

ARCHITECTURAL MODEL PHOTOGRAPHS

36-64 WHITTEMORE AVE.



36-64 WHITTEMORE AVE.
PROJECT MODEL - VIEW FROM SOUTHWEST



36-64 WHITTEMORE AVE.
PROJECT MODEL - VIEW FROM SOUTH



36-64 WHITTEMORE AVE.
PROJECT MODEL - VIEW FROM EAST



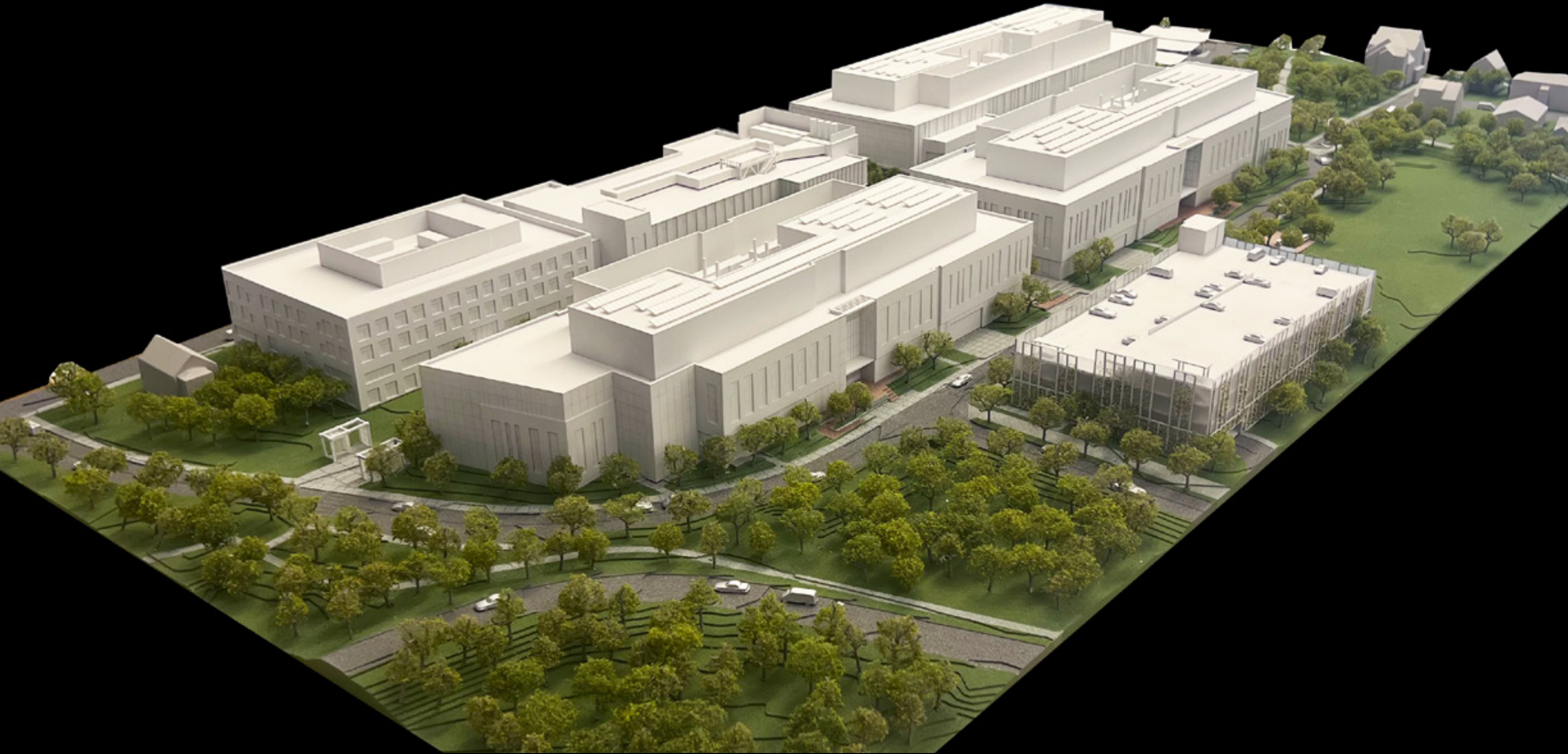
36-64 WHITTEMORE AVE.
PROJECT MODEL - VIEW FROM NORTHEAST



36-64 WHITTEMORE AVE.
PROJECT MODEL - VIEW FROM NORTHWEST



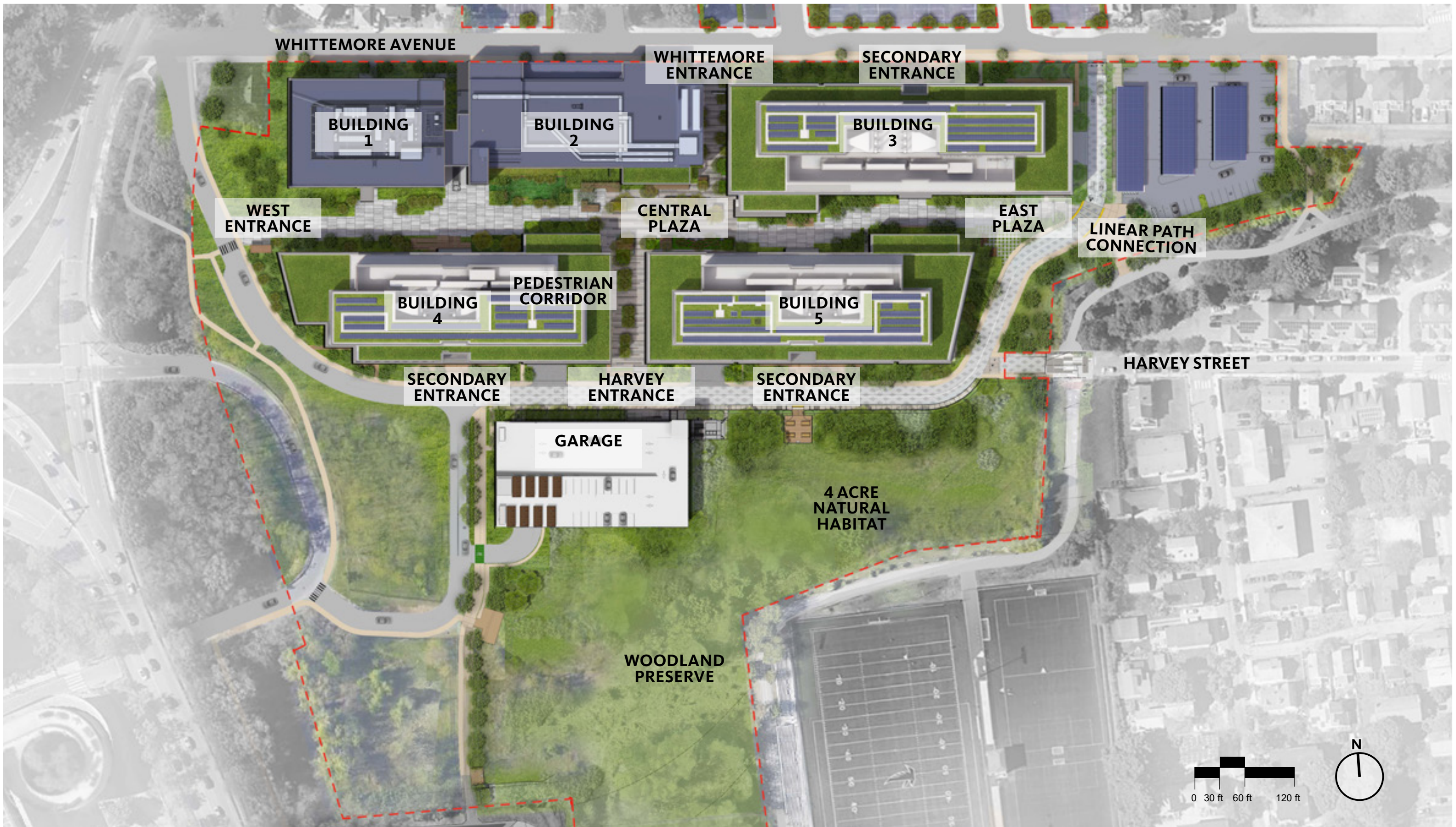
36-64 WHITTEMORE AVE.
PROJECT MODEL - VIEW OF PROMENANDE



36-64 WHITTEMORE AVE.
PROJECT MODEL - VIEW FROM SOUTHWEST

LANDSCAPE DESIGN

36-64 WHITTEMORE AVE.



36-64 WHITTEMORE AVE.
 OVERALL LANDSCAPE PLAN

REVISED



FOOD TRUCKS



SEATING PLATFORMS



CAFE SEATING



BENCH SEATING

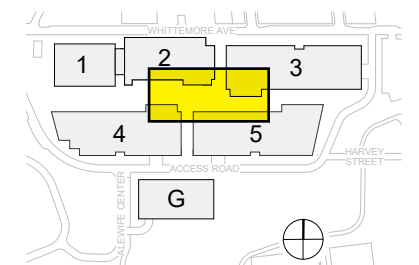
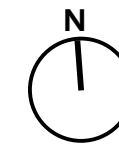
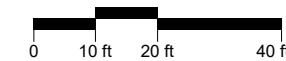
AMPHITHEATER STYLE FOR TEMP PERFORMANCE



**WEST
PEDESTRIAN
CORRIDOR**

**EAST
PEDESTRIAN
CORRIDOR**

CENTRAL PLAZA
HEART OF THE CAMPUS WITH A VARIETY OF SEATING AND SPACES TO ENJOY, AND TEMPORARY PERFORMANCE AREA



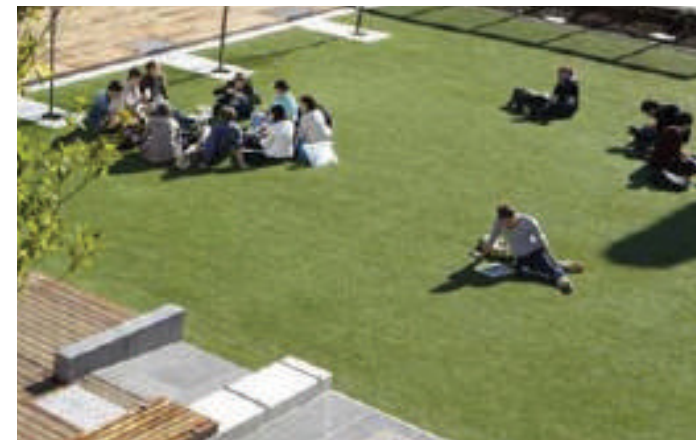
36-64 WHITTEMORE AVE.
CENTRAL PLAZA



ENTRANCE PAVILIONS



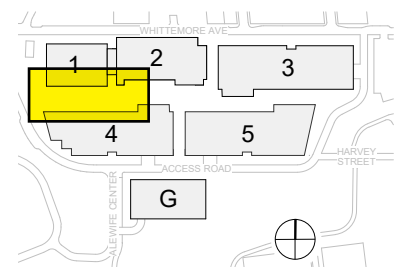
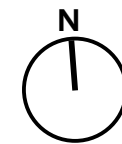
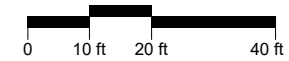
FOOD TRUCKS



LAWN SEATING



WEST PEDESTRIAN CORRIDOR
LAWN SEATING AND BEAUTIFUL EXISTING HONEY LOCUST TREES



36-64 WHITTEMORE AVE.

WEST PEDESTRIAN CORRIDOR



BENCH SEATING



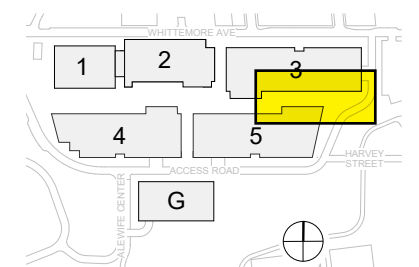
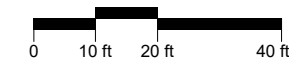
GRASS PAVING (EMERGENCY ROUTE)



BUILT-IN SEATING



EAST PEDESTRIAN CORRIDOR
 VARIETY OF SEATING AND A QUIET,
 GARDEN-LIKE SETTING



36-64 WHITTEMORE AVE.
 EAST PEDESTRIAN CORRIDOR

PEDESTRIAN AND BICYCLE CONNECTIONS:
 NOTWITHSTANDING THE PROVISIONS OF SECTION 17.33.11, NO BUILDING PERMIT SHALL BE ISSUED...UNTIL A PEDESTRIAN AND BIKE CONNECTION HAS BEEN CONSTRUCTED... WITHIN THE DISTRICT BETWEEN THE LINEAR PARK AND WHITTEMORE AVENUE IN THE VICINITY OF MADISON AVENUE, TO A STANDARD COMPARABLE TO THE IMPROVEMENTS IN THE LINEAR PARK AND THE MINUTEMAN BIKEWAY.

BOLLARDS (NO VEHICLE ACCESS)

MULTI-MODAL PATH 14'-0" WIDE

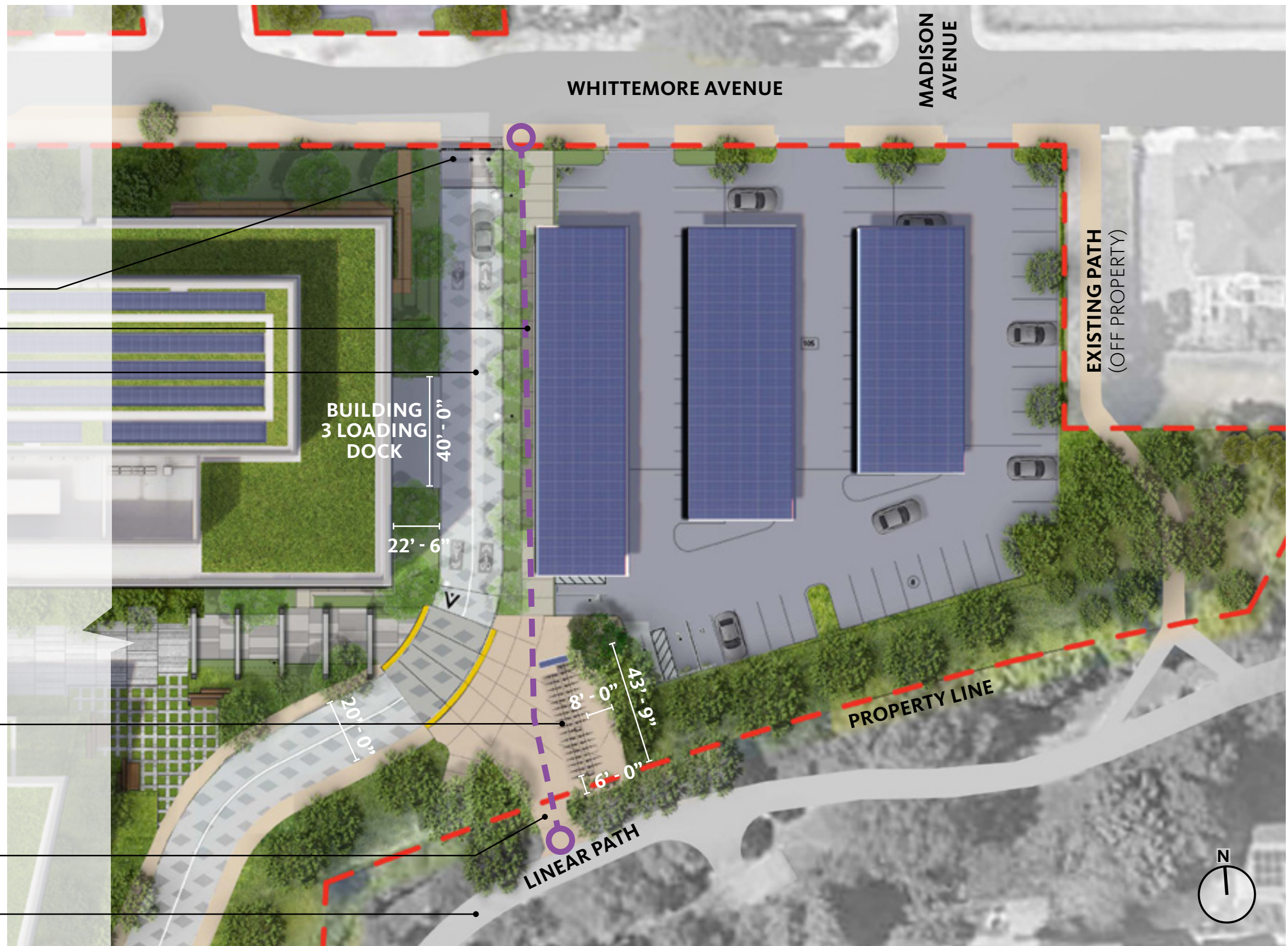
SHARED SERVICE DRIVE (SPECIALTY ROAD MARKINGS WITH SHARROW)



BLUE BIKE STATION (33 BIKES)
 BACK-TO-BACK CONFIGURATION

MULTI-MODAL PATH, 14'-0" WIDTH

EXISTING LINEAR PATH



36-64 WHITTEMORE AVE.

