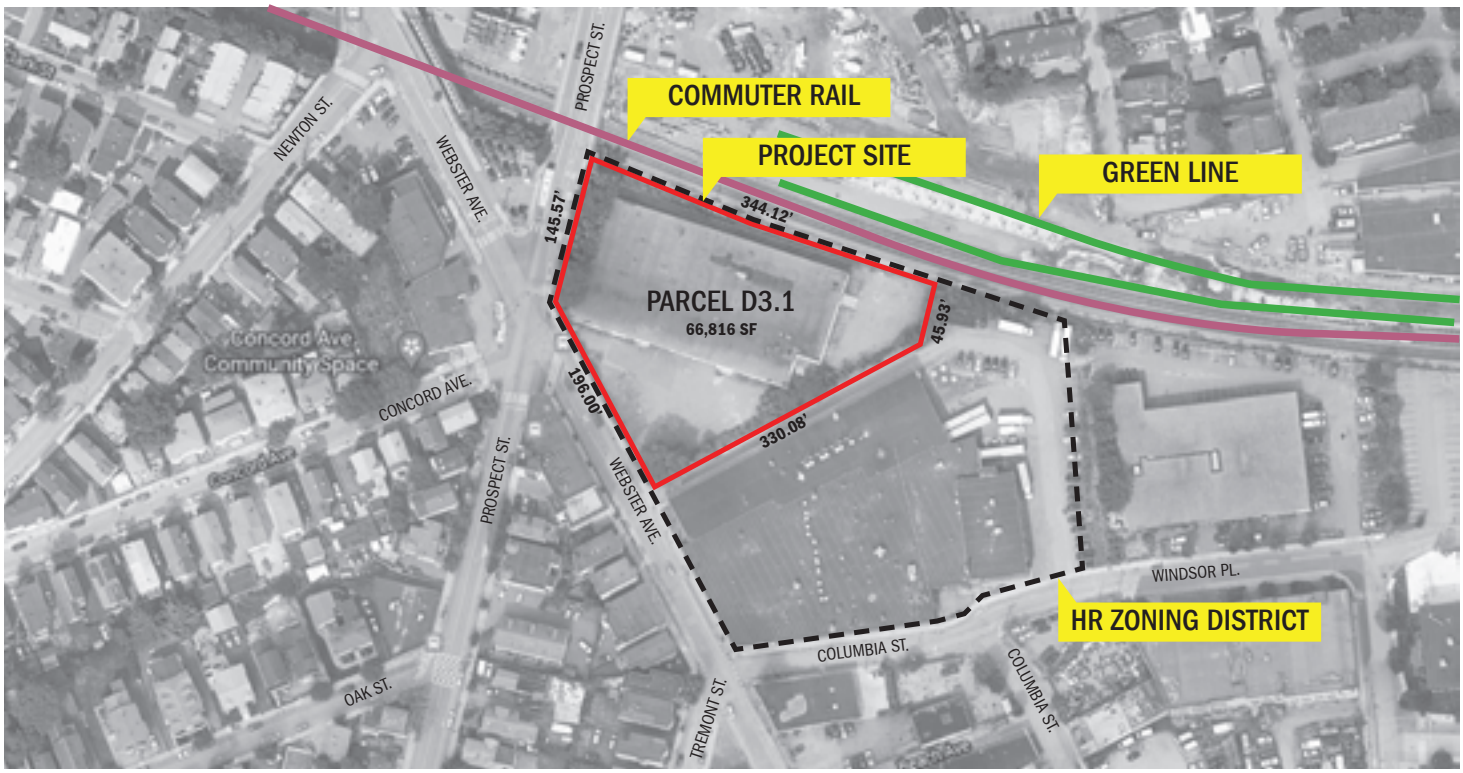
US2	US2
SGA	SGA
MARVEL DESIGN	MARVEL
HOWARD STEIN HUDSON	
MCNAMARA SALVIA	
AHA	AHA
dbHMS	dbHMS

SITE

SITE ANALYSIS | REGIONAL CONTEXT



SITE ANALYSIS | LOT

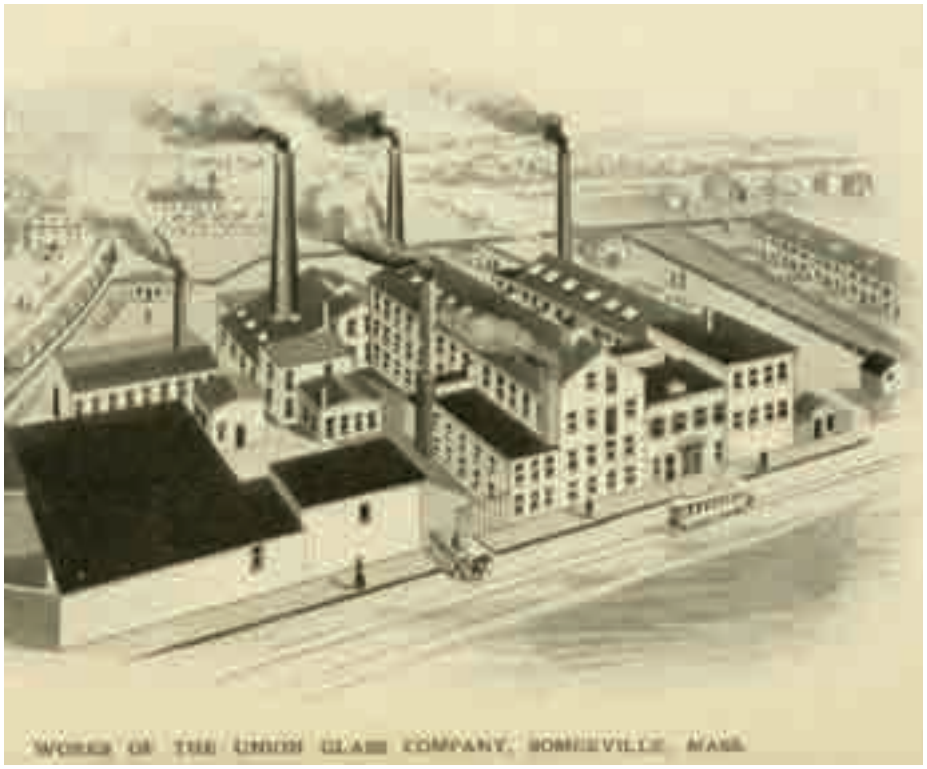


SITE ANALYSIS | LOT HISTORY

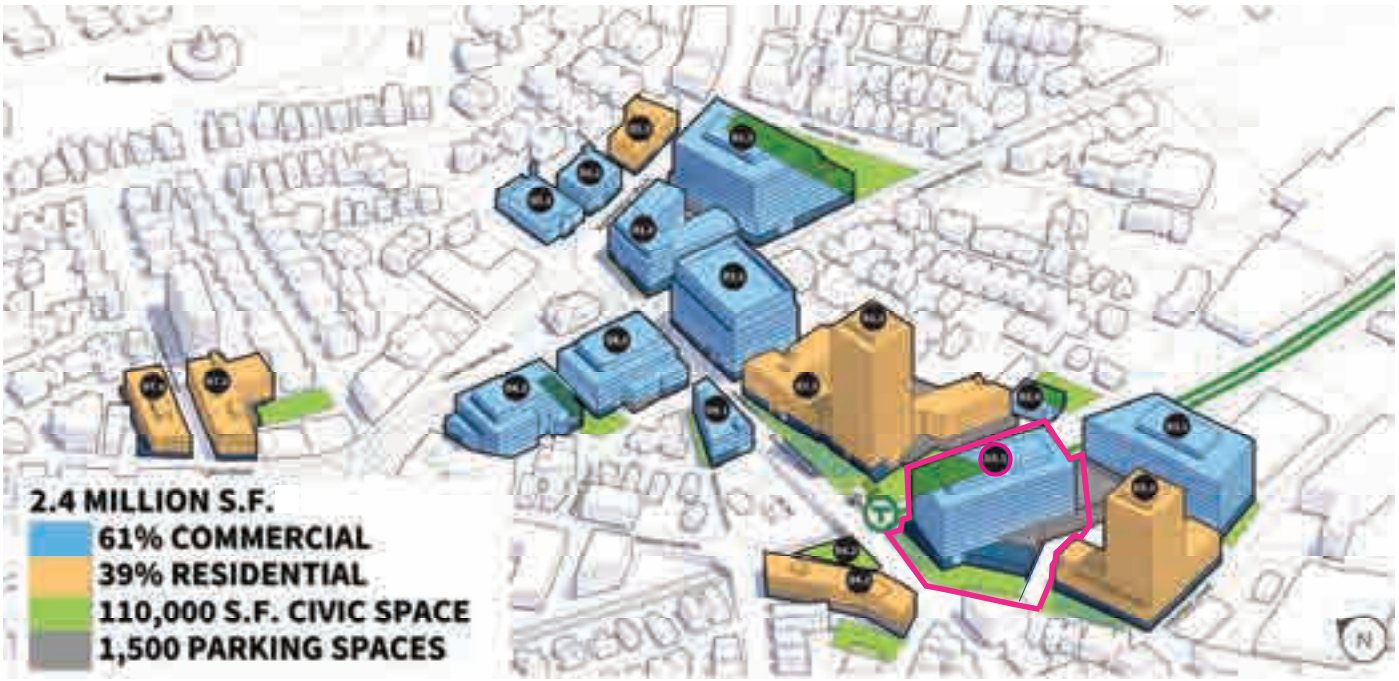
SPECIAL THANKS TO THE

SITE ANALYSIS | LOT HISTORY

SPECIAL THANKS TO THE SOMERVILLE MUSEUM history · art · culture

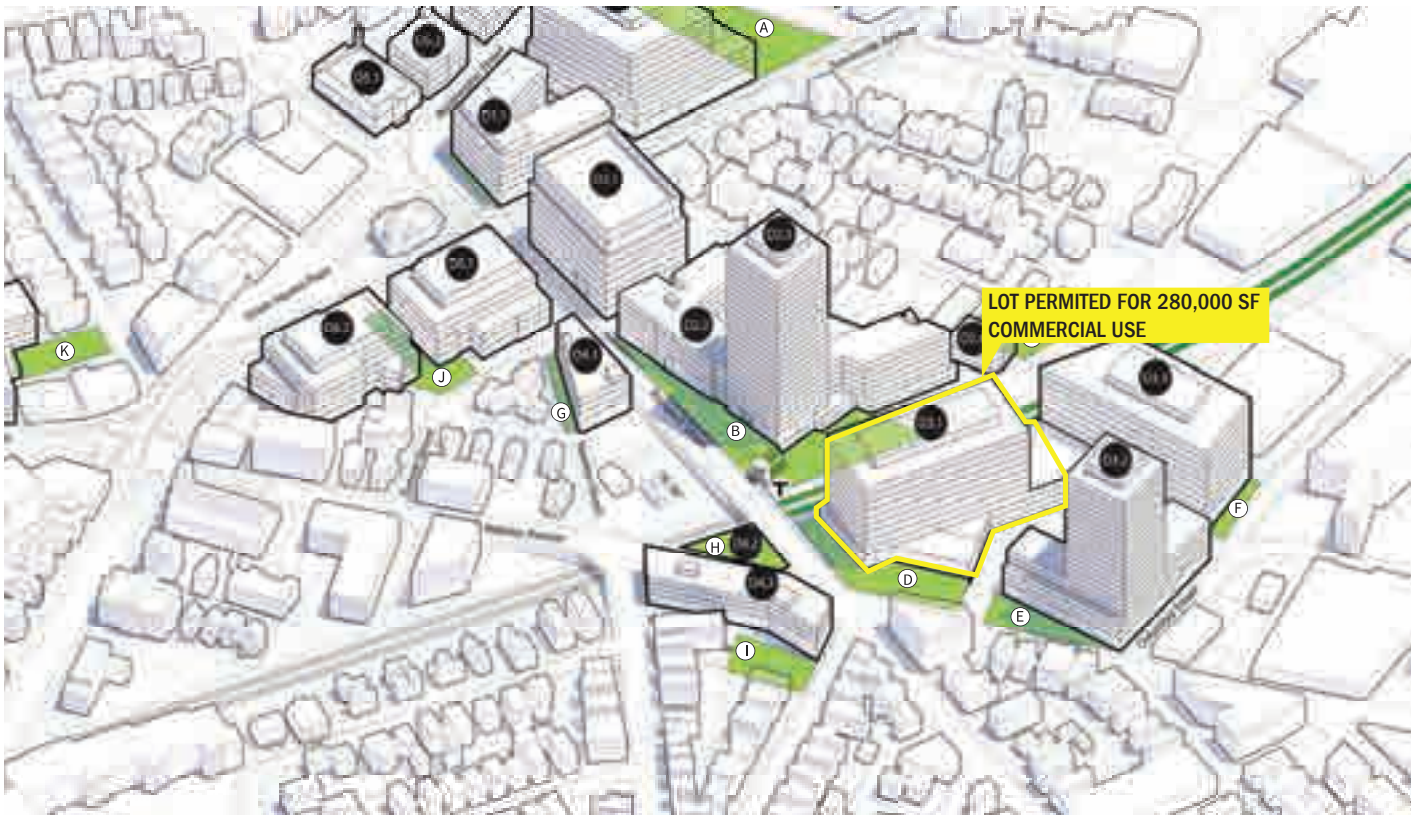


SITE ANALYSIS | COORDINATED LOT DEVELOPMENT SPECIAL PERMIT (CDSP),



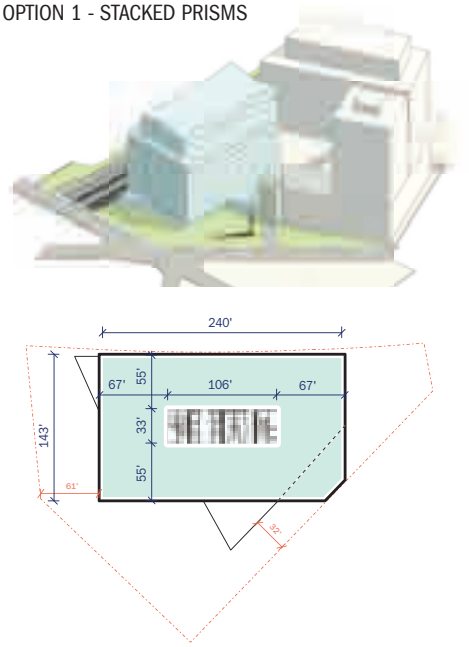
BUILDING MASS DEVELOPMENT

BUILDING MASS DEVELOPMENT | BASE CDSP MASSING



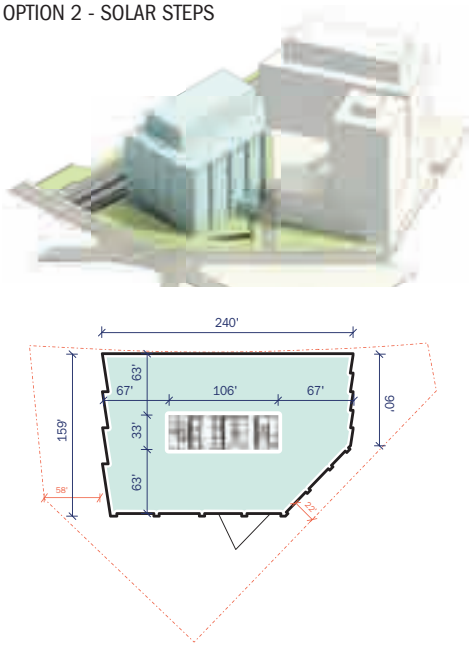
BUILDING MASS DEVELOPMENT | INITIAL CONCEPTS

OPTION 1 - STACKED PRISMS



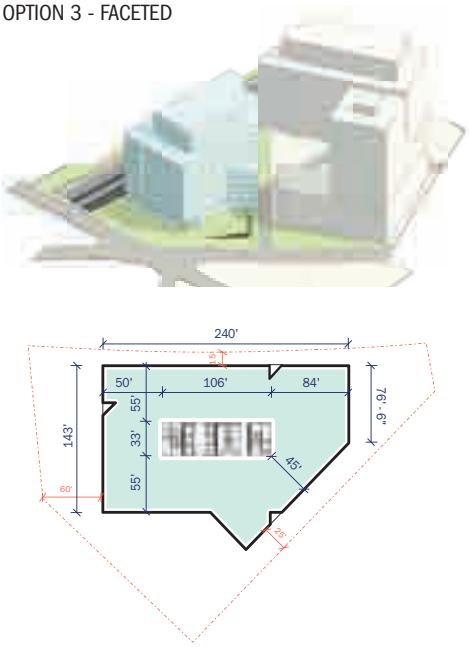
RECOGNIZES THE VARIOUS SITE ANGLES AND POSSIBLE AREAS WITHIN THE SITE.

OPTION 2 - SOLAR STEPS



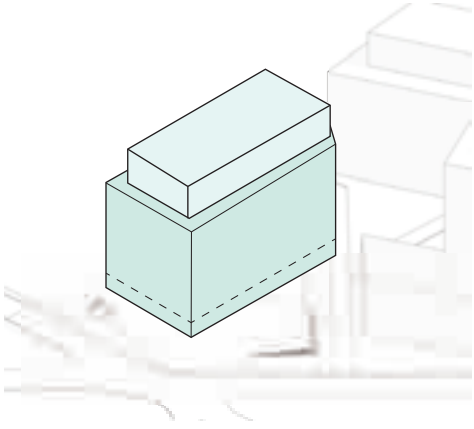
ARTICULATIONS AND SETBACKS ARE DRIVEN BY PASSIVE SOLAR PROTECTION STRATEGIES

OPTION 3 - FACETED



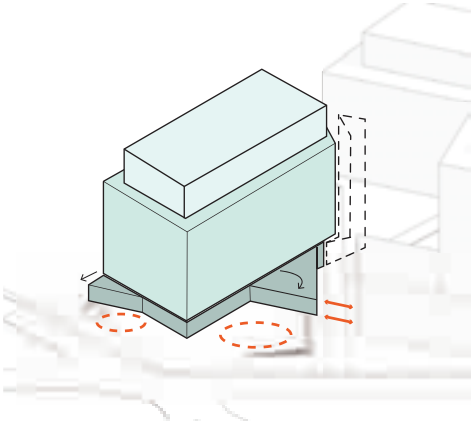
FORM DRIVEN BY CIVIC SPACE BENEFITS. GROUND LEVEL NOTCH AT SOUTWEST CORNER INCREASES CONNECTION AND WIDTH OF CIVIC SPACE. SOUTH WING OPENS AT LOWER LEVELS TO DEFINE PLAZA EDGE AND ENTRY. VERTICAL CUTS REDUCE VISUAL BULK.

BUILDING MASS DEVELOPMENT | OPTION 1 - STACKED PRISMS



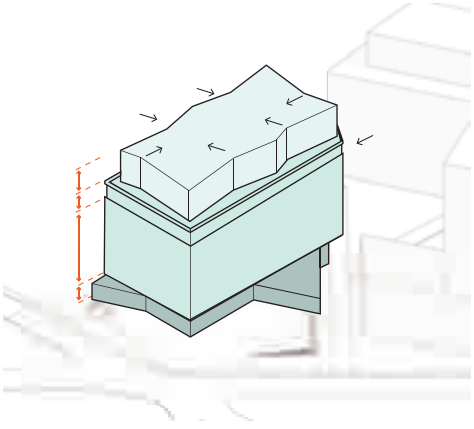
STEP 01

MAXIMIZED MASS ON-SITE.
RECTANGULAR FORM BROKEN DOWN TO A COMMERCIAL BASE, AN EFFICIENT MIDDLE , AND A SIMPLE TOP.



STEP 02

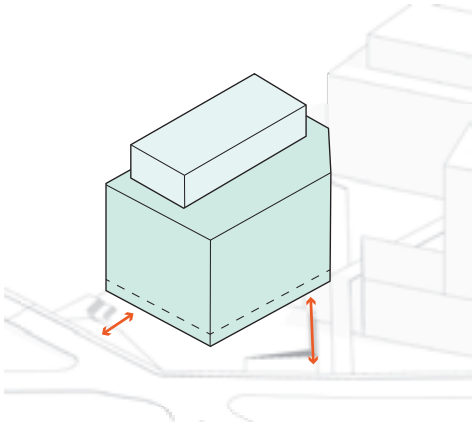
ARTICULATION OF BASE TO BOTH RECOGNIZE THE VARIOUS SITE ANGLES PROPOSED BY THE MASTERPLAN DIAGRAMS AND DEFINE POSSIBLE PUBLIC AREAS WITHIN THE SITE.



STEP 03

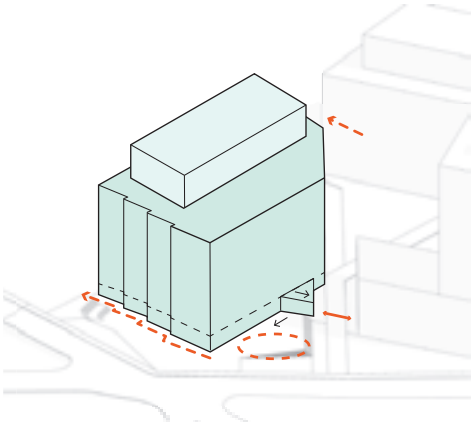
SET OF SETBACKS AND MOVES ON PENTHOUSE LEVELS TO RELATE TO BASE FORM AND PROMOTE A DISTINCTIVE IDENTITY.

BUILDING MASS DEVELOPMENT | OPTION 2 - SOLAR STEPS



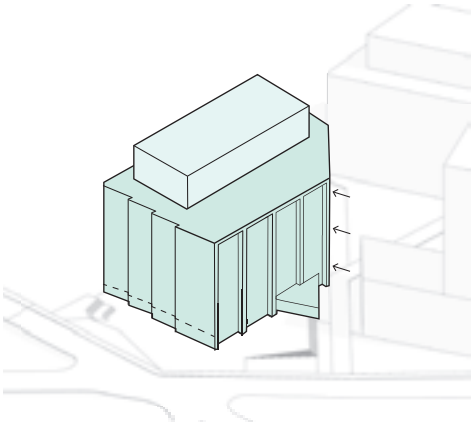
STEP 01

CHAMFERED MASS FOLLOWING THE PROPERTY LINE ANGLES ON EAST AND SOUTH FACADES BROKEN DOWN TO A BASE MIDDLE TOP CONDITION AND INITIAL SETBACKS FOR PLAZA AS PER THE MASTERPLAN DIAGRAM.



STEP 02

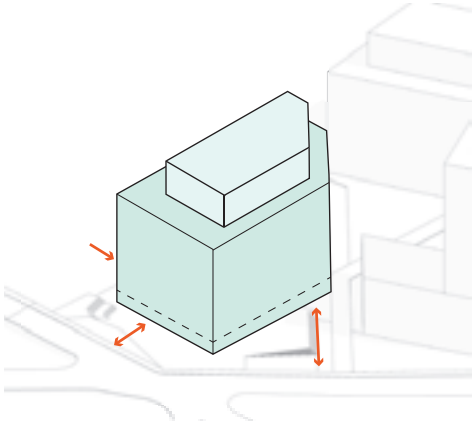
ARTICULATION OF MASS TO PROVIDE PASSIVE SOLAR PROTECTION ON EAST AND SOUTH FACADES. PROJECTING SOUTH EAST WING RECOGNIZES D3.2 BUILDING FACE AND DEFINES CIVIC EDGE.



STEP 03

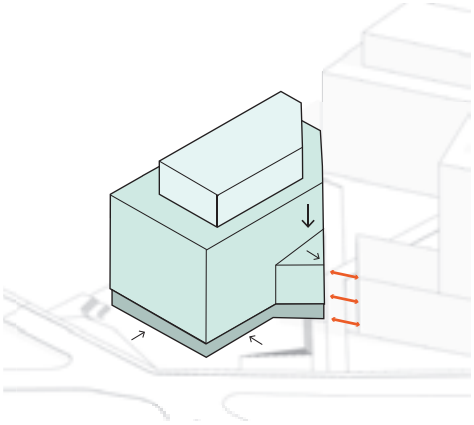
INDENTED SOUTH FAÇADE TO PROVIDE SHADE AND FURTHER DEVELOP CONCEPT OF PASSIVE SOLAR PROTECTION .

BUILDING MASS DEVELOPMENT | OPTION 3 - FACETED PREFERRED



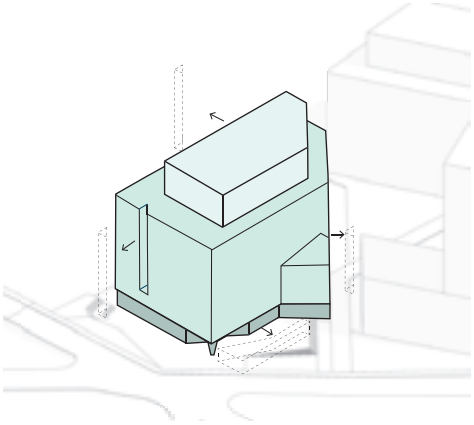
STEP 01

CHAMFERED MASS FOLLOWING THE PROPERTY LINE ANGLES ON EAST AND SOUTH FACADES BROKEN DOWN TO A BASE MIDDLE TOP CONDITION AND INITIAL SETBACKS FOR PLAZA AS PER THE MASTERPLAN DIAGRAM.



STEP 02

GROUND LEVEL DEFINITION PROMOTES RETAIL ACTIVATION.SOUTH EAST WING PROVIDES DEFINITION FOR CIVIC SPACE AND BUILDING ENTRY.



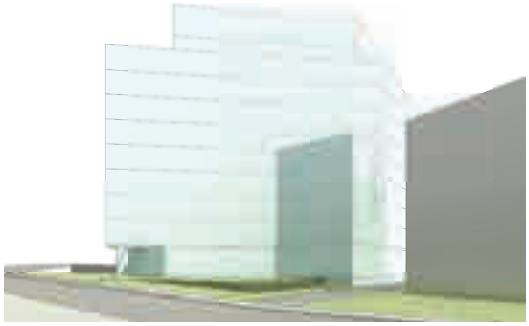
STEP 03

SOUTH EAST GROUND FLOOR NOTCH INCREASES CIVIC SPACE AND CIRCULATION. ACCENTUATION OF VERTICAL CUTS REDUCE VISUAL BULK AND ESTABLISHES OPPORTUNITIES.

BUILDING MASS DEVELOPMENT | OPTION 3 - FACETED PREFERRED

NORTH & WEST FACADES FROM PROSPECT ST. BRIDGE

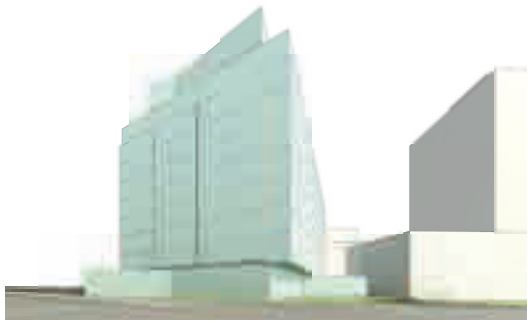
WEST & SOUTH FACADES FROM PROSPECT ST. AND WEBSTER AVE.



SOUTH & EAST FACADES FROM WEBSTER AVE.

BUILDING MASS DEVELOPMENT | OPTION SUMMARY

OPTION 1 - STACKED PRISMS



OPTION 2 - SOLAR STEPS

PREFERRED

OPTION 3 - FACETED

FACADE DEVELOPMENT

FACADE DESIGN | INSPIRATION

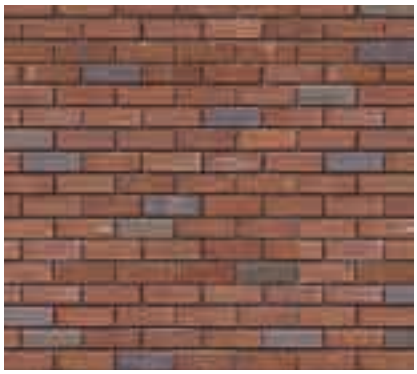
SITE'S INDUSTRIAL AND GLASS MAKING HISTORY

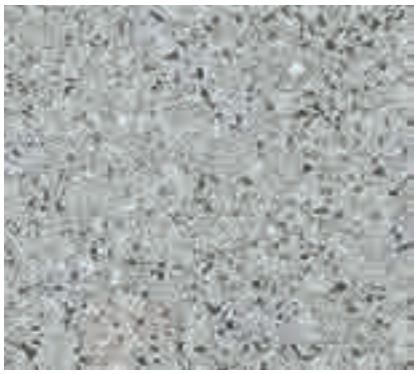
TECHNOLOGY AND INNOVATION

ACTIVE GROUND FLOOR

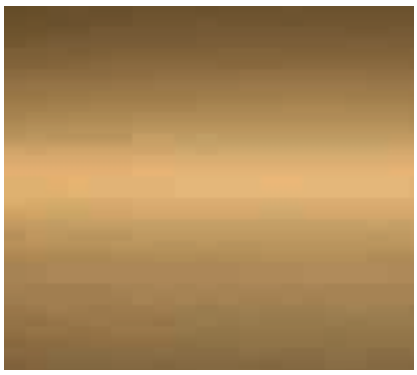
SOLAR ORIENTATION AND SUSTAINABILITY

FACADE DESIGN | MATERIALS PALETTE - PREFERRED OPTION


BRICK


GFRC


CONCRETE


BRONZE


GLASS


GLASS

FACADE DESIGN | INITIAL FACADE CONCEPTS

OPTION 1 - CANT

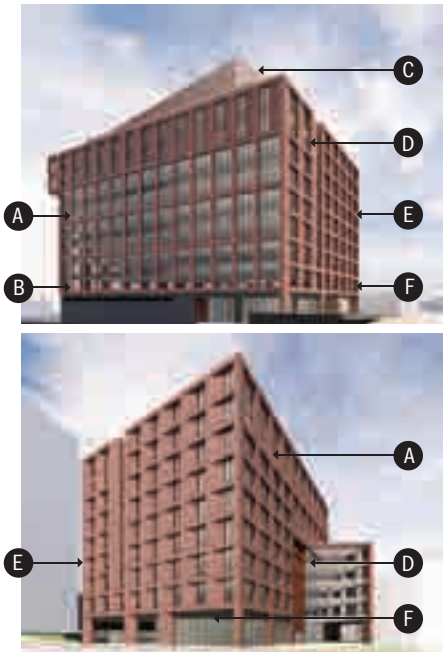
OPTION 2 - PLATE

OPTION 3 - GRID

FACADE DESIGN | MATERIALS

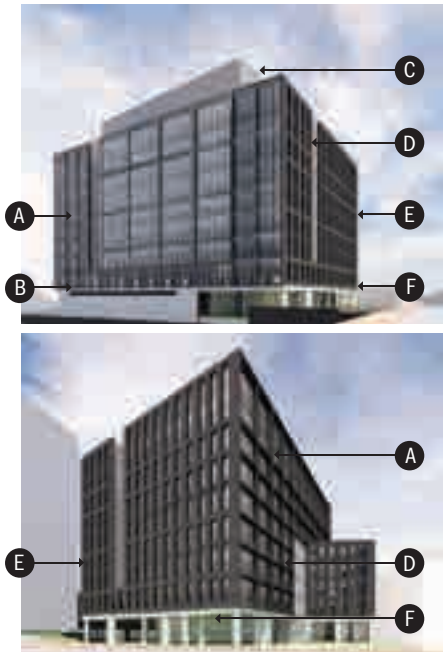
PREFERRED

OPTION 1 - CANT



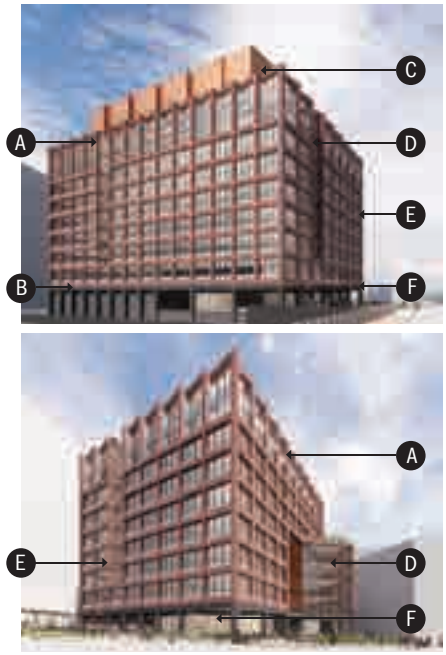
A - UNITIZED GLAZING SYSTEM WITH SPANDREL PANELS
B - PIGMENTED CONCRETE
C - ALUMINUM METAL PANEL WITH INTEGRATED LOUVERS
D - CURTAIN WALL SYSTEM WITH VERTICAL LOUVERS
E - BRICK WITH WINDOW WALL
F - STOREFRONT SYSTEM

OPTION 2 - PLATE



A - UNITIZED GLAZING SYSTEM WITH SPANDREL PANELS
B - PIGMENTED CONCRETE
C - ALUMINUM METAL PANEL WITH INTEGRATED LOUVERS
D - CURTAIN WALL SYSTEM WITH VERTICAL LOUVERS
E - GFRC CLADDING WITH PUNCHED WINDOWS/WINDOW WALL
F - STOREFRONT SYSTEM

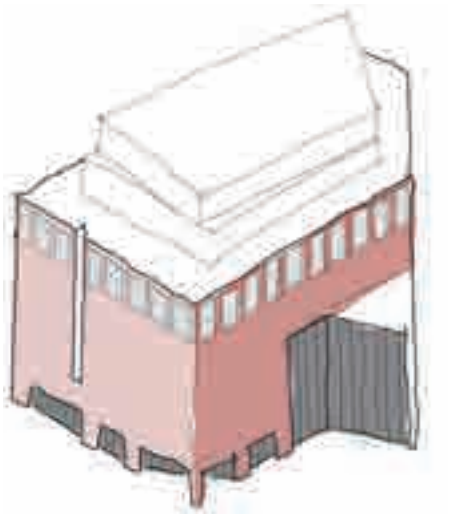
OPTION 3 - GRID



A - UNITIZED GLAZING SYSTEM WITH SPANDREL PANELS
B - STONE CLADDING BASE
C - ALUMINUM METAL PANEL WITH INTEGRATED LOUVERS
D - CURTAIN WALL SYSTEM WITH VERTICAL LOUVERS
E - BRICK WITH WINDOW WALL
F - STOREFRONT SYSTEM

FACADE DESIGN | DESIGN GUIDELINES - CONCEPT DIAGRAMS

OPTION 1



BASE - MIDDLE - TOP DEFINITION

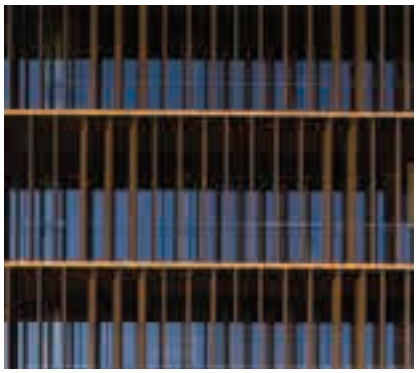
VERTICAL AND HORIZONTAL ARTICULATION

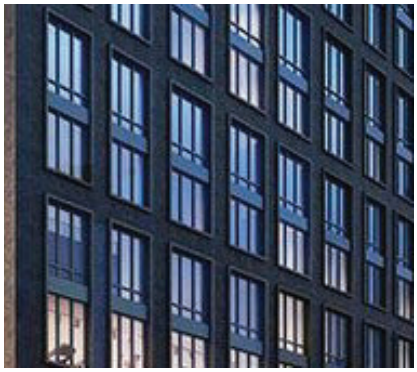
FACADE DESIGN | OPTION 1 - CANT

NORTH & WEST FACADE FROM PROSPECT ST. BRIDGE

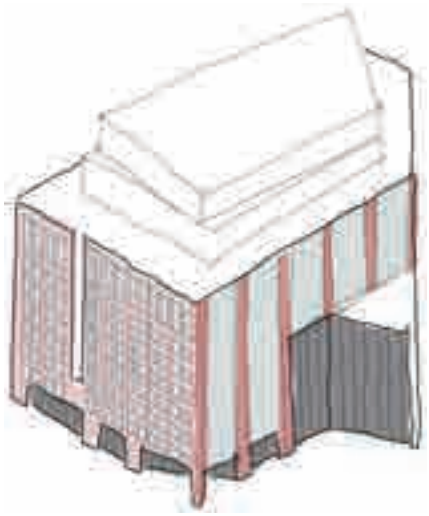
WEST & SOUTH FACADES FROM PROSPECT ST. AND WEBSTER AVE.