WHITTEMORE TO LINEAR PATH CONNECTION



AERIAL VIEW OF ENTRANCE



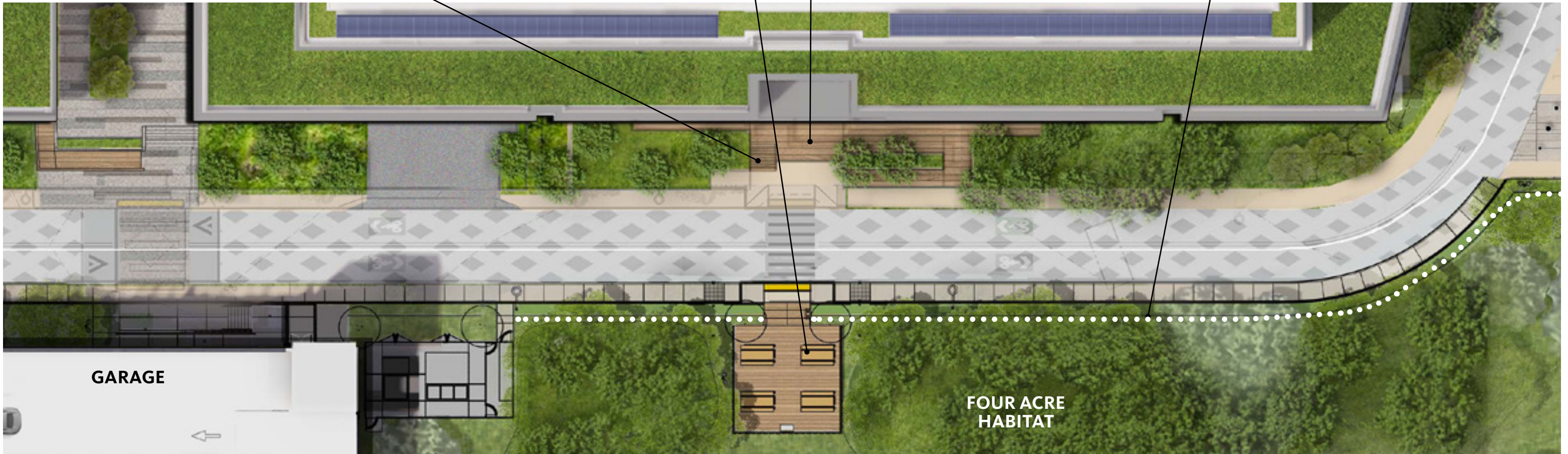
PICNIC FURNISHINGS



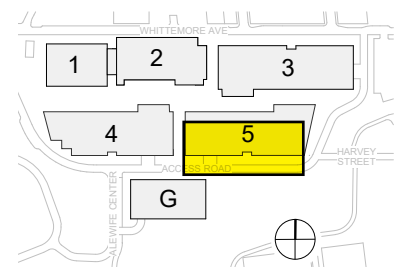
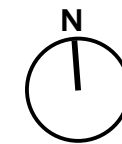
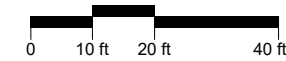
WOOD DECK



NATURAL HABITAT FENCING



SECONDARY ENTRANCE
ELEVATED WOOD DECK ENTRANCES TO REACH RESILIENCE HEIGHT OF +24'-0"



36-64 WHITTEMORE AVE.
BUILDING 5 SECONDARY ENTRANCE



ENTRANCE CANOPY

BUILDING ENTRANCE

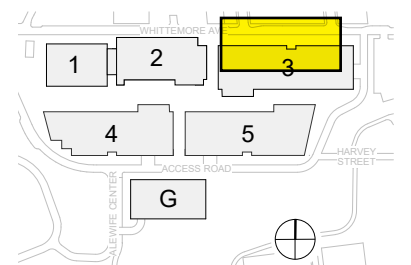
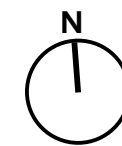
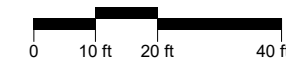
WOOD ENTRANCE DECK

WHITTEMORE SIDEWALK WITH STREET TREES

AERIAL VIEW OF ENTRANCE



WHITTEMORE ENTRANCE
 ELEVATED WOOD DECK ENTRANCES TO REACH RESILIENCE HEIGHT OF +24'-0"
 25'-6" SETBACK PROVIDES LANDSCAPE BUFFER TO THE NEIGHBORHOOD



36-64 WHITTEMORE AVE.
 WHITTEMORE SETBACK AND BUILDING 3 ENTRANCE



REVISED





NATIVE WILDFLOWER MEADOW



OVERLOOK

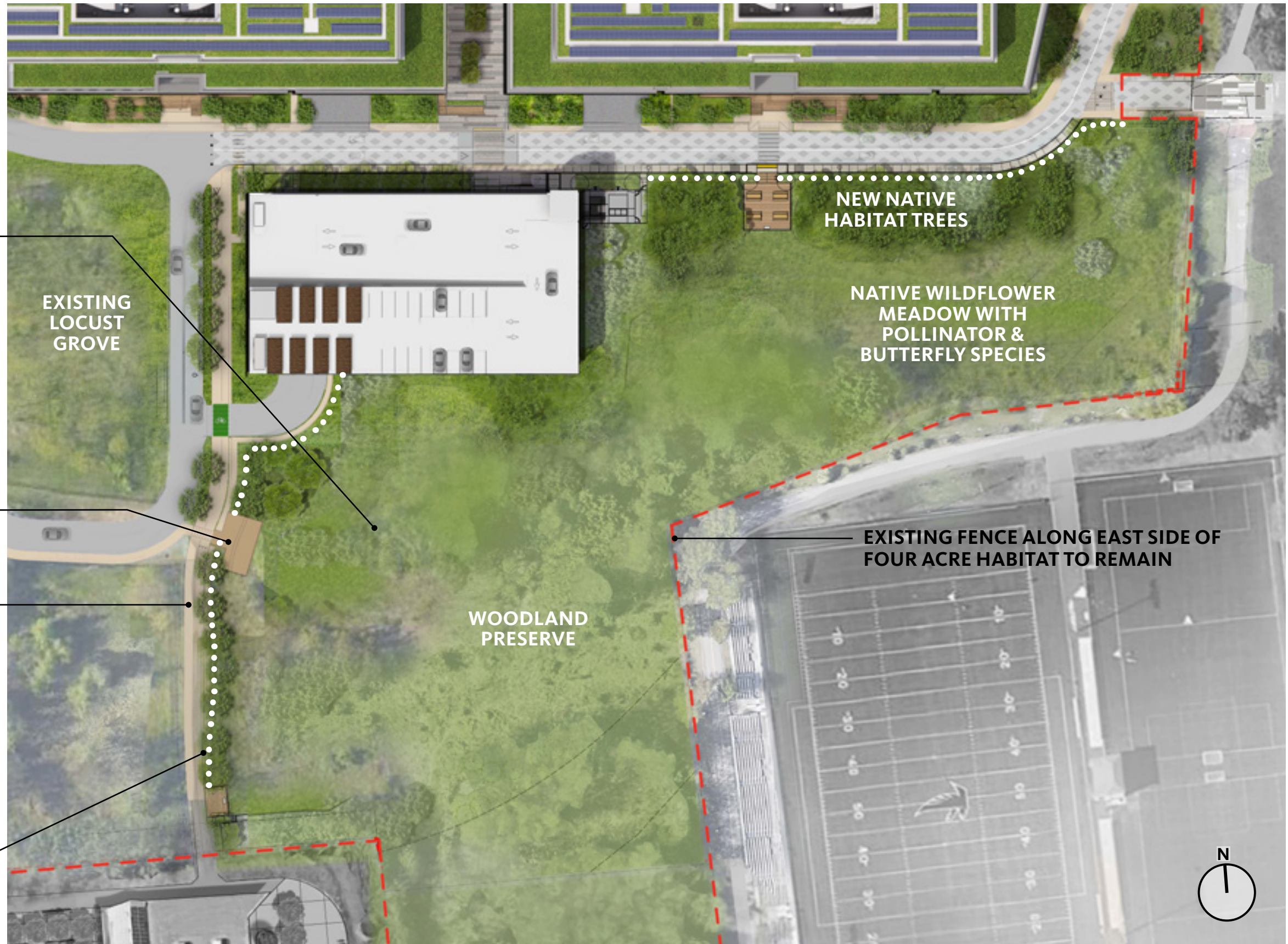
MATERIAL AND DETAILING CONSISTENT WITH THE ALEWIFE RESERVATION. TO INCLUDE INTERPRETIVE SIGNAGE

MULTI-MODAL PATH, 14'-0" WIDTH



NATURAL HABITAT FENCING

FENCING TO DISCOURAGE DISTURBANCE OF THE FOUR ACRE HABITAT, WHILE PROVIDING OPEN VIEWING AND ENJOYMENT



36-64 WHITTEMORE AVE.

FOUR ACRE NATURAL HABITAT



MULTI-MODAL PATH TO ALEWIFE STATION



OVERLOOK



INTERPRETIVE SIGNAGE



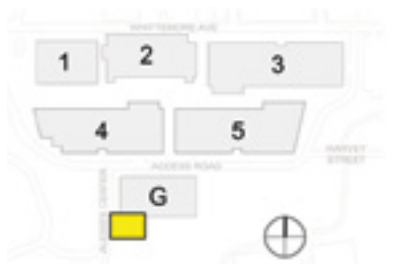
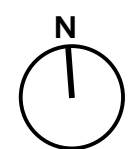
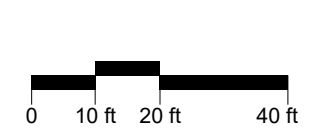
HABITAT PLANTING



FENCE

EXTENT OF REGRADING OF SOIL

EXISTING TREES TO REMAIN



36-64 WHITTEMORE AVE. MULTI-MODAL PATH



GLEDITSIA TRIACANTHOS F. INERMIS 'DRAVES'



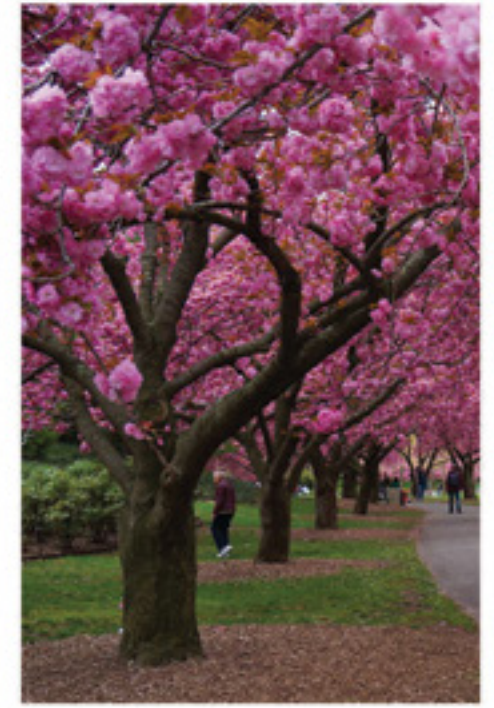
NYSSA SYLVATICA 'HAYMANRED'



CARPINUS CAROLINIANA



CORNUS FOLORIDA F. RUBRA



PRUNUS SERRULATA 'KANZAN'



BETULA NIGRA 'HERITAGE'



PRUNUS VIRGINIANA



QUERCUS BICOLOR



QUERCUS PALUSTRIS

36-64 WHITTEMORE AVE. PROPOSED PLAZA AND PEDESTRIAN CORRIDOR TREES



AMELANCHIER X GRANDIFLORA
'AUTUMN BRILLIANCE'



ACER X FREEMANII
'AUTUMN BLAZE'



BETULA NIGRA 'HERITAGE'



JUNIPERUS VIRGINIANA



POPULUS DELTOIDES



QUERCUS ALBA

36-64 WHITTEMORE AVE. PROPOSED OPEN SPACE TREES

SITE

- RECONNECTS COMMUNITITES AND LOCAL AMENITIES
- PUBLIC PLAZA WITH RETAIL CAFE
- PEDESTRIAN CORRIDORS
- NEW BIKE CONNECTIONS
- MULTI-MODAL PATH TO MBTA
- BLUE BIKE STATIONS
- REDUCTION IN STORMWATER RUNOFF
- STORMWATER TREATMENT

CENTRAL PLAZA

- RETAIL CAFE AND OUTDOOR SEATING
- SHADE AND ORNAMENTAL TREES
- EVENT AND PERFORMANCE SPACE
- LAWN SEATING
- FOOD TRUCKS

PEDESTRIAN CORRIDOR

- CONNECTIONS TO ALEWIFE LINEAR PARK AND WHITTEMORE COMMUNITY
- LANDSCAPE FURNISHINGS
- NATIVE AND ADAPTED VEGETATION
- PERMEABLE PAVERS

FOUR ACRE NATURAL HABITAT

- NATURALIZED HABITAT AREA DEVELOPED DUE TO LIMITED USE AND FENCING
- NATIVE PLANTINGS INCLUDING POLLINATOR AND BUTTERFLY SPECIES
- VIEWING PLATFORMS WITH BENCHES AND EDUCATIONAL SIGNAGE

36-64 WHITTEMORE AVE.

PUBLIC LANDSCAPE BENEFITS



PRECAST PERMEABLE PAVERS



IPE DECKING



PEDESTRIAN CONCRETE



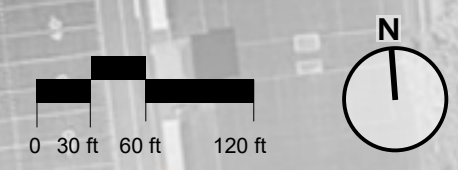
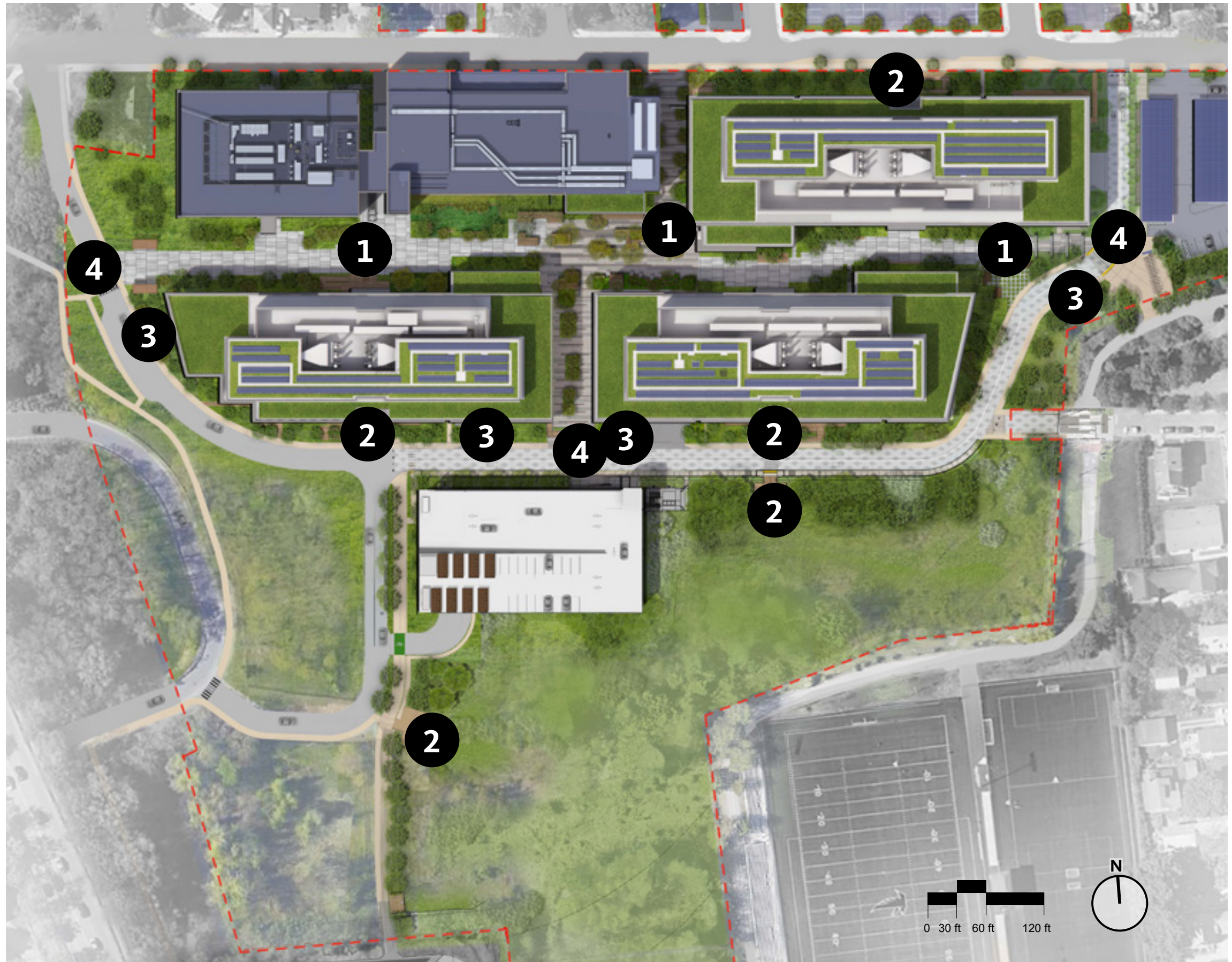
RAISED CROSSWALK