FACADE DESIGN | PRECEDENTS | OPTION 1 - CANT





OPTION 2



BASE - MIDDLE - TOP DEFINITION

VERTICAL AND HORIZONTAL ARTICULATION

NORTH & WEST FACADE FROM PROSPECT ST. BRIDGE

WEST & SOUTH FACADES FROM PROSPECT ST. AND WEBSTER AVE.

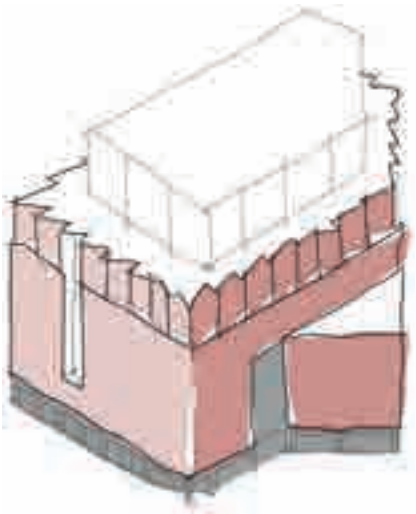
FACADE DESIGN | PRECEDENTS | OPTION 2 - PLATES





FACADE DESIGN | DESIGN GUIDELINES - CONCEPT DIAGRAMS

OPTION 3



BASE - MIDDLE - TOP DEFINITION

VERTICAL AND HORIZONTAL ARTICULATION

FACADE DESIGN | OPTION 3 - GRID PREFERRED

NORTH & WEST FACADE FROM PROSPECT ST. BRIDGE

FACADE DESIGN | OPTION 3 - GRID PREFERRED

WEST FACADE FROM PROSPECT ST.

FACADE DESIGN | OPTION 3 - GRID PREFERRED

WEST & SOUTH FACADES FROM PROSPECT ST. AND WEBSTER AVE.

FACADE DESIGN | OPTION 3 - GRID PREFERRED

SOUTH & EAST FACADES FROM WEBSTER AVE.

FACADE DESIGN | OPTION 3 - GRID PREFERRED

EAST FACADE FROM PARCEL D3.2

FACADE DESIGN | OPTION 3 - GRID PREFERRED

NORTH & EAST FACADES FROM GREEN LINE

FACADE DESIGN | PRECEDENTS | OPTION 3 - GRID PREFERRED





FACADE DESIGN | OPTION 3 - GRID-GROUND LEVEL

FACADE DESIGN | OPTION 3 - GRID PREFERRED

LOBBY ENTRANCE FROM CIVIC SPACE

FACADE DESIGN | OPTION 3 - GRID PREFERRED

WEST FACADE FROM PROSPECT ST. OVERLOOK

FACADE DESIGN | OPTION 3 - GRID PREFERRED

WEST FACADE FROM PROSPECT ST.

FACADE DESIGN | OPTION 3 - GRID PREFERRED

SOUTH RETAIL FROM CIVIC SPACE

50 WEBSTER AVENUE (D3.1)

URBAN DESIGN COMMISION SUBMISSION #2 11/23/21

BUILDING

PROJECT TEAM

US2	
SGA	
MARVEL DESIGN	
HOWARD STEIN HUDSON	
MCNAMARA SALVIA	
AHA	
dbHMS	

PREVIOUS DESIGN | OCTOBER 26, 2021

NORTH & WEST FACADE FROM PROSPECT ST. BRIDGE

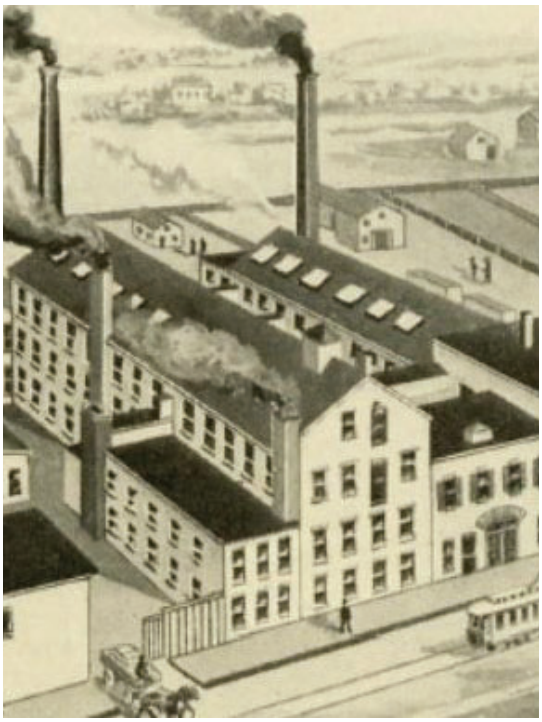
*MBTA BRIDGE GUARDRAIL OMMITED FOR CLARITY

WHAT WE HEARD SUMMARY:

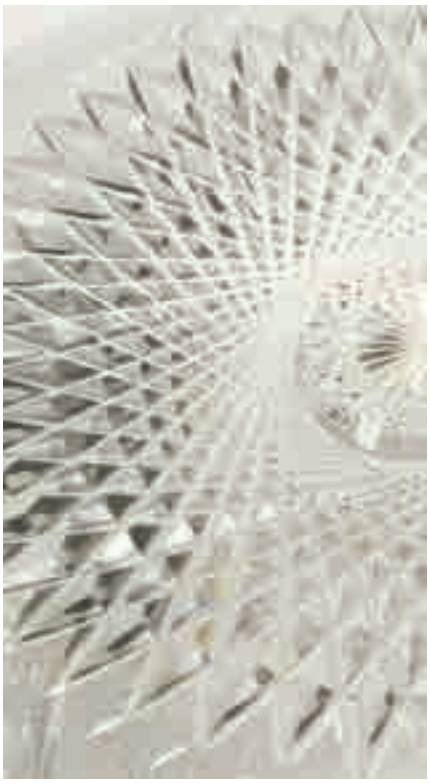
Faceted Grid Scheme
Skin and massing approved

- **Massing** - serrated top edge creates a unique and exciting skyline
- **Materiality** - opportunity for modern innovative ways to use or be inspired by brick
- **Materiality** - opportunity for an innovative use of glass
- **Massing** - appreciate south facade angular projection creating distinctive identity and entry
- **Massing** - northwest corner is an important viewshed
- **Skin -** north facade: consider creating a prominent moment
- **Massing** - southwest corner undercut at grade seems small/hidden not special enough
- **Site** - show parcel boundaries on an lot and block plan
- **Site** - indicate site design for areas to immediate north and east of building

PROPOSED DESIGN | INDUSTRIAL INSPIRATION



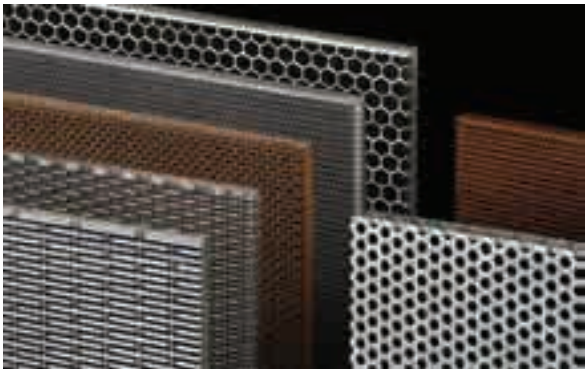
PROPOSED DESIGN | CUT GLASS INSPIRATION



PROPOSED DESIGN | CONCRETE PRECEDENTS

PROPOSED DESIGN | METAL PRECEDENTS

PROPOSED DESIGN | GLASS PRECEDENTS



*MATERIAL IMAGE SHOWN FOR INSPIRATION.
ACTUAL PRODUCT MAY BE SIMILAR OR VARY.

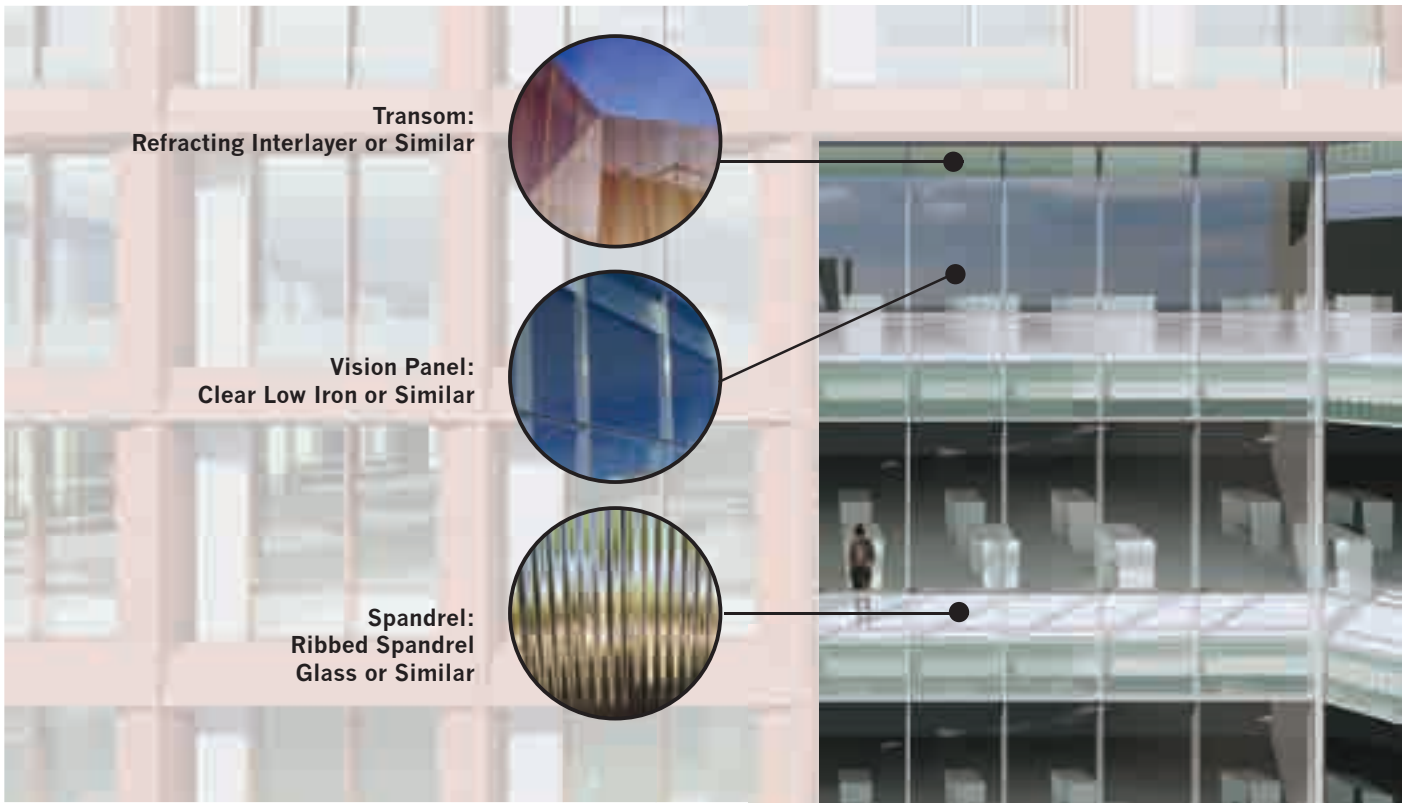
PREVIOUS DESIGN | FACADE DETAIL

WHAT WE HEARD:

- **Materiality** - opportunity for modern innovative ways to use or be inspired by brick
- **Materiality** - opportunity for an innovative use of glass

PROPOSED DESIGN | FACADE DETAIL

PROPOSED DESIGN | FACADE DETAIL



PREVIOUS DESIGN

WEST & SOUTH FACADES FROM PROSPECT ST. AND WEBSTER AVE.

WHAT WE HEARD:

- **Massing** - serrated top edge creates a unique and exciting skyline
- **Massing** - appreciate south facade angular projection creating distinctive identity and entry
- **Massing** - southwest corner undercut at grade seems small/hidden not special enough

PROPOSED DESIGN

WEST & SOUTH FACADES FROM PROSPECT ST. AND WEBSTER AVE.

PROPOSED DESIGN

SOUTHWEST CORNER DETAIL VIEW

PROPOSED DESIGN

SOUTH & EAST FACADES FROM WEBSTER AVE.

PROPOSED DESIGN

LOBBY ENTRANCE FROM CIVIC SPACE

PREVIOUS DESIGN

NORTH & WEST FACADE FROM PROSPECT ST. BRIDGE

WHAT WE HEARD:

- **Massing** - Northwest corner is an important viewshed
- **Skin -** North Facade: consider creating a prominent moment

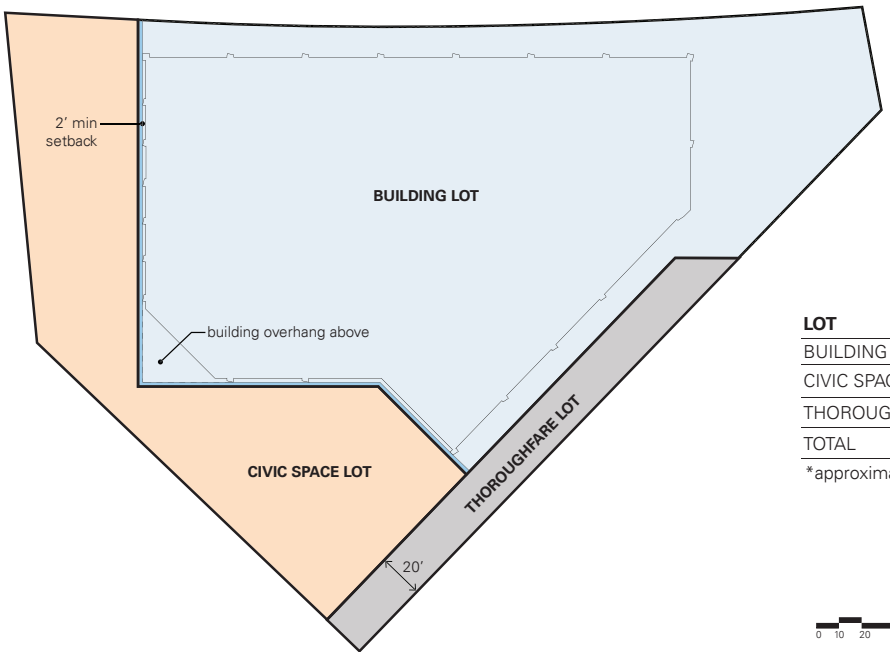
PROPOSED DESIGN

NORTH & WEST FACADE FROM PROSPECT ST. BRIDGE

PROPOSED DESIGN

WEST FACADE FROM PROSPECT ST.

PROPOSED DESIGN | LOT PLAN



WHAT WE HEARD:

- **Site** - show parcel boundaries on an lot and block plan

LOT	AREA
BUILDING LOT	45,718 SF*
CIVIC SPACE LOT	16,000 SF*
THOROUGHFARE LOT	4,602 SF
TOTAL	66,320 SF

*approximate lot areas

PROPOSED DESIGN- SITE PLAN

WHAT WE HEARD:

- **Site** - indicate site design for areas to immediate north and east of building

PUBLIC PROCESS + DESIGN REVIEW MATERIALS

C. NEIGHBORHOOD MEETING #2

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50 WEBSTER AVE. BUILDING (D3.1)

NEIGHBORHOOD MEETING #2
1/12/2022

AGENDA

Announcements

Project Team
Public Process Review

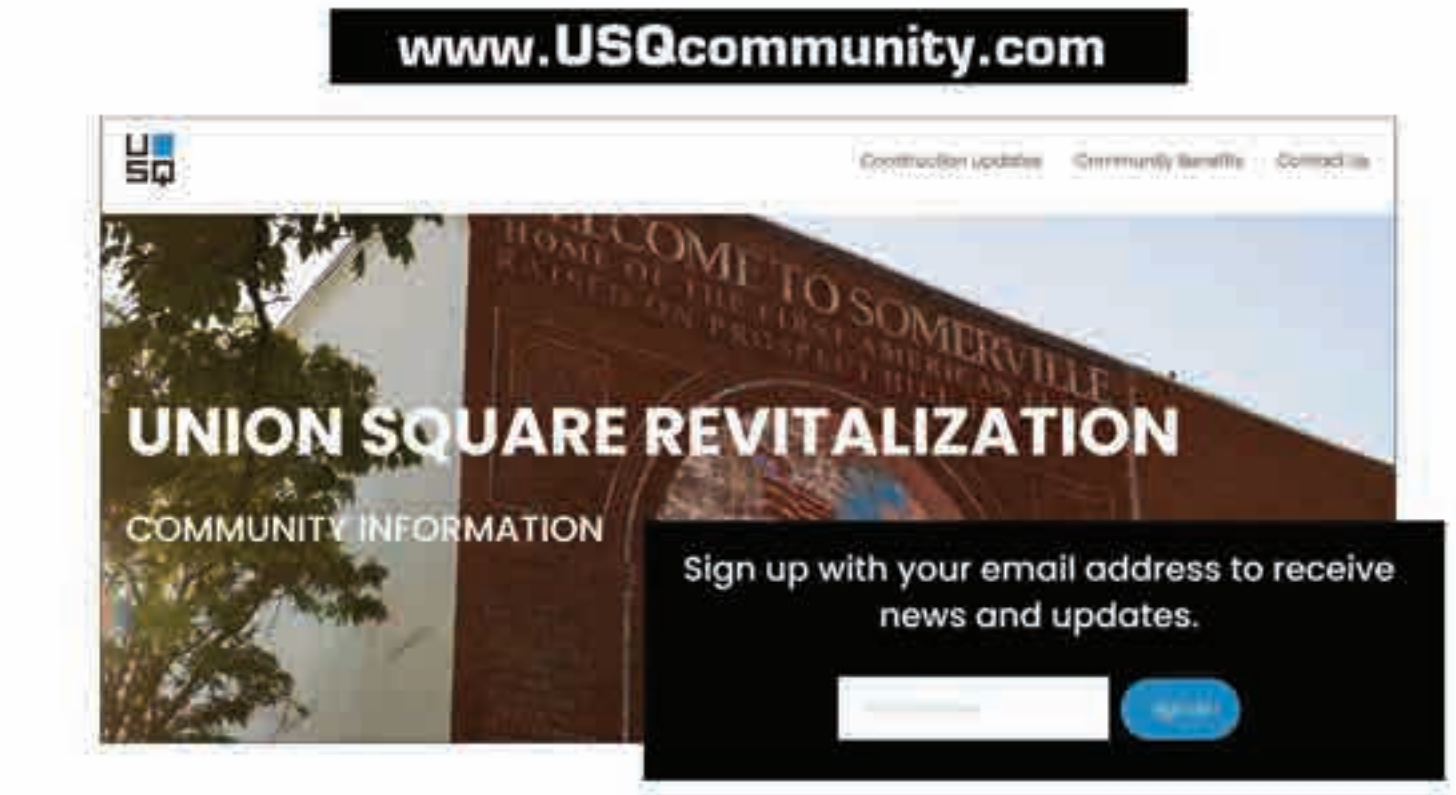
Building Meeting 2

- Neighborhood Meeting 1 Recap
- Urban Design Commission Design and Direction 1-2
- Neighborhood Meeting 2 Update
- Questions & Discussion

Civic Space Meeting 2

- Neighborhood Meeting 1 Recap
- Urban Design Commission Design and Direction 1-2
- Neighborhood Meeting 2 Update
- Questions & Discussion

ANNOUNCEMENTS | UNION SQUARE REVITALIZATION: NEW WEBSITE FOR COMMUNITY UPDATES



ANNOUNCEMENTS | MEETING DETAILS

Note: **This Live Meeting is being recorded**

By participating in this meeting, you agree that your communications are being recorded, including Q&A that may arise. The purpose of this recording is to save and archive this presentation for those who are unable to participate in the live presentation.

Zoom Tips

Here are some tips on using Zoom for first-time users. Your controls should be available at the bottom of your screen. Clicking on these symbols activates different features.

Mute/unmute (you will remain muted until the Q&A begins)
If you joined the meeting by dialing from your phone, dial *6 to mute/unmute yourself

Turn video on/off

The Q&A feature may be used to provide written questions and comments during the presentation and questions and answer session

Raise hand to ask for audio permission at the end of presentation
If you joined the meeting by dialing in from your phone, dial *9 to raise your hand

Virtual Meeting Etiquette

- We want to ensure that this conversation is a pleasant experience for all, and that all community members are comfortable sharing their comments, questions, and feedback.
- Participants will be muted during the presentation to avoid background noise. However, you will be able to unmute yourself and ask questions during the Q&A.
- Please be respectful and mindful of each other's time when asking questions/ providing comments, so that all attendees are able to participate in the meeting.

Please email us at info@discoverUSQ.com to set up a conversation with us directly to further discuss the project and/or process.

PROJECT TEAM

US2
[illegible] Owner LLC

SGA
Architect

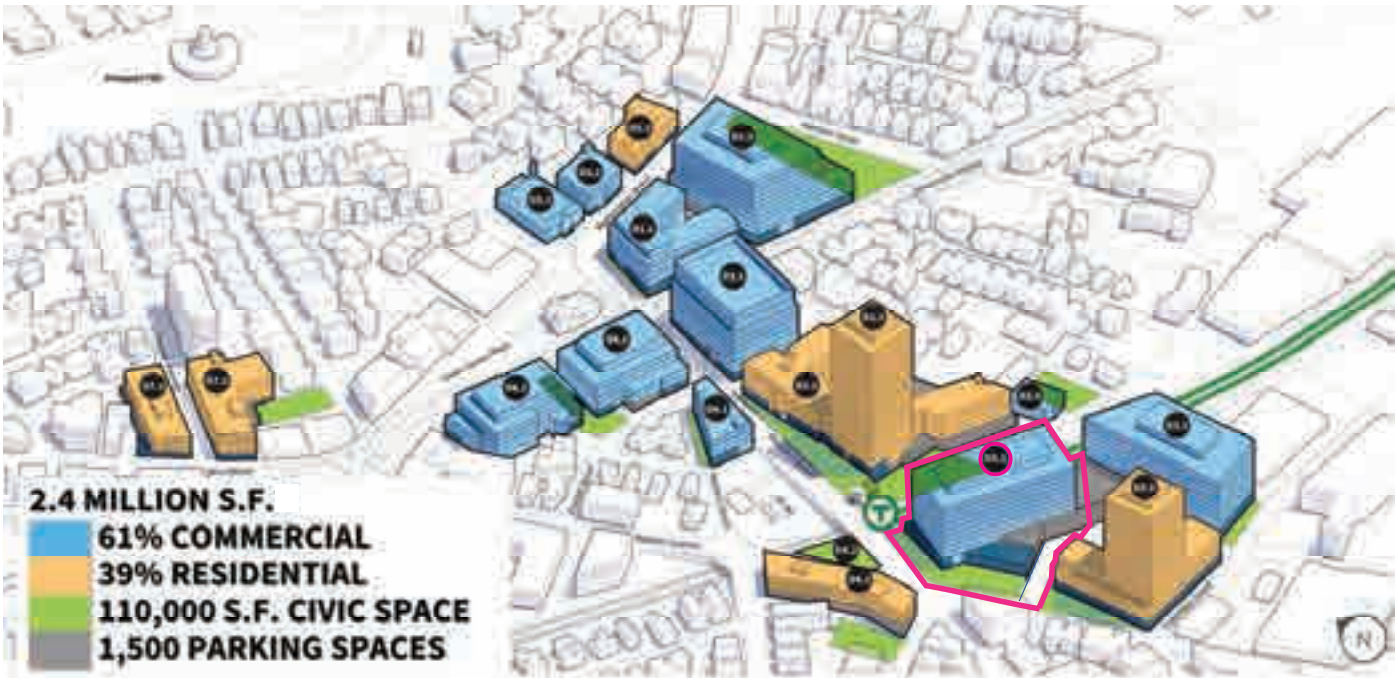
MARVEL DESIGN
Design Architect + Landscape Architect

HOWARD STEIN HUDSON
Civil Engineer

AHA
Mechanical Engineer

dbHMS
Sustainability Consultant

PUBLIC PROCESS REVIEW | STARTING POINT | COORDINATED DEVELOPMENT SPECIAL PERMIT 2017 (CDSP)

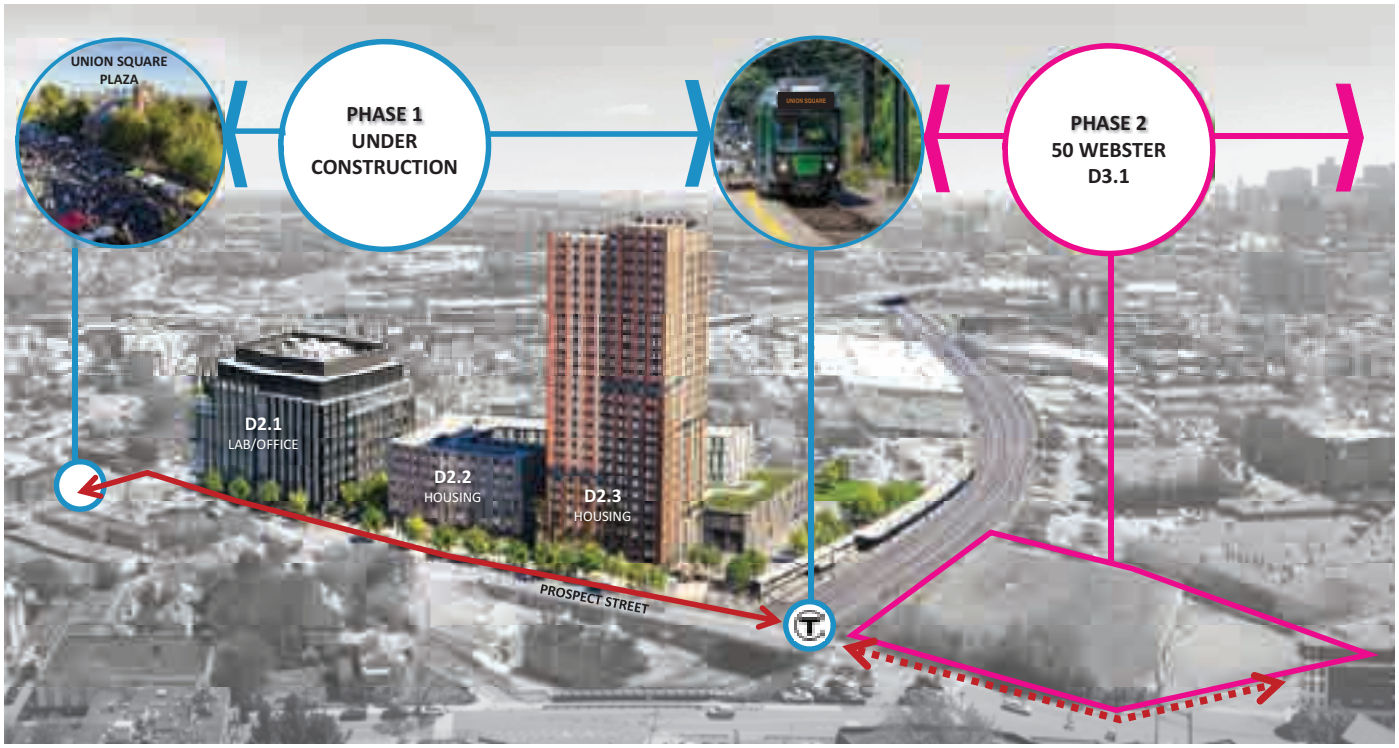


PUBLIC PROCESS REVIEW | D3.1 SITE ORGANIZATION | CDSP BLOCK AND LOT PLAN (2017)

MASTER BLOCK AND LOT PLAN

50 WEBSTER AVENUE (D3.1) BLOCK AND LOT PLAN

PUBLIC PROCESS REVIEW | PHASE TWO PLANNING BEGINS WITH 50 WEBSTER (D3.1)



PUBLIC PROCESS REVIEW | DESIGN AND SITE PLAN REVIEW

PARALLEL PROCESSES FOR D3.1 BUILDING + D3.1 CIVIC SPACE

NEIGHBORHOOD MEETING 2
50 WEBSTER AVENUE | BUILDING LOT

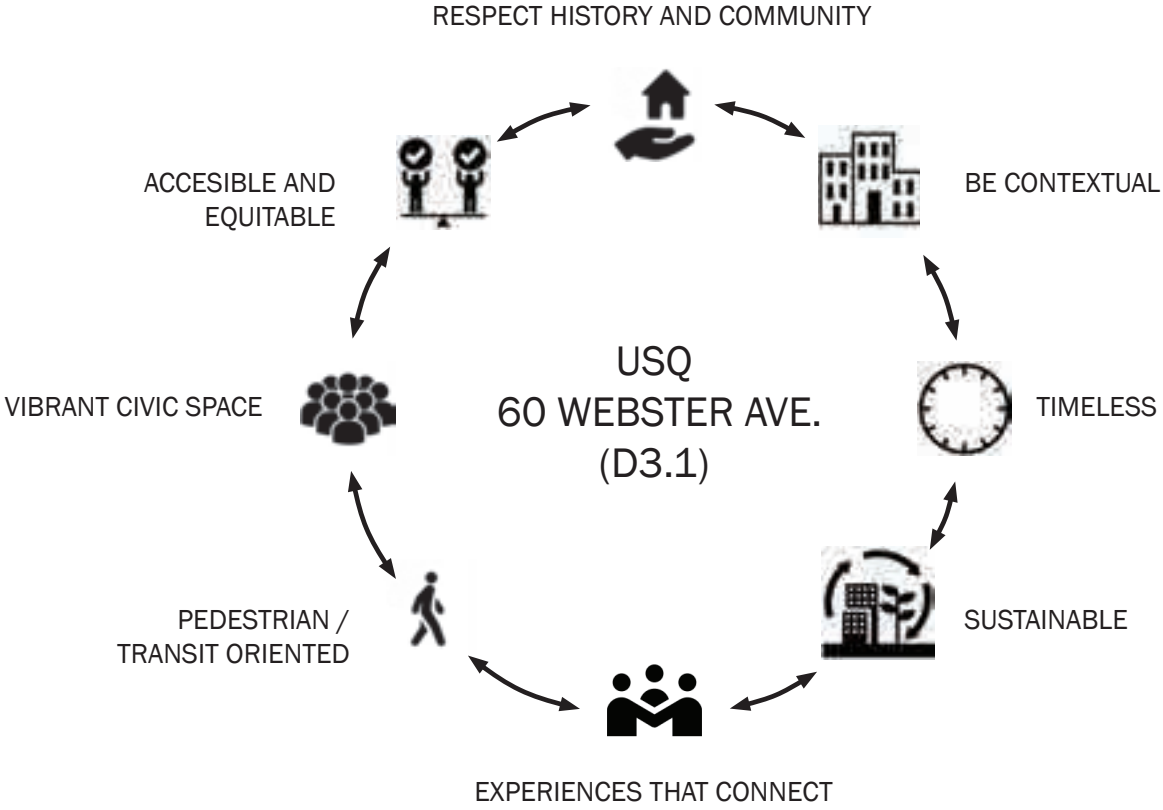
- Neighborhood Meeting 1 Recap
- Urban Design Commission Design and Direction 1-2
- Neighborhood Meeting 2 Update
- Questions & Discussion

NEIGHBORHOOD MEETING 1

URBAN DESIGN COMMISSION 1-2

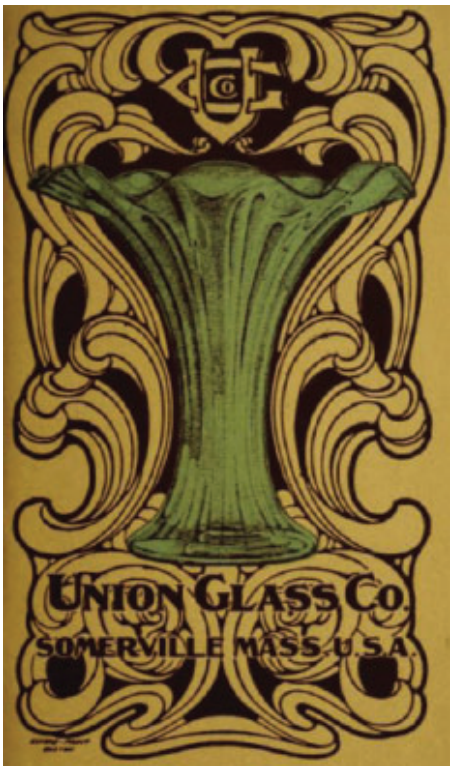
NEIGHBORHOOD MEETING 2

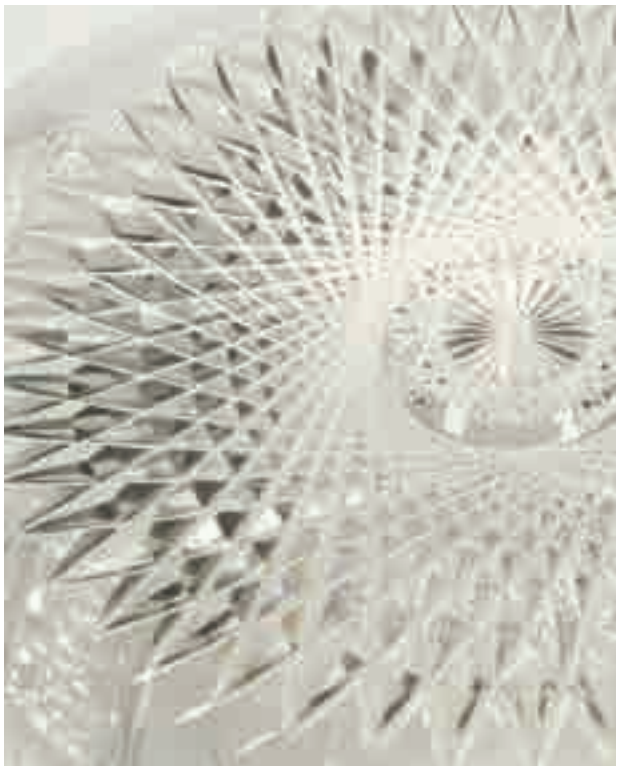
NM 1 | DESIGN PRINCIPLES



NM 1 | UNION GLASS COMPANY (1854 - 1927)

NM 1 | CUT AND CAST GLASS





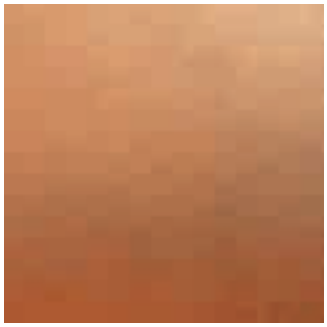
NM 1 | SITE MATERIALS

STONE

COBBLESTONE

BRICK

WOOD



STEEL

GLASS

NM 1 | CONTEXTUAL ARCHITECTURE

EAST SOMERVILLE COMMUNITY SCHOOL

1060 BROADWAY

SOMERVILLE HIGH SCHOOL RENOVATION

10 PROSPECT (D2.1)

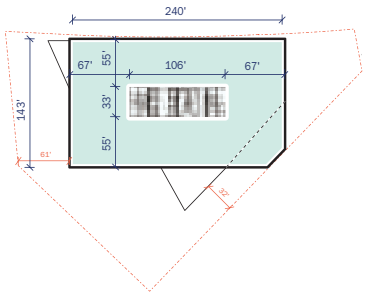
20- 50 PROSPECT (D2.3)

BOYTON YARDS LAB

UDC 1-2 | DESIGN OPTIONS AND DIRECTION

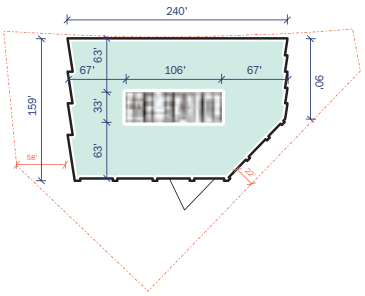
RECOMMENDED FOR CONTINUED STUDY

OPTION 1 - STACKED PRISMS



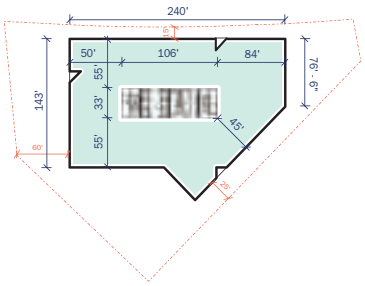
RECOGNIZES THE VARIOUS SITE ANGLES AND POSSIBLE AREAS WITHIN THE SITE.

OPTION 2 - SOLAR STEPS



ARTICULATIONS AND SETBACKS ARE DRIVEN BY PASSIVE SOLAR PROTECTION STRATEGIES

OPTION 3 - FACETED



FORM DRIVEN BY CIVIC SPACE BENEFITS. GROUND LEVEL NOTCH AT SOUTWEST CORNER INCREASES CONNECTION AND WIDTH OF CIVIC SPACE. SOUTH WING OPENS AT LOWER LEVELS TO DEFINE PLAZA EDGE AND ENTRY. VERTICAL CUTS REDUCE VISUAL BULK.

UDC 1-2 | FOUR DESIGN PILLARS

INDUSTRIAL AND GLASS MAKING HISTORY

TECHNOLOGY AND INNOVATION

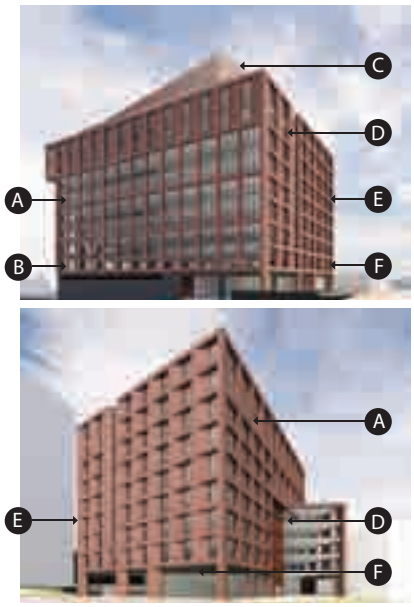
ACTIVE GROUND FLOOR

SUSTAINABILITY

UDC 1-2 | DESIGN OPTIONS AND DIRECTION

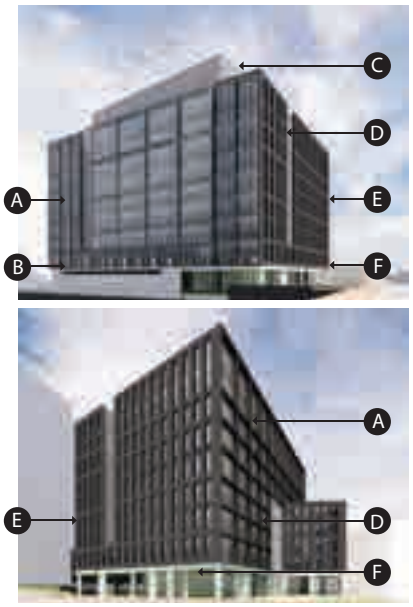
RECOMMENDED FOR CONTINUED STUDY

OPTION 1 - CANT



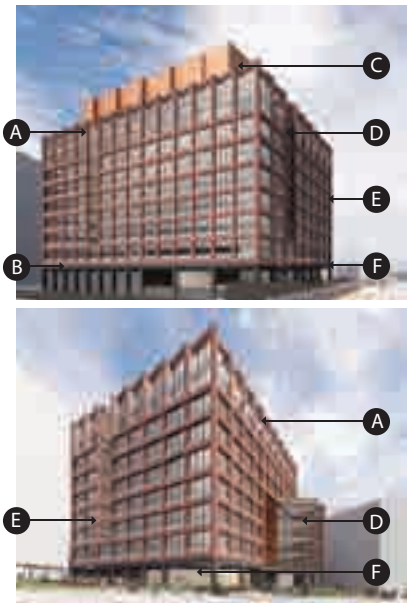
A - UNITIZED GLAZING SYSTEM WITH SPANDREL PANELS
B - PIGMENTED CONCRETE
C - ALUMINUM METAL PANEL WITH INTEGRATED LOUVERS
D - CURTAIN WALL SYSTEM WITH VERTICAL LOUVERS
E - BRICK WITH WINDOW WALL
F - STOREFRONT SYSTEM

OPTION 2 - PLATE



A - UNITIZED GLAZING SYSTEM WITH SPANDREL PANELS
B - PIGMENTED CONCRETE
C - ALUMINUM METAL PANEL WITH INTEGRATED LOUVERS
D - CURTAIN WALL SYSTEM WITH VERTICAL LOUVERS
E-GFRC CLADDING WITH PUNCHED WINDOWS/WINDOW WALL
F - STOREFRONT SYSTEM

OPTION 3 - GRID



A - UNITIZED GLAZING SYSTEM WITH SPANDREL PANELS
B - STONE CLADDING BASE
C - ALUMINUM METAL PANEL WITH INTEGRATED LOUVERS
D - CURTAIN WALL SYSTEM WITH VERTICAL LOUVERS
E - BRICK WITH WINDOW WALL
F - STOREFRONT SYSTEM

NM 1 & UDC 1-2 | COMMENTS

- Consider incorporating green roof

- Consider public lobby access

- Organize site for redundant paths, connectivity to T

- Manage vehicular access, parking

- Consider flood prevention and resiliency

- On site stormwater management

- Consider visual importance of northwest corner from street perspective

- Develop column pass-through concept at Southwest corner

- Continue study of north facade

- Honor cut glass history, pursue refinement of building materiality

- Diminish penthouse prominance, scalloped building top well received

PROPOSED DESIGN

SOUTH & EAST FACADES FROM WEBSTER AVE.

PROPOSED DESIGN

WEST & SOUTH FACADES FROM PROSPECT ST. AND WEBSTER AVE.

PROPOSED DESIGN

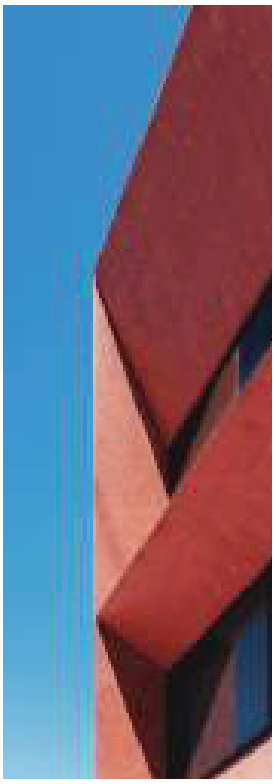
WEST FACADE FROM PROSPECT ST.

PROPOSED DESIGN

NORTH & WEST FACADE FROM PROSPECT ST. BRIDGE

PROPOSED DESIGN | MATERIAL PALETTE

MATERIALS ARE REPRESENTATIVE AND SUBJECT TO CHANGE, REFINEMENT AS DESIGN PROGRESSES



PROPOSED DESIGN | FACADE DETAIL

PROPOSED DESIGN

SOUTHWEST CORNER DETAIL VIEW

PROPOSED DESIGN

LOBBY ENTRANCE FROM CIVIC SPACE

PROPOSED DESIGN

PHYSICAL MODEL

PROPOSED DESIGN

PHYSICAL MODEL

PROPOSED DESIGN

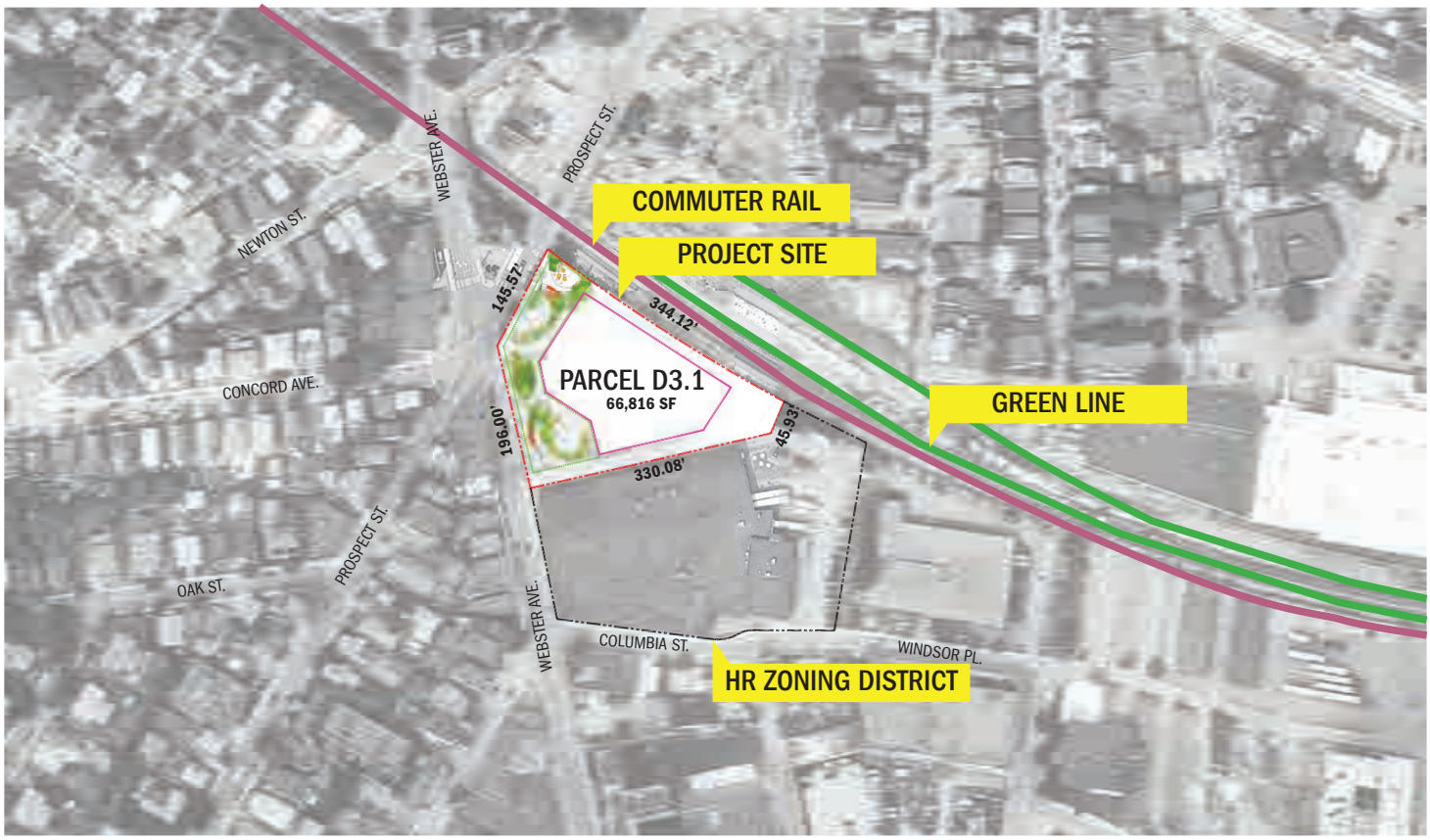
SOUTH & EAST FACADES FROM WEBSTER AVE.

BUILDING

QUESTIONS & DISCUSSIONS

APPENDIX

SITE ANALYSIS | LOT



PEDESTRIAN LEVEL WIND TABLES

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TABLES

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Velocity		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
1	No Build	Annual	10		Sitting	14		Acceptable
	Build	Annual	9		Sitting	15		Acceptable
	Full Build	Annual	9		Sitting	14		Acceptable
2	No Build	Annual	11		Sitting	15		Acceptable
	Build	Annual	11		Sitting	17	13%	Acceptable
	Full Build	Annual	11		Sitting	18	20%	Acceptable
3	No Build	Annual	9		Sitting	13		Acceptable
	Build	Annual	24	167%	Uncomfortable	32	146%	Unacceptable
	Full Build	Annual	22	144%	Uncomfortable	30	131%	Acceptable
4	No Build	-	-		-	-		-
	Build	Annual	13		Standing	21		Acceptable
	Full Build	Annual	11		Sitting	19		Acceptable
5	No Build	-	-		-	-		-
	Build	Annual	10		Sitting	16		Acceptable
	Full Build	Annual	9		Sitting	14		Acceptable
6	No Build	-	-		-	-		-
	Build	Annual	12		Sitting	18		Acceptable
	Full Build	Annual	11		Sitting	17		Acceptable
7	No Build	Annual	9		Sitting	15		Acceptable
	Build	Annual	22	144%	Uncomfortable	30	100%	Acceptable
	Full Build	Annual	21	133%	Uncomfortable	29	93%	Acceptable
8	No Build	Annual	12		Sitting	16		Acceptable
	Build	Annual	15	25%	Standing	22	38%	Acceptable
	Full Build	Annual	15	25%	Standing	23	44%	Acceptable
9	No Build	Annual	13		Standing	20		Acceptable
	Build	Annual	17	31%	Walking	24	20%	Acceptable
	Full Build	Annual	15	15%	Standing	23	15%	Acceptable
10	No Build	Annual	10		Sitting	15		Acceptable
	Build	Annual	16	60%	Walking	24	60%	Acceptable
	Full Build	Annual	13	30%	Standing	20	33%	Acceptable
11	No Build	Annual	11		Sitting	15		Acceptable
	Build	Annual	10		Sitting	17	13%	Acceptable
	Full Build	Annual	15	36%	Standing	21	40%	Acceptable
12	No Build	Annual	13		Standing	17		Acceptable
	Build	Annual	17	31%	Walking	25	47%	Acceptable
	Full Build	Annual	16	23%	Walking	24	41%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Velocity		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
13	No Build	-	-		-	-		-
	Build	Annual	7		Sitting	12		Acceptable
	Full Build	Annual	7		Sitting	12		Acceptable
14	No Build	-	-		-	-		-
	Build	Annual	7		Sitting	11		Acceptable
	Full Build	Annual	8		Sitting	14		Acceptable
15	No Build	Annual	12		Sitting	16		Acceptable
	Build	Annual	19	58%	Walking	27	69%	Acceptable
	Full Build	Annual	15	25%	Standing	23	44%	Acceptable
16	No Build	Annual	8		Sitting	12		Acceptable
	Build	Annual	9	12%	Sitting	14	17%	Acceptable
	Full Build	Annual	9	12%	Sitting	14	17%	Acceptable
17	No Build	Annual	8		Sitting	13		Acceptable
	Build	Annual	21	162%	Uncomfortable	29	123%	Acceptable
	Full Build	Annual	23	188%	Uncomfortable	30	131%	Acceptable
18	No Build	Annual	10		Sitting	14		Acceptable
	Build	Annual	10		Sitting	17	21%	Acceptable
	Full Build	Annual	11		Sitting	18	29%	Acceptable
19	No Build	Annual	9		Sitting	14		Acceptable
	Build	Annual	17	89%	Walking	27	93%	Acceptable
	Full Build	Annual	14	56%	Standing	23	64%	Acceptable
20	No Build	Annual	8		Sitting	13		Acceptable
	Build	Annual	17	112%	Walking	25	92%	Acceptable
	Full Build	Annual	15	88%	Standing	23	77%	Acceptable
21	No Build	Annual	9		Sitting	14		Acceptable
	Build	Annual	21	133%	Uncomfortable	29	107%	Acceptable
	Full Build	Annual	17	89%	Walking	25	79%	Acceptable
22	No Build	Annual	12		Sitting	16		Acceptable
	Build	Annual	22	83%	Uncomfortable	31	94%	Acceptable
	Full Build	Annual	19	58%	Walking	27	69%	Acceptable
23	No Build	Annual	13		Standing	18		Acceptable
	Build	Annual	21	62%	Uncomfortable	27	50%	Acceptable
	Full Build	Annual	18	38%	Walking	25	39%	Acceptable
24	No Build	Annual	9		Sitting	14		Acceptable
	Build	Annual	18	100%	Walking	26	86%	Acceptable
	Full Build	Annual	18	100%	Walking	25	79%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Velocity		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
25	No Build	-	-		-	-		-
	Build	Annual	16		Walking	24		Acceptable
	Full Build	Annual	16		Walking	23		Acceptable
26	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	19	73%	Walking	27	59%	Acceptable
	Full Build	Annual	19	73%	Walking	26	53%	Acceptable
27	No Build	-	-		-	-		-
	Build	Annual	19		Walking	28		Acceptable
	Full Build	Annual	19		Walking	27		Acceptable
28	No Build	Annual	8		Sitting	13		Acceptable
	Build	Annual	13	62%	Standing	20	54%	Acceptable
	Full Build	Annual	12	50%	Sitting	19	46%	Acceptable
29	No Build	Annual	18		Walking	25		Acceptable
	Build	Annual	23	28%	Uncomfortable	32	28%	Unacceptable
	Full Build	Annual	22	22%	Uncomfortable	31	24%	Acceptable
30	No Build	Annual	17		Walking	24		Acceptable
	Build	Annual	18		Walking	25		Acceptable
	Full Build	Annual	16		Walking	23		Acceptable
31	No Build	Annual	12		Sitting	18		Acceptable
	Build	Annual	16	33%	Walking	24	33%	Acceptable
	Full Build	Annual	14	17%	Standing	22	22%	Acceptable
32	No Build	Annual	13		Standing	19		Acceptable
	Build	Annual	13		Standing	20		Acceptable
	Full Build	Annual	15	15%	Standing	22	16%	Acceptable
33	No Build	Annual	10		Sitting	16		Acceptable
	Build	Annual	10		Sitting	16		Acceptable
	Full Build	Annual	17	70%	Walking	24	50%	Acceptable
34	No Build	Annual	13		Standing	18		Acceptable
	Build	Annual	13		Standing	18		Acceptable
	Full Build	Annual	8	-38%	Sitting	13	-28%	Acceptable
35	No Build	Annual	9		Sitting	14		Acceptable
	Build	Annual	10	11%	Sitting	15		Acceptable
	Full Build	Annual	15	67%	Standing	23	64%	Acceptable
36	No Build	-	-		-	-		-
	Build	-	-		-	-		-
	Full Build	Annual	13		Standing	20		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Velocity		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
37	No Build	-	-		-	-		-
	Build	-	-		-	-		-
	Full Build	Annual	15		Standing	24		Acceptable
38	No Build	Annual	15		Standing	21		Acceptable
	Build	Annual	15		Standing	22		Acceptable
	Full Build	Annual	13	-13%	Standing	21		Acceptable
39	No Build	-	-		-	-		-
	Build	-	-		-	-		-
	Full Build	Annual	14		Standing	24		Acceptable
40	No Build	-	-		-	-		-
	Build	-	-		-	-		-
	Full Build	Annual	13		Standing	19		Acceptable
41	No Build	Annual	9		Sitting	14		Acceptable
	Build	Annual	10	11%	Sitting	15		Acceptable
	Full Build	Annual	21	133%	Uncomfortable	29	107%	Acceptable
42	No Build	Annual	9		Sitting	14		Acceptable
	Build	Annual	9		Sitting	14		Acceptable
	Full Build	Annual	17	89%	Walking	24	71%	Acceptable
43	No Build	Annual	7		Sitting	12		Acceptable
	Build	Annual	7		Sitting	12		Acceptable
	Full Build	Annual	17	143%	Walking	23	92%	Acceptable
44	No Build	Annual	9		Sitting	14		Acceptable
	Build	Annual	12	33%	Sitting	17	21%	Acceptable
	Full Build	Annual	18	100%	Walking	25	79%	Acceptable
45	No Build	Annual	7		Sitting	11		Acceptable
	Build	Annual	6	-14%	Sitting	10		Acceptable
	Full Build	Annual	14	100%	Standing	21	91%	Acceptable
46	No Build	Annual	8		Sitting	13		Acceptable
	Build	Annual	13	62%	Standing	19	46%	Acceptable
	Full Build	Annual	17	112%	Walking	25	92%	Acceptable
47	No Build	-	-		-	-		-
	Build	-	-		-	-		-
	Full Build	Annual	14		Standing	21		Acceptable
48	No Build	Annual	11		Sitting	16		Acceptable
	Build	Annual	10		Sitting	16		Acceptable
	Full Build	Annual	9	-18%	Sitting	15		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Velocity		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
49	No Build	Annual	12		Sitting	19		Acceptable
	Build	Annual	14	17%	Standing	21	11%	Acceptable
	Full Build	Annual	10	-17%	Sitting	17	-11%	Acceptable
50	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	14	27%	Standing	20	18%	Acceptable
	Full Build	Annual	11		Sitting	17		Acceptable
51	No Build	Annual	9		Sitting	14		Acceptable
	Build	Annual	10	11%	Sitting	16	14%	Acceptable
	Full Build	Annual	9		Sitting	14		Acceptable
52	No Build	Annual	7		Sitting	11		Acceptable
	Build	Annual	8	14%	Sitting	11		Acceptable
	Full Build	Annual	6	-14%	Sitting	10		Acceptable
53	No Build	Annual	10		Sitting	15		Acceptable
	Build	Annual	9		Sitting	14		Acceptable
	Full Build	Annual	8	-20%	Sitting	13	-13%	Acceptable
54	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	9	-18%	Sitting	15	-12%	Acceptable
	Full Build	Annual	8	-27%	Sitting	13	-24%	Acceptable
55	No Build	Annual	7		Sitting	12		Acceptable
	Build	Annual	7		Sitting	11		Acceptable
	Full Build	Annual	7		Sitting	11		Acceptable
56	No Build	Annual	10		Sitting	15		Acceptable
	Build	Annual	7	-30%	Sitting	12	-20%	Acceptable
	Full Build	Annual	8	-20%	Sitting	14		Acceptable
57	No Build	Annual	8		Sitting	12		Acceptable
	Build	Annual	7	-12%	Sitting	12		Acceptable
	Full Build	Annual	8		Sitting	13		Acceptable
58	No Build	Annual	7		Sitting	12		Acceptable
	Build	Annual	7		Sitting	12		Acceptable
	Full Build	Annual	7		Sitting	13		Acceptable
59	No Build	Annual	11		Sitting	18		Acceptable
	Build	Annual	10		Sitting	16	-11%	Acceptable
	Full Build	Annual	8	-27%	Sitting	14	-22%	Acceptable
60	No Build	Annual	7		Sitting	12		Acceptable
	Build	Annual	7		Sitting	12		Acceptable
	Full Build	Annual	10	43%	Sitting	15	25%	Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Velocity		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
61	No Build	Annual	10		Sitting	17		Acceptable
	Build	Annual	11		Sitting	17		Acceptable
	Full Build	Annual	11		Sitting	17		Acceptable
62	No Build	Annual	9		Sitting	14		Acceptable
	Build	Annual	12	33%	Sitting	18	29%	Acceptable
	Full Build	Annual	11	22%	Sitting	16	14%	Acceptable
63	No Build	Annual	10		Sitting	15		Acceptable
	Build	Annual	9		Sitting	15		Acceptable
	Full Build	Annual	10		Sitting	15		Acceptable
64	No Build	Annual	9		Sitting	15		Acceptable
	Build	Annual	10	11%	Sitting	16		Acceptable
	Full Build	Annual	10	11%	Sitting	16		Acceptable
65	No Build	Annual	6		Sitting	9		Acceptable
	Build	Annual	6		Sitting	9		Acceptable
	Full Build	Annual	5	-17%	Sitting	8	-11%	Acceptable
66	No Build	Annual	10		Sitting	15		Acceptable
	Build	Annual	9		Sitting	15		Acceptable
	Full Build	Annual	9		Sitting	15		Acceptable
67	No Build	Annual	12		Sitting	19		Acceptable
	Build	Annual	11		Sitting	18		Acceptable
	Full Build	Annual	10	-17%	Sitting	17	-11%	Acceptable
68	No Build	Annual	12		Sitting	18		Acceptable
	Build	Annual	10	-17%	Sitting	15	-17%	Acceptable
	Full Build	Annual	8	-33%	Sitting	13	-28%	Acceptable
69	No Build	Annual	12		Sitting	17		Acceptable
	Build	Annual	15	25%	Standing	20	18%	Acceptable
	Full Build	Annual	13		Standing	18		Acceptable
70	No Build	Annual	15		Standing	22		Acceptable
	Build	Annual	12	-20%	Sitting	19	-14%	Acceptable
	Full Build	Annual	11	-27%	Sitting	18	-18%	Acceptable
71	No Build	Annual	24		Uncomfortable	32		Unacceptable
	Build	Annual	24		Uncomfortable	32		Unacceptable
	Full Build	Annual	22		Uncomfortable	30		Acceptable
72	No Build	Annual	22		Uncomfortable	29		Acceptable
	Build	Annual	23		Uncomfortable	32	10%	Unacceptable
	Full Build	Annual	22		Uncomfortable	30		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Velocity		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
73	No Build	Annual	21		Uncomfortable	32		Unacceptable
	Build	Annual	23		Uncomfortable	32		Unacceptable
	Full Build	Annual	22		Uncomfortable	30		Acceptable
74	No Build	Annual	18		Walking	25		Acceptable
	Build	Annual	18		Walking	27		Acceptable
	Full Build	Annual	16	-11%	Walking	24		Acceptable
75	No Build	Annual	16		Walking	24		Acceptable
	Build	Annual	16		Walking	25		Acceptable
	Full Build	Annual	16		Walking	24		Acceptable
76	No Build	Annual	14		Standing	21		Acceptable
	Build	Annual	14		Standing	21		Acceptable
	Full Build	Annual	14		Standing	22		Acceptable
77	No Build	Annual	13		Standing	20		Acceptable
	Build	Annual	12		Sitting	19		Acceptable
	Full Build	Annual	12		Sitting	20		Acceptable
78	No Build	Annual	17		Walking	25		Acceptable
	Build	Annual	16		Walking	25		Acceptable
	Full Build	Annual	17		Walking	26		Acceptable
79	No Build	Annual	10		Sitting	17		Acceptable
	Build	Annual	9		Sitting	15	-12%	Acceptable
	Full Build	Annual	8	-20%	Sitting	13	-24%	Acceptable
80	No Build	Annual	11		Sitting	17		Acceptable
	Build	Annual	9	-18%	Sitting	15	-12%	Acceptable
	Full Build	Annual	8	-27%	Sitting	12	-29%	Acceptable
81	No Build	Annual	13		Standing	19		Acceptable
	Build	Annual	9	-31%	Sitting	15	-21%	Acceptable
	Full Build	Annual	6	-54%	Sitting	11	-42%	Acceptable
82	No Build	Annual	19		Walking	26		Acceptable
	Build	Annual	16	-16%	Walking	25		Acceptable
	Full Build	Annual	17	-11%	Walking	24		Acceptable
83	No Build	Annual	15		Standing	22		Acceptable
	Build	Annual	15		Standing	23		Acceptable
	Full Build	Annual	15		Standing	22		Acceptable
84	No Build	Annual	20		Uncomfortable	27		Acceptable
	Build	Annual	20		Uncomfortable	27		Acceptable
	Full Build	Annual	19		Walking	26		Acceptable