1

2

3

4



36-64 WHITTEMORE AVE. LANDSCAPE MATERIALS PLAN



BENCH SEATING WITH AMPHITHEATER ARRANGEMENT FOR TEMP. PERFORMANCES

1



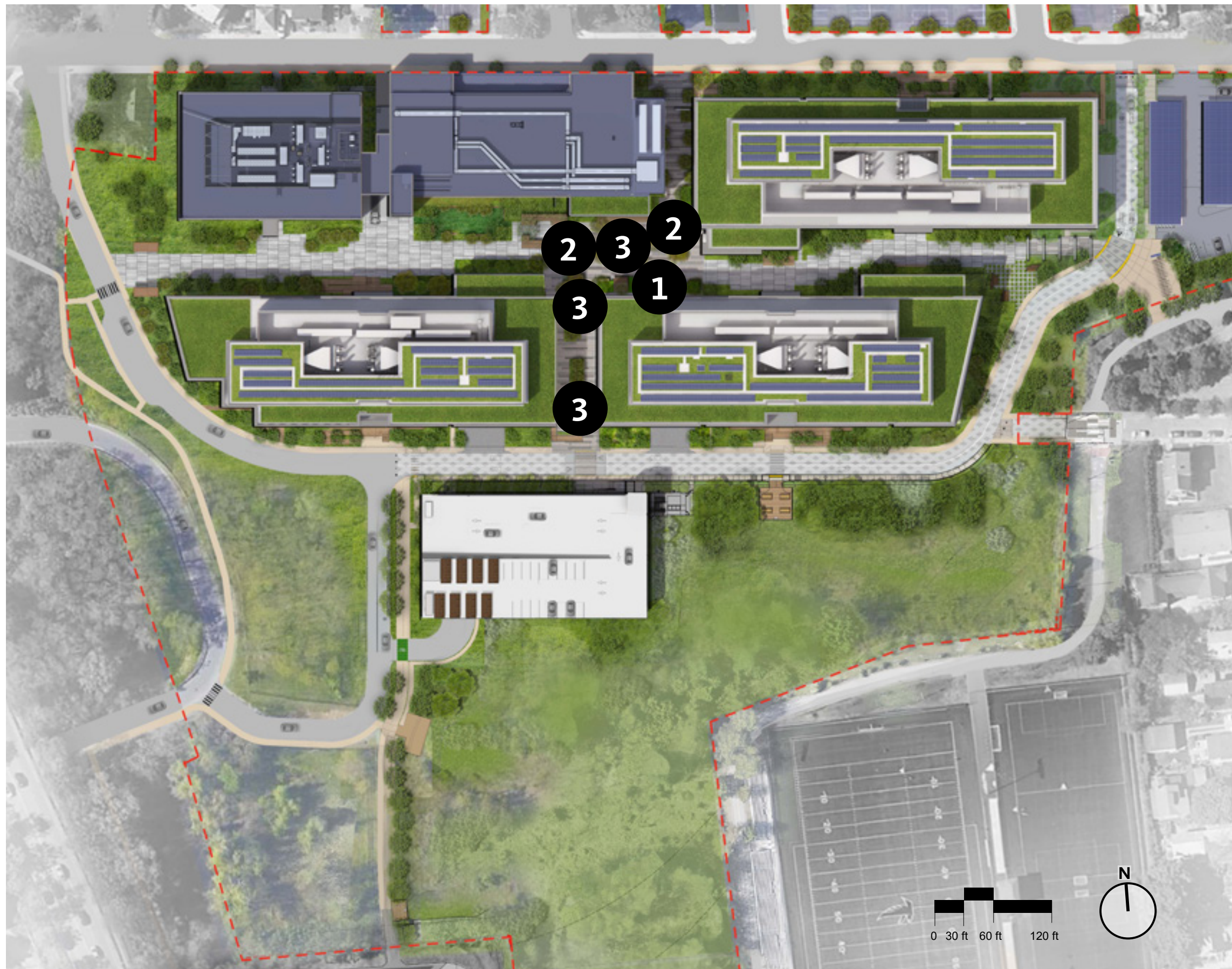
SEATING PLATFORMS

2



CAFE FURNITURE

3



36-64 WHITTEMORE AVE.

LANDSCAPE FURNITURE PLAN



BLUE BIKE STATION



BENCHES

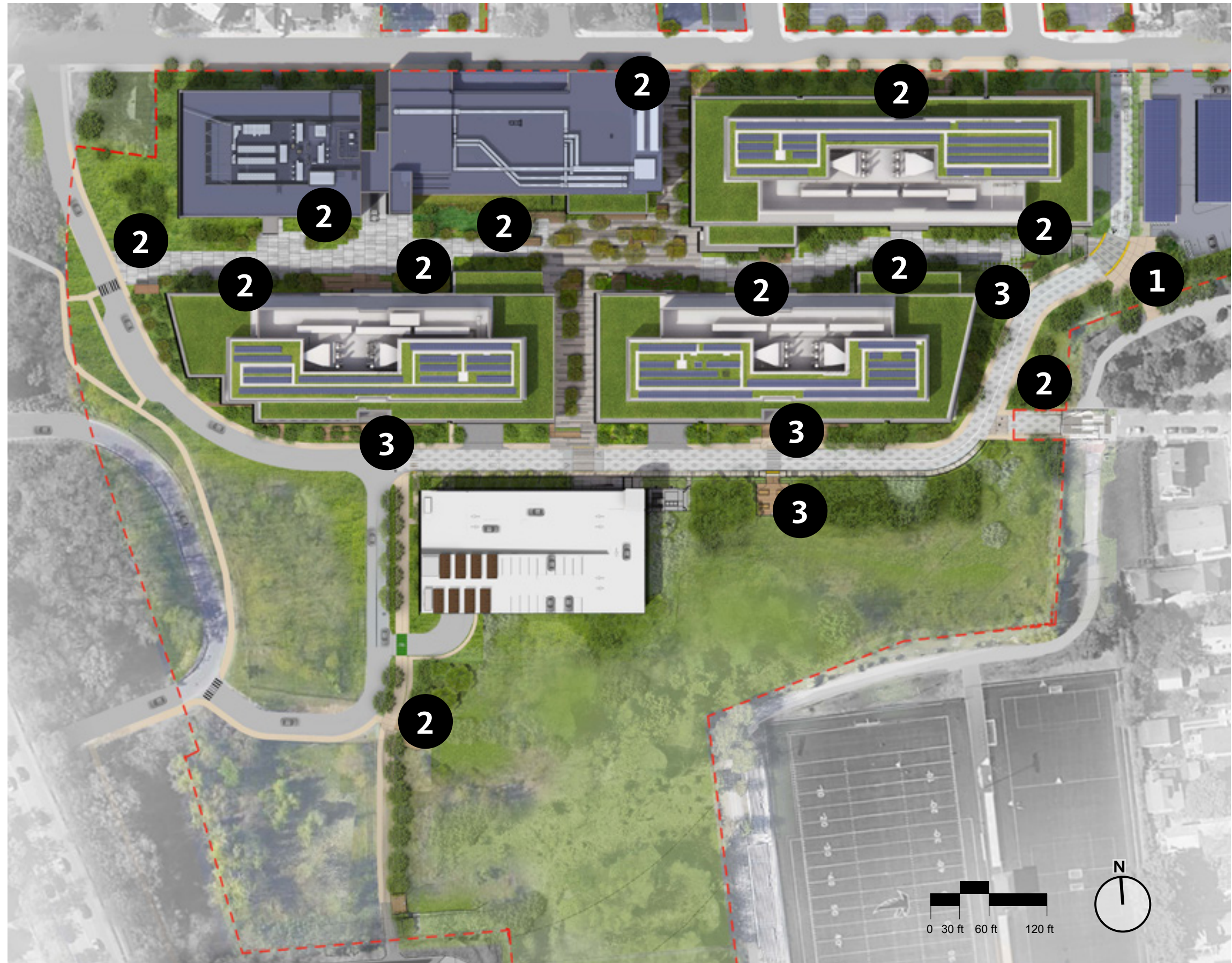


PICNIC FURNISHINGS

1

2

3

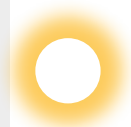


36-64 WHITTEMORE AVE.

LANDSCAPE FURNITURE PLAN



ROADWAY LIGHT FIXTURE



PEDESTRIAN LIGHT FIXTURE



CATENARY LIGHT FIXTURE

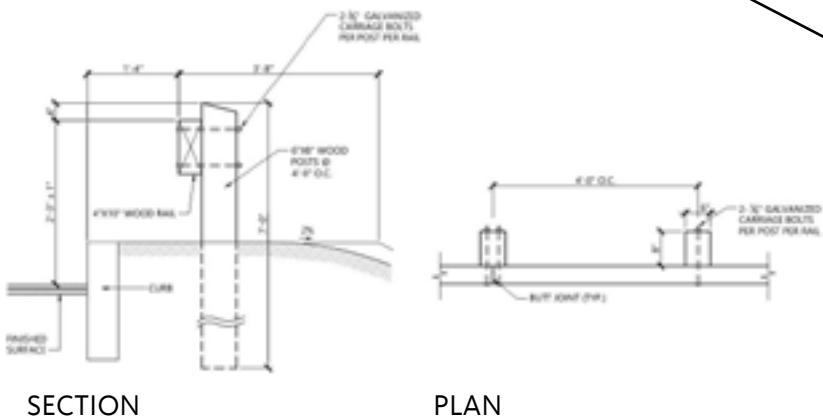


LIGHT FIXTURES ARE CUT-OFF TYPE FIXTURES TO MINIMIZE LIGHT SPILLING INTO FOUR ACRE HABITAT

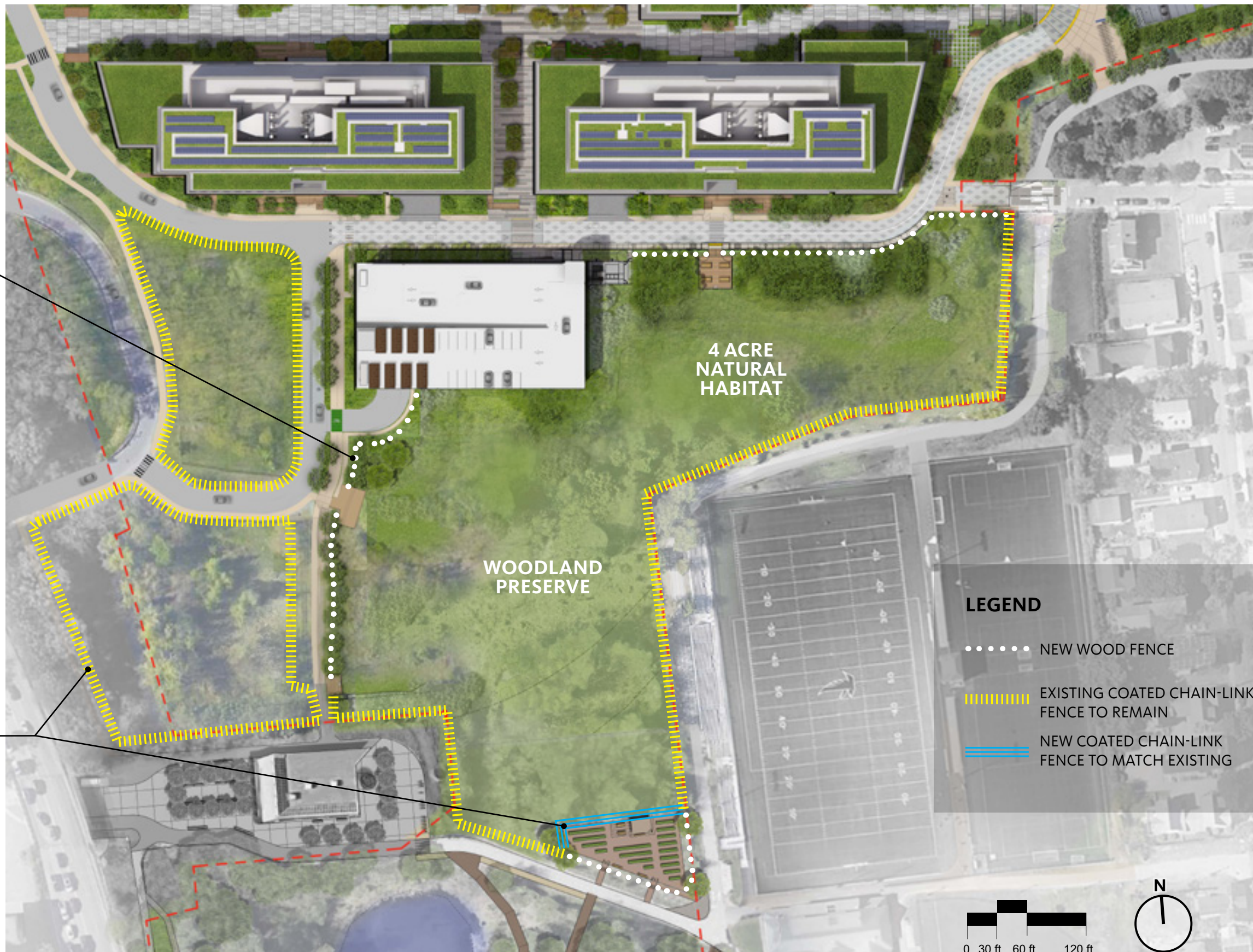
36-64 WHITTEMORE AVE. LANDSCAPE LIGHTING PLAN



NATURAL HABITAT NEW WOOD FENCE



COATED CHAIN-LINK FENCE

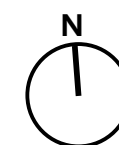


36-64 WHITTEMORE AVE.

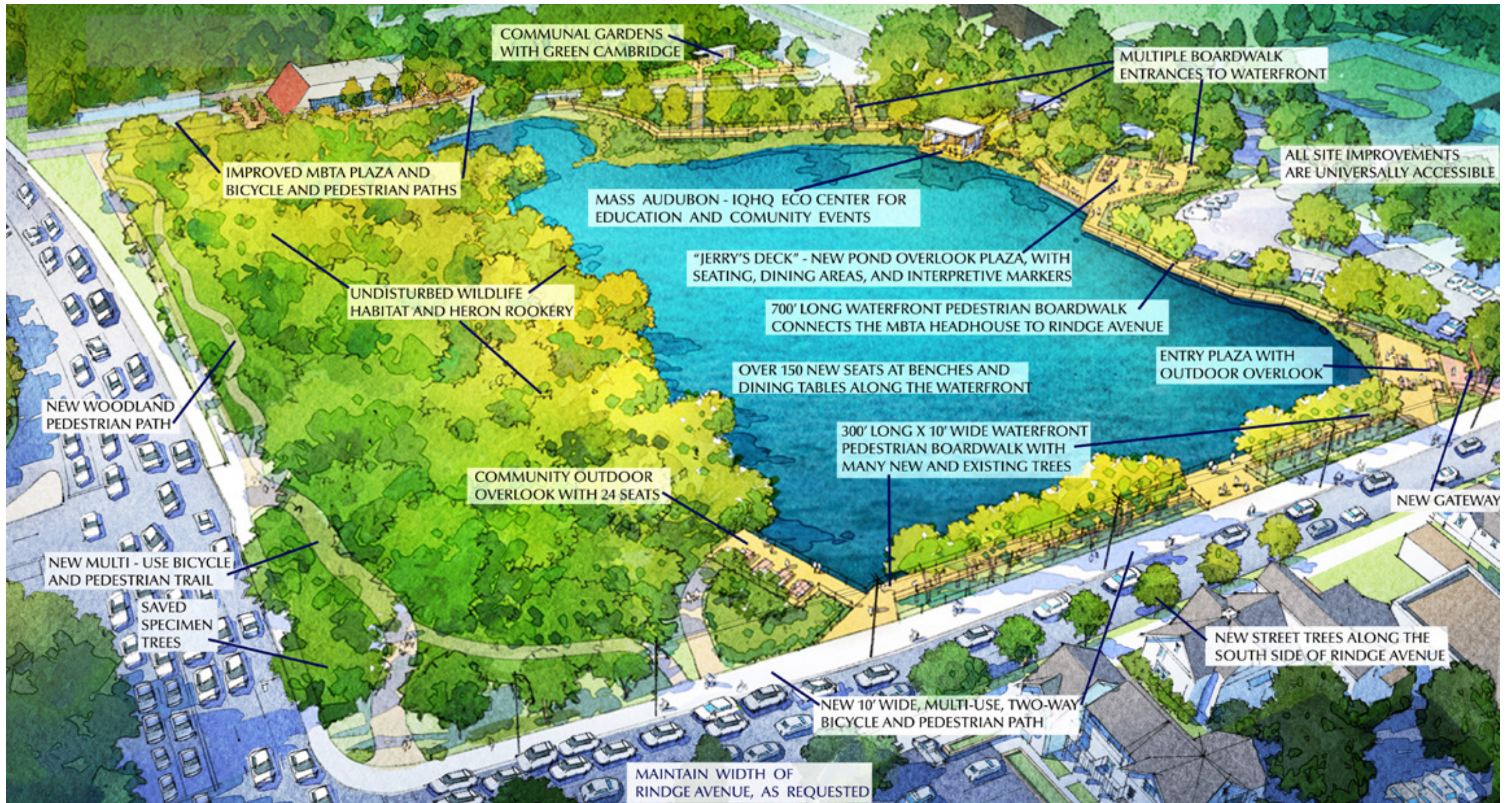
LANDSCAPE FENCING DETAILS

COMMITMENT AREAS

36-64 WHITTEMORE AVE.