Table 1: Mean Speed and Effective Gust Categories - Annual

Location	Configuration	Season	Mean Wind Speed			Effective Gust Wind Velocity		
			Speed (mph)	% Change	Rating	Speed (mph)	% Change	Rating
85	No Build	Annual	12		Sitting	19		Acceptable
	Build	Annual	10	-17%	Sitting	17	-11%	Acceptable
	Full Build	Annual	8	-33%	Sitting	15	-21%	Acceptable
86	No Build	Annual	20		Uncomfortable	30		Acceptable
	Build	Annual	19		Walking	29		Acceptable
	Full Build	Annual	20		Uncomfortable	30		Acceptable
87	No Build	Annual	13		Standing	22		Acceptable
	Build	Annual	13		Standing	22		Acceptable
	Full Build	Annual	14		Standing	22		Acceptable
88	No Build	Annual	18		Walking	26		Acceptable
	Build	Annual	16	-11%	Walking	25		Acceptable
	Full Build	Annual	17		Walking	26		Acceptable
89	No Build	Annual	18		Walking	25		Acceptable
	Build	Annual	17		Walking	24		Acceptable
	Full Build	Annual	16	-11%	Walking	23		Acceptable
90	No Build	-	-		-	-		-
	Build	Annual	14		Standing	19		Acceptable
	Full Build	Annual	16		Walking	21		Acceptable
91	No Build	-	-		-	-		-
	Build	Annual	18		Walking	25		Acceptable
	Full Build	Annual	17		Walking	24		Acceptable

Configurations		Mean Wind Criteria Speed (mph)		Effective Gust Criteria (mph)	
No Build	Existing site and surroundings	≤ 12	Comfortable for Sitting	≤ 31	Acceptable
		13 - 15	Comfortable for Standing	> 31	Unacceptable
Build	Proposed D3.1 Building with existing surroundings	16 - 19	Comfortable for Walking		
		>20	Uncomfortable		
Full Build	Proposed D3.1 Building with future surroundings				

Notes

1) Wind Speeds are for a 1% probability of exceedance

2) % Change is based on comparison with Configuration A

3) % changes less than 10% are excluded

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Velocity (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
1	No Build	10	7	9	11	14	11	13	15
	Build	9	8	9	10	15	12	14	16
	Full Build	9	7	8	10	15	12	14	16
2	No Build	11	8	10	12	16	12	14	17
	Build	11	10	10	11	18	15	16	17
	Full Build	11	10	11	12	18	16	17	19
3	No Build	9	7	8	9	14	11	13	15
	Build	25	19	23	26	33	26	30	35
	Full Build	23	19	21	24	31	25	28	32
4	No Build	-	-	-	-	-	-	-	-
	Build	14	12	13	14	22	19	21	23
	Full Build	12	9	11	13	19	16	18	20
5	No Build	-	-	-	-	-	-	-	-
	Build	10	8	10	10	17	14	16	17
	Full Build	9	7	8	10	15	12	14	16
6	No Build	-	-	-	-	-	-	-	-
	Build	12	10	11	13	19	15	18	20
	Full Build	11	9	10	12	18	14	17	19
7	No Build	10	7	9	9	16	12	15	16
	Build	23	17	21	24	31	23	29	33
	Full Build	22	16	20	23	30	22	27	32
8	No Build	12	9	11	13	17	12	15	17
	Build	16	12	14	16	23	17	21	24
	Full Build	16	12	15	17	24	17	22	24
9	No Build	14	10	12	15	20	15	19	22
	Build	17	13	16	18	24	18	22	26
	Full Build	16	12	14	16	24	18	22	24
10	No Build	10	7	9	10	16	12	15	17
	Build	17	13	16	17	26	18	23	25
	Full Build	14	10	13	14	21	16	20	22
11	No Build	11	8	10	12	16	12	15	17
	Build	11	9	10	11	18	14	17	18
	Full Build	17	12	15	16	24	17	21	22
12	No Build	13	10	12	14	18	13	16	19
	Build	19	15	17	18	26	21	24	26
	Full Build	17	14	16	17	25	21	24	25

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Velocity (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
13	No Build	-	-	-	-	-	-	-	-
	Build	8	6	7	8	12	10	12	13
	Full Build	8	6	7	8	12	9	11	13
14	No Build	-	-	-	-	-	-	-	-
	Build	7	6	7	8	11	10	11	12
	Full Build	8	6	8	9	14	12	13	15
15	No Build	12	9	11	13	17	13	16	18
	Build	19	15	18	20	27	21	26	29
	Full Build	15	13	15	16	24	20	23	25
16	No Build	8	6	8	9	13	10	12	14
	Build	9	8	9	10	14	12	14	15
	Full Build	9	7	8	10	14	11	13	15
17	No Build	9	7	8	9	13	10	12	14
	Build	21	17	20	23	29	23	28	31
	Full Build	24	19	22	26	30	25	29	33
18	No Build	10	7	9	11	14	11	13	16
	Build	10	9	10	11	17	14	16	19
	Full Build	11	9	10	11	18	15	17	19
19	No Build	10	7	9	10	14	11	13	15
	Build	18	13	16	19	28	20	25	30
	Full Build	15	11	14	16	24	18	22	25
20	No Build	8	6	8	8	14	10	12	13
	Build	18	15	17	18	25	21	25	27
	Full Build	15	12	14	16	23	19	22	25
21	No Build	10	8	9	10	15	12	14	15
	Build	21	17	20	23	30	24	28	31
	Full Build	17	13	16	18	25	19	23	27
22	No Build	12	9	11	13	17	12	15	18
	Build	23	17	21	25	32	24	28	34
	Full Build	20	15	18	21	29	21	26	30
23	No Build	13	10	12	14	18	13	17	19
	Build	21	16	19	23	28	21	26	30
	Full Build	19	15	17	19	25	20	23	27
24	No Build	9	7	8	10	14	11	13	15
	Build	19	16	17	19	27	22	25	28
	Full Build	18	16	17	19	26	21	24	27

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Velocity (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
25	No Build	-	-	-	-	-	-	-	-
	Build	17	14	15	17	25	21	23	25
	Full Build	17	14	16	17	24	20	22	25
26	No Build	11	9	11	12	17	13	16	18
	Build	21	16	19	20	29	22	27	28
	Full Build	20	15	19	20	28	22	26	27
27	No Build	-	-	-	-	-	-	-	-
	Build	19	15	18	21	28	21	26	30
	Full Build	19	14	17	21	27	20	25	29
28	No Build	8	6	8	8	13	10	13	13
	Build	14	10	13	14	21	16	20	22
	Full Build	13	9	12	14	20	14	18	21
29	No Build	18	13	17	20	25	19	23	27
	Build	23	17	22	25	33	24	30	36
	Full Build	23	16	21	25	32	23	29	35
30	No Build	17	13	16	19	25	18	23	27
	Build	18	14	17	19	26	20	24	27
	Full Build	16	12	15	17	24	18	22	25
31	No Build	12	9	11	13	19	14	17	20
	Build	17	13	15	17	25	19	23	26
	Full Build	16	11	14	15	24	17	22	23
32	No Build	13	10	12	14	19	15	18	21
	Build	13	10	12	13	21	16	19	22
	Full Build	16	12	15	16	24	18	22	23
33	No Build	10	8	10	11	16	13	15	17
	Build	10	8	10	11	17	13	16	17
	Full Build	19	14	17	18	27	19	24	26
34	No Build	14	11	13	14	19	16	18	20
	Build	14	11	13	14	19	15	18	19
	Full Build	9	7	8	9	14	11	13	14
35	No Build	9	7	9	10	14	11	14	15
	Build	10	8	10	11	15	12	14	16
	Full Build	16	13	15	16	24	19	22	24
36	No Build	-	-	-	-	-	-	-	-
	Build	-	-	-	-	-	-	-	-
	Full Build	13	10	12	14	20	16	19	22

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Velocity (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
37	No Build	-	-	-	-	-	-	-	-
	Build	-	-	-	-	-	-	-	-
	Full Build	15	12	14	17	24	19	23	26
38	No Build	15	11	14	16	21	16	20	23
	Build	16	13	15	16	24	19	22	24
	Full Build	13	10	12	14	21	17	20	23
39	No Build	-	-	-	-	-	-	-	-
	Build	-	-	-	-	-	-	-	-
	Full Build	15	12	14	15	24	19	23	25
40	No Build	-	-	-	-	-	-	-	-
	Build	-	-	-	-	-	-	-	-
	Full Build	13	10	12	14	20	15	18	21
41	No Build	9	8	9	10	15	12	14	15
	Build	10	8	10	11	15	12	15	16
	Full Build	21	17	20	23	30	24	27	32
42	No Build	9	7	8	10	14	11	13	15
	Build	10	7	9	10	15	11	14	16
	Full Build	17	13	16	18	25	19	23	27
43	No Build	7	6	7	8	12	10	11	12
	Build	7	6	7	8	12	10	12	13
	Full Build	17	13	16	18	24	19	22	25
44	No Build	9	7	9	10	14	11	13	15
	Build	13	10	12	13	18	14	17	19
	Full Build	19	14	17	20	26	19	24	27
45	No Build	7	5	7	7	12	8	11	11
	Build	7	5	6	7	11	8	10	11
	Full Build	14	10	13	15	21	16	19	23
46	No Build	8	7	8	8	14	11	13	14
	Build	13	10	12	14	19	15	18	20
	Full Build	17	13	16	18	26	20	24	28
47	No Build	-	-	-	-	-	-	-	-
	Build	-	-	-	-	-	-	-	-
	Full Build	15	12	14	16	22	18	20	23
48	No Build	11	8	10	11	16	12	15	17
	Build	10	8	10	11	16	12	15	17
	Full Build	10	7	9	10	16	12	15	17

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Velocity (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
49	No Build	12	9	11	13	20	15	18	21
	Build	14	11	13	15	21	17	20	23
	Full Build	11	8	10	11	17	13	16	18
50	No Build	11	9	11	12	18	14	17	19
	Build	14	11	13	15	20	16	19	21
	Full Build	12	9	11	13	17	13	16	18
51	No Build	9	7	9	10	15	11	14	16
	Build	11	8	10	11	16	12	15	17
	Full Build	9	7	9	10	15	11	14	15
52	No Build	8	6	7	7	11	9	11	11
	Build	8	7	7	8	12	10	11	12
	Full Build	6	5	6	6	10	8	10	10
53	No Build	10	8	9	11	15	12	14	16
	Build	10	8	9	10	15	12	14	15
	Full Build	9	7	8	9	14	11	13	15
54	No Build	11	8	10	12	17	12	16	18
	Build	9	7	8	10	15	11	14	16
	Full Build	8	6	7	8	13	10	12	14
55	No Build	8	6	7	8	13	10	12	13
	Build	7	6	7	7	12	9	11	12
	Full Build	7	6	7	7	12	9	11	12
56	No Build	10	8	9	10	16	12	14	16
	Build	8	6	7	8	13	10	12	13
	Full Build	9	8	8	9	14	12	13	15
57	No Build	8	7	8	8	12	10	12	13
	Build	8	6	7	8	12	10	12	13
	Full Build	9	7	8	9	13	10	12	14
58	No Build	7	6	7	8	12	10	12	13
	Build	7	6	7	7	12	10	11	12
	Full Build	8	6	7	8	13	11	12	14
59	No Build	12	9	11	12	18	14	17	19
	Build	11	8	10	11	17	12	16	18
	Full Build	9	6	8	9	14	10	13	15
60	No Build	8	6	7	8	12	9	12	13
	Build	8	6	7	8	12	9	12	13
	Full Build	11	8	10	11	16	12	14	16

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Velocity (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
61	No Build	11	8	10	10	19	13	17	17
	Build	12	8	11	11	19	13	17	17
	Full Build	12	8	11	11	19	13	18	18
62	No Build	10	7	9	10	15	11	14	15
	Build	13	11	12	13	19	15	17	19
	Full Build	12	10	11	12	17	14	16	17
63	No Build	10	8	10	11	16	12	14	17
	Build	10	7	9	9	16	12	14	15
	Full Build	11	8	10	10	16	13	15	16
64	No Build	10	8	9	10	16	12	15	15
	Build	11	10	10	10	17	15	16	16
	Full Build	11	9	10	10	17	15	16	16
65	No Build	6	5	6	6	9	7	9	10
	Build	6	5	6	6	10	8	9	10
	Full Build	5	4	5	5	9	7	8	9
66	No Build	10	8	10	10	16	13	15	16
	Build	9	7	9	10	15	12	15	16
	Full Build	9	8	9	10	15	13	14	16
67	No Build	12	10	12	13	20	15	19	21
	Build	11	9	11	12	19	14	18	20
	Full Build	10	8	9	11	17	13	16	18
68	No Build	13	10	12	13	19	14	18	19
	Build	11	8	10	11	16	12	15	16
	Full Build	8	6	8	9	14	11	13	14
69	No Build	12	10	11	12	18	14	17	18
	Build	16	12	15	16	22	17	20	22
	Full Build	14	11	12	14	20	15	18	19
70	No Build	15	11	14	17	22	16	20	24
	Build	13	10	12	13	20	17	19	21
	Full Build	11	9	10	12	18	14	17	19
71	No Build	24	18	22	27	32	24	30	35
	Build	24	18	22	26	33	25	30	35
	Full Build	22	17	20	24	30	22	28	33
72	No Build	22	17	20	24	31	22	28	32
	Build	24	18	22	26	33	24	30	35
	Full Build	22	16	20	24	30	23	28	33

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Velocity (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
73	No Build	21	16	20	24	32	23	28	33
	Build	23	17	22	25	33	25	30	35
	Full Build	22	17	20	24	30	23	28	33
74	No Build	18	13	16	20	26	19	24	28
	Build	19	15	18	20	29	22	26	29
	Full Build	16	12	15	17	25	19	23	26
75	No Build	16	12	15	18	24	18	22	27
	Build	17	13	15	18	26	20	24	28
	Full Build	16	13	15	17	25	19	23	26
76	No Build	14	11	13	16	22	16	20	23
	Build	14	11	13	15	22	17	20	23
	Full Build	15	10	14	14	23	17	21	23
77	No Build	13	10	12	14	21	16	19	22
	Build	13	10	12	13	20	15	19	21
	Full Build	13	10	12	14	20	16	19	22
78	No Build	17	14	16	19	26	20	24	28
	Build	16	13	15	17	26	21	24	28
	Full Build	17	14	16	19	26	21	24	28
79	No Build	11	9	10	11	17	14	16	18
	Build	10	7	9	10	16	12	14	16
	Full Build	8	6	8	8	13	10	12	14
80	No Build	12	9	11	11	18	14	17	18
	Build	10	7	9	10	17	12	15	16
	Full Build	8	7	7	8	13	10	12	13
81	No Build	14	11	12	13	20	16	18	19
	Build	10	7	9	9	16	12	15	16
	Full Build	7	5	6	6	12	8	11	11
82	No Build	19	16	18	20	26	22	25	28
	Build	16	14	16	17	25	21	24	27
	Full Build	17	14	16	18	25	21	23	26
83	No Build	15	12	14	17	23	17	21	25
	Build	15	12	14	16	24	19	22	26
	Full Build	15	11	14	16	23	18	21	25
84	No Build	21	16	19	22	28	22	26	30
	Build	20	15	19	22	27	20	25	29
	Full Build	19	14	18	21	26	19	24	28

Table 2: Mean Speed and Effective Gust Categories - Seasonal

Location	Configuration	Mean Wind Speed (mph)				Effective Gust Wind Velocity (mph)			
		Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
85	No Build	13	10	12	12	21	16	19	19
	Build	11	8	10	11	19	14	17	18
	Full Build	9	7	9	9	16	11	15	15
86	No Build	20	17	19	21	30	26	29	32
	Build	19	17	19	21	29	25	28	31
	Full Build	20	17	19	21	30	25	28	32
87	No Build	14	12	13	14	22	18	21	24
	Build	13	12	13	14	22	18	20	23
	Full Build	14	12	14	15	23	18	21	25
88	No Build	18	15	17	19	27	22	26	29
	Build	17	13	16	18	26	20	24	27
	Full Build	18	14	17	19	26	20	24	28
89	No Build	19	14	17	20	26	20	24	27
	Build	17	13	16	18	24	18	23	26
	Full Build	16	12	15	17	23	17	21	25
90	No Build	-	-	-	-	-	-	-	-
	Build	14	12	13	15	19	16	18	20
	Full Build	16	13	15	17	22	18	20	23
91	No Build	-	-	-	-	-	-	-	-
	Build	18	13	16	20	26	19	23	28
	Full Build	18	13	16	19	25	18	23	27

Seasons	Months
Spring	March - May
Summer	June - August
Fall	September - November
Winter	December - February
Annual	January - December

Mean Wind Criteria Speed (mph)	
≤ 12	Comfortable for Sitting
13 - 15	Comfortable for Standing
16 - 19	Comfortable for Walking
>20	Uncomfortable

Effective Gust Criteria (mph)	
≤ 31	Acceptable
> 31	Unacceptable

Configurations	
No Build	Existing site and surroundings
Build	Proposed D3.1 Building with existing surroundings
Full Build	Proposed D3.1 Building with future surroundings

Notes

Wind Speeds are for a 1% probability of exceedance

ANNUAL REFLECTION DIAGRAMS

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APPENDIX A

ANNUAL REFLECTION IMPACT DIAGRAMS

Presentation of Results

The frequency, duration, and intensity of glare events throughout the year is illustrated using "annual impact diagrams" (see Figure A1 below for the general layout of these plots). The color of the plot for a given combination of date and time indicates the relative impact of any glare sources found. The horizontal axis of the diagram indicates the day of the year, and the vertical axis indicates the hour of the day.

We note that the referenced times are in local standard time, so in jurisdictions where Daylight Savings Time is used, the time should be shifted by an hour when appropriate.

The following pages present the impact categories for three types of Annual Impact Diagrams: Visual Impact, Thermal Impact on People, and Thermal Impact on Property. More information on RWDI's criteria is available in Appendix B.

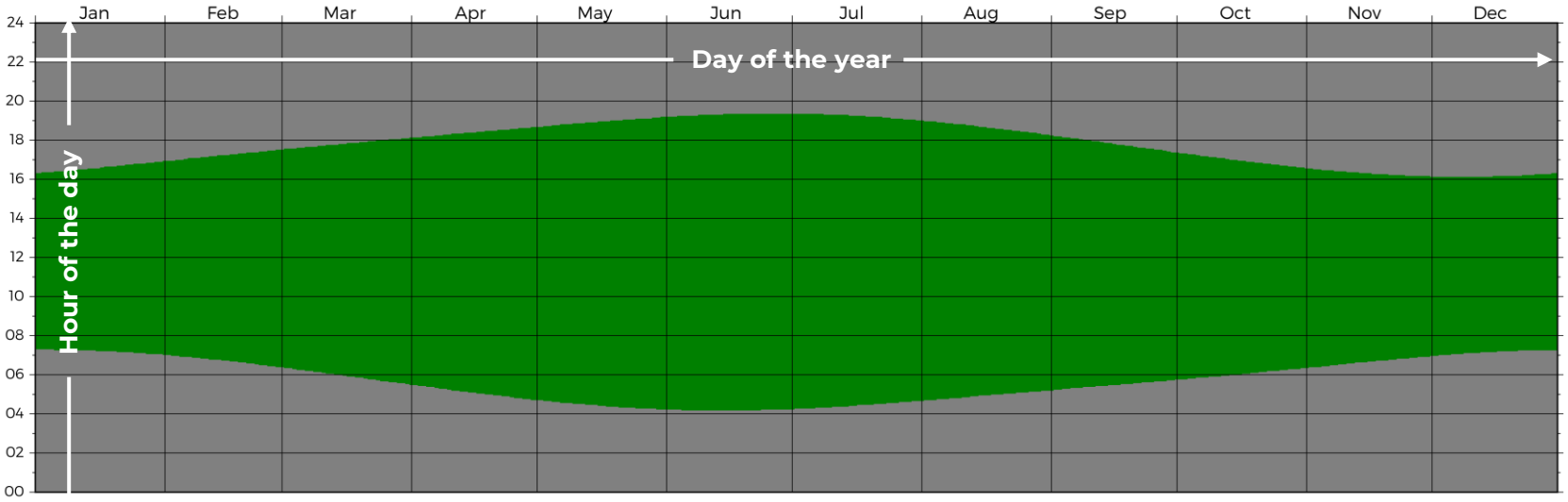


Figure A1: Layout of Annual Reflection Impact Diagram

Visual Impact Categories

Low: Either no significant reflections occur or the reflections will have a minimal effect on a viewer, even when looking directly at the source.

Moderate: The reflections can cause some visual nuisance only to viewers looking directly at the source.

High: The reflections can reduce visual acuity for viewers operating vehicles or performing other high-risk tasks who are unable to look away from the source, posing a significant risk of distraction.

Damaging: The brightest glare source is bright enough to permanently damage the eye for a viewer looking directly at the source.

Hatched areas indicate times and dates when the sun would also be in a driver's field of view.

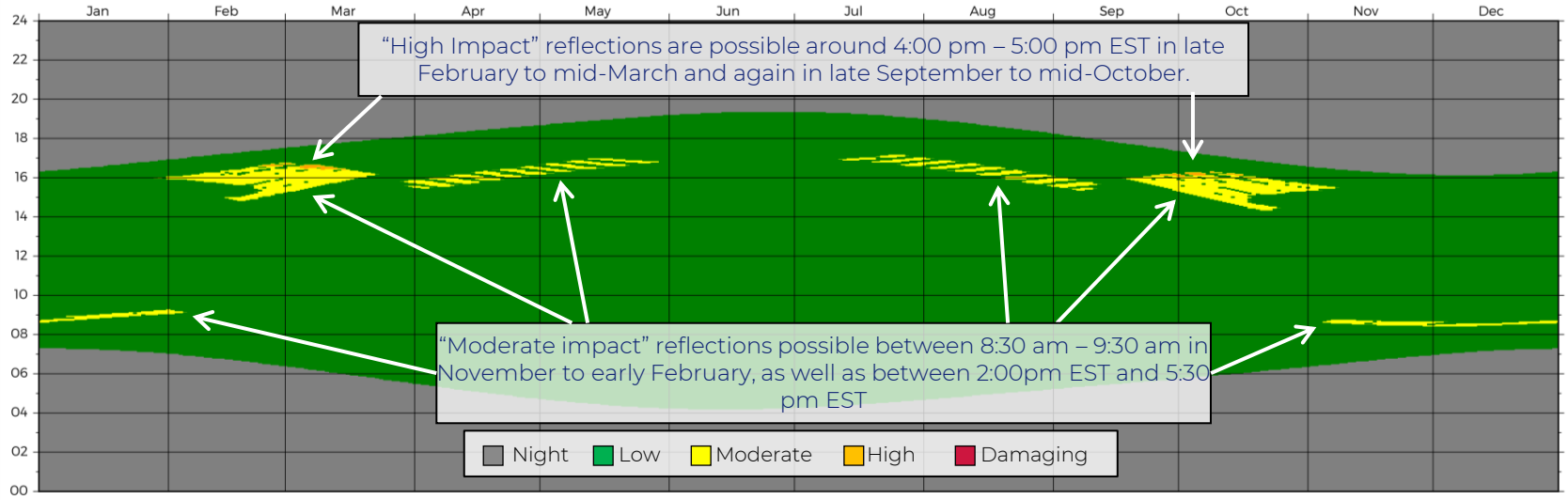


Figure A2: Example of Annual Visual Glare Impact Diagram – Receptor D2

Thermal Impact Categories for People

Low: Either no significant reflections occur or the reflection intensity is below the short-term exposure threshold of 1500 W/m².

Moderate: The reflection intensity is above the short-term exposure threshold of 1500 W/m² but below the safety threshold of 2500 W/m². Such reflections would quickly cause thermal discomfort in people.

High: The reflection intensity is above the safety threshold of 2500 W/m² but below 3500 W/m². This level of exposure to bare skin would lead to the onset of pain within 30 seconds.

Very High: Reflection intensity exceeds 3500 W/m². This level of exposure leads to second degree burns on bare skin within 1 minute.

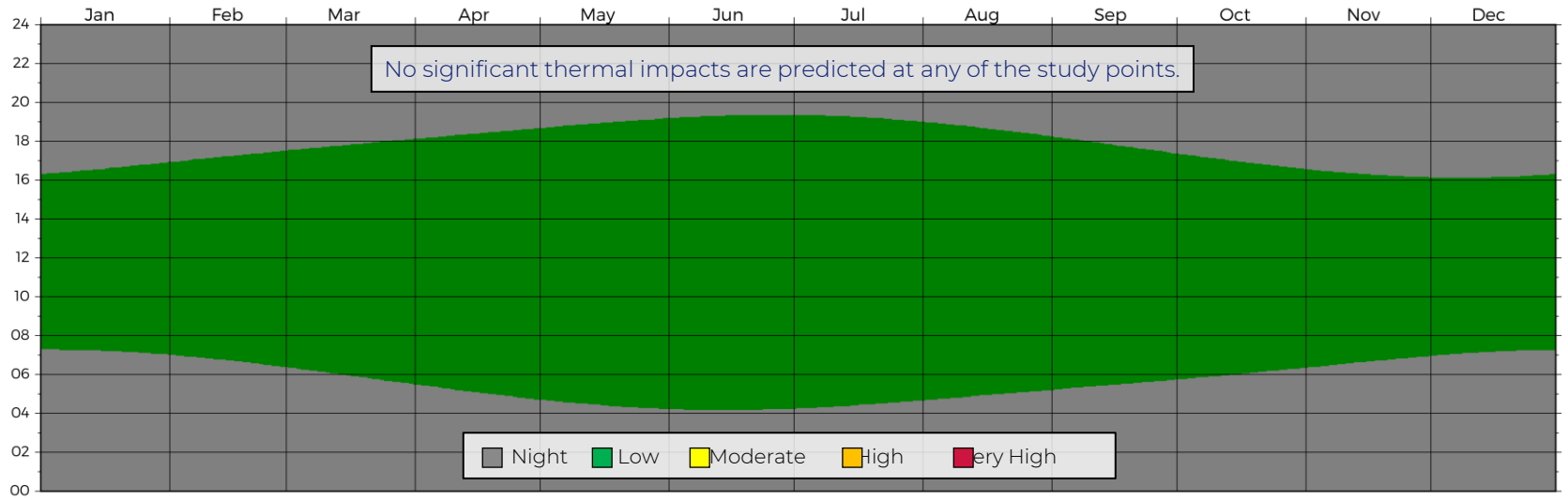


Figure A3: Example of Annual Pedestrian Thermal Impact Diagram – Receptor P19

Thermal Impact Categories for Property

A different scale is used to illustrate the reflected thermal energy on facades in order to provide further clarity on the potential for heat gain issues. The diagrams illustrate the irradiance levels of all predicted reflection events along with their frequency and duration.

The format of the diagram is similar to the diagrams described in the previous pages. The color of the plot for a given combination of date and time indicates the intensity of the reflected light at that point in time.

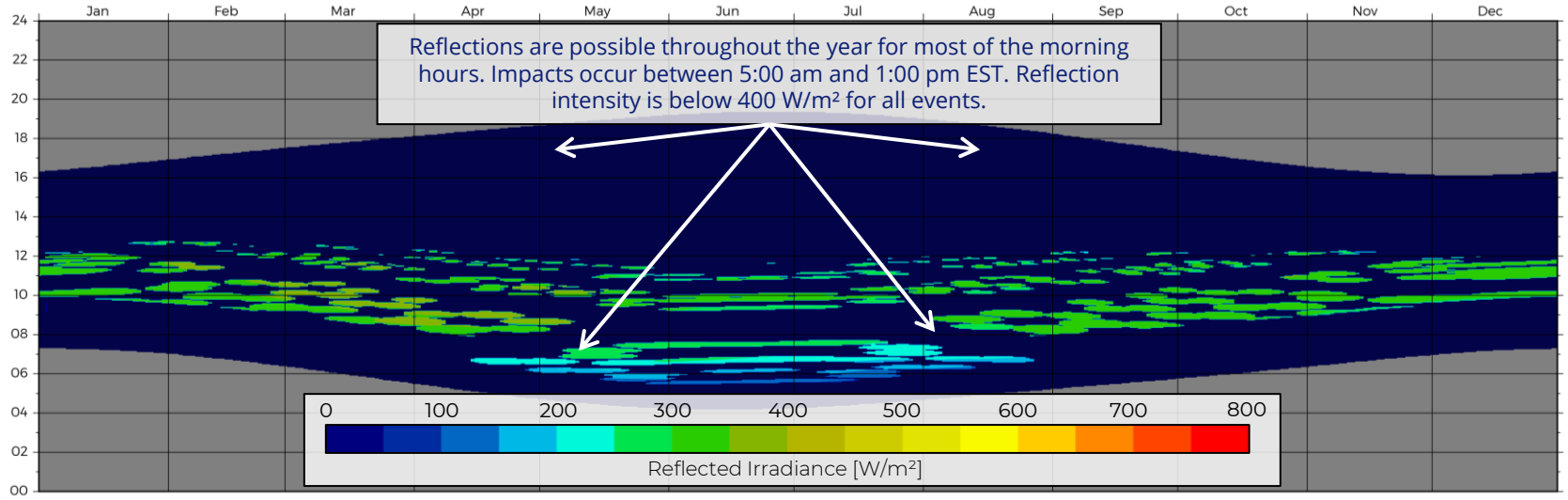


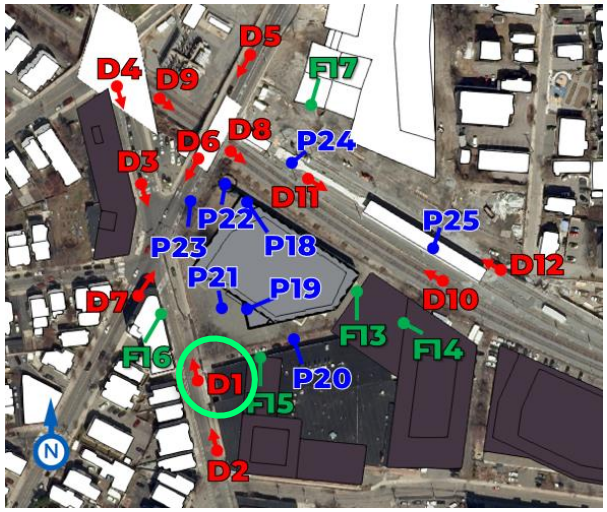
Figure A4: Example of Annual Property Thermal Impact Diagram – Receptor F13

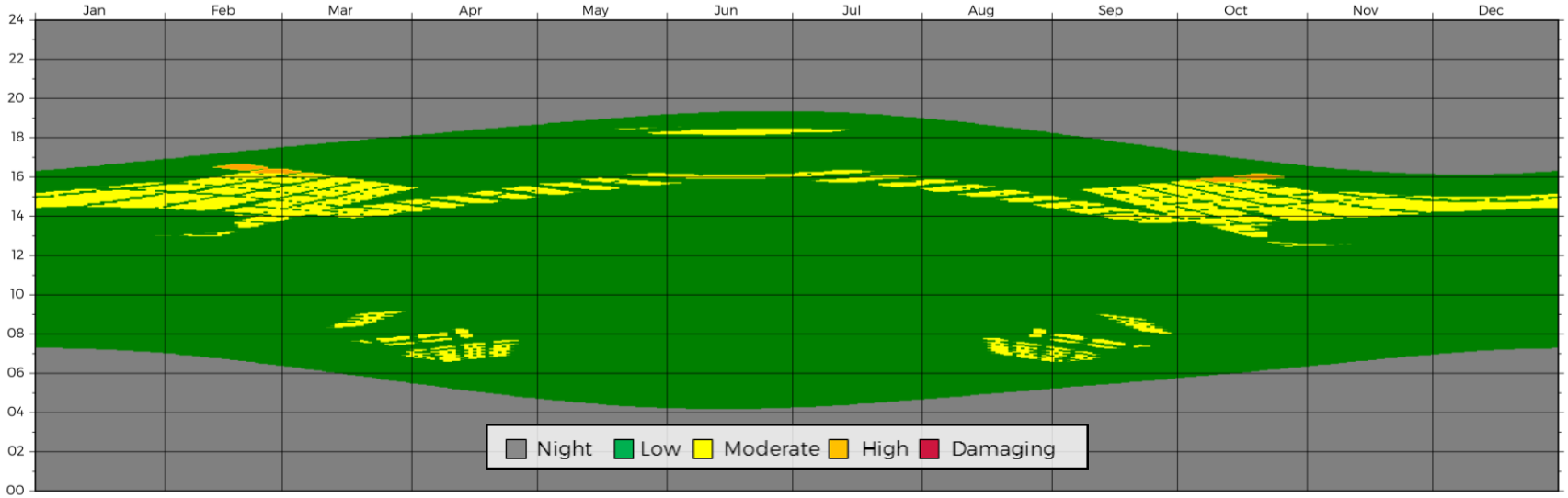
Driver Receptor D1

Receptor D1 was chosen to assess the visual impact associated with solar reflections affecting northbound drivers on Webster Avenue.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

Hatched areas on the plot indicate times when the sun is within a driver's field-of-view.



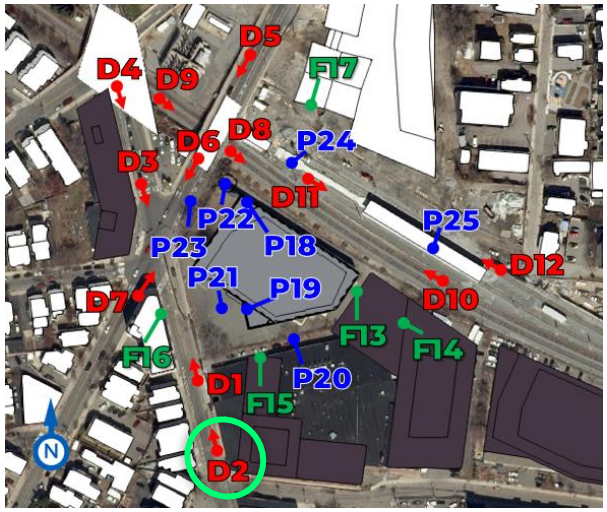


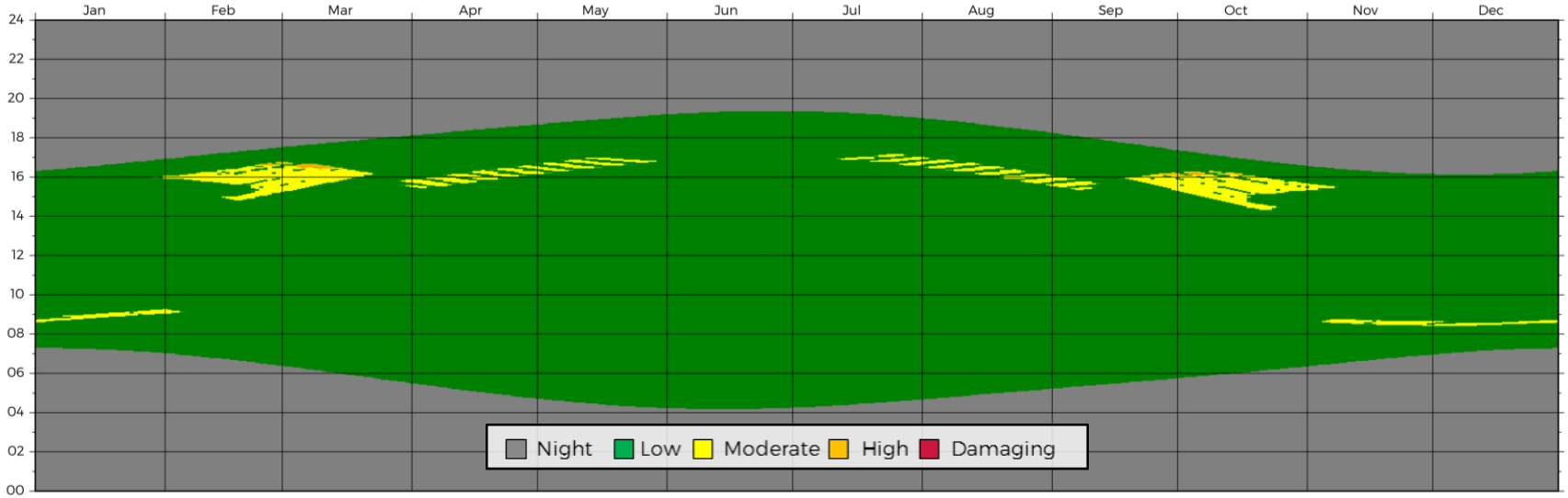
Driver Receptor D2

Receptor D2 was chosen to assess the visual impact associated with solar reflections affecting northbound drivers on Webster Avenue.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

Hatched areas on the plot indicate times when the sun is within a driver's field-of-view.



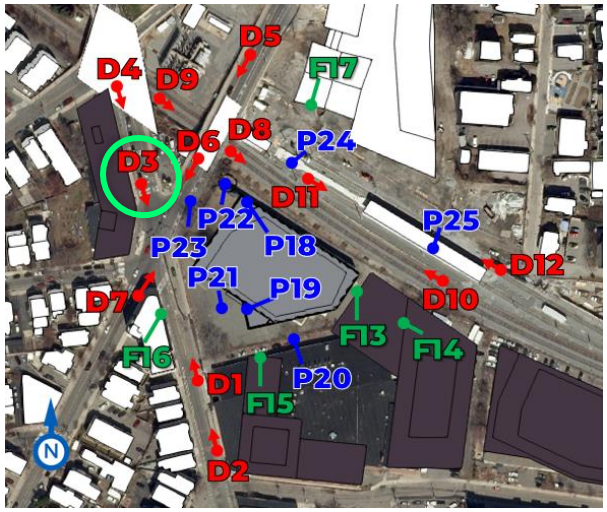


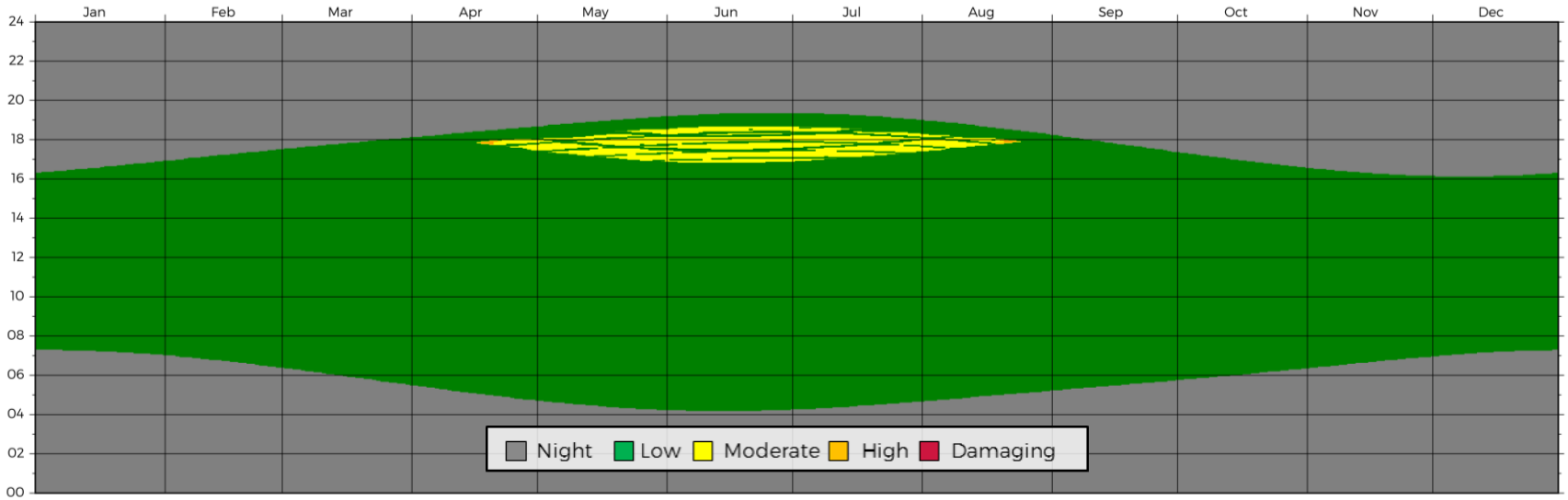
Driver Receptor D3

Receptor D3 was chosen to assess the visual impact associated with solar reflections affecting southbound drivers on Webster Avenue.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

Hatched areas on the plot indicate times when the sun is within a driver's field-of-view.



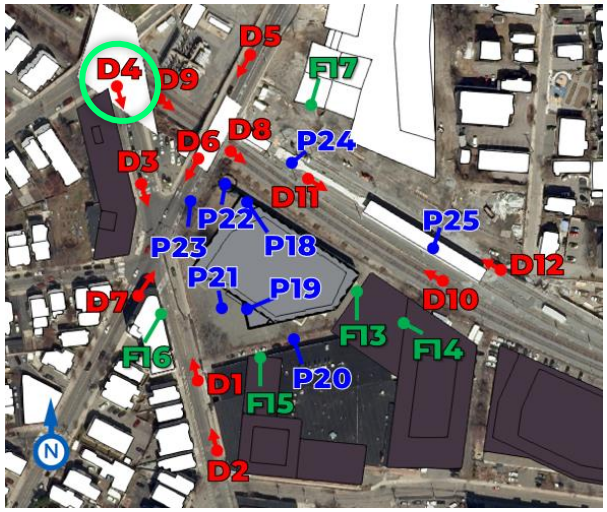


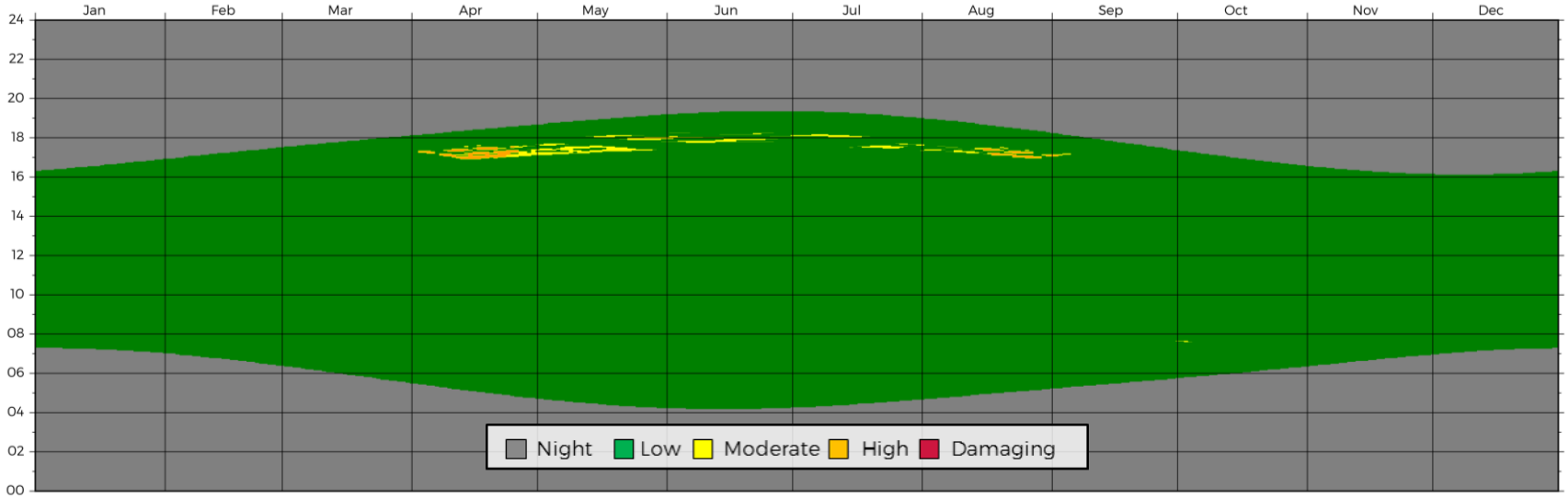
Driver Receptor D4

Receptor D4 was chosen to assess the visual impact associated with solar reflections affecting southbound drivers on Webster Avenue.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

Hatched areas on the plot indicate times when the sun is within a driver's field-of-view.



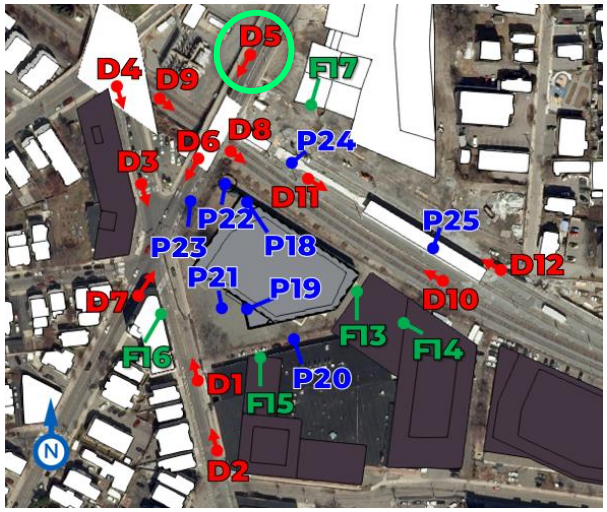


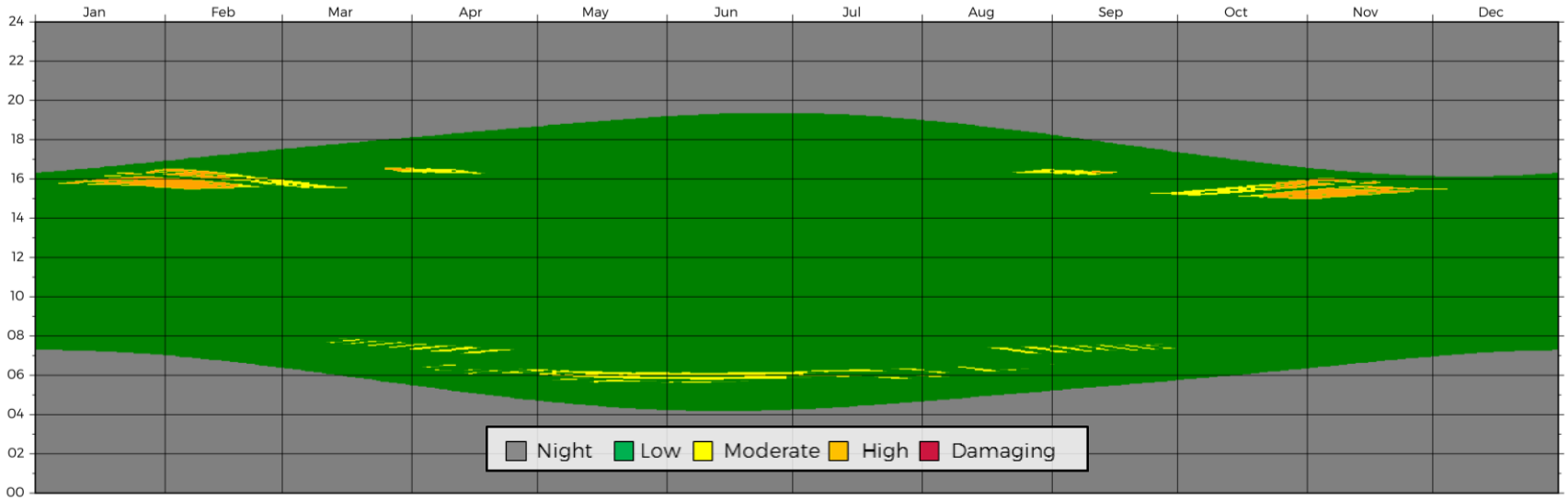
Driver Receptor D5

Receptor D5 was chosen to assess the visual impact associated with solar reflections affecting southbound drivers on Prospect Street.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

Hatched areas on the plot indicate times when the sun is within a driver's field-of-view.



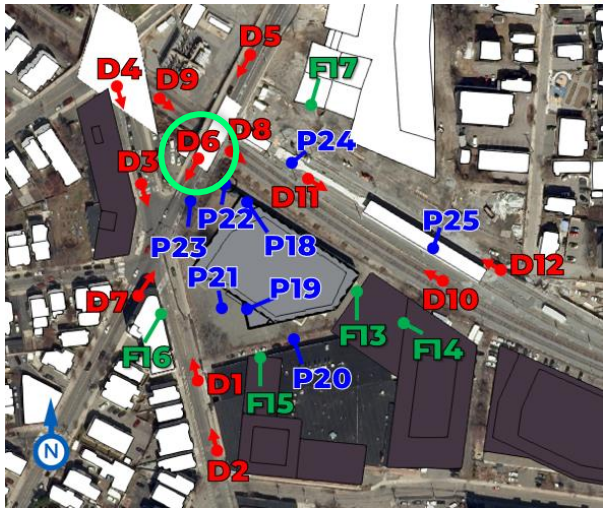


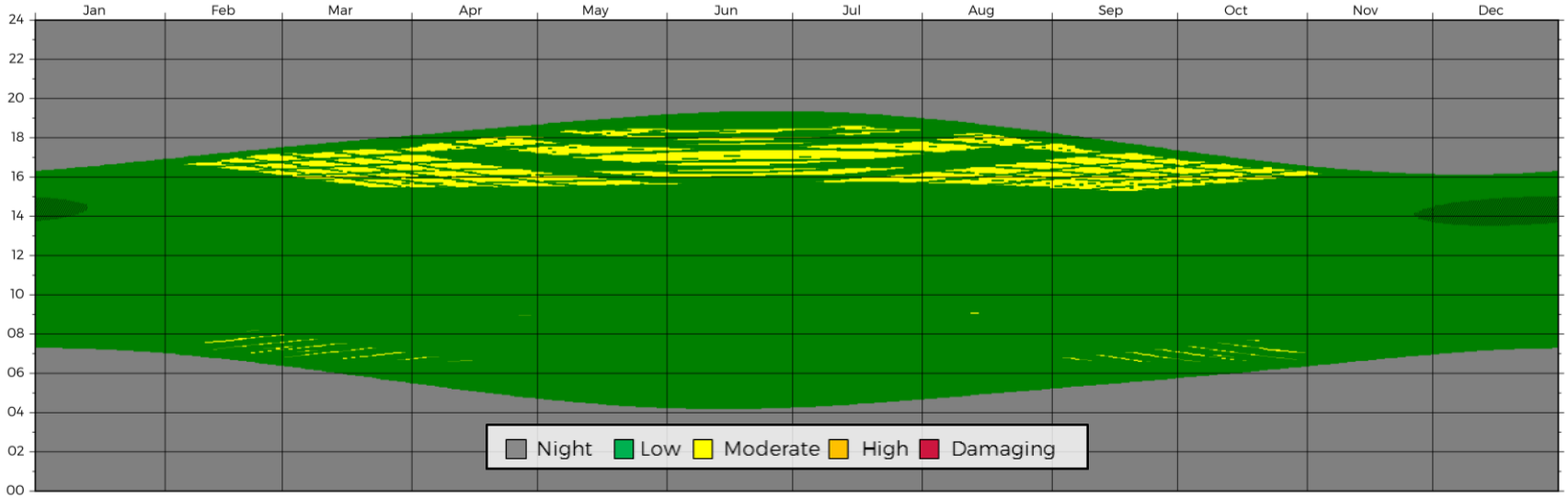
Driver Receptor D6

Receptor D6 was chosen to assess the visual impact associated with solar reflections affecting southbound drivers on Prospect Street.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

Hatched areas on the plot indicate times when the sun is within a driver's field-of-view.



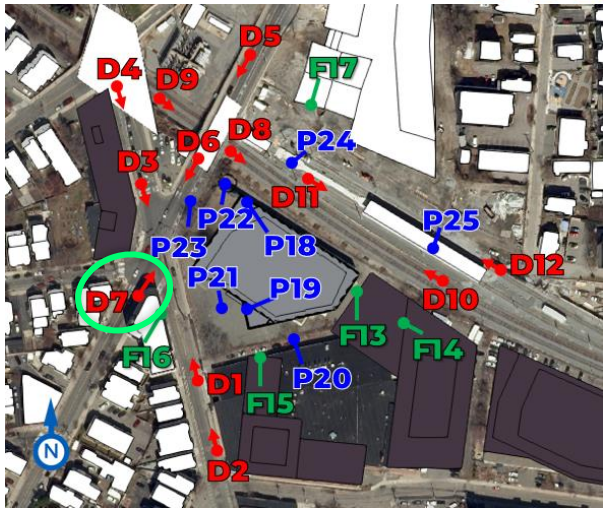


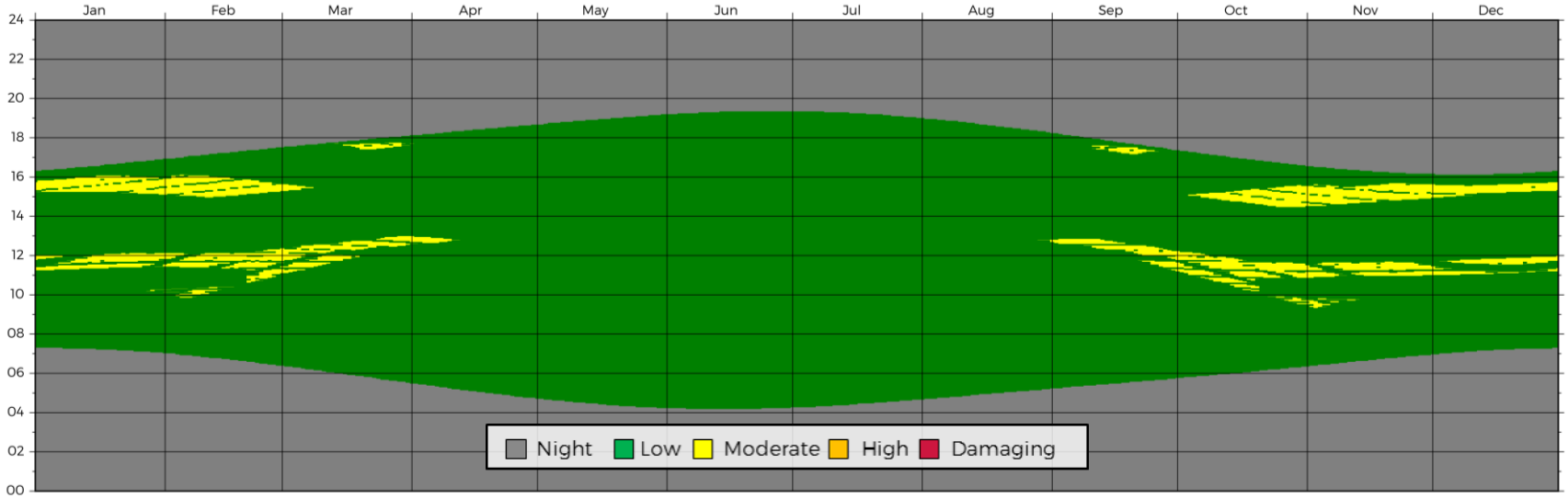
Driver Receptor D7

Receptor D7 was chosen to assess the visual impact associated with solar reflections affecting northbound drivers on Prospect Street at the intersection of Webster Avenue.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

Hatched areas on the plot indicate times when the sun is within a driver's field-of-view.



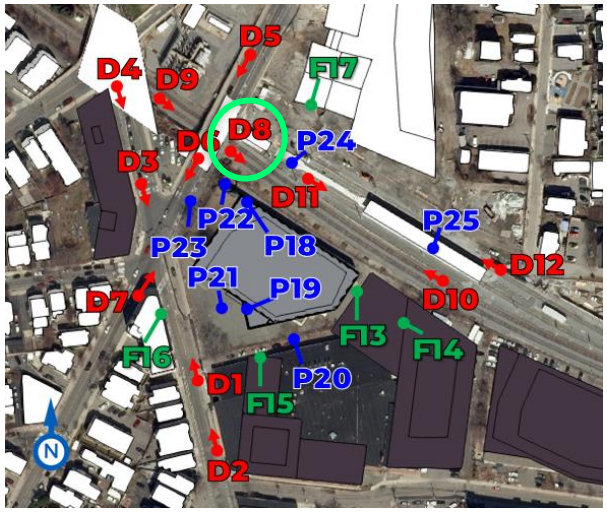


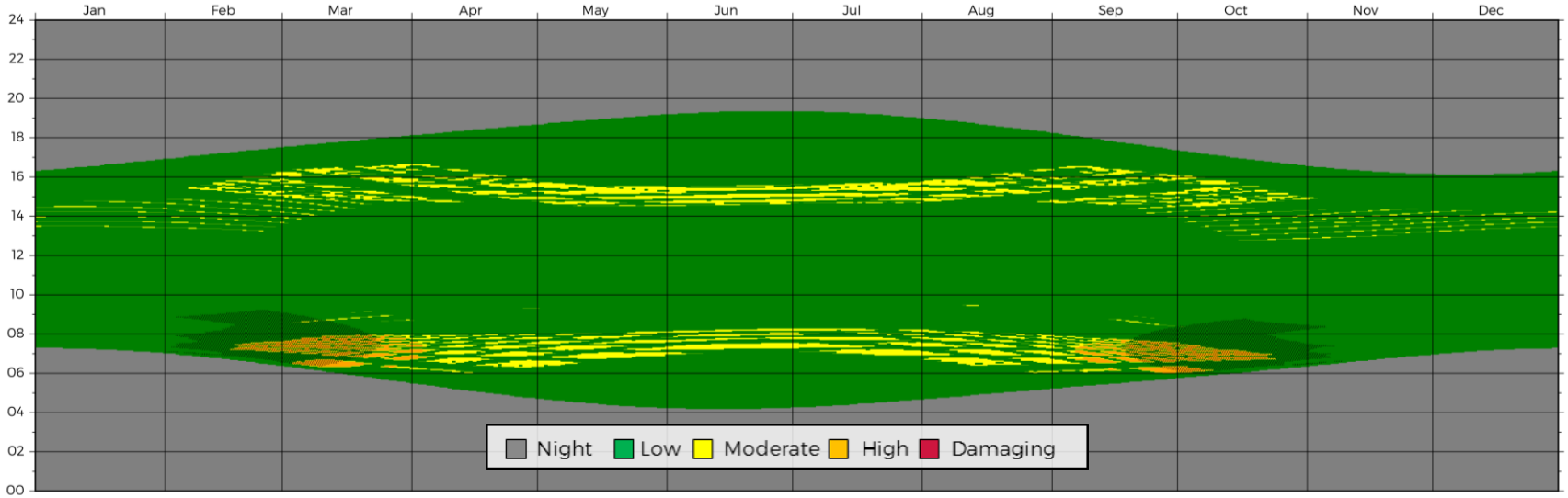
Driver Receptor D8

Receptor D8 was chosen to assess the visual impact associated with solar reflections affecting eastbound trains on the train tracks north of the development.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

Hatched areas on the plot indicate times when the sun is within a driver's field-of-view.



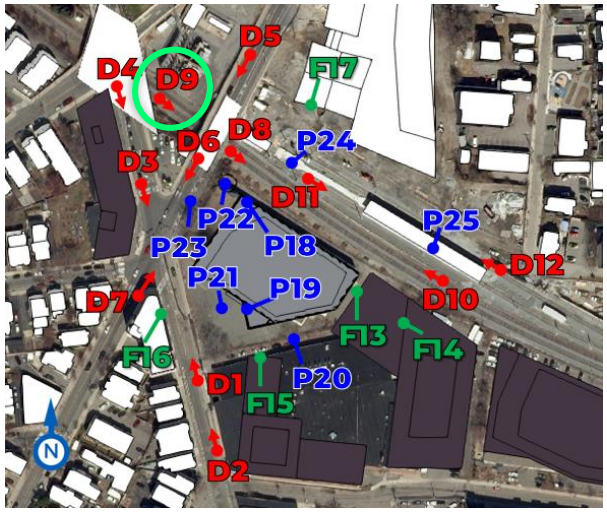


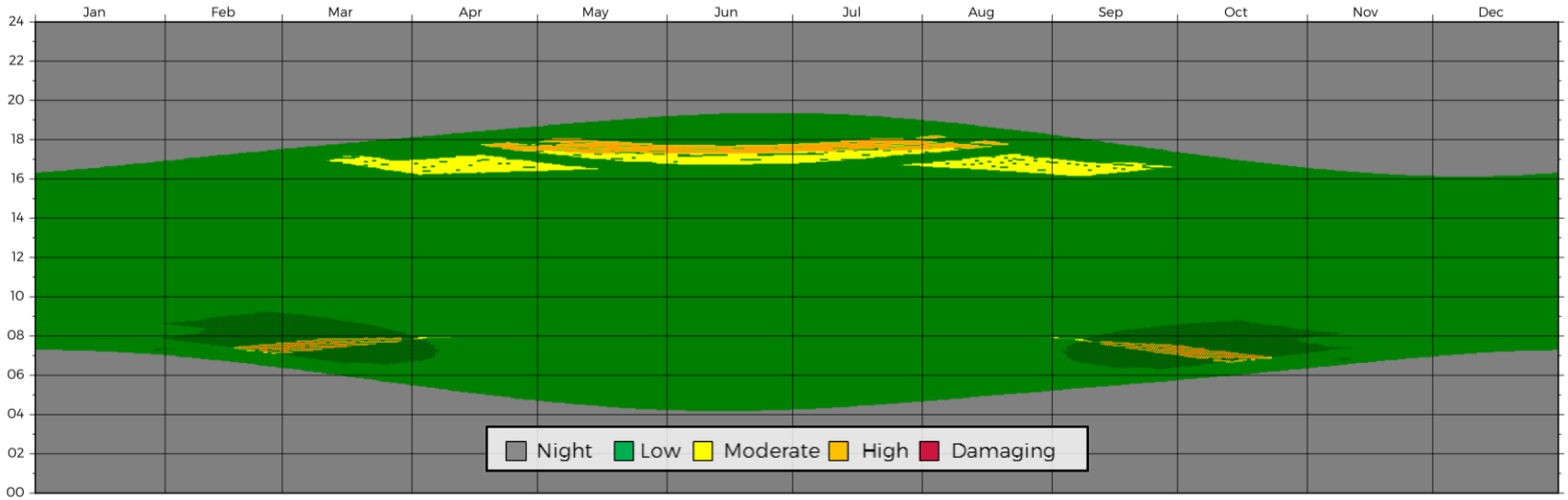
Driver Receptor D9

Receptor D9 was chosen to assess the visual impact associated with solar reflections affecting eastbound trains on the train tracks north of the development.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

Hatched areas on the plot indicate times when the sun is within a driver's field-of-view.