36-64 WHITTEMORE AVE.
 COMMITMENT AREAS, DCR MULTI-USE PATH, MBTA & JERRY'S POND



JERRY'S POND - BIRD'S EYE VIEW

36-64 WHITTEMORE AVE.

JERRY'S POND - BIRD'S EYE VIEW



JERRY'S DECK



ECO CENTER - EVENT



ECO CENTER - OFF HOURS



ECO CENTER - CLASSROOM

36-64 WHITTEMORE AVE. JERRY'S POND - RENDERINGS



5
ENTRY GATEWAY



6
COMMUNAL GARDEN



7
BOARDWALK PATH TOWARD MBTA HEADHOUSE



8
BOARDWALK AT RINDGE AVE.

36-64 WHITTEMORE AVE. JERRY'S POND - RENDERINGS



JERRY'S DECK OVERLOOK



COMMUNITY OUTDOOR OVERLOOK

36-64 WHITTEMORE AVE.

JERRY'S POND - RENDERINGS



Repaint West, South and East Facades of the Headhouse

New Plantings and Exterior Lighting

Replace Entry Doors

Replace Plaza Paving
Mural at North Elevation

Widen path to create multi-modal path

Area for Food Trucks

1 RENDERING VIEW

36-64 WHITTEMORE AVE.

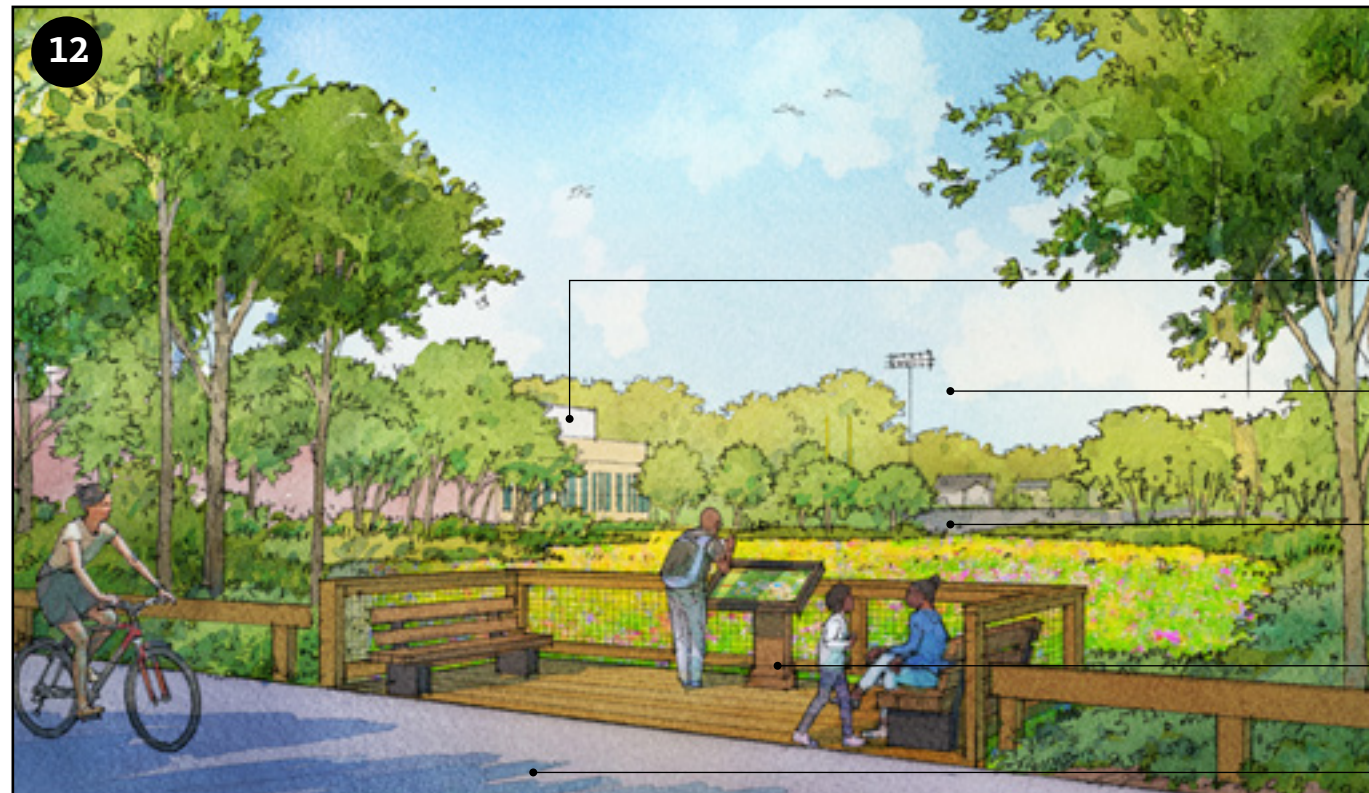
COMMITMENT AREAS, MBTA HEADHOUSE



New Bike Racks

Existing Blue Bike Station to Remain

MBTA PLAZA & HEADHOUSE PLAN



Building 5 Beyond

Russell Field

Harvey Street Neighborhood Beyond

Overlook with Interpretive Signage

New Multi-Modal Path

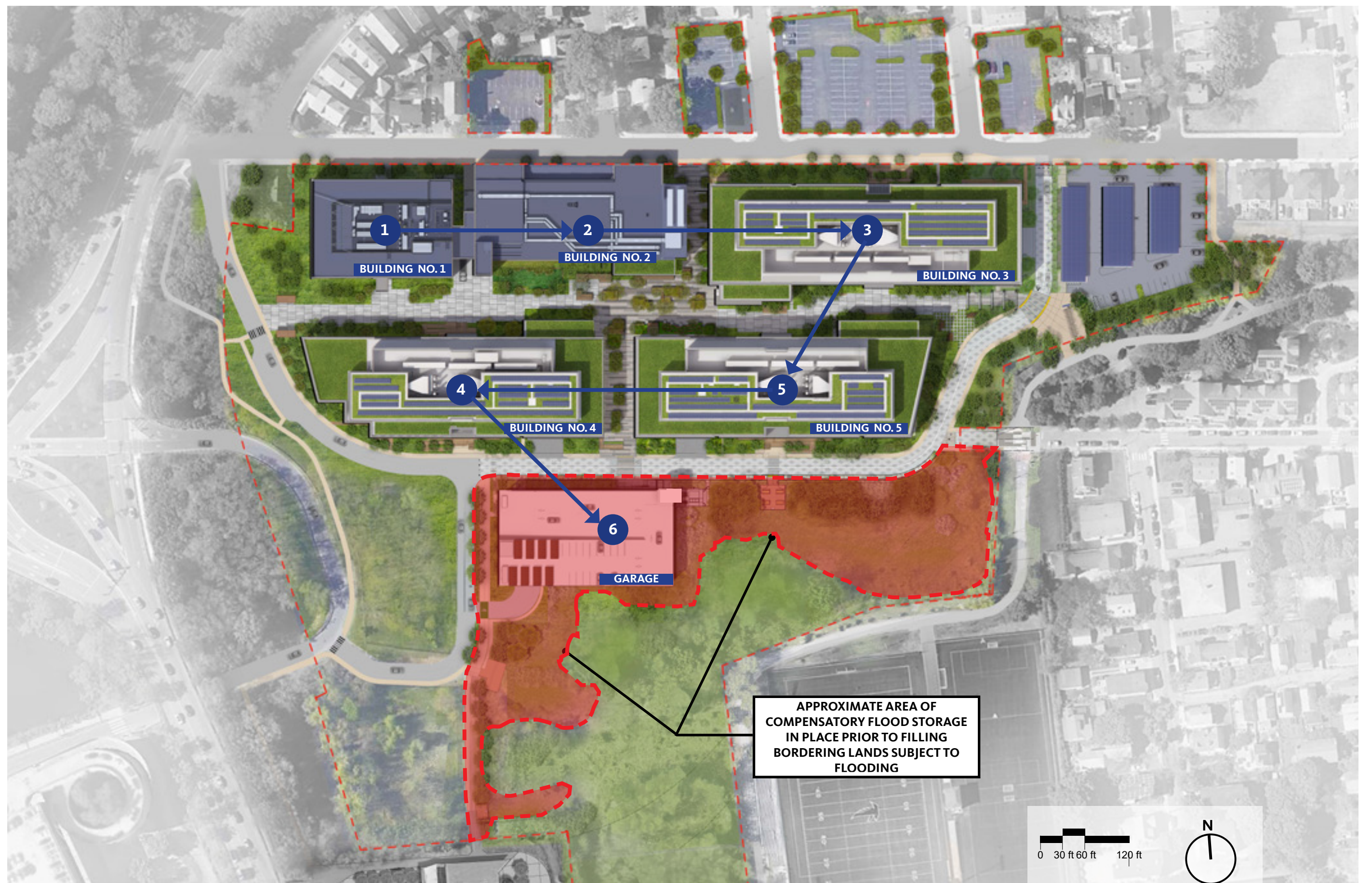
OVERLOOK AT FOUR ACRE HABITAT

36-64 WHITTEMORE AVE.

MBTA HEADHOUSE RENDERINGS

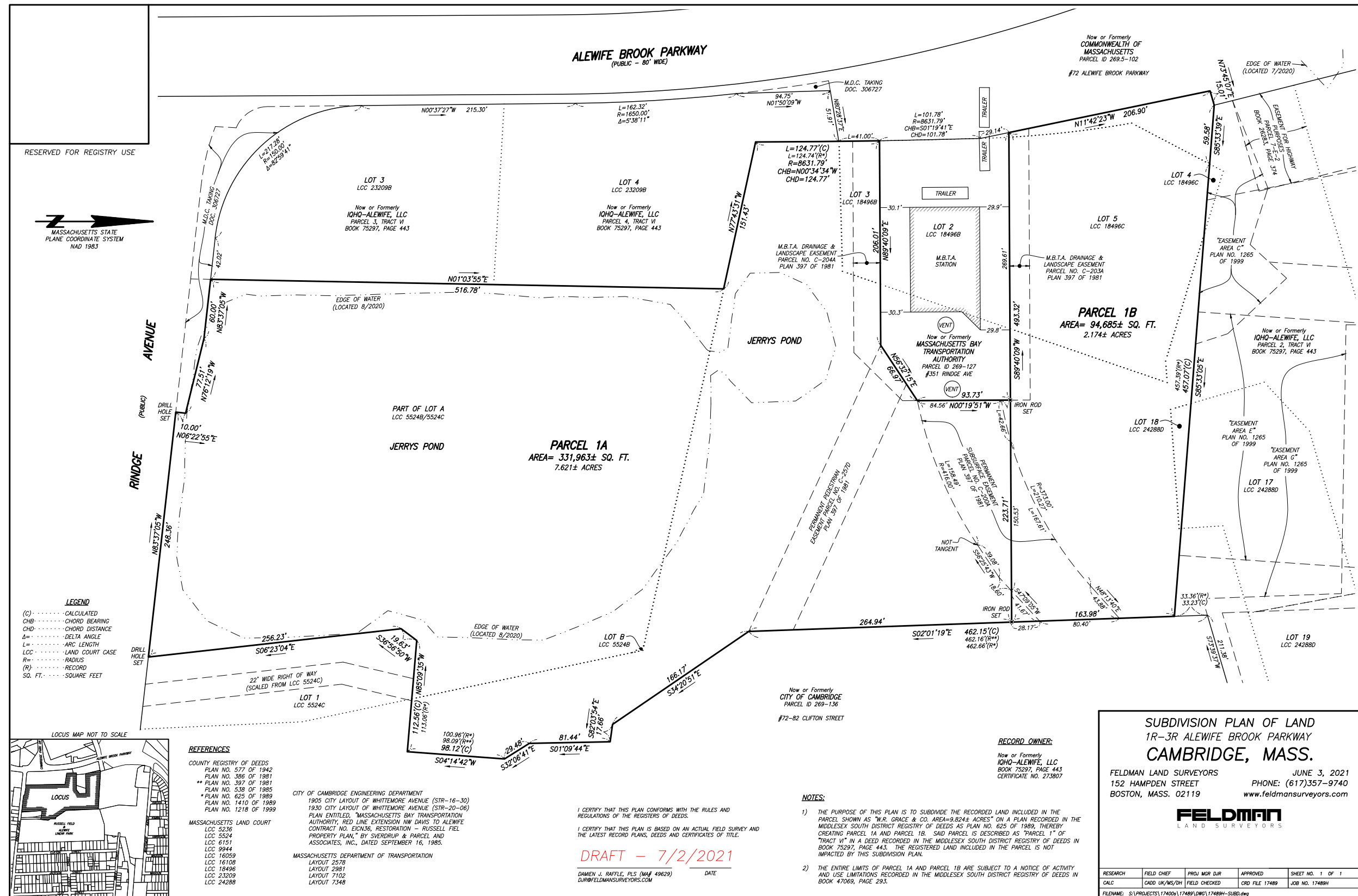
SEQUENCE OF CONSTRUCTION AND SUBDIVISION

36-64 WHITTEMORE AVE.



36-64 WHITTEMORE AVE.

SEQUENCE OF CONSTRUCTION



36-64 WHITTEMORE AVE. SUBDIVISION PLAN

SUSTAINABILITY

36-64 WHITTEMORE AVE.

Primary Goals and Strategies of the Project

Overall Goals

- 

Exceeding Article 22 for all 5 buildings
- 


LEED Gold Certification for all buildings
- 

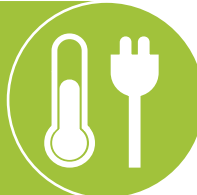
Fitwel Health & Wellness Certification
- 

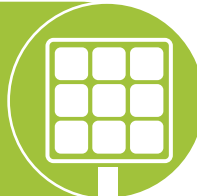
Ground Floor Level above 2070 Resilience Height
- 


Integrate Green Roofs on All New Construction Buildings

Energy & Building Performance

- 

26%* Total Energy Savings
- 


53% Reduction of On-Site Fossil Fuels
- 


575_{kw} On-Site Renewable Energy
- 


High Performance Building Envelope & MEP Systems

** Percentages above are against a Stretch Code Baseline for new construction buildings 3-5*

Operational & Embodied Carbon

- 


21%* Reduction in Emissions
- 


Adaptive Reuse of Existing Buildings to Reduce Carbon Impact
- 

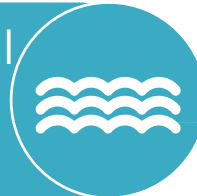
Performed LCA to Reduce Embodied Carbon in Materials


** Percentages above are against a Stretch Code Baseline for new construction buildings 3-5*

Water

- 

50k Gal. captured and reused for irrigation
- 

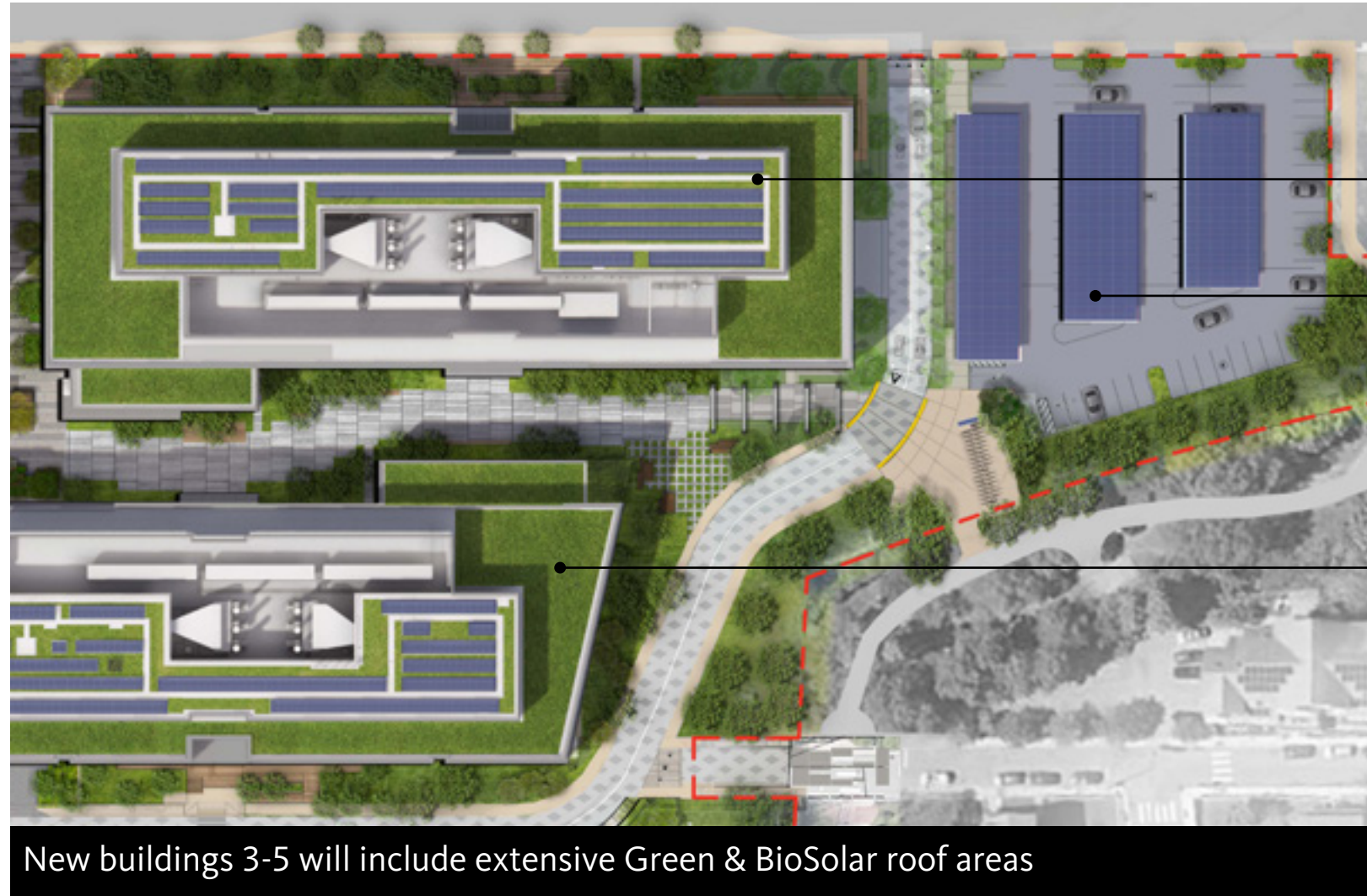
+30% Water Use Reduction
- 

15k cuft of Additional Flood Storage Capacity
- 

Stormwater Rates Reduced and Quality Improved

36-64 WHITTEMORE AVE.
SUSTAINABILITY

Exceeding the 80% requirement for Green Roofs
+75,000sf of extensive and biosolar roof area across three buildings



All new construction buildings are **fully compliant** with City of Cambridge Green Roof Ordinance



BIOSOLAR ROOF SYSTEM
 Reduce urban heat island & produce renewable energy

INSIGHT

Biosolar roofs systems combine green roofs and solar panels resulting in **improved panel efficiency**



PV PARKING CANOPY
 Reduce heat island and generate renewable energy

INSIGHT

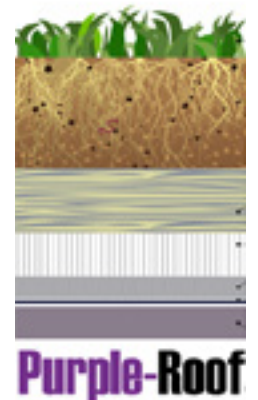
Parking canopies shade surface lots to help **reduce urban heat island** & generate renewable energy from solar panels



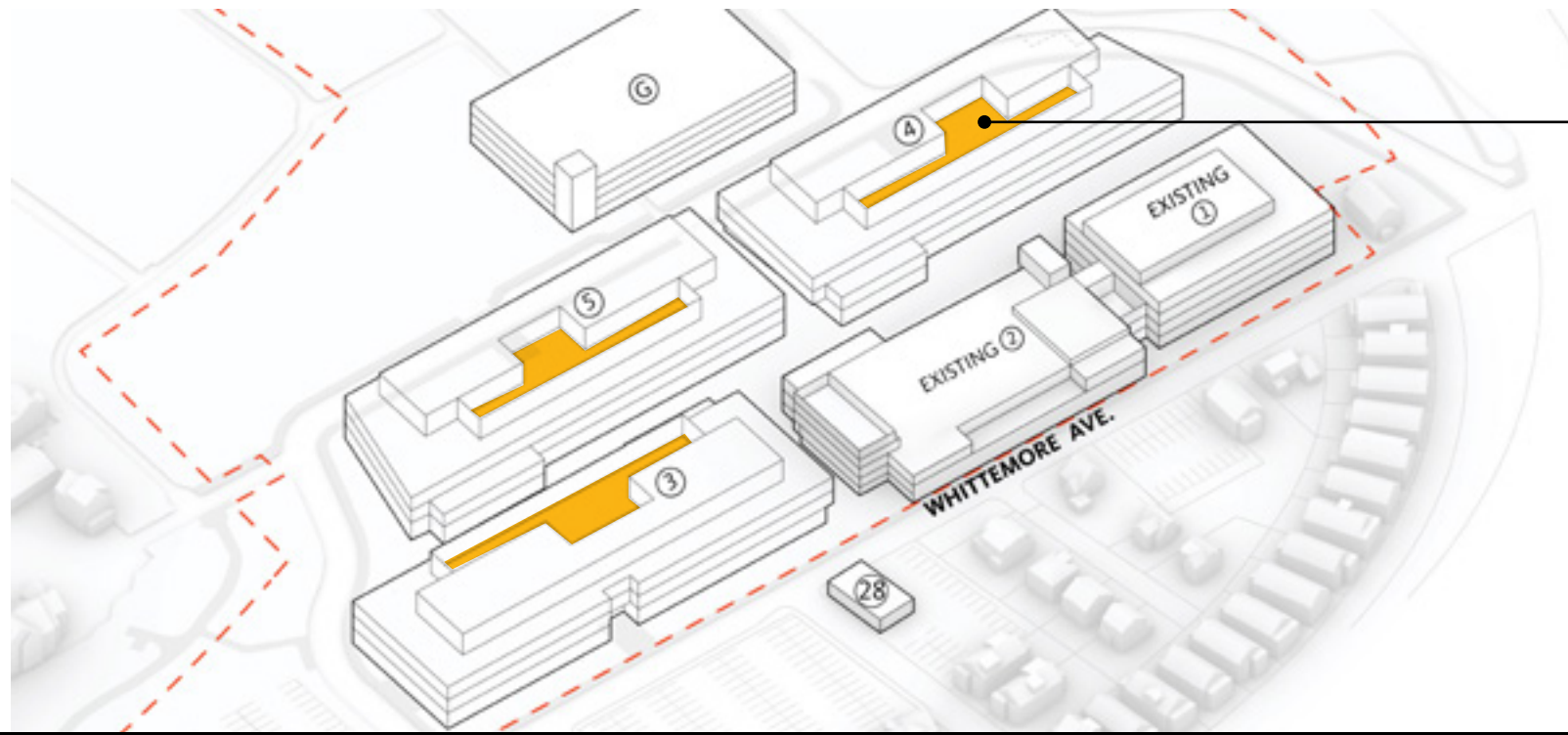
GREEN ROOF + PURPLE ROOF SYSTEM
 Absorb stormwater, reduce runoff & create habitat

INSIGHT

Purple roof concept increases **retention and detention** of stormwater, **reducing peak flows** and **improving plant health**



36-64 WHITTEMORE AVE.
 DYNAMIC BUILDING ROOFS



New buildings 3-5 have increase structural capacity for future all-electric equipment

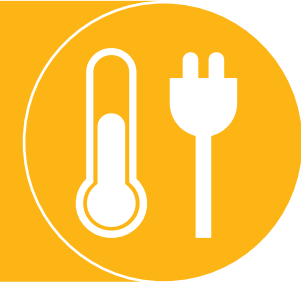


INCREASED STRUCTURAL CAPACITY INCLUDED IN CURRENT DESIGN

To support future all electric equipment at the building roof level of all new construction buildings.

INSIGHT

Future transition to all electric will require additional equipment at the roof level, which requires additional capacity from structure.

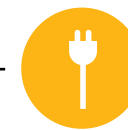


Existing surface lots to receive light-color pavement + EVCS at garage and east surface lot



HEAT ISLAND MITIGATION

Existing surface lots will receive **new trees to help with urban heat island**. Additionally, the project is including light-color pavement at these lots.



ELECTRIC VEHICLE STATIONS

**Day One: 20 at surface lots
88 at garage (25% of garage) with ECVS**

Future: Evaluating infrastructure to support **100% EV ready for garage**



INCREASED STRUCTURAL CAPACITY

To support tree nursery in cooperation with Green Cambridge.

36-64 WHITTEMORE AVE.
PLANNING FOR THE FUTURE

PROPOSED DESIGN

The project is a 146,317 sf core and shell building, intended for a combination of laboratories and offices, which is located on a campus of five buildings in Cambridge, Massachusetts. The structural system consists of steel beams and columns, with composite concrete and steel slabs and concrete stairs and foundations. Concrete is specified with 20-50% SCM.

The enclosure is a primarily a combination of rainscreen and curtain wall systems, with UHPC and metal panels and double-glazed windows. The ground floor level also includes granite panels and CMU walls near loading docks. There is a double-height mechanical penthouse with acoustically insulated metal panels, and all roofs are either green or purple roof assemblies.

Materials within the project scope which could be included in the assessment include structural steel and concrete, steel reinforcements for concrete, rainscreen and curtain wall panels, insulation, framing, vapor barriers, sheathing, roofing components, and exterior doors. No materials outside of the core & shell scope have been included. A detailed breakdown of all materials and data sources is provided in the appendix.

BASELINE DESIGN

The LCA baseline is a hypothetical alternative that can be used to investigate the relative lifecycle impacts of intentional design decisions. It represents a typical design for the project size, location, use type, and energy performance.

For this assessment, the baseline has been developed by modifying the proposed design to remove intentional design decisions which are expected to change the carbon footprint, using industry average data, standard specifications, and/or the Carbon Leadership Forum 2021 “Typical” materials global warming potential baselines. These modifications were made only when sufficient data of equal or greater specificity is available and technical equivalence could be confirmed; otherwise, the material is the same in the baseline and proposed designs and no credit is taken, resulting in as fair a comparison as possible.

- Differences between the baseline and proposed design include:
- No significant SCM content in concrete mixes Industry-average and/or nearest available data to CLF
- “Typical” values for metal panels, glass, board insulation, and TPO membranes
- 2” standard precast panels in lieu of UHPC panels

All insulation depths in the baseline were adjusted to provide the R-value in the proposed design to maintain performance equivalence. Although not often considered typical, the green/purple roofs were not modified in the baseline because they provide additional stormwater capture benefits meeting regulatory requirements.

OPTIMIZED PROPOSED DESIGN

As the project has not yet been built, whenever there are multiple procurement options compliant with the design documents, the proposed design in this study is based on the option with the highest stage A1-A3 embodied carbon intensity, with the intent of reflecting a conservative estimate of the as-built project. In contrast, the optimized proposed design reflects the options with the lowest stage A1-A3 embodied carbon intensity, with the intent of estimating the greatest achievable lifecycle impact reductions.

Potential selections to further reduce lifecycle impacts within the current design documents include:

- Increasing SCM content to the 50% maximum allowed in the specifications
- Selecting structural steel decking, plates, rolled steel plates, rebar, and wire reinforcements with maximum recycled content, close to the CLF Achievable baseline value
- Selecting the design alternative for 20 ga. steel instead of painted aluminum backpan panels
- Selecting Rockwool CavityRock insulation in lieu of Thermafiber RainBarrier 45
- Selecting Carlisle SynTec TPO in lieu of Firestone UltraPly TPO
- Selecting Sheetrock EcoSmart Firecode X, which is the lowest-carbon gypsum board product meeting both recycled content and regional requirements in the specifications

36-64 WHITTEMORE AVE.

LCA - ASSESSMENT BASIS

The total carbon footprint of the project is 8,030 mt CO₂e, representing an 11.6% reduction compared to the baseline. Over a 60-year lifespan the normalized footprint is estimated at 0.91 kg CO₂e/sf/year.

The primary drivers of this reduction are:

- 25% SCM additives in cement mix
- Selecting a lower-carbon insulation product
- Selecting lightweight ultra-high performance composite panels over conventional precast panels

Savings are reduced by a carbon-intensive roof membrane and glass products.

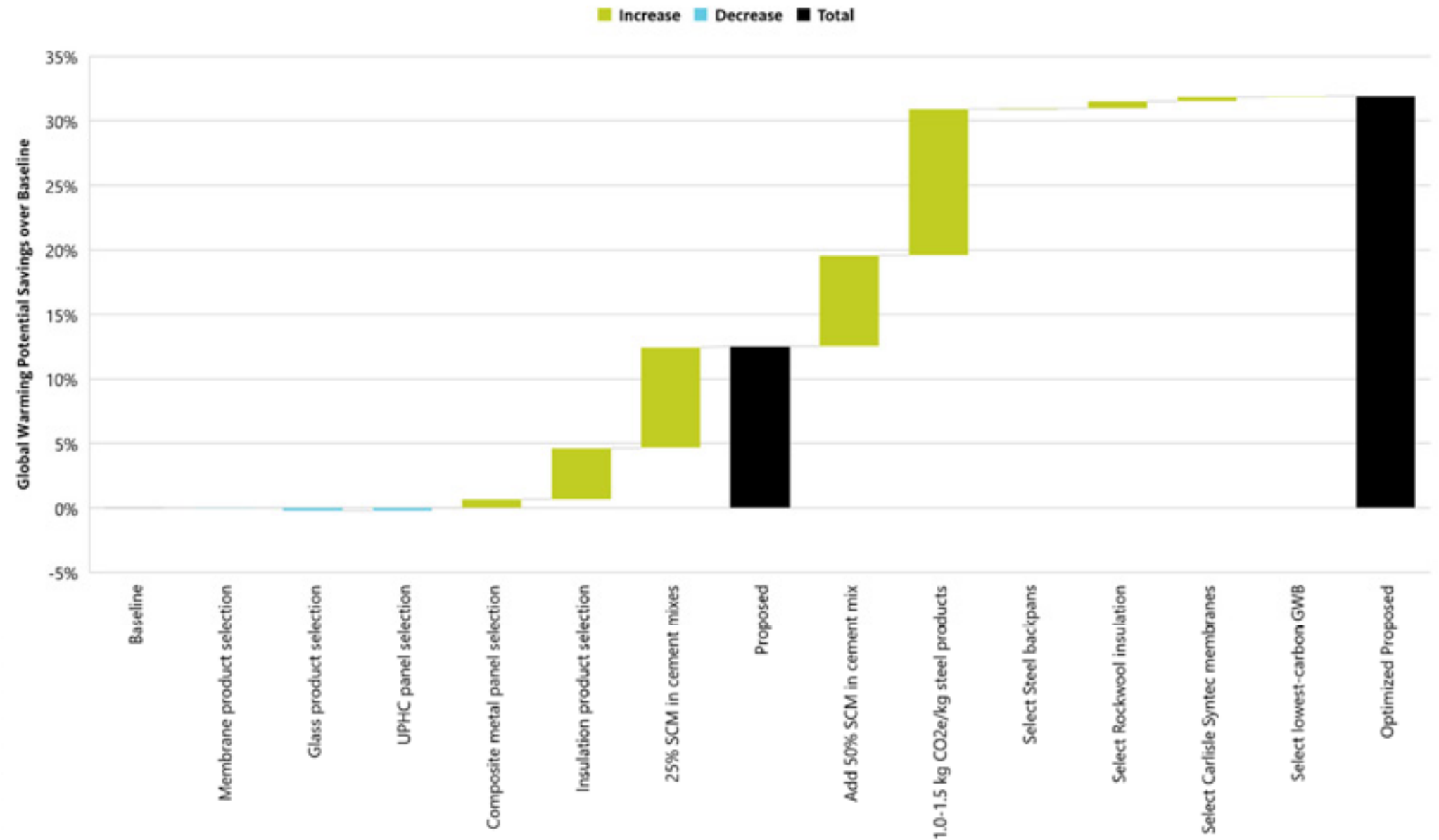
With the selections in the optimized proposed design, the project could achieve up to an 31.7% reduction compared to the baseline, or an additional reduction of 1,828 mt CO₂e.

The best opportunities to maximize embodied carbon savings include:

- Reducing the carbon intensity of steel selection to the current
- Carbon Leadership Forum “Achievable” target of 1.0-1.5 kg CO₂e/kg
- Maximizing the SCM additives in the cement mix to 50%
- Selecting the lowest-carbon compliant products for insulation and roofing membranes

While there are also opportunities to reduce embodied carbon through selecting steel instead of aluminum backpans, and selecting a low-carbon gypsum board product, these two materials are low in quantity and would not make a significant difference to the embodied carbon associated with the core and shell.

Contributors to Global Warming Potential Savings



36-64 WHITTEMORE AVE.

LCA - GLOBAL WARMING POTENTIAL SAVINGS

PROPOSED DESIGN DETAILS

STRUCTURE

Structural materials represent 80% of the proposed design's embodied carbon footprint. Steel, in particular rolled steel shapes and decking, is the greatest primary contributing material. At this stage, the steel data in the assessment represents industry-average values. Evaluating embodied carbon as part of the procurement process could provide opportunities to further reduce these impacts. Maximizing recycled content, procuring steel locally (to reduce transportation-related emissions), and if possible selecting steel from electric arc furnaces are all effective strategies.