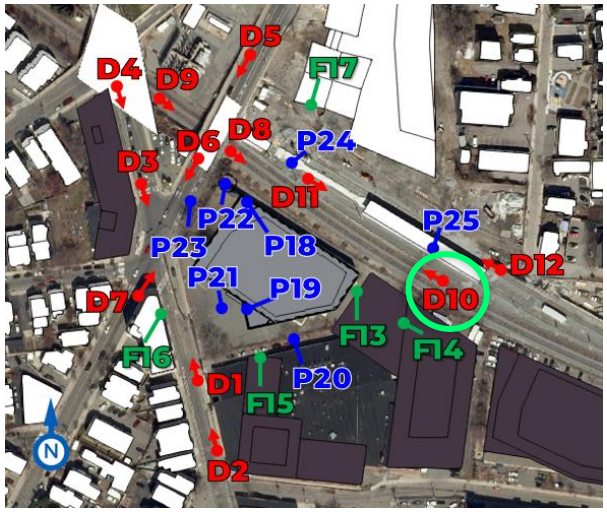


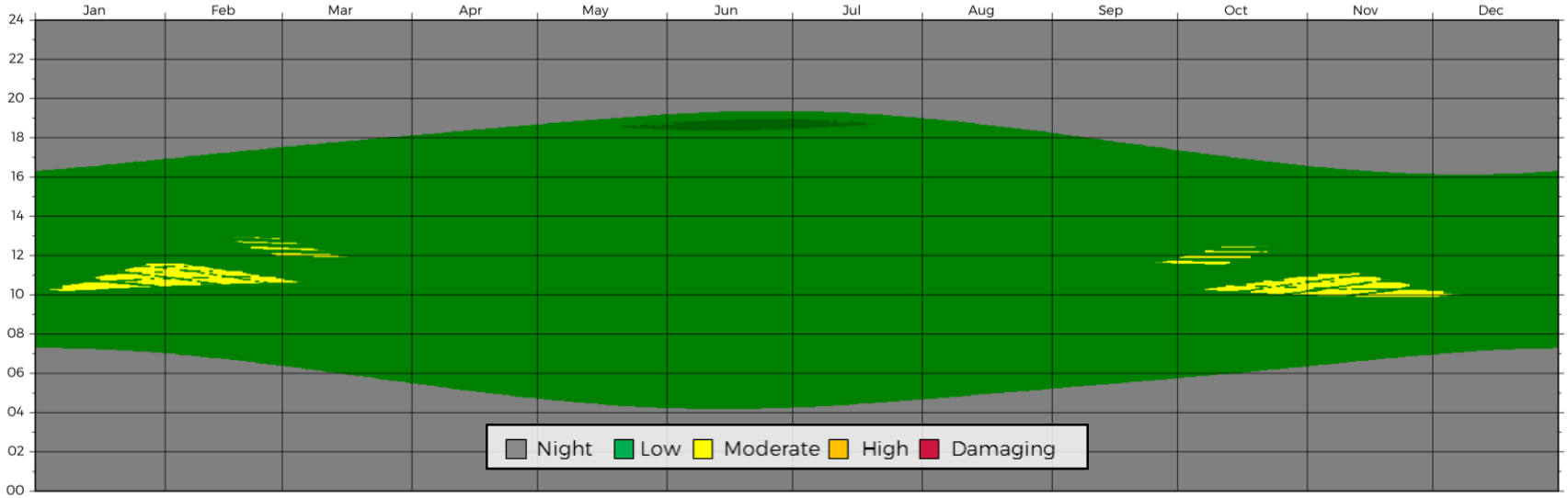
Driver Receptor D10

Receptor D10 was chosen to assess the visual impact associated with solar reflections affecting westbound trains on the train tracks north of the development.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

Hatched areas on the plot indicate times when the sun is within a driver's field-of-view.



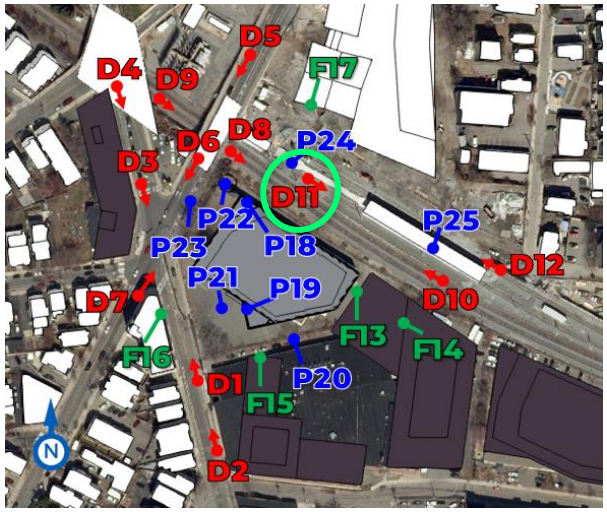


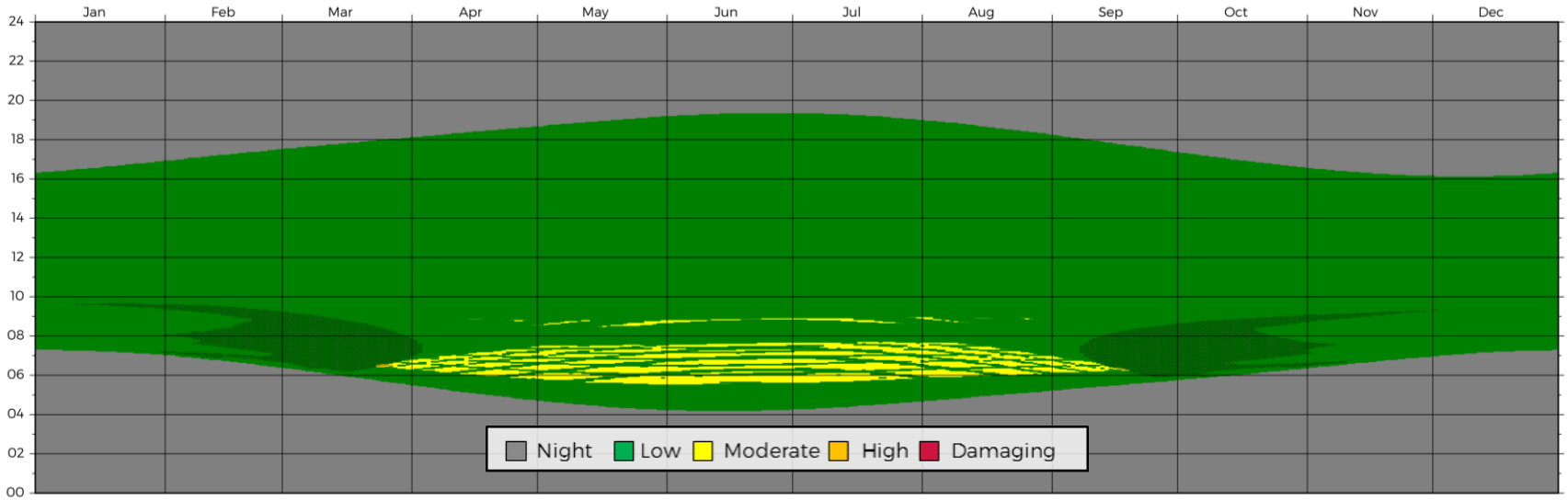
Driver Receptor D11

Receptor D11 was chosen to assess the visual impact associated with solar reflections affecting trains exiting Union Square station.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

Hatched areas on the plot indicate times when the sun is within a driver's field-of-view.



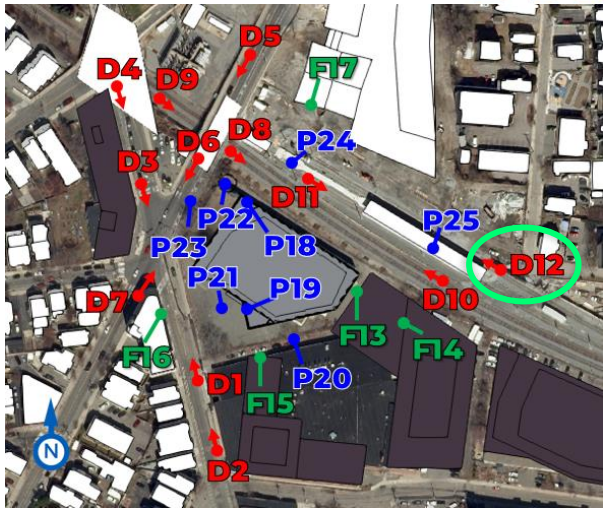


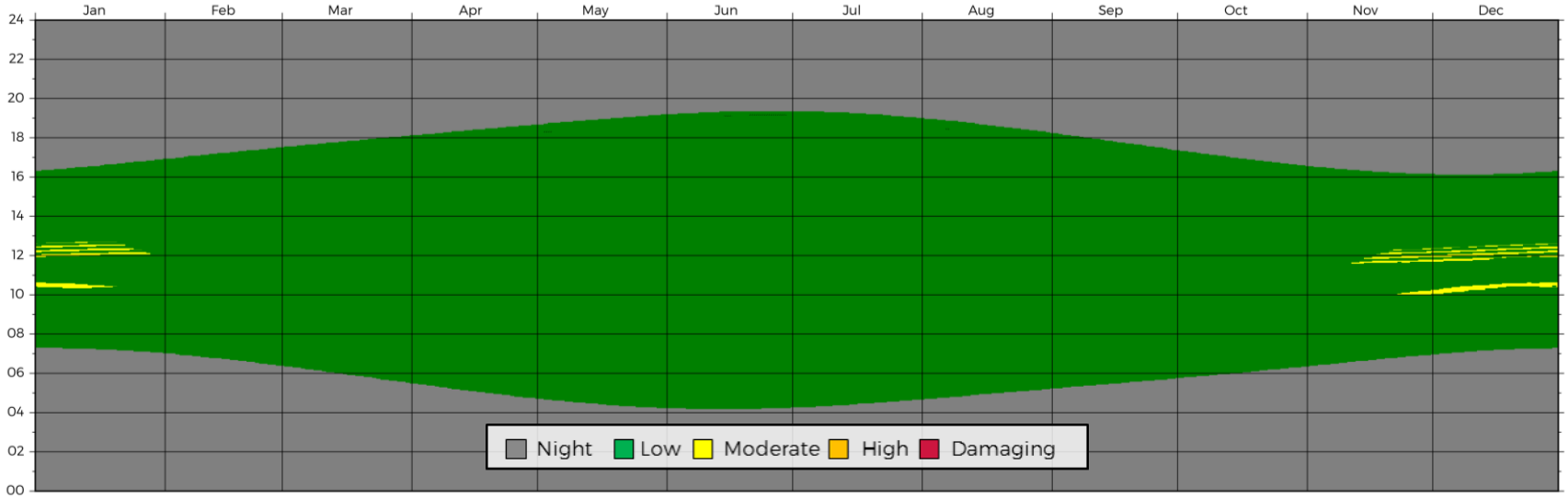
Driver Receptor D12

Receptor D12 was chosen to assess the visual impact associated with solar reflections affecting trains entering Union Square station.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

Hatched areas on the plot indicate times when the sun is within a driver's field-of-view.

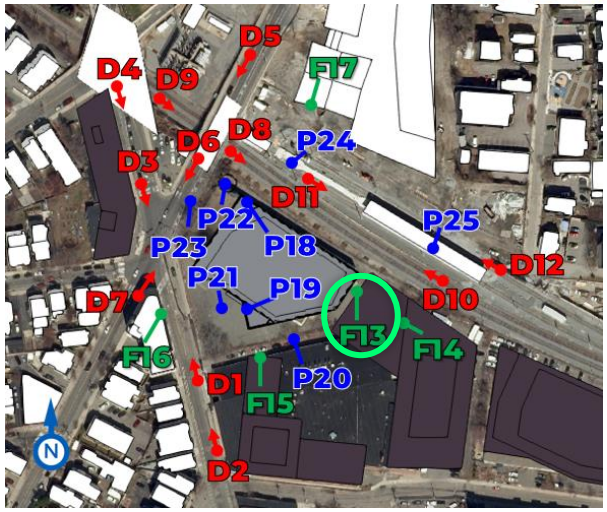


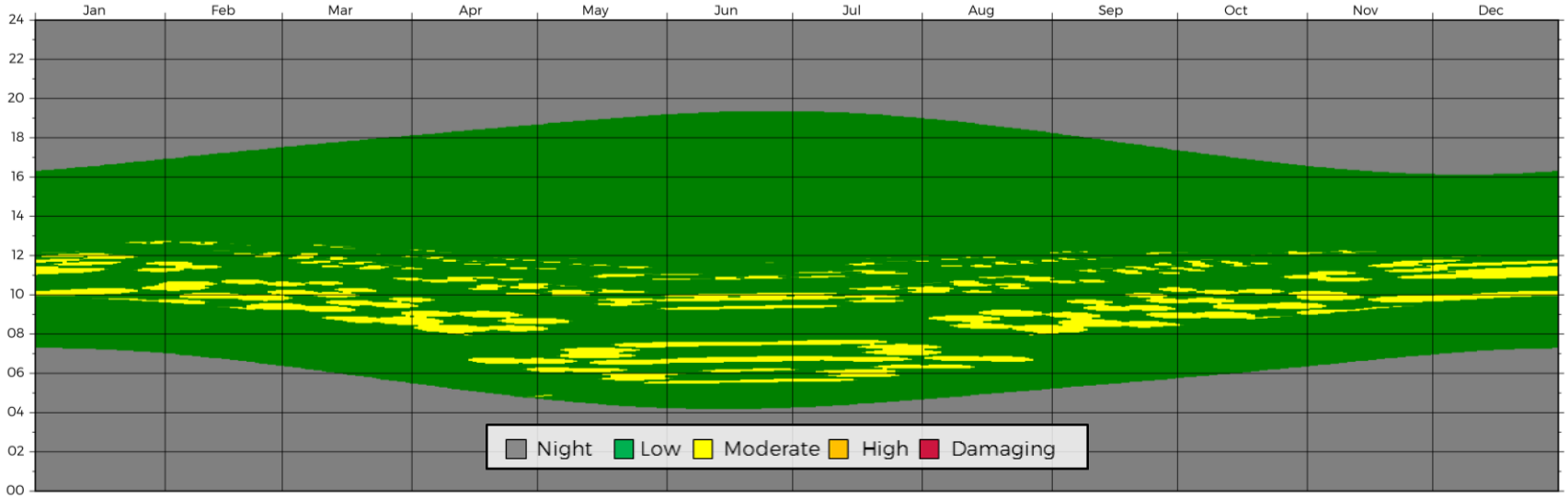


Facade Receptor F13

Receptor F13 was chosen to assess the visual impact associated with solar reflections affecting northwest facade at approximately 2nd floor height of the building immediately southeast of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

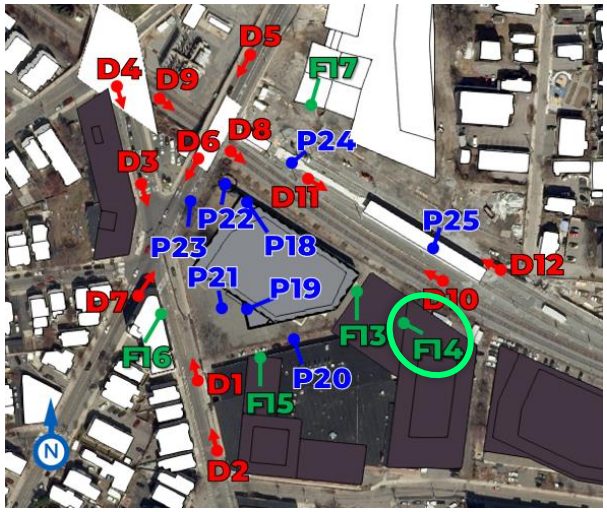


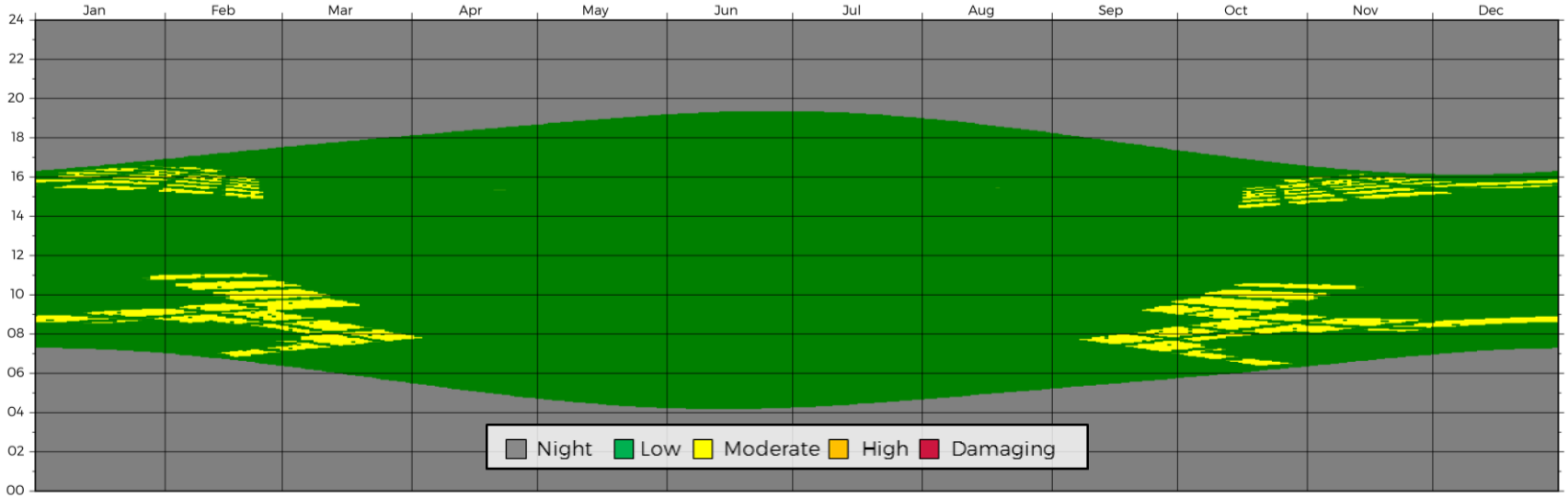


Facade Receptor F14

Receptor F14 was chosen to assess the visual impact associated with solar reflections affecting northwest facade at approximately 3rd floor height of the building immediately southeast of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



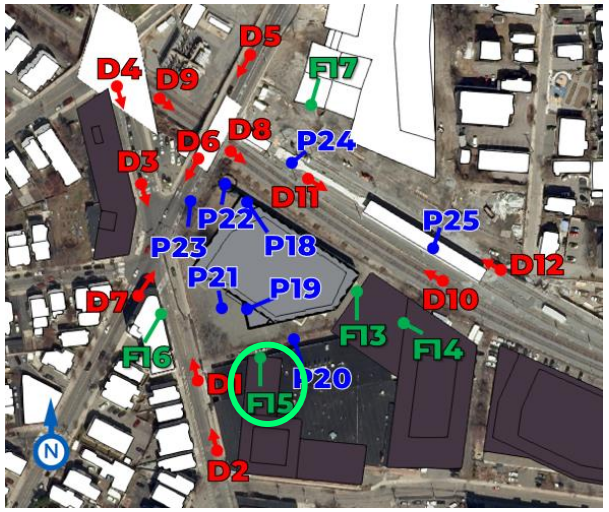


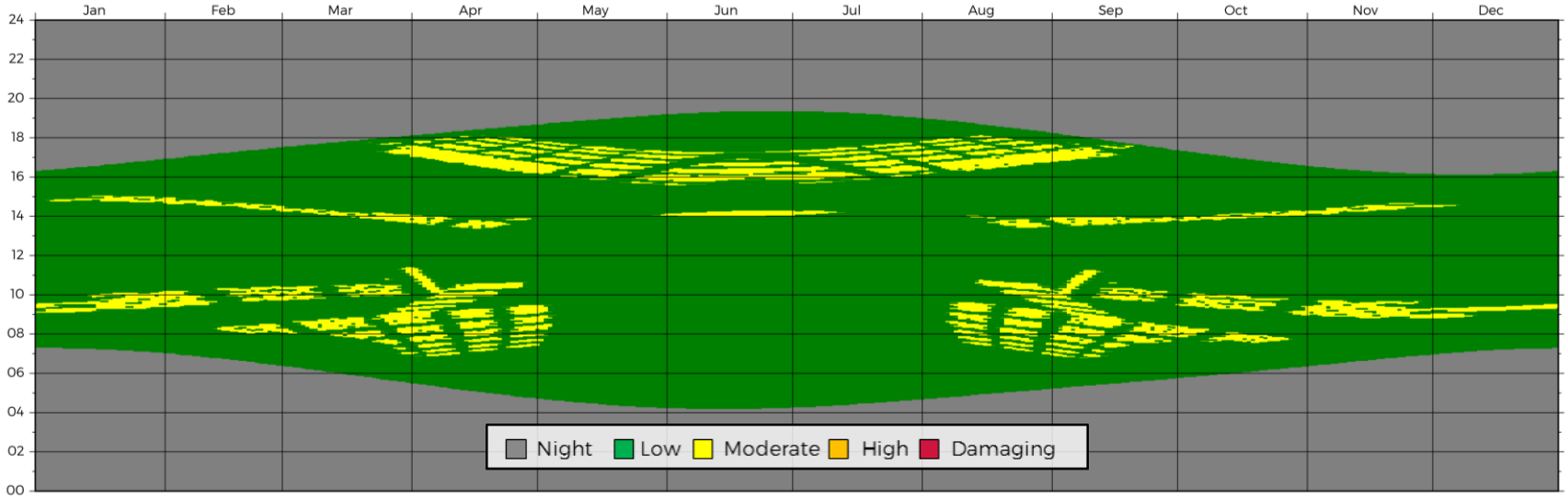
ANNUAL VISUAL IMPACT

Facade Receptor F15

Receptor F15 was chosen to assess the visual impact associated with solar reflections affecting north facade at 2nd floor height of the building immediately south of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

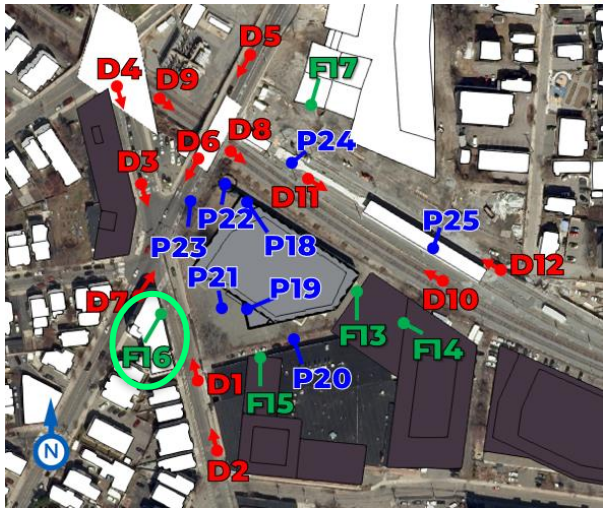


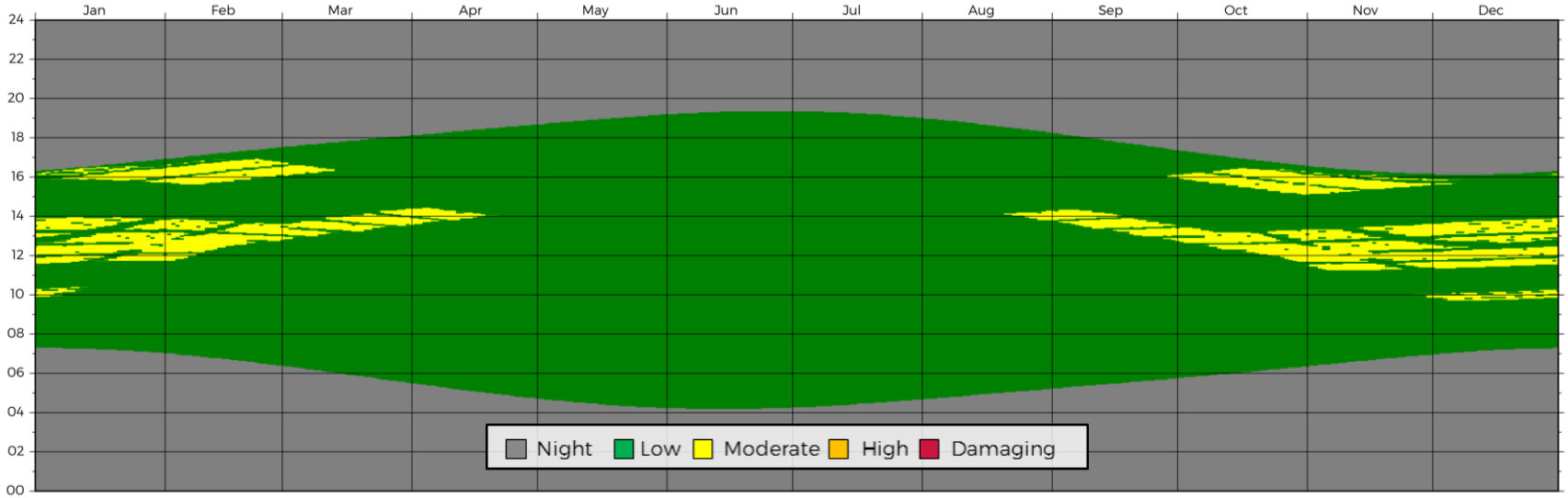


Facade Receptor F16

Receptor F16 was chosen to assess the visual impact associated with solar reflections affecting east facade at 3rd floor height of the building immediately Southwest of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

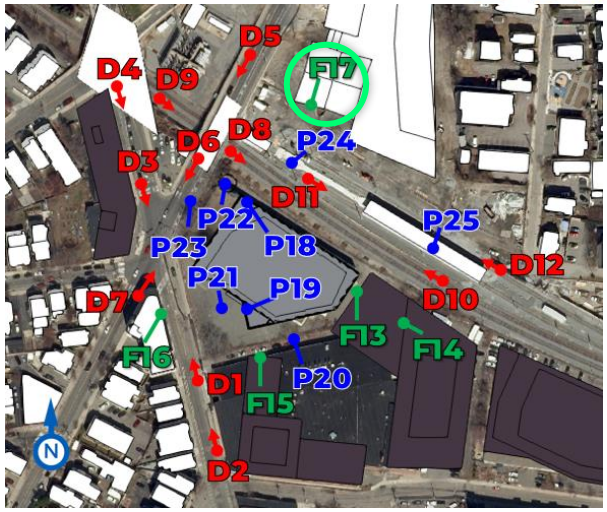


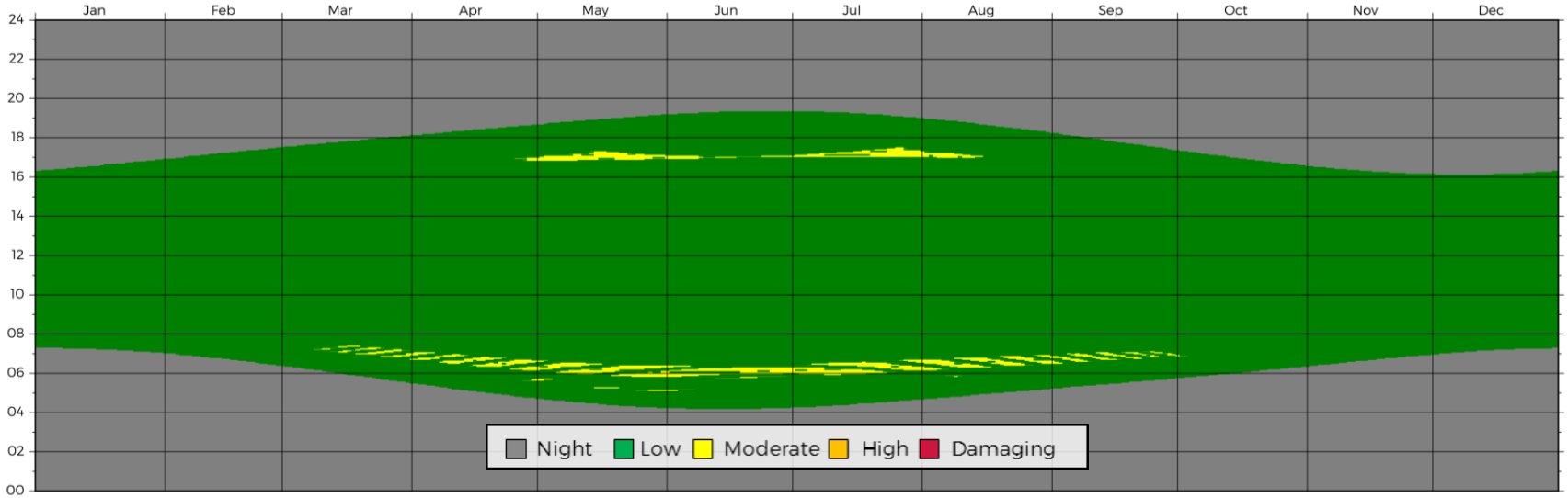


Facade Receptor F17

Receptor F17 was chosen to assess the visual impact associated with solar reflections affecting south facade at 4th floor height of the building immediately Northeast of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

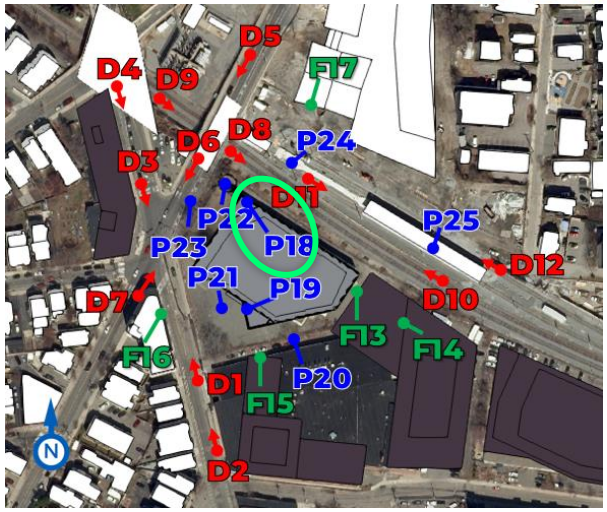


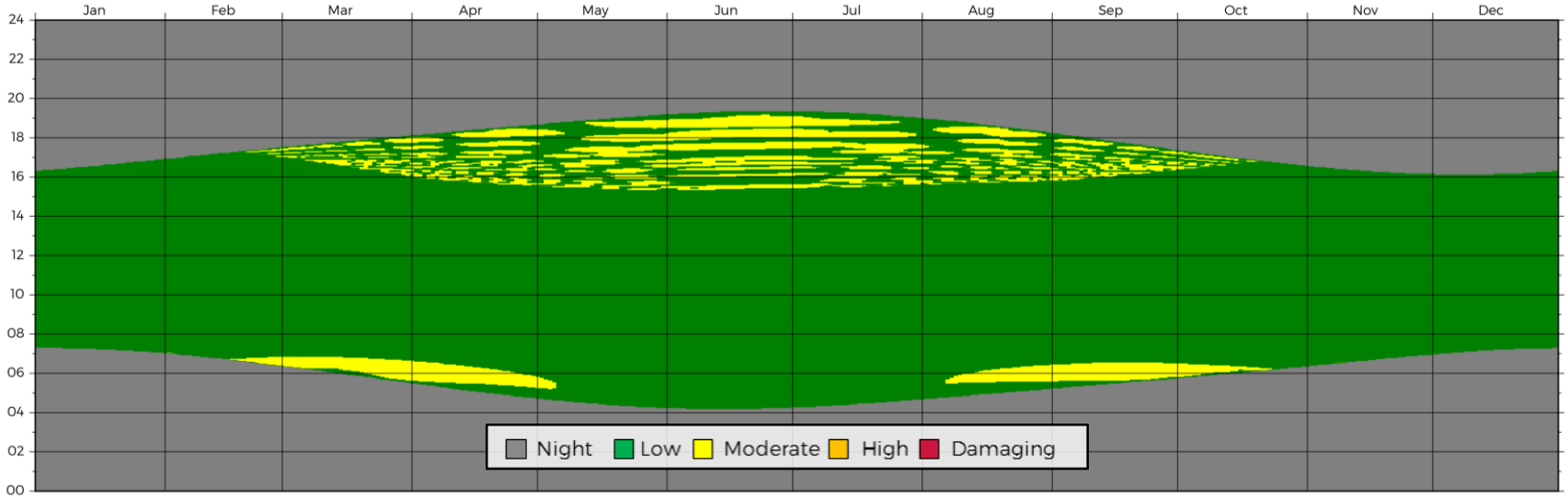


Pedestrian Receptor P18

Receptor P18 was chosen to assess the visual impact associated with solar reflections affecting pedestrians on the northern terrace of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

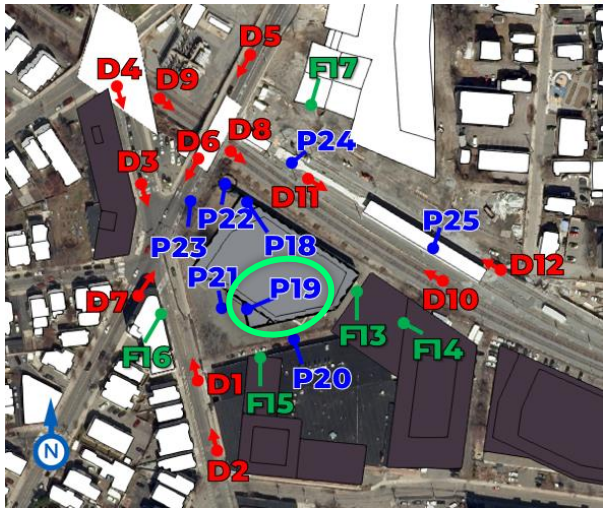


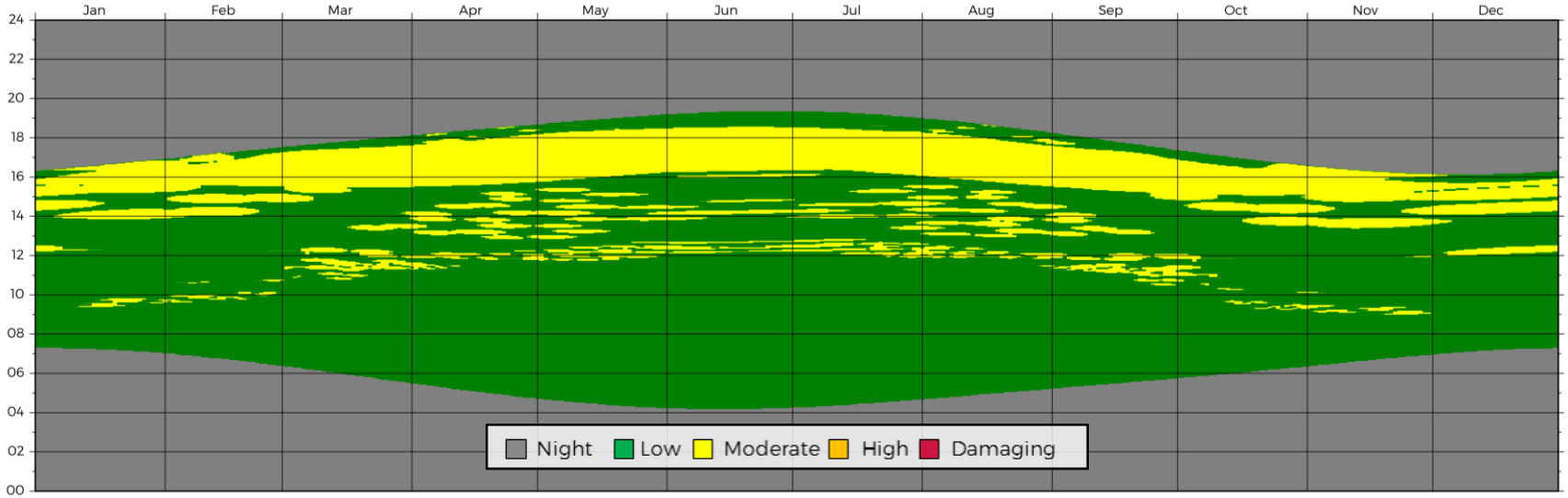


Pedestrian Receptor P19

Receptor P19 was chosen to assess the visual impact associated with solar reflections affecting pedestrians on the southern terrace of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

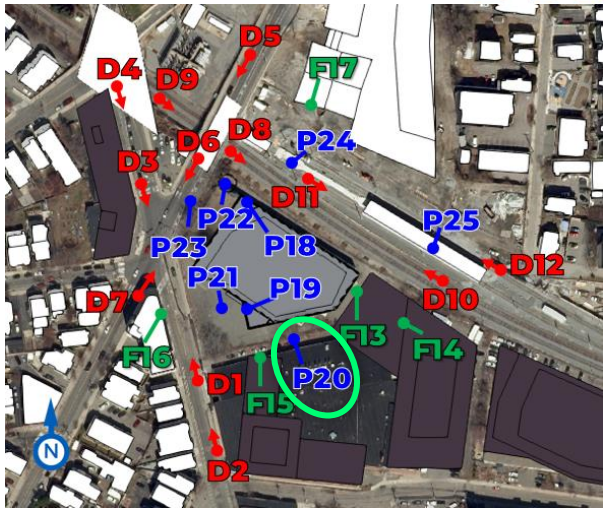


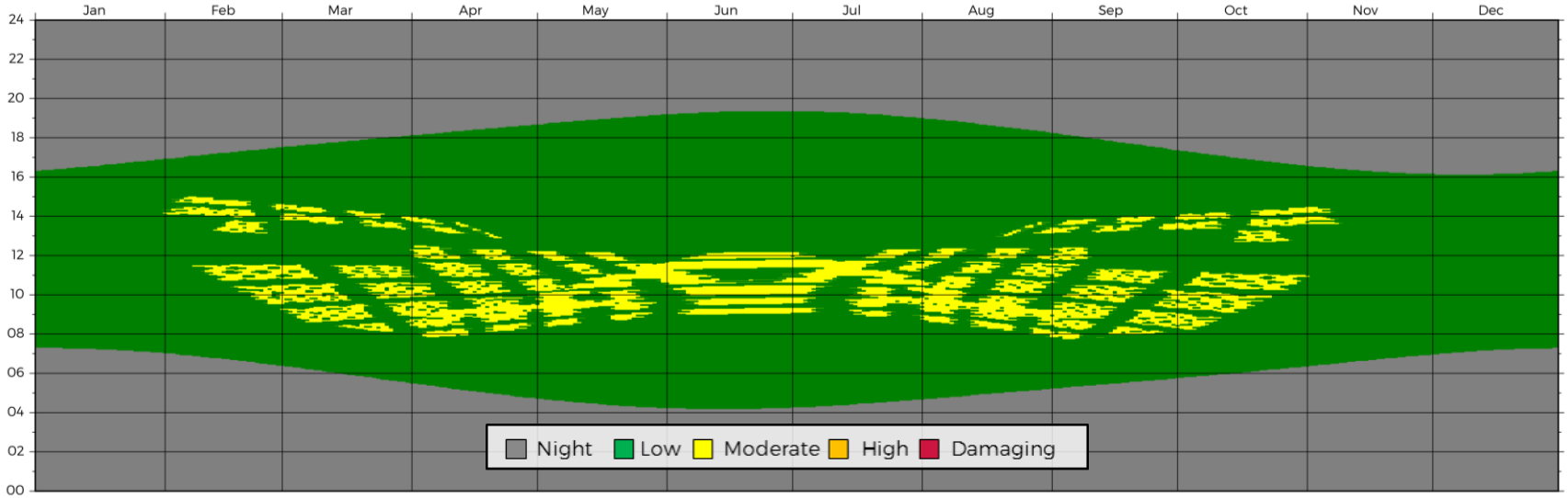


Pedestrian Receptor P20

Receptor P20 was chosen to assess the visual impact associated with solar reflections affecting pedestrians south of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

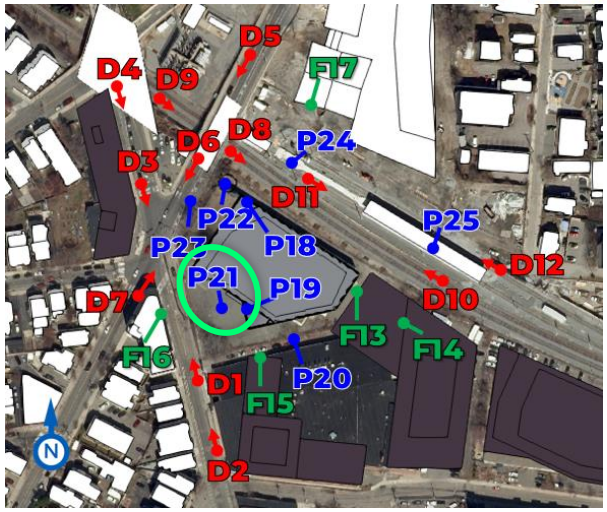


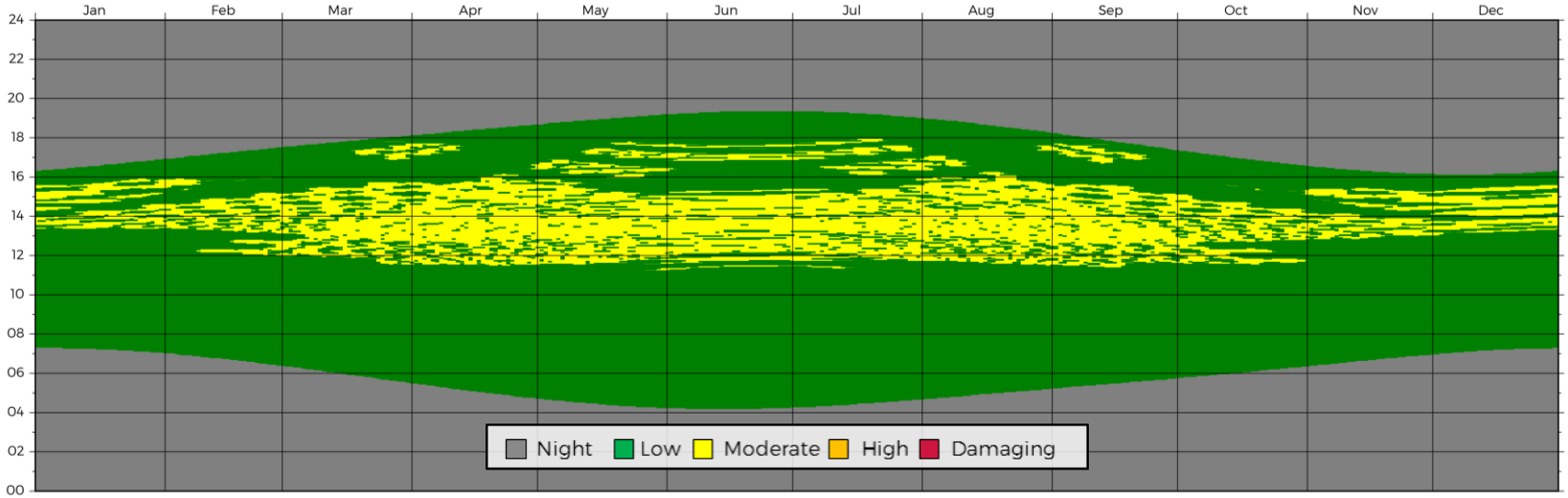


Pedestrian Receptor P21

Receptor P21 was chosen to assess the visual impact associated with solar reflections affecting pedestrians south of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

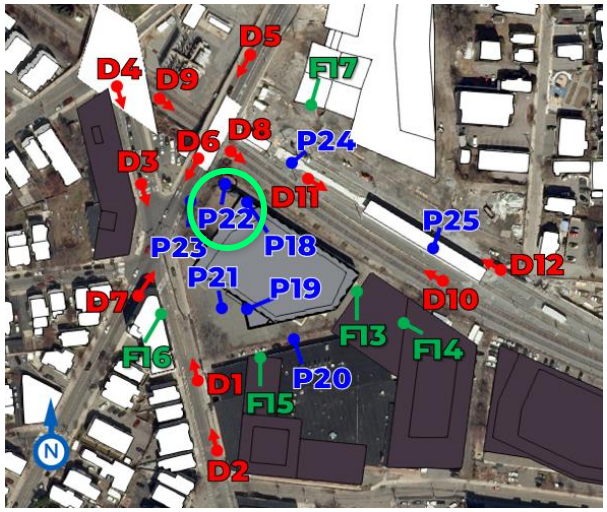


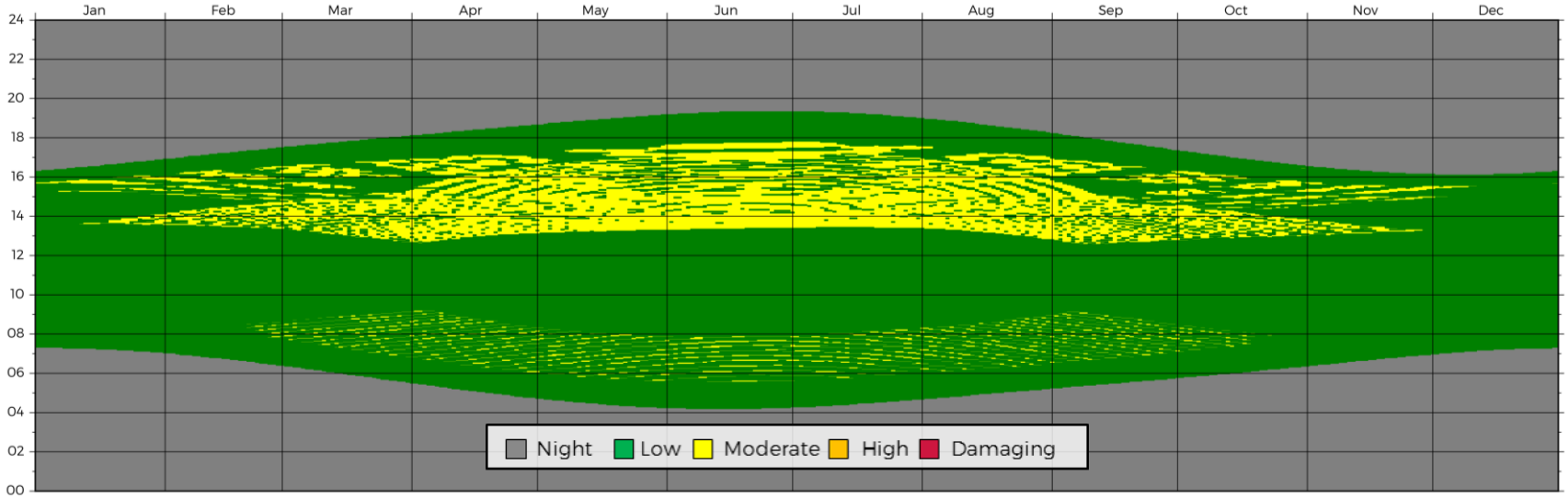


Pedestrian Receptor P22

Receptor P22 was chosen to assess the visual impact associated with solar reflections affecting pedestrians under the Northwest glass sculpture.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

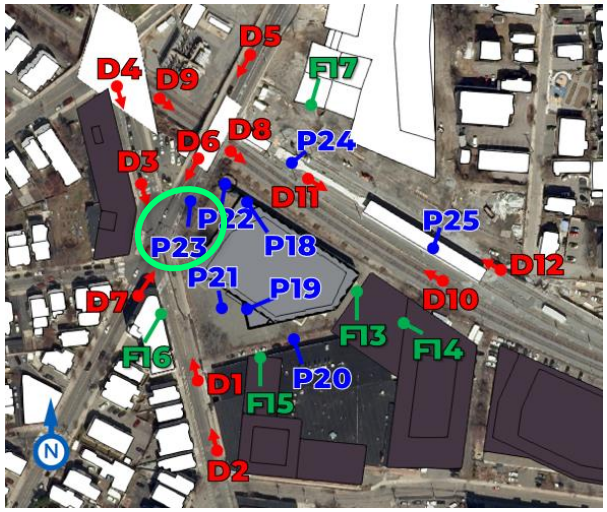


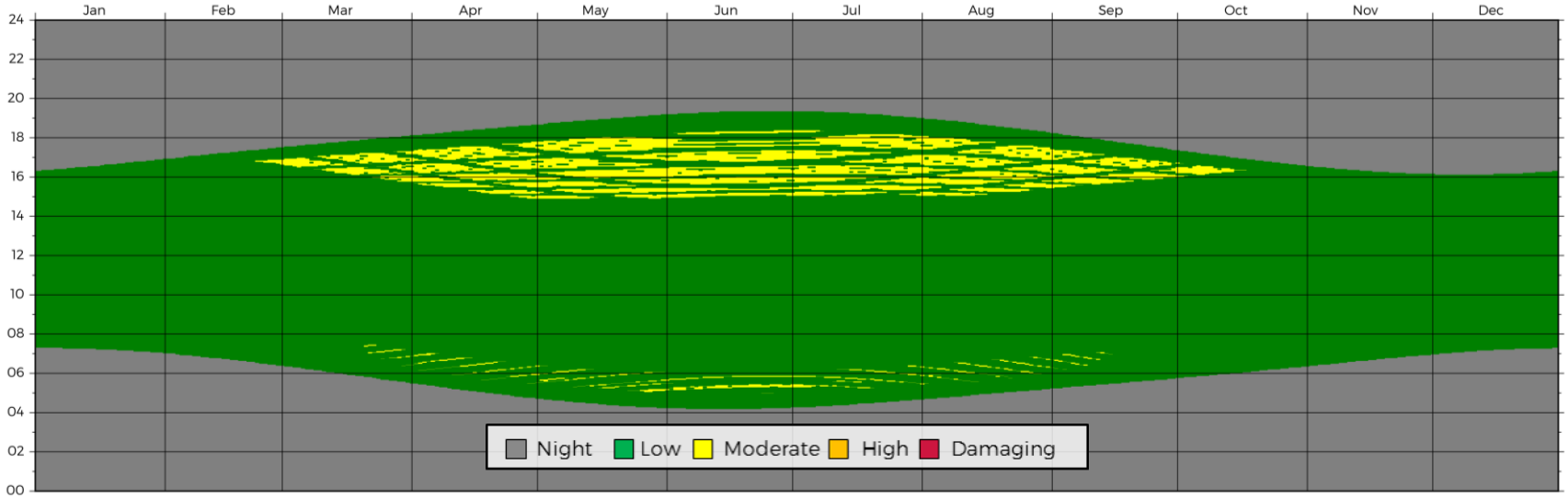


Pedestrian Receptor P23

Receptor P23 was chosen to assess the visual impact associated with solar reflections affecting pedestrians crossing Prospect Street at the intersection of Prospect St. and Webster Ave.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

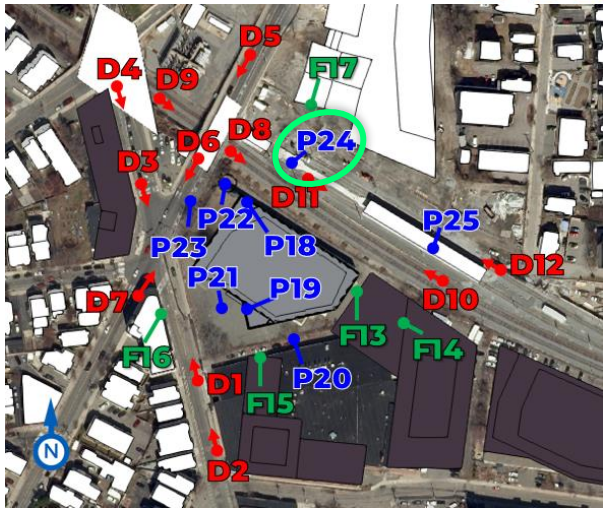


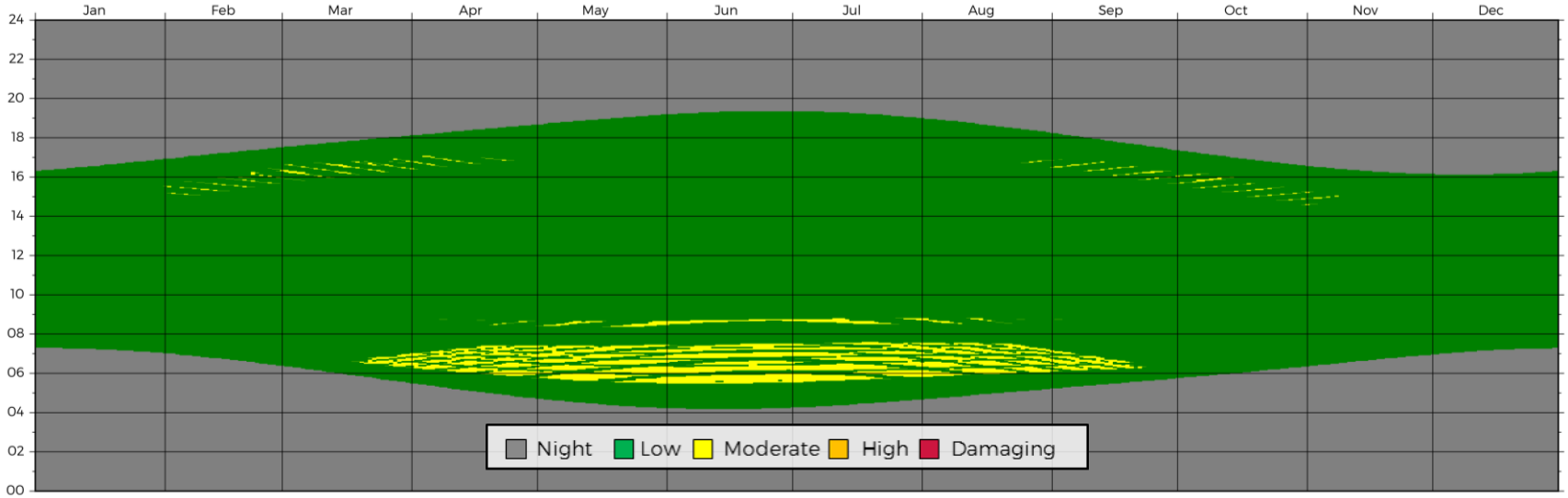


Pedestrian Receptor P24

Receptor P24 was chosen to assess the visual impact associated with solar reflections affecting pedestrians waiting at Union Square station.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

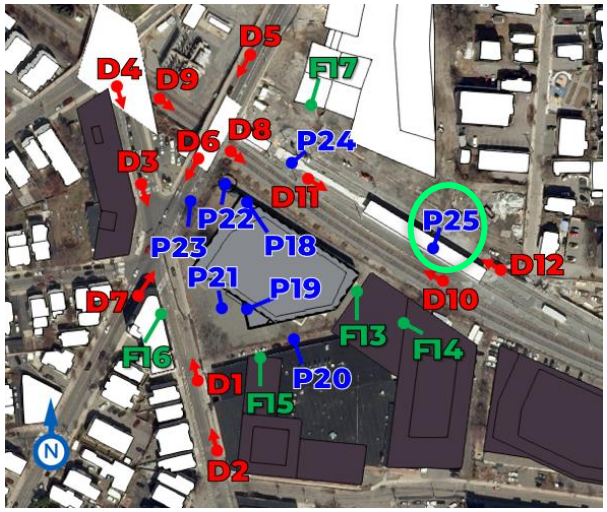


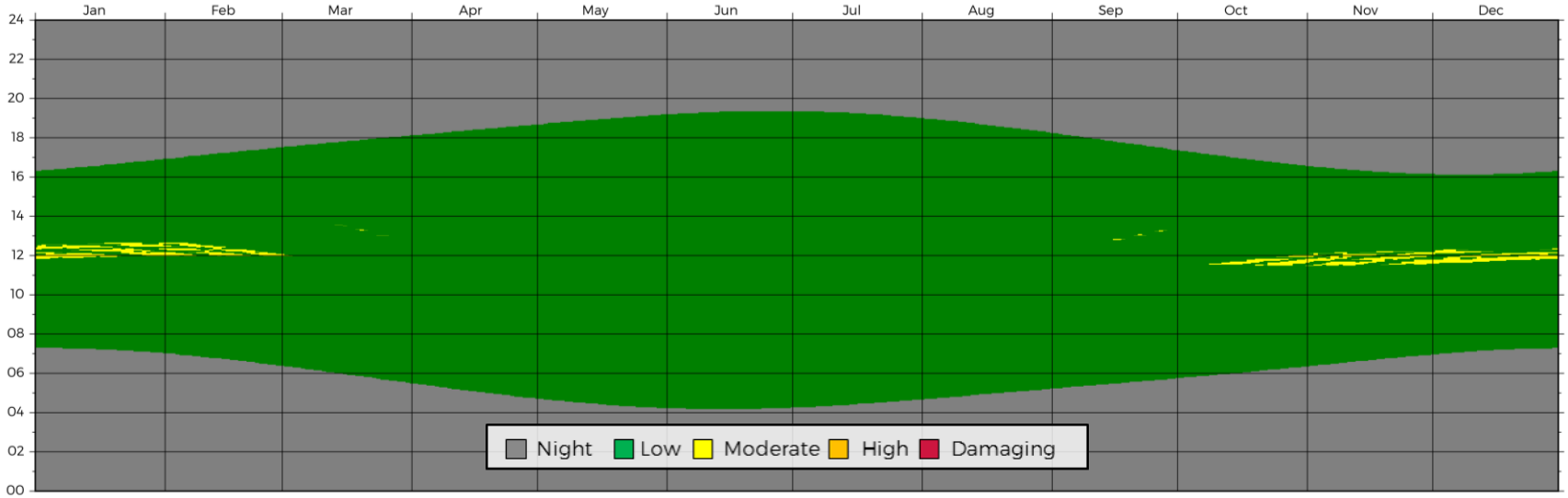


Pedestrian Receptor P25

Receptor P25 was chosen to assess the visual impact associated with solar reflections affecting pedestrians waiting at Union Square station.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



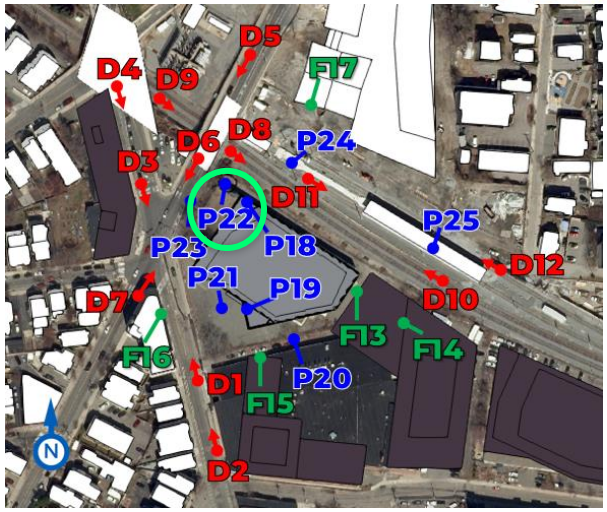


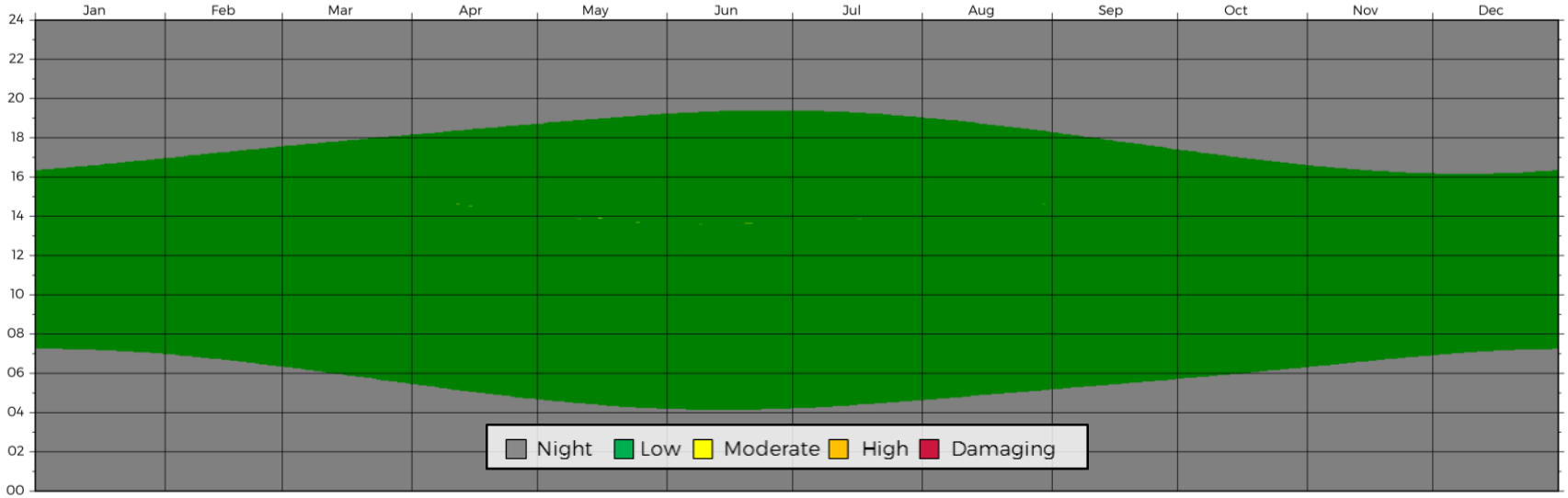
ANNUAL THERMAL IMPACT - PEOPLE

Pedestrian Receptor P22

Receptor P22 was chosen to assess the visual impact associated with solar reflections affecting pedestrians under the Northwest glass sculpture.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



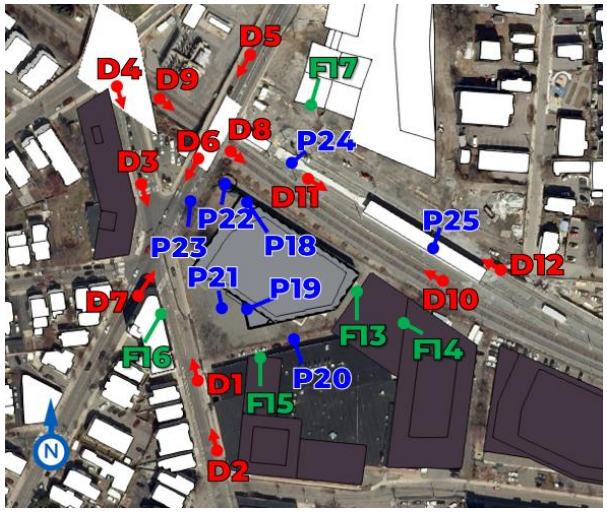


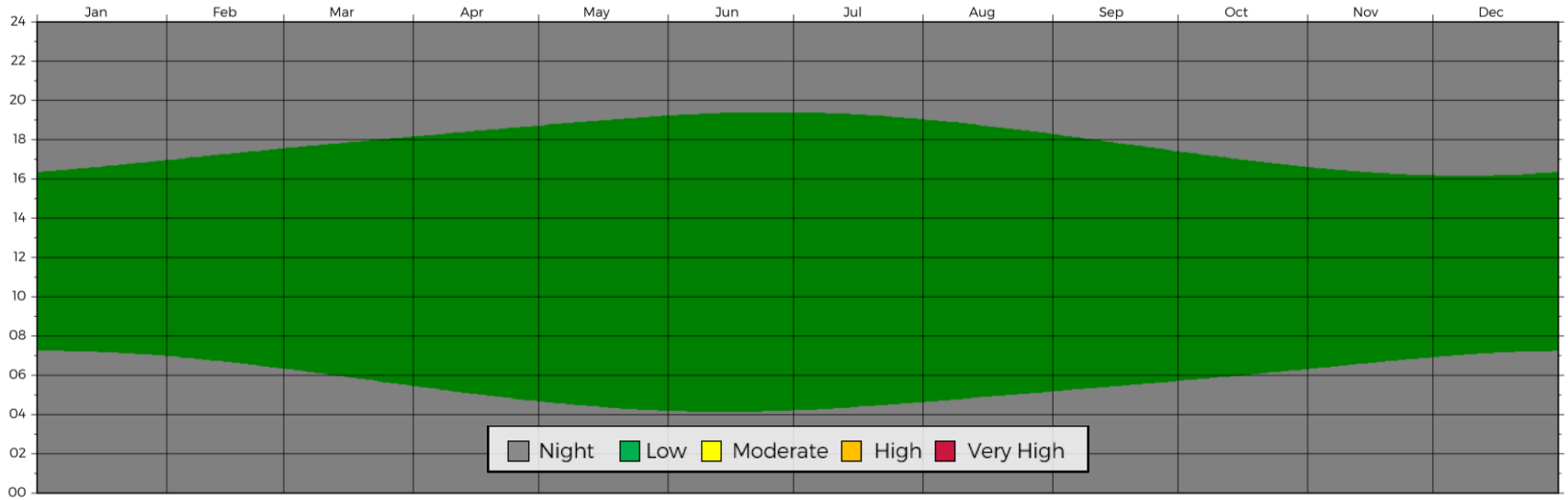
ANNUAL THERMAL IMPACT - PEOPLE

All Other Receptors

All reflection impacts at all other receptors were found to have intensities below RWDI's short-term and human safety threshold values.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