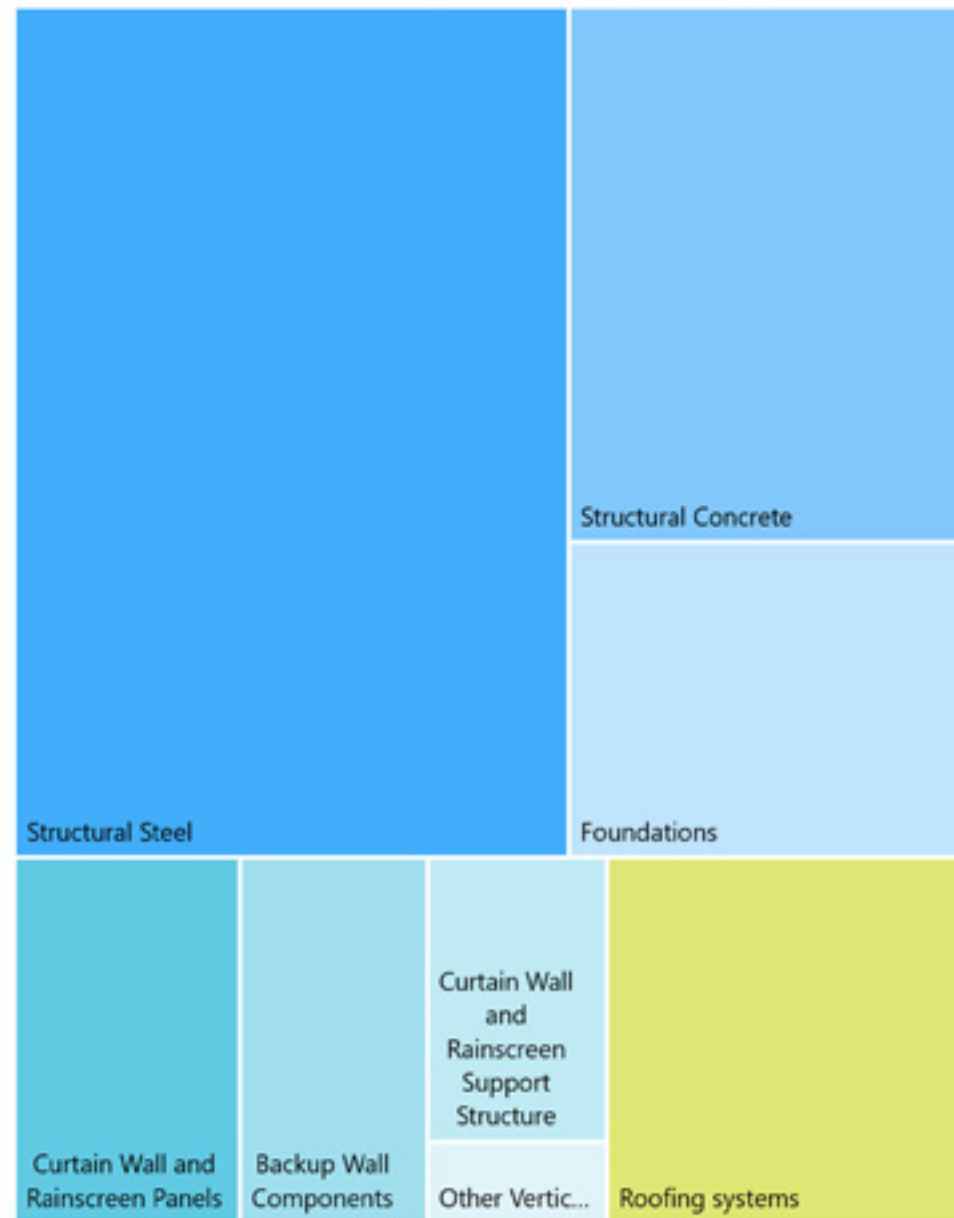
The additives in the concrete cement mix in the proposed design are also a conservative interpretation of the specifications, showing the minimum SCM content from fossil fuel byproduct additives. If the cure times are acceptable in the schedule, maximizing the SCM content while maintaining required compressive strength could also improve savings.

ENCLOSURE

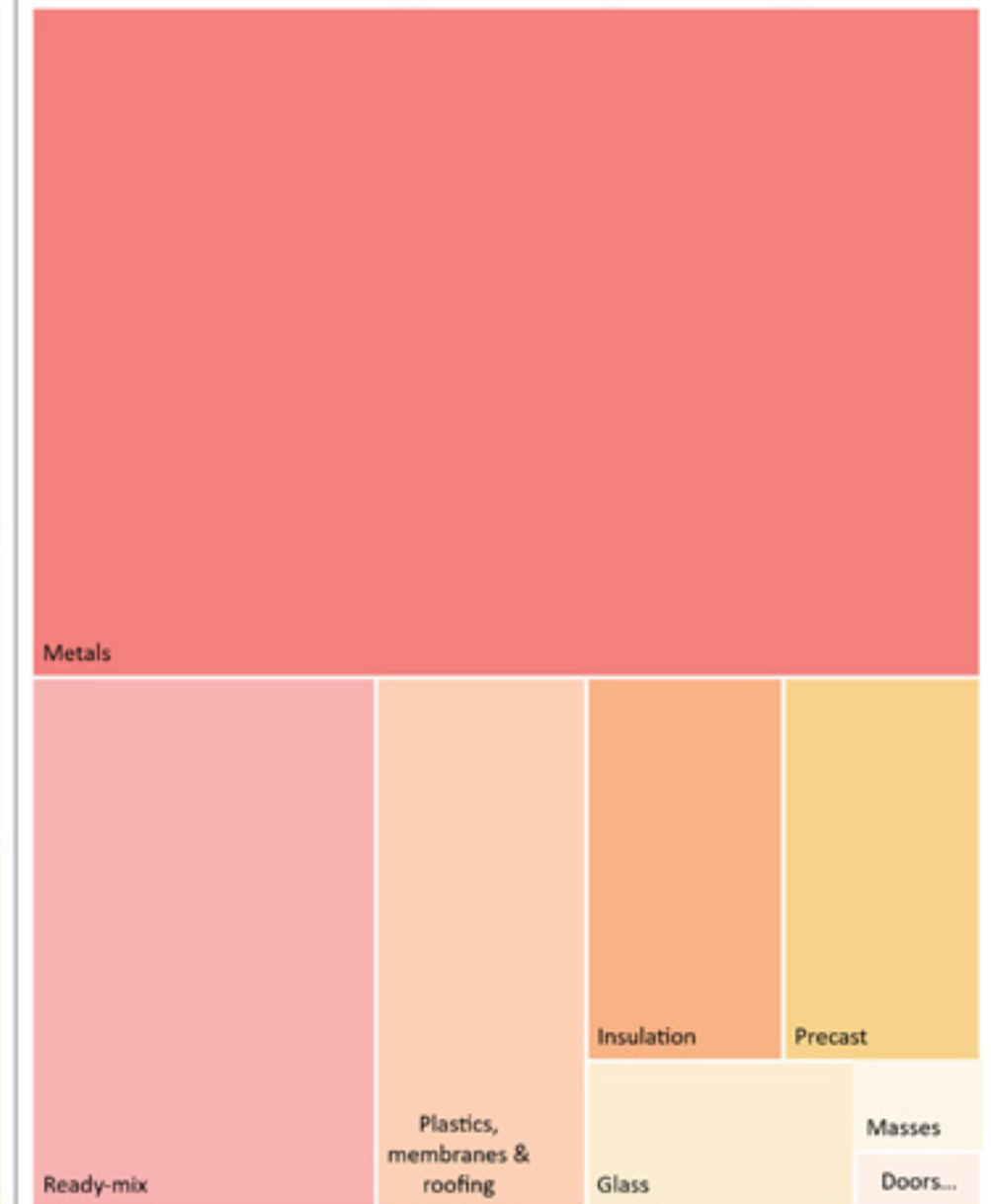
The enclosure represents 19% of the carbon footprint. For the project design, roofing systems have a high impact relative to surface area, which is largely driven by the waterproofing membrane, insulation, and vapor barriers. In comparison, the green and purple roof components themselves are not significant contributors to the carbon footprint.

For the envelope, the rainscreen and curtain panels themselves comprise 5.5% of the system impacts, while the supporting structure comprises 2.3%. Insulation and framing are the primary contributors in the backup wall constructions, contributing to 3.8% of the total carbon footprint.

Global Warming Potential by Use Type



Global Warming Potential by Material Type



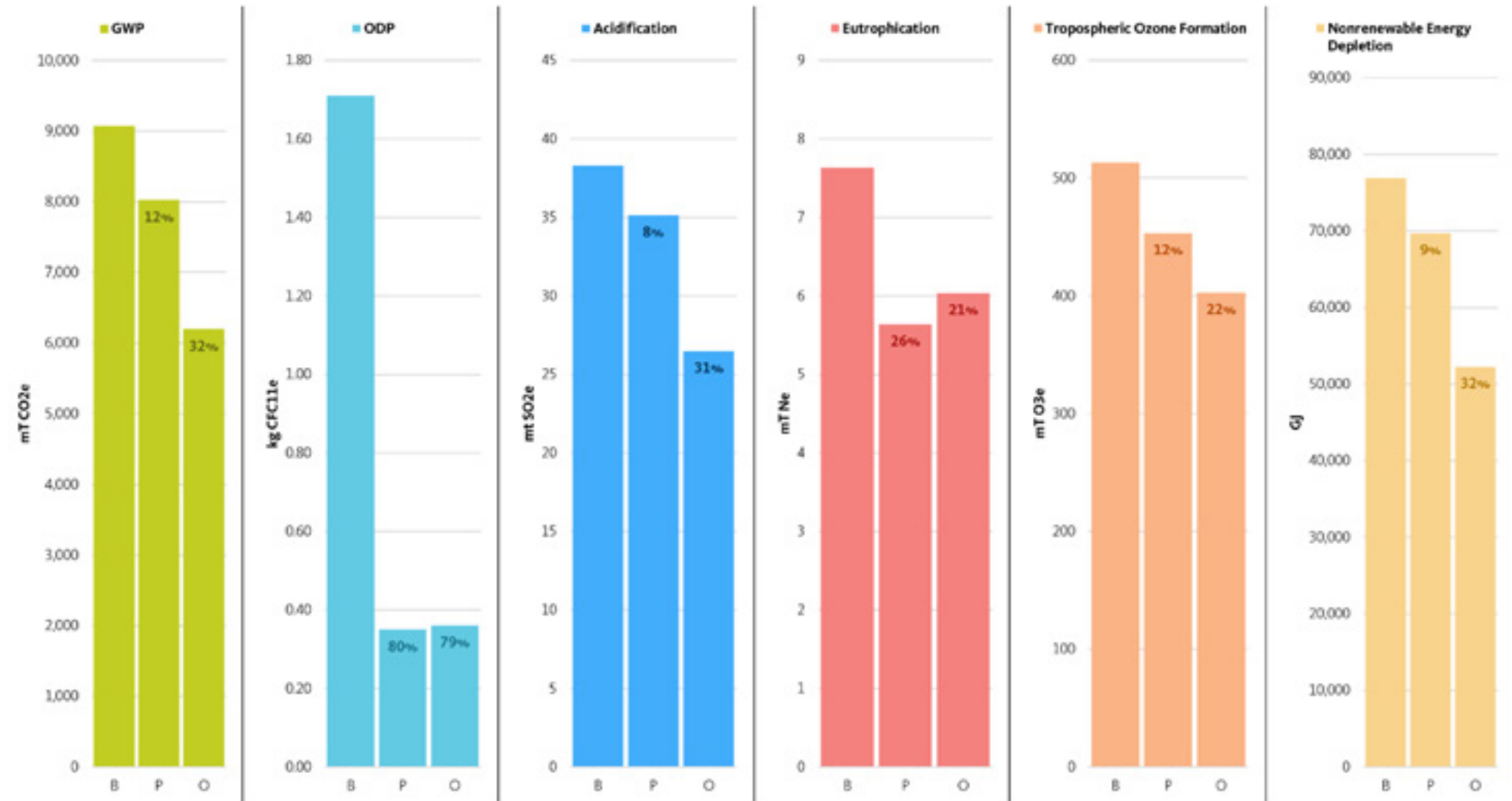
TRACI LCA INDICATORS

The comparative difference in impact between the baseline and proposed across all the TRACI 2.1 categories are:

- Global Warming Potential (GWP): 11.6%
- Ozone Depletion (ODP): 79.5%
- Acidification: 8.3%
- Eutrophication: 26.1%
- Tropospheric Ozone Formation: 11.7%
- Depletion of Nonrenewable Energy: 9.4%

These indicators are all independently assessed and measured. Many materials with reduced global warming impacts do show reductions across all LCA categories, but the primary drivers are not always the same and for some materials there are trade-offs. An effective embodied carbon strategy should consider all the LCA indicators as much as possible to avoid unintended consequences.

XPS insulation products are an outsized contributor to ozone depletion from their manufacturing process, representing half of all total ODP. The savings to the right are driven by selecting a product with a lower total ODP and a higher R-value per inch, which also allows for dematerialization.



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LCA - TRACI INDICATORS

LCA IMPACTS BY STAGE

The graph to the right shows the percentage of impacts in each TRACI category by LCA stage:

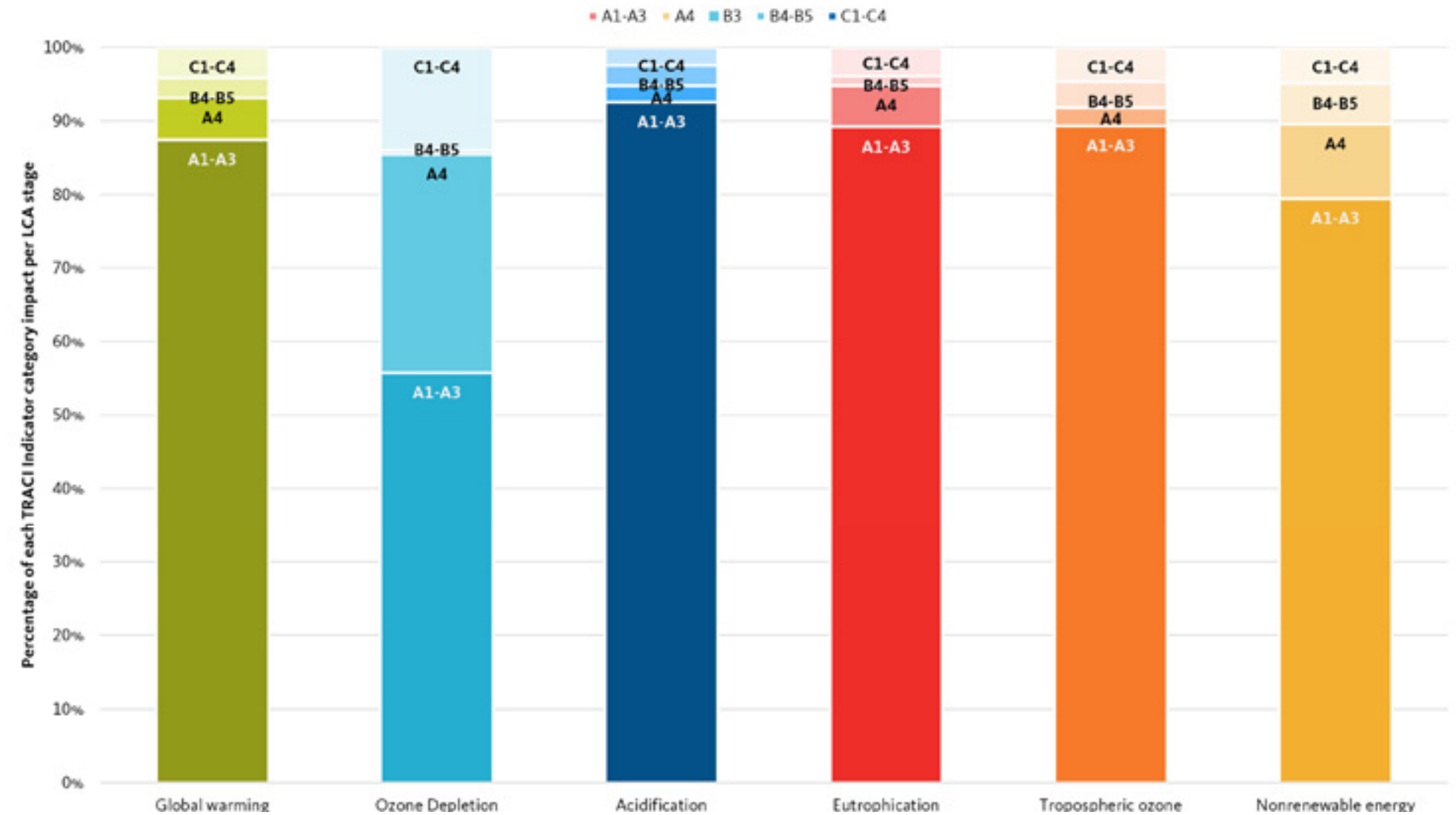
- Stages A1-A3: Material extraction through manufacture
- Stages A4: Transportation from factory to site
- Stages B4-B5: Replacement during 60-year lifespan
- Stages C1-C4: End of life demolition and disposal or recycling

Across all categories, the majority of impacts occur during material extraction through manufacture. Materials which have lower percentages of raw materials and require less intensive processing through either dematerialization, cleaner energy for manufacture, or other advantages are therefore shown to be effective strategies for reducing lifecycle impacts. This is especially true when considering the time value of immediate carbon reductions in slowing global climate change.

Selecting local materials which reduce transportation distances have the greatest benefit to reduce ozone depletion and non-renewable energy resource usage. For the purpose of this study, default assumptions for transportation distance were used in all cases unless a specific distance limit was specified in the design documents. In practice, transportation stage impacts may be larger or smaller depending on procurement and availability.

The materials included in the scope of this study across all three cases are all durable materials, which limits the share of replaced materials. No non-standard assumptions were made for end-of-life reuse.

TRACI Indicator Impacts by Lifecycle Stage



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LCA - TRACI INDICATORS

Lifecycle assessment is a developing field and not all products have compliant product-specific LCA reports needed for accurate testing. In addition, many LCA reports available are generalized or rely on standard assumptions as allowed in EN 15804.

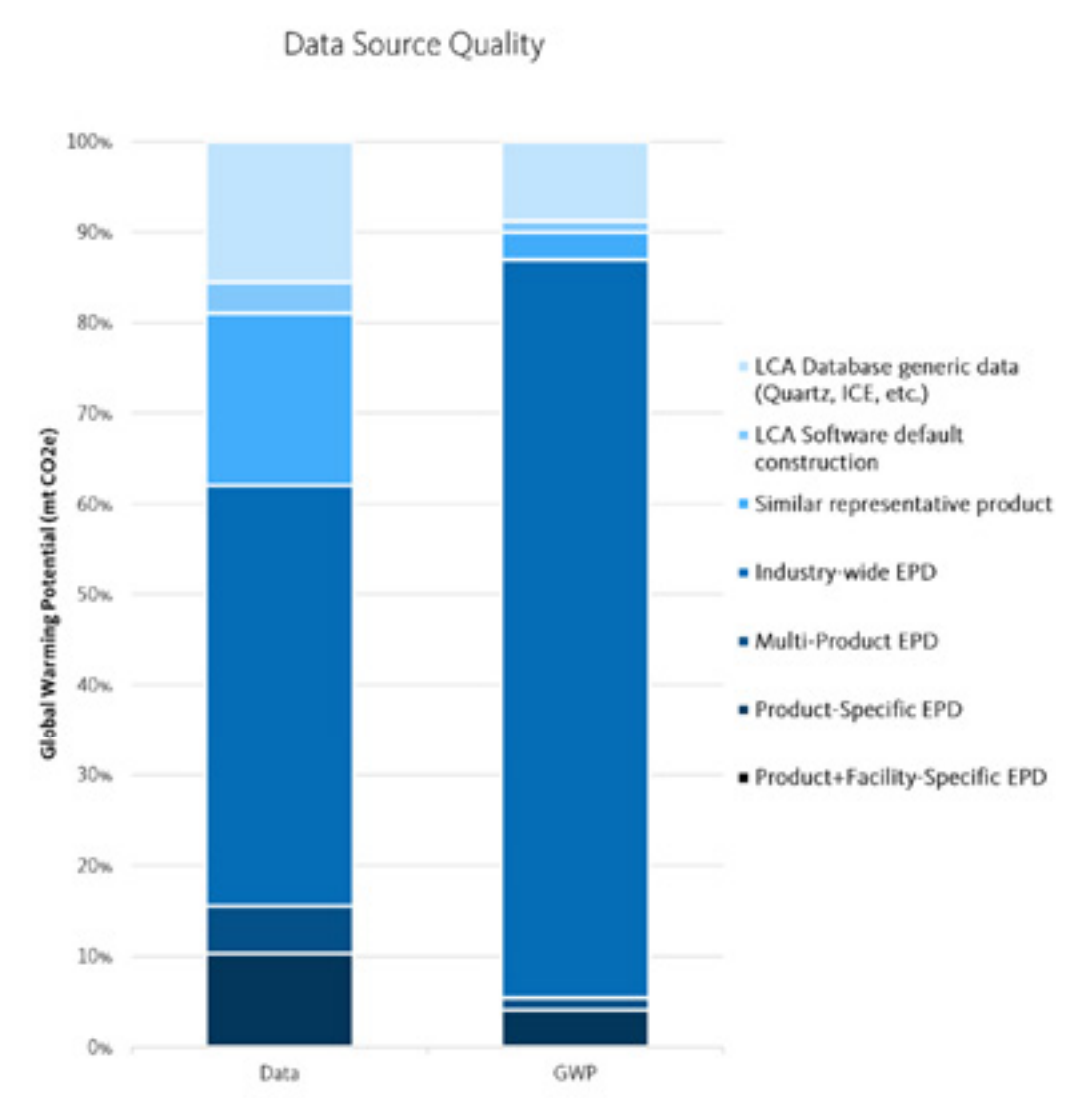
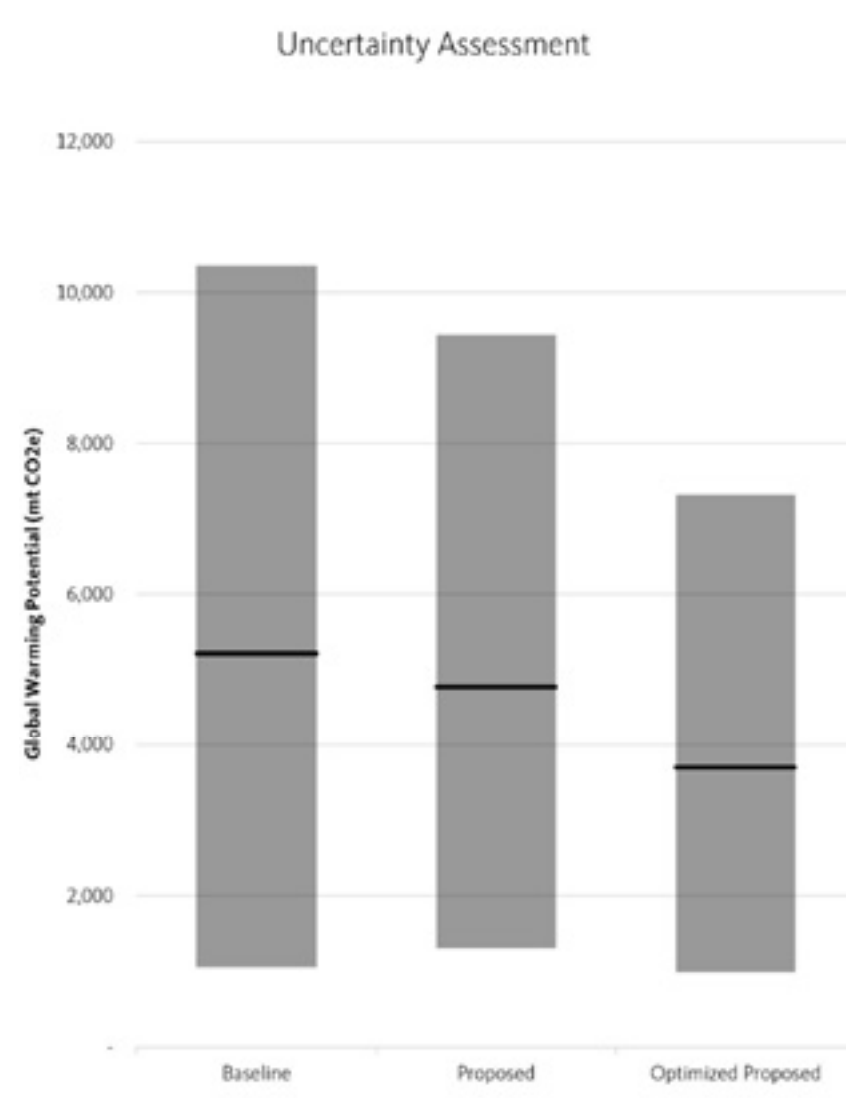
For the purposes of this study, all LCA data was used from the OneClick LCA North America database in the OneClick LCA online platform. This selection allows for the creation of an ISO 14044-compliant LCA process with as comparable as data as possible. Data was selected based on the following preference:

- Product-specific EPD (current)
 - Product-specific EPD (outdated)
 - Industry-wide EPD with manufacturer participation
 - Industry-wide EPD without manufacturer participation
 - Similar product if no generic EPD exists
 - OneClick LCA default constructions
 - Generic data point from databases such as Quartz or ICE
- If none of the above were available, then the material in question was excluded from both the baseline and proposed assessments.

This was true for:

- Ground floor garage doors
- Rooftop walkway mats
- Rainscreen clips, fasteners, and similar small components

At this stage, 15% of the data points are from product-specific EPDs, while 66% are from industry-wide EPDs or a similar representative product with the same technical specifications. Some product-specific EPDs which report using CML weighting values only could not be used for the LEED assessment, and were substituted with similar products.



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LCA - DATA LIMITATIONS

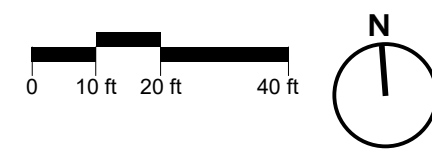
SHADOW STUDIES

36-64 WHITTEMORE AVE.



LEGEND:

- EXISTING SHADOWS REMOVED
- EXISTING SHADOWS TO REMAIN
- NEW NET SHADOWS
- EXISTING FOOTPRINT



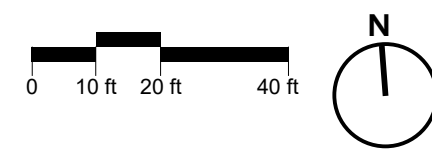
36-64 WHITTEMORE AVE.

SHADOW STUDIES: SUMMER SOLSTICE - JUNE 21



LEGEND:

- EXISTING SHADOWS REMOVED
- EXISTING SHADOWS TO REMAIN
- NEW NET SHADOWS
- EXISTING FOOTPRINT



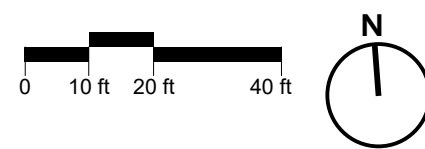
36-64 WHITTEMORE AVE.

SHADOW STUDIES: FALL EQUINOX - SEPT 21



LEGEND:

- EXISTING SHADOWS REMOVED
- EXISTING SHADOWS TO REMAIN
- NEW NET SHADOWS
- EXISTING FOOTPRINT



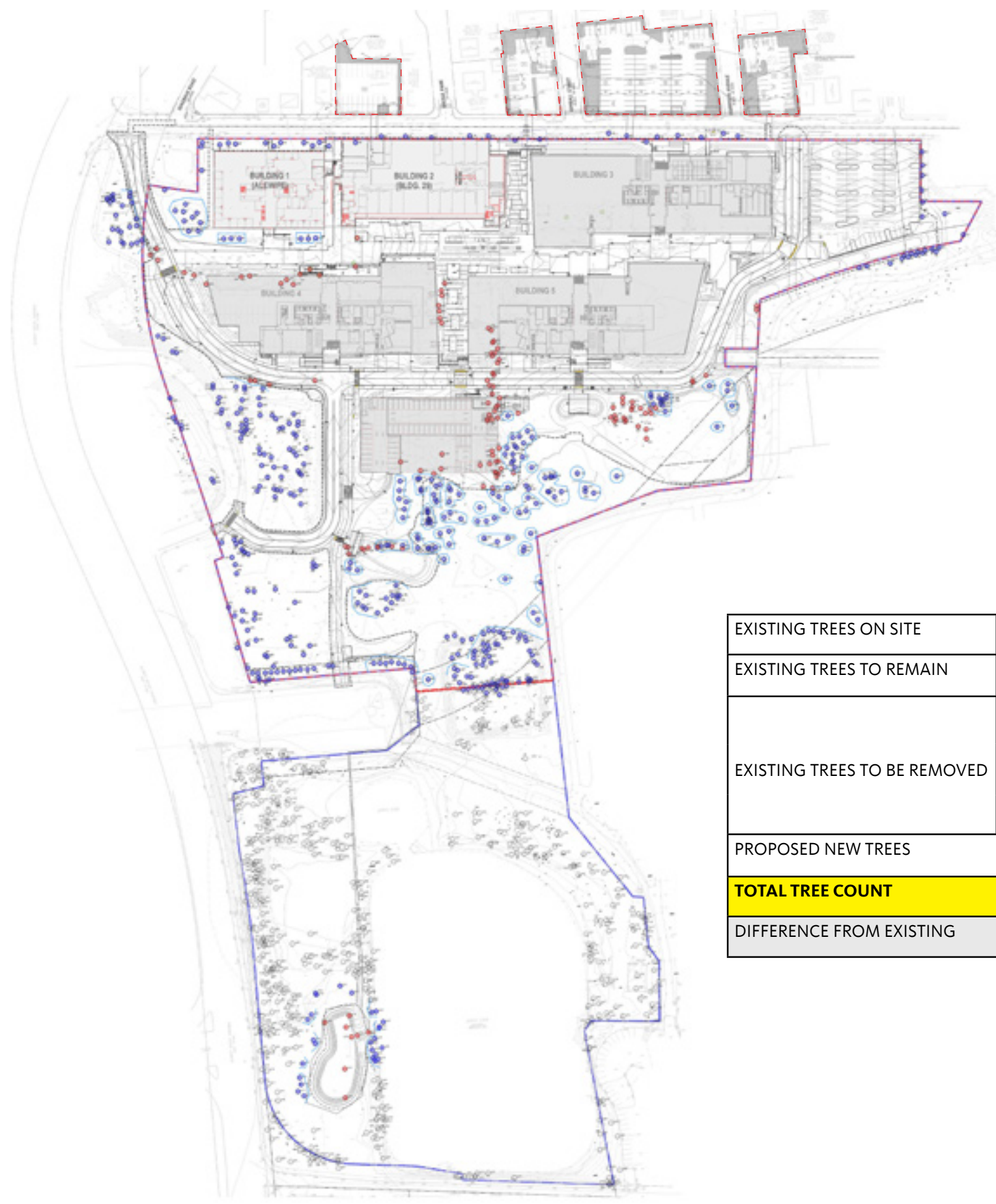
36-64 WHITTEMORE AVE.

SHADOW STUDIES: WINTER SOLSTICE - DEC 21

REVISED

TREE PROTECTION AND FOUR ACRE PLANTING PLANS

36-64 WHITTEMORE AVE.

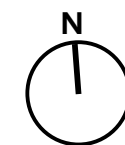


NO TREES ARE BEING REMOVED IN AREAS WHERE SOIL IS NOT BEING DISTURBED

TO MITIGATE THE REMOVED TREES, IQHQ WILL BE PLANING 656 NEW TREES.

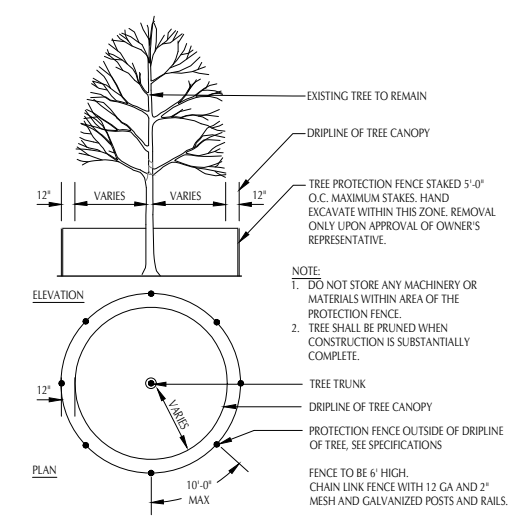
WHEN COMPLETE, OVER 1,460 TREES WILL BE LOCATED ON THE OVERALL PROPERTY

		DEVELOPMENT AREA	JERRY'S POND	TOTAL
EXISTING TREES ON SITE		462	501	963
EXISTING TREES TO REMAIN		354	453	807
EXISTING TREES TO BE REMOVED	Due to condition or close proximity to trees	108	40	148
	At SW corner of Jerry's Pond	-	8	8
	Total	(108)	(48)	(156)
PROPOSED NEW TREES		656	TBD	656
TOTAL TREE COUNT		1,002	453	1,463
DIFFERENCE FROM EXISTING		+540	-48	+492



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TREE PROTECTION PLAN DEVELOPMENT SITE & COMMITMENT AREAS



LEGEND

- EXISTING TREES TO REMAIN IN DEVELOPMENT AREA
- EXISTING TREES TO BE REMOVED IN DEVELOPMENT AREA
- EXISTING TREES TO BE REMOVED AT SW CORNER OF JERRY'S POND

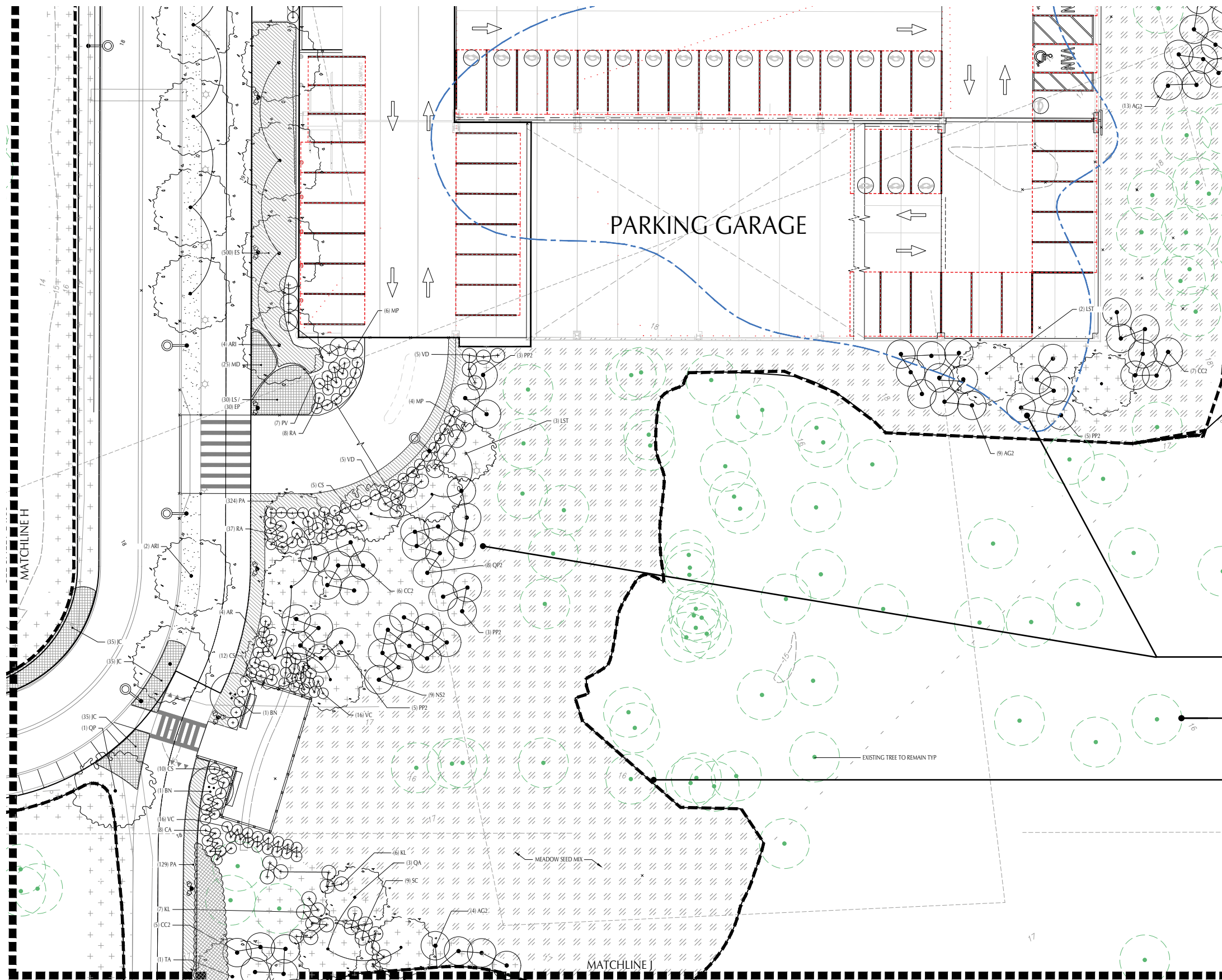
LEGEND	QUANTITY	TOTAL CALIPER INCHES
EXISTING TREES IN DEVELOPMENT AREA	462	5,746
EXISTING TREES TO REMAIN IN DEVELOPMENT AREA	354	4,422
EXISTING TREES TO BE REMOVED IN DEVELOPMENT AREA	(108)	(1,324)
EXISTING TREES TO BE REMOVED AT SW CORNER OF JERRY'S POND	(8)	(87)
PROPOSED NEW TREES	656	1,420
PROPOSED NET NEW TREE COUNT	1,002	5,755
DIFFERENCE FROM EXISTING	+540	+9

- TREE PROTECTION FENCE
- DEVELOPMENT BOUNDARY



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TREE PROTECTION PLAN DEVELOPMENT AREA



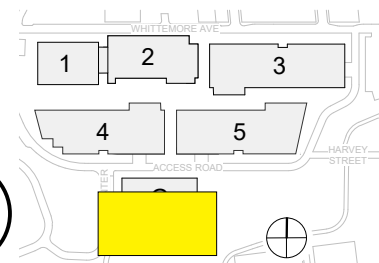
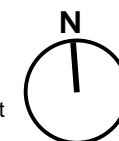
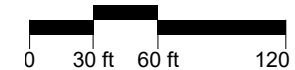
PLANTING SCHEDULE

SYM	QTY	BOTANICAL NAME	COMMON NAME	SIZE	COMMENTS
DECIDUOUS SHADE TREES (257 TOTAL)					
AF	17	<i>Acer x freemanii</i> 'Autumn Blaze'	Autumn Blaze Freeman Maple	4' - 4 1/2' CAL.	7' LOWEST BRANCH, SPRING PLANT
AR	9	<i>Acer rubrum</i> 'October Glory'	October Glory Red Maple (oval)	3' - 3 1/2' CAL.	7' LOWEST BRANCH, SPRING PLANT
AR1	36	<i>Acer rubrum</i> 'Armstrong'	Armstrong Red Maple (upright)	3' - 3 1/2' CAL.	7' LOWEST BRANCH, SPRING PLANT
AR2	11	<i>Acer rubrum</i> 'Armstrong'	Armstrong Red Maple (upright)	1' - 1 1/2' CAL.	
CO	6	<i>Carya ovata</i>	Shagbark Hickory	1' - 1 1/2' CAL.	
FGR	3	<i>Fagus grandifolia</i>	American Beech	3' - 3 1/2' CAL.	7' LOWEST BRANCH, SPRING PLANT
FGR2	9	<i>Fagus grandifolia</i>	American Beech	1' - 1 1/2' CAL.	SPRING PLANT
GB	15	<i>Ginkgo biloba</i> 'Princeton Sentry'	Princeton Sentry Maidenhair Tree	3' - 3 1/2' CAL.	7' LOWEST BRANCH
GT	22	<i>Gleditsia triacanthos</i> var. <i>inermis</i> 'Draves'	Street Keeper Honeylocust (upright)	4' - 4 1/2' CAL.	7' LOWEST BRANCH
LST	11	<i>Liquidambar styraciflua</i>	Sweetgum	3' - 3 1/2' CAL.	7' LOWEST BRANCH
NS	6	<i>Nyssa sylvatica</i> 'Wildfire'	Wildfire Tupelo	3' - 3 1/2' CAL.	7' LOWEST BRANCH
NS2	35	<i>Nyssa sylvatica</i> 'Wildfire'	Wildfire Tupelo	1' - 1 1/2' CAL.	
QA	3	<i>Quercus alba</i>	White Oak	3' - 3 1/2' CAL.	
QB	7	<i>Quercus bicolor</i>	Swamp White Oak	3 1/2' - 4' CAL.	7' LOWEST BRANCH
QP	25	<i>Quercus palustris</i>	Pin Oak	3 1/2' - 4' CAL.	7' LOWEST BRANCH
QP2	20	<i>Quercus palustris</i>	Pin Oak	1' - 1 1/2' CAL.	
QR	10	<i>Quercus rubra</i>	Northern Red Oak	3 1/2' - 4' CAL.	7' LOWEST BRANCH
TA	12	<i>Tilia americana</i>	American Linden	3' - 3 1/2' CAL.	7' LOWEST BRANCH
ORNAMENTAL TREES (349 TOTAL)					
AP	2	<i>Acer palmatum</i> 'Pixie'	Pixie Japanese Maple	5'-6' HT.	B & B
AG	30	<i>Amelanchier x grandiflora</i> 'Autumn Brilliance'	Autumn Brilliance Serviceberry	10'-12' HT.	3 TRUNKS MIN. / 5 MAX.
AG2	48	<i>Amelanchier x grandiflora</i> 'Autumn Brilliance'	Autumn Brilliance Serviceberry	1' - 1 1/2' CAL.	
BN	41	<i>Betula nigra</i> 'Heritage'	Heritage River Birch	12'-14' HT.	3 TRUNKS MIN. / 5 MAX. SPRING PLANT
BP	24	<i>Betula pendula</i>	Silver Birch	3' - 3 1/2' CAL.	SINGLE STEM, SPRING PLANT
CC	16	<i>Cercis canadensis</i> 'Tennessee Pink'	Tennessee Pink Eastern Redbud	2' - 2 1/2' CAL.	SINGLE STEM, SPRING PLANT
CC2	63	<i>Cercis canadensis</i> 'Tennessee Pink'	Tennessee Pink Eastern Redbud	1' - 1 1/2' CAL.	SINGLE STEM, SPRING PLANT
CCA	13	<i>Carpinus caroliniana</i>	American Hornbeam	2 1/2' - 3' CAL.	SINGLE STEM, SPRING PLANT
CF	19	<i>Comus florida</i>	Flowering Dogwood	2' - 2 1/2' CAL.	SINGLE STEM, SPRING PLANT
CFR	9	<i>Comus florida</i> var. <i>rubra</i>	Flowering Red Dogwood	2' - 2 1/2' CAL.	SINGLE STEM, SPRING PLANT
PP2	66	<i>Prunus pensylvanica</i>	Pin Cherry	1' - 1 1/2' CAL.	SINGLE STEM, SPRING PLANT
PK	2	<i>Prunus serrulata</i> 'Kwanzan'	Kwanzan Flowering Cherry	8' CAL.	7' LOWEST BRANCH, SPRING PLANT
PV1	3	<i>Prunus virginiana</i>	Chokecherry	2' - 2 1/2' CAL.	SINGLE STEM, SPRING PLANT
SR	12	<i>Syringa reticulata</i> 'Ivory Silk'	Ivory Silk Japanese Tree Lilac	2' - 2 1/2' CAL.	SINGLE STEM, UPRIGHT FORM

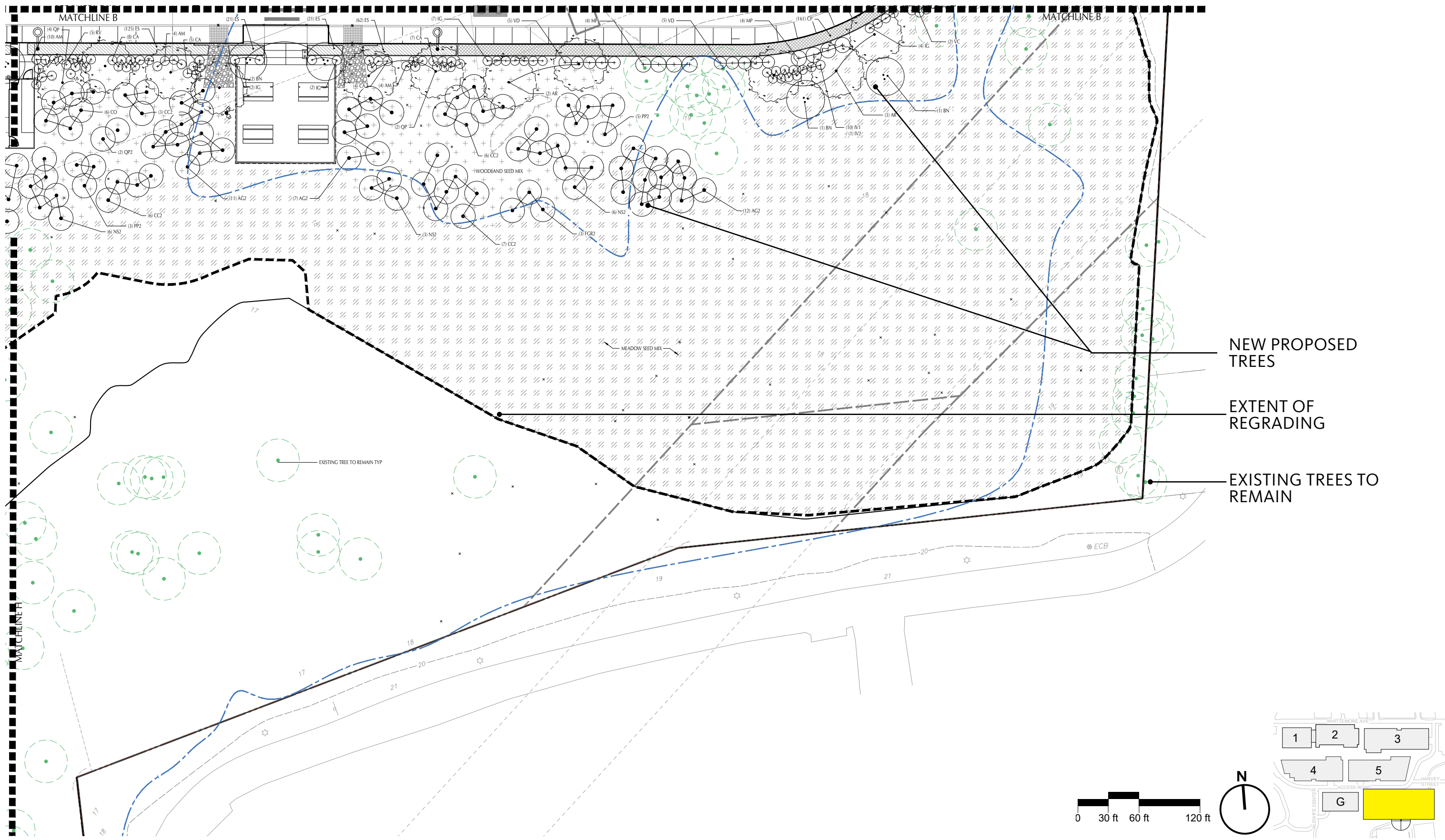
NEW PROPOSED TREES

EXISTING TREES TO REMAIN

EXTENT OF REGRADING OF SOIL



36-64 WHITTEMORE AVE.
NATURAL HABITAT AREA: PROPOSED TREES



36-64 WHITTEMORE AVE.

NATURAL HABITAT AREA: PROPOSED TREES

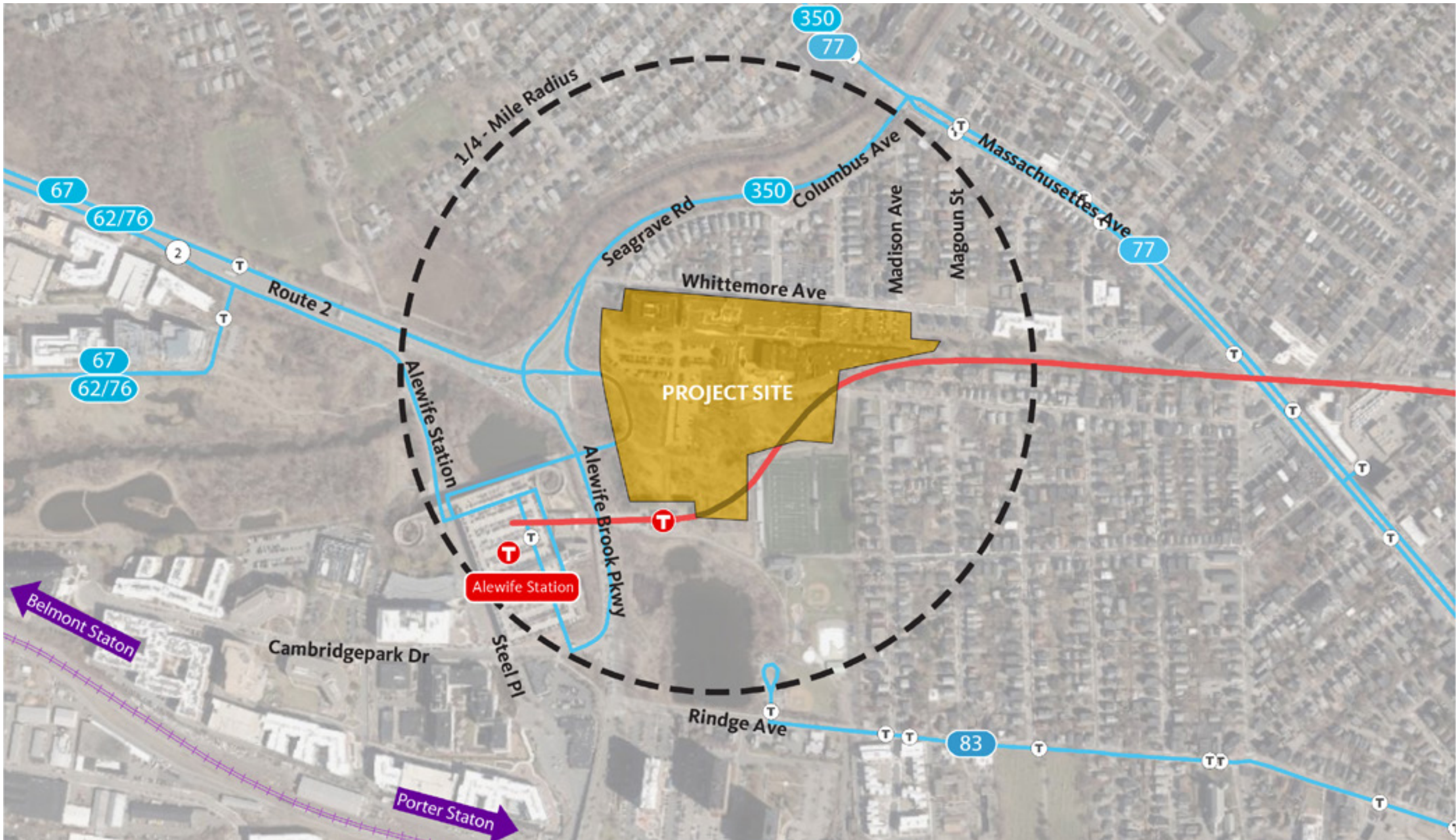
TRAFFIC, PARKING, AND TRANSIT

36-64 WHITTEMORE AVE.



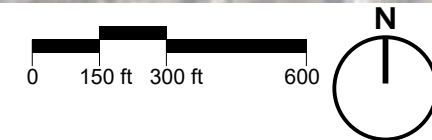