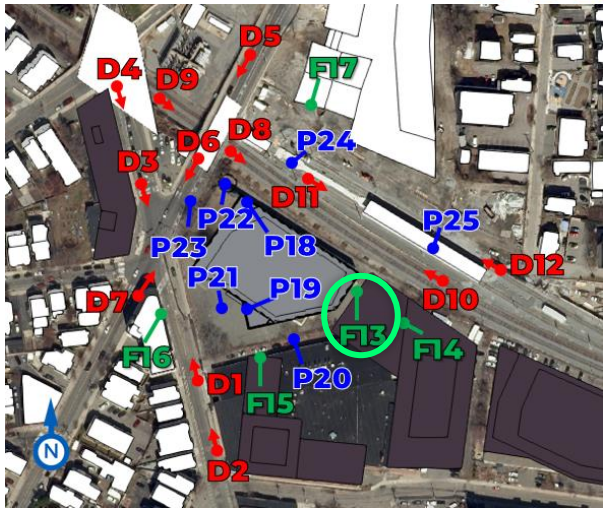


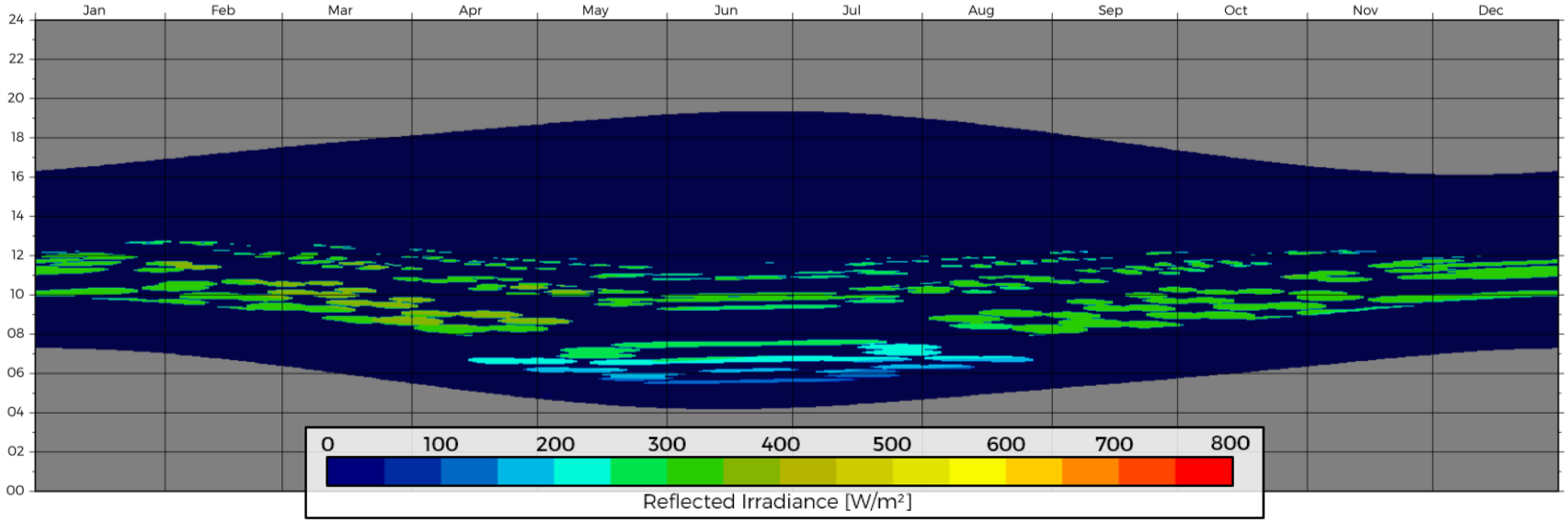
ANNUAL THERMAL IMPACT - PROPERTY

Facade Receptor F13

Receptor F13 was chosen to assess the thermal impact associated with solar reflections affecting northwest facade at approximately 2nd floor height of the building immediately southeast of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



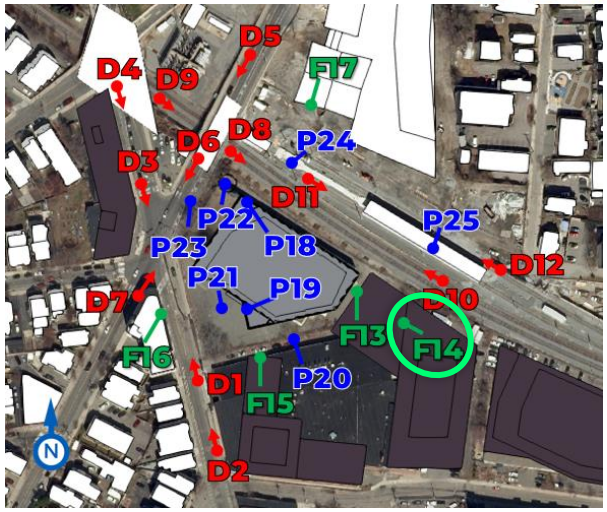


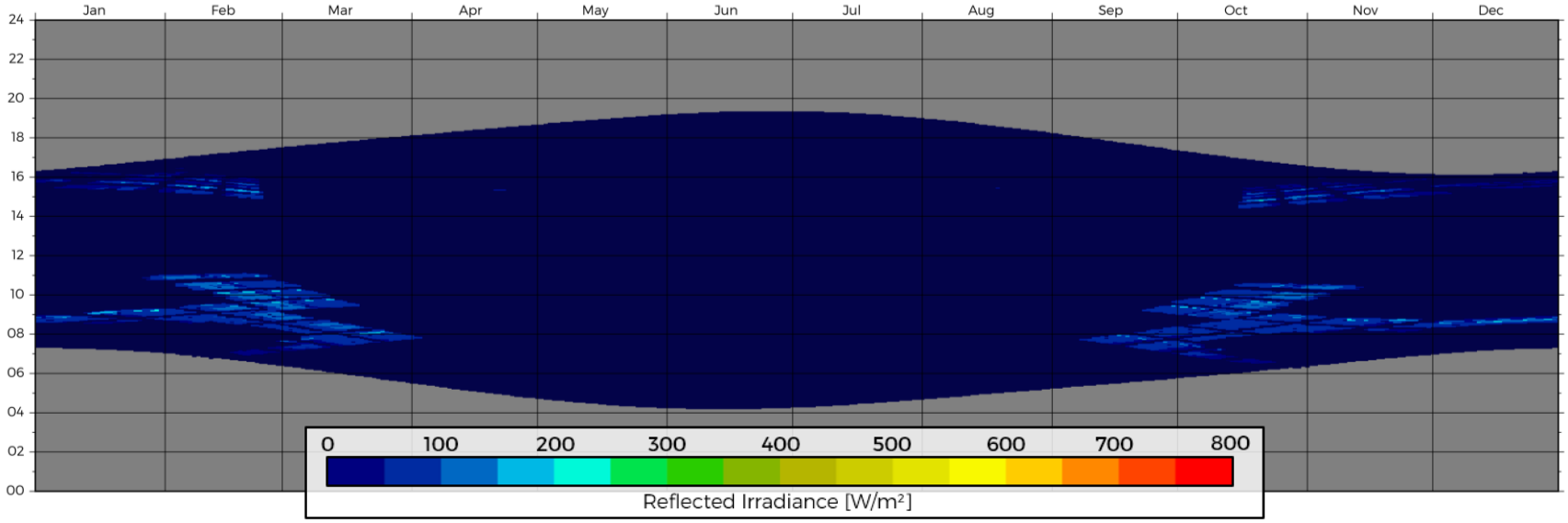
ANNUAL THERMAL IMPACT - PROPERTY

Facade Receptor F14

Receptor F14 was chosen to assess the thermal impact associated with solar reflections affecting northwest facade at approximately 3rd floor height of the building immediately southeast of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



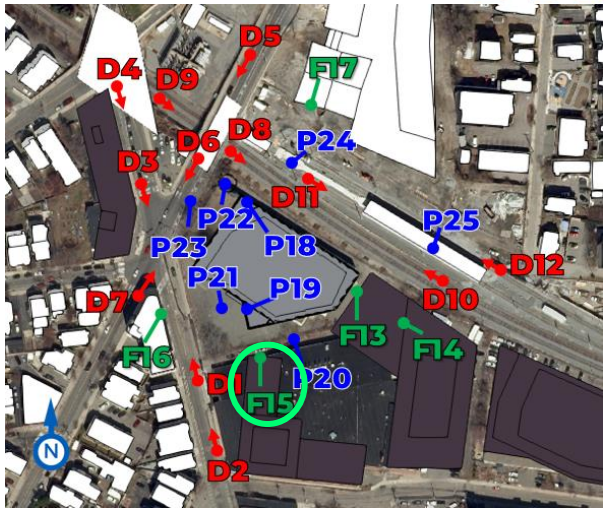


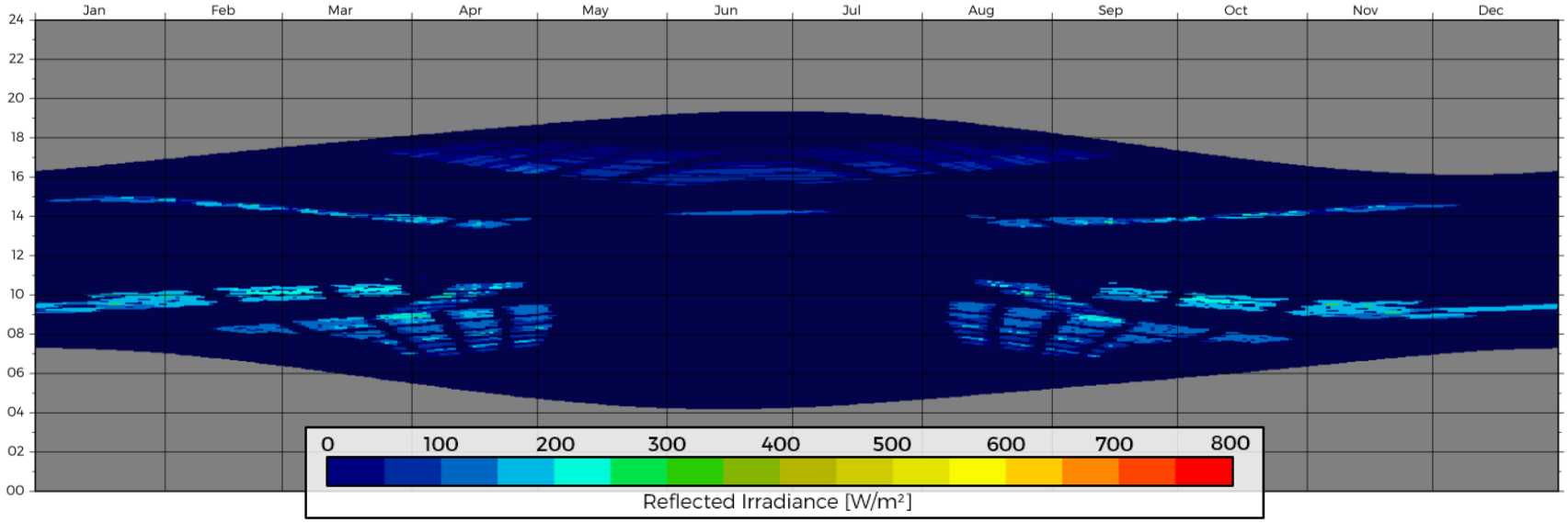
ANNUAL THERMAL IMPACT - PROPERTY

Facade Receptor F15

Receptor F15 was chosen to assess the thermal impact associated with solar reflections affecting north facade at 2nd floor height of the building immediately south of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.



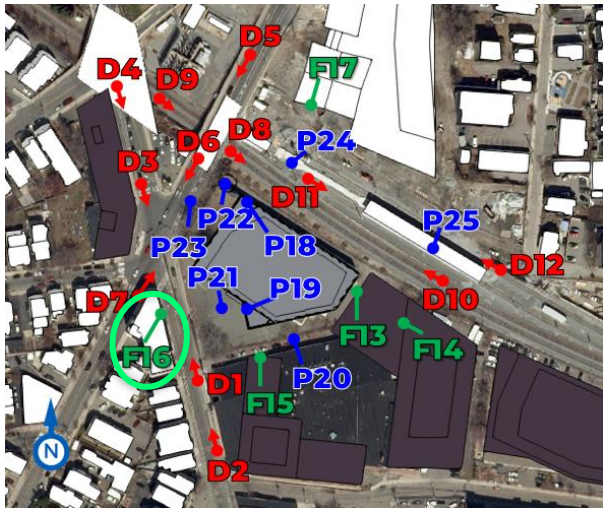


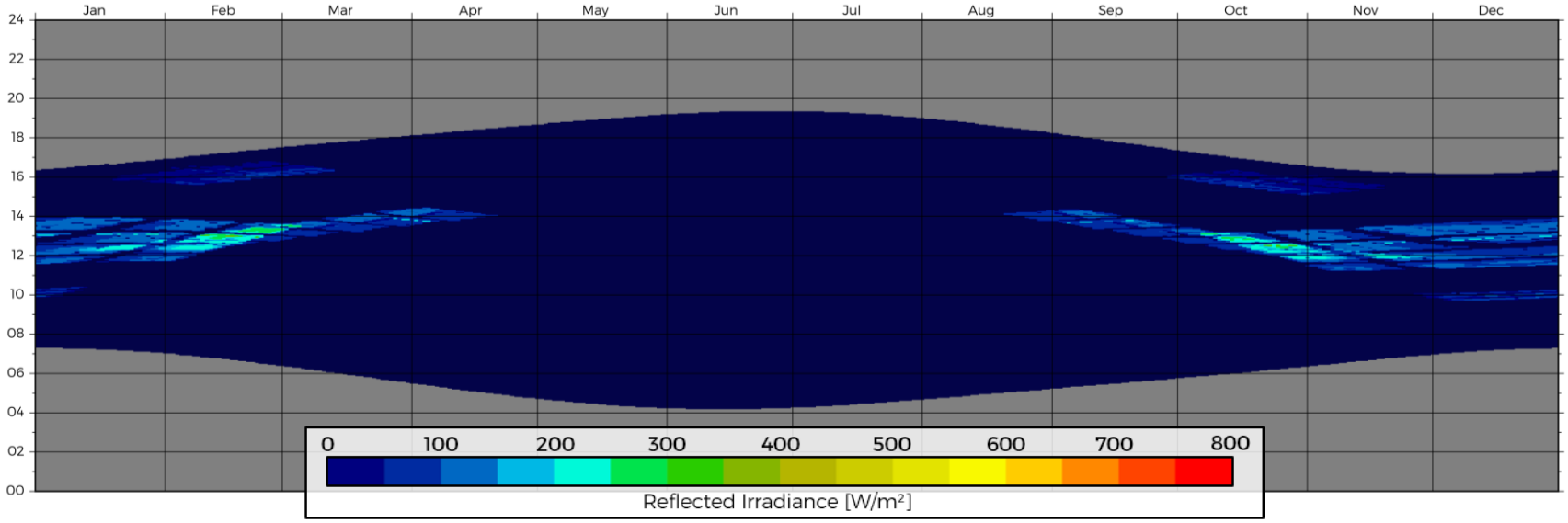
ANNUAL THERMAL IMPACT - PROPERTY

Facade Receptor F16

Receptor F16 was chosen to assess the thermal impact associated with solar reflections affecting east facade at 3rd floor height of the building immediately Southwest of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.

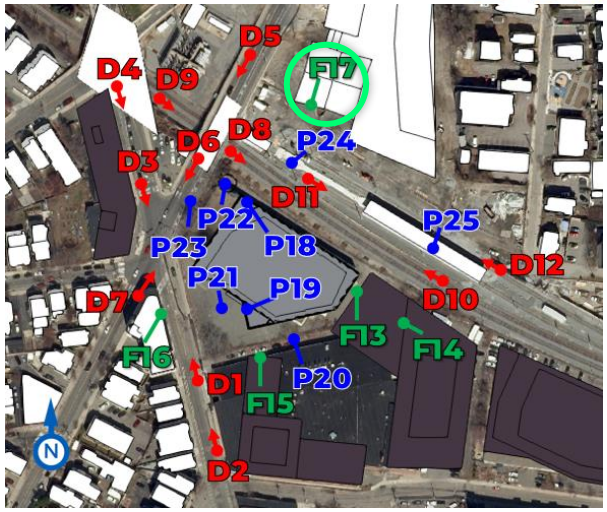


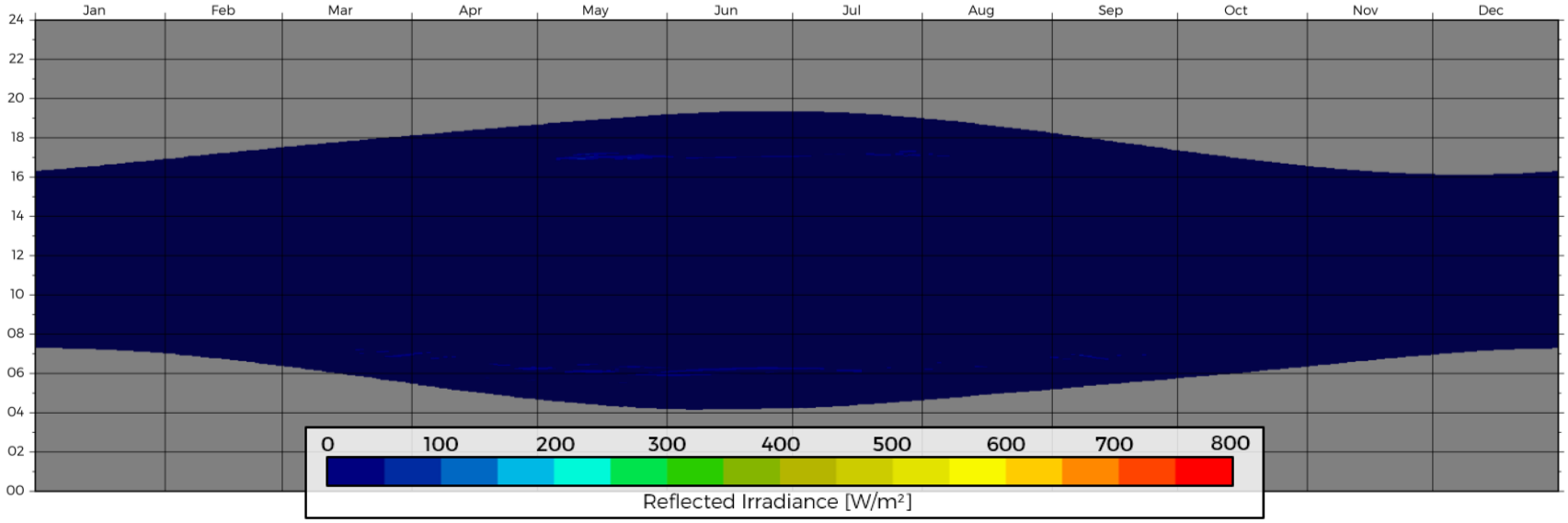


Facade Receptor F17

Receptor F17 was chosen to assess the thermal impact associated with solar reflections affecting south facade at 4th floor height of the building immediately Northeast of Parcel D3.1.

Please note that the referenced times are in local standard time. In jurisdictions where Daylight Savings Time is used, the time should be shifted by one hour when appropriate.





APPENDIX B

RWDI REFLECTION CRITERIA

Visual Glare

There are currently no criteria or standards that define an "acceptable" level of reflected solar radiation from buildings. RWDI has conducted a literature review of available scientific sources[1] to determine levels of solar radiation that could be considered acceptable to individuals from a visual standpoint.

Many glare metrics are designed for interior use and have been found to not correlate well with the glare impact humans perceive from direct sun or in outdoor environments. RWDI uses the methodology of Ho et al[2], which defines glare impact based on a physical reaction rather than on a preference-based correlation.

Based on the intensity of the glare source and the size of the source in the field of view (Figure B1), the risk of that source causing temporary flash blindness (i.e. the after images visible after one is exposed to a camera flash in a dark room) faster than a person can reflexively close their eyes can be determined.

If this 'after-imaging' can occur faster than the human blink reflex, it presents an unavoidable effect on a person based on physiology rather than preference. This forms the basis of how we determine if a reflection is 'significant'.

This methodology was previously required by the United States Federal Aviation Administration (FAA) to determine the risk of glare to pilots and other airport staff under FAA Interim Policy 78 FR 63276. While the need to use this exact metric has since been relaxed under FAA Policy 86 FR25801, RWDI still feels that it is appropriate for this work.

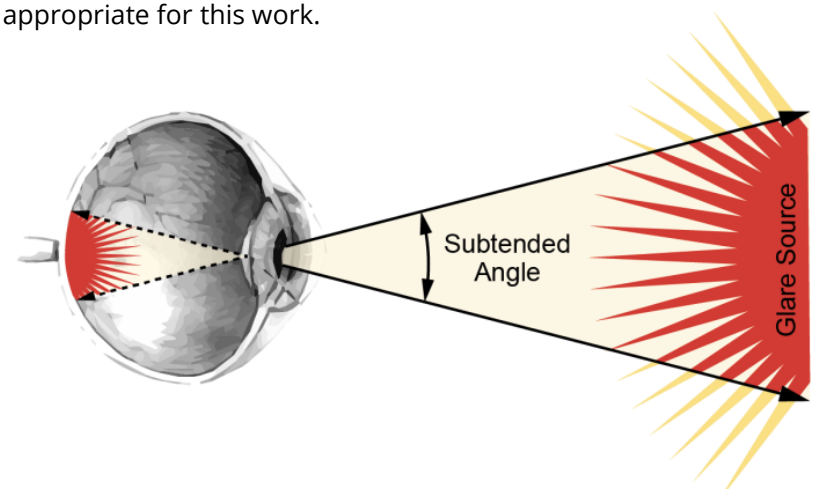


Figure B1: Schematic Illustrating the Subtended Angle of a Glare Source

Visual Glare (cont'd)

At the screening level, we conservatively take any reflections at least 50% of the intensity required to cause after-images as a "significant" reflection to be counted in the frequency analysis. In the detailed phase of work, we use the typical threshold level.

As a reference, point 1 on Figure B2 illustrates where looking directly at the sun falls in terms of irradiance on the retina (the back of the eye) and the size of the angle that the sun subtends in the sky. This puts it just at the border of causing serious damage before the blink reflex can close the eye.

The other points in Figure B2 correspond to the following:

2. Direct viewing of high-intensity car headlamp from 50 feet / 15 m
3. Direct viewing of typical camera flash from 7 feet / 2 m
4. Direct viewing of high-intensity car headlamp from 5 feet / 1.5 m
5. Direct viewing of frosted 60W light bulb from 5 feet / 1.5 m
6. Direct viewing of average computer monitor from 2 feet / 0.6 m

Note that the retinal irradiances described on this page are significantly higher than the irradiance levels discussed elsewhere in this report. This is because the human eye focuses the energy on to the retina. The magnitude of the increase is dependent on the geometry of the human eye and the source of the glare, both of which are computed per the Ho et al methodology.

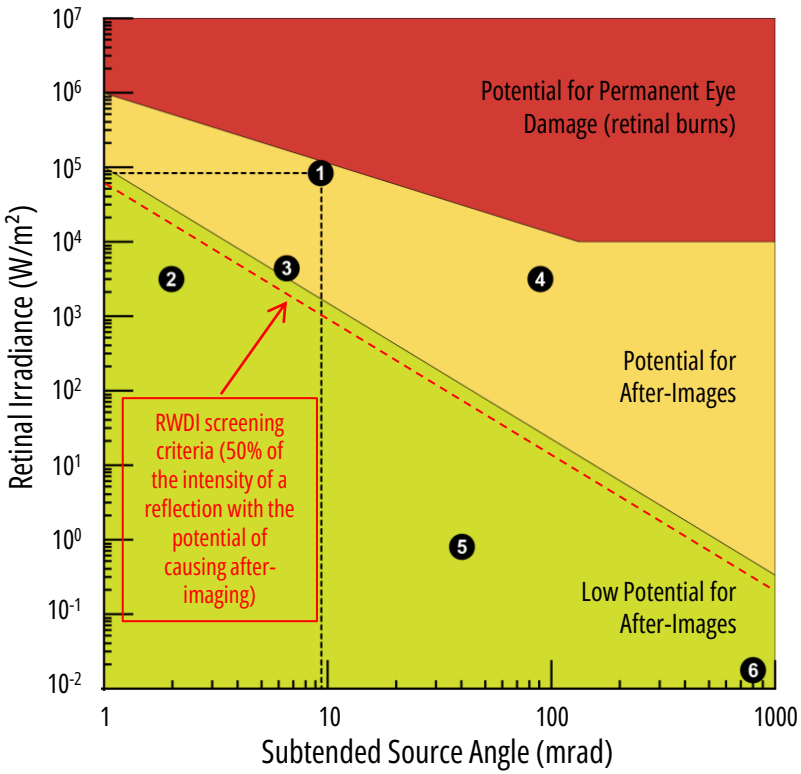


Figure B2: After-Imaging Potential From Various Glare Sources

Visual Glare (cont'd)

Significant glare impacts on the operators of vehicles or heavy equipment pose a particular risk to public safety due to operator distraction or reduction in their visual acuity. Thus, in the detailed analysis, RWDI assigns an assumed view direction to those engaged in "high-risk" activities (e.g. driving a car or flying a plane) as well as an assumed field of view.

The assigned directions and fields of view acknowledge that an operator is particularly sensitive to reflections emanating from the direction in which they are travelling (and therefore cannot safely look away from) and that the opaque elements of the vehicle will act to obstruct reflections beyond a given angle.

For drivers, the critical angle is taken to be 20° away from the direction of view[3]. Thus, any reflections emanating from within this 20° field of view are considered 'high' impacts, whereas reflections emanating from outside this cone are classified as 'moderate' impacts. This angle is adjusted as needed for impacts on other vehicles such as aircraft[4], trains[5], and other heavy equipment[6].

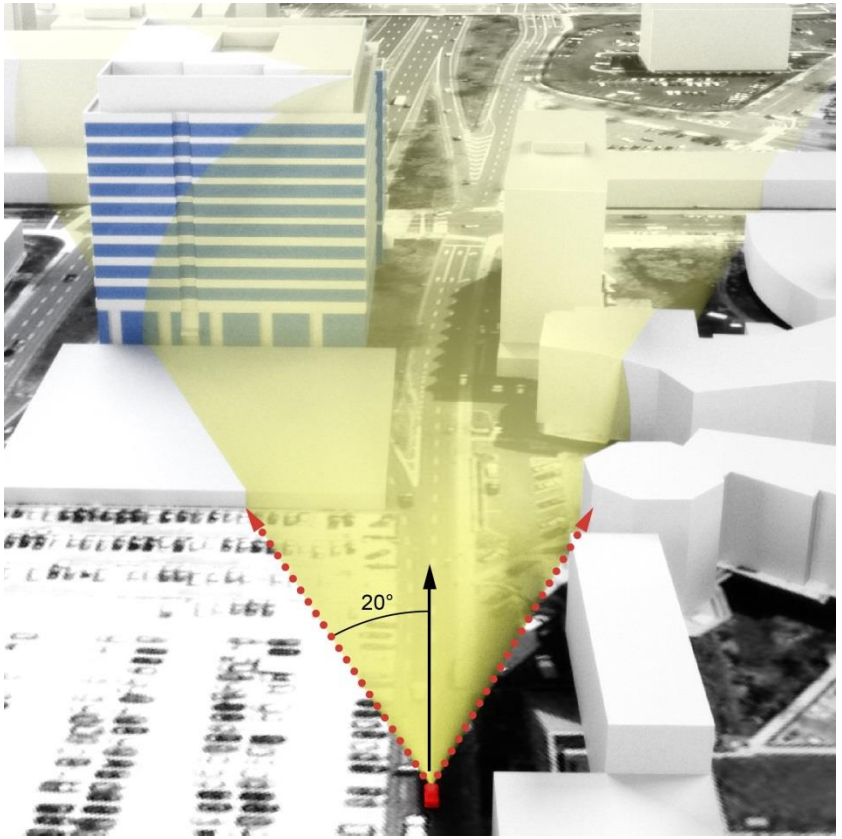


Figure B3: Illustration of a Driver's 20° Field of View

Thermal Impact (Heat Gain) on People

The primary sources for exposure limits to thermal radiation come from fire protection literature. However, there is currently inconsistency between different bodies regarding what level of exposure can be reasonably tolerated by people.

The U.S. National Fire Protection Association (NFPA) defines 1,700 W/m² as an upper limit for a tenable egress environment[7]; i.e. an individual could escape through such an environment successfully, though they would not necessarily emerge unscathed. The British Standards Institution[8] sets their limit at 2,000 W/m², which "*…is tolerable for ~ 5 min[utes]…*". Other researchers[9] have found that higher irradiance levels (3,500 – 5,000 W/m²) can be tolerated in outdoor environments for several minutes without issue.

The only current quantitative guideline specific to reflections comes from the City of London's Planning Note on 'Solar Convergence'[10]. Produced in conjunction with the UK Building Research Establishment (BRE), this document indicates that no areas should receive 10,000 W/m² or more for any duration, exposures above 2,500 W/m² should be limited to less than 30 seconds; and that "*…areas with reflected irradiances above 1,500 W/m², and preferably those above 1000 W/m², should be minimized.*"

It should be noted that all these thresholds are guideline values only, and that in reality many factors (skin color, age, clothing choice, etc.) influence how a person reacts to thermal radiation.

Clearly, there are currently no definitive guidelines or criteria with respect to the issue of thresholds for exposure to thermal irradiance in an urban setting. We know this criterion should be lower than the thresholds set in the context of an individual escaping from a fire and greater than typical peak solar noon levels of 1,000 W/m² which people commonly experience.

Therefore, RWDI's opinion at this time, is that reasonable criteria is to establish 2,500 W/m² as a ceiling exposure limit, which reflection intensity should not exceed for any length of time; and 1,500 W/m² as a short term (10 minutes or less) exposure limit.

Thermal Impact (Heat Gain) on Property

The impact of solar irradiance on different materials is primarily based on the temperature gains to the material which can cause softening, deformation, melting, or in extreme cases, combustion. These temperature gains are difficult to predict as they are highly dependent on the convective heat transfer from air movement around the object and long-wave radiative heat transfer to the surroundings.

Generally, irradiance levels at or above 10,000 W/m² for more than 10 minutes are required to ignite common building and automotive materials in the presence of a pilot flame. That value increases to 25,000 W/m² when no pilot flame is present[11,12,13]. However, some materials like plastics and even some asphalts may begin to soften and deform at lower temperatures. For example, some plastics can deform at a temperature of 140°F (60°C), or lower if force is applied. The applied force typically comes from the thermal expansion of the material, the force of gravity acting on the material or an external mechanical force (i.e. someone or something pushing or pulling on it).

Aside from the risk of damage to the material itself, a hot surface poses a safety risk to any person who may come into contact with it. This is particularly important in an urban context as the individual may not expect the object to be heated. NASA[14] defines an upper limit of 111°F (44°C) for surfaces that require extended contact time with bare skin. Surface temperatures below this limit can be handled for any length of time without causing pain.

That said, surfaces within the urban realm are routinely exposed to reflections from windows, metal panels and bodies of water without causing material damage or excessive heating.

Therefore, as this time, RWDI takes a conservative approach and **uses a value of 1,000 W/m², consistent with a single (i.e. non-focused) reflection of the sun's peak intensity, as a baseline threshold for reflected irradiance on stationary objects.**

However, this is simply a starting point. As noted, depending on the environmental conditions and material properties of the object/assembly other values may be used instead.

References

1. Danks, R., Good, J., and Sinclair, R., “Assessing reflected sunlight from building facades: A literature review and proposed criteria.” *Building and Environment*, 103, 193-202, 2016.

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3. Vargas-Martin, F., and Garcia-Perez, M.A., "Visual fields at the wheel." *Optometry and Vision Science* 82, no. 8 (2005): 675-681.

4. Rogers, J.A., et al, "Evaluation of Glare as a Hazard for General Aviation Pilots on Final Approach." *Federal Aviation Administration* (2015).

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7. National Fire Protection Association. (2017). NFPA 130: standard for fixed guideway transit and passenger rail systems. NFPA.

8. The application of fire safety engineering principles to fire safety design of buildings – Part 6: Human Factors’ PD 7974-6:2019, British Standards Institution, 2019.

9. Raj, P.K., “Field tests on human tolerance to (LNG) fire radiant heat exposure, and attenuation effects of clothing and other objects”, *Journal of Hazardous Materials,* vol. 157 no. 2-3, 2008.

10. Department of the Built Environment. (2017). Solar Convergence Planning Advice Note. City of London Corporation.

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12. SFPE Handbook of Fire Protection Engineering 4th Edition NFPA/SPFE 2008 USA

13. V. Babrauskas ‘Ignition Handbook’ Fire Science Publishers + SFP, 2003

14. E Ungar, K Stroud ‘A New Approach to Defining Human Touch Temperature Standards’ National Aeronautics and Space Agency , 2010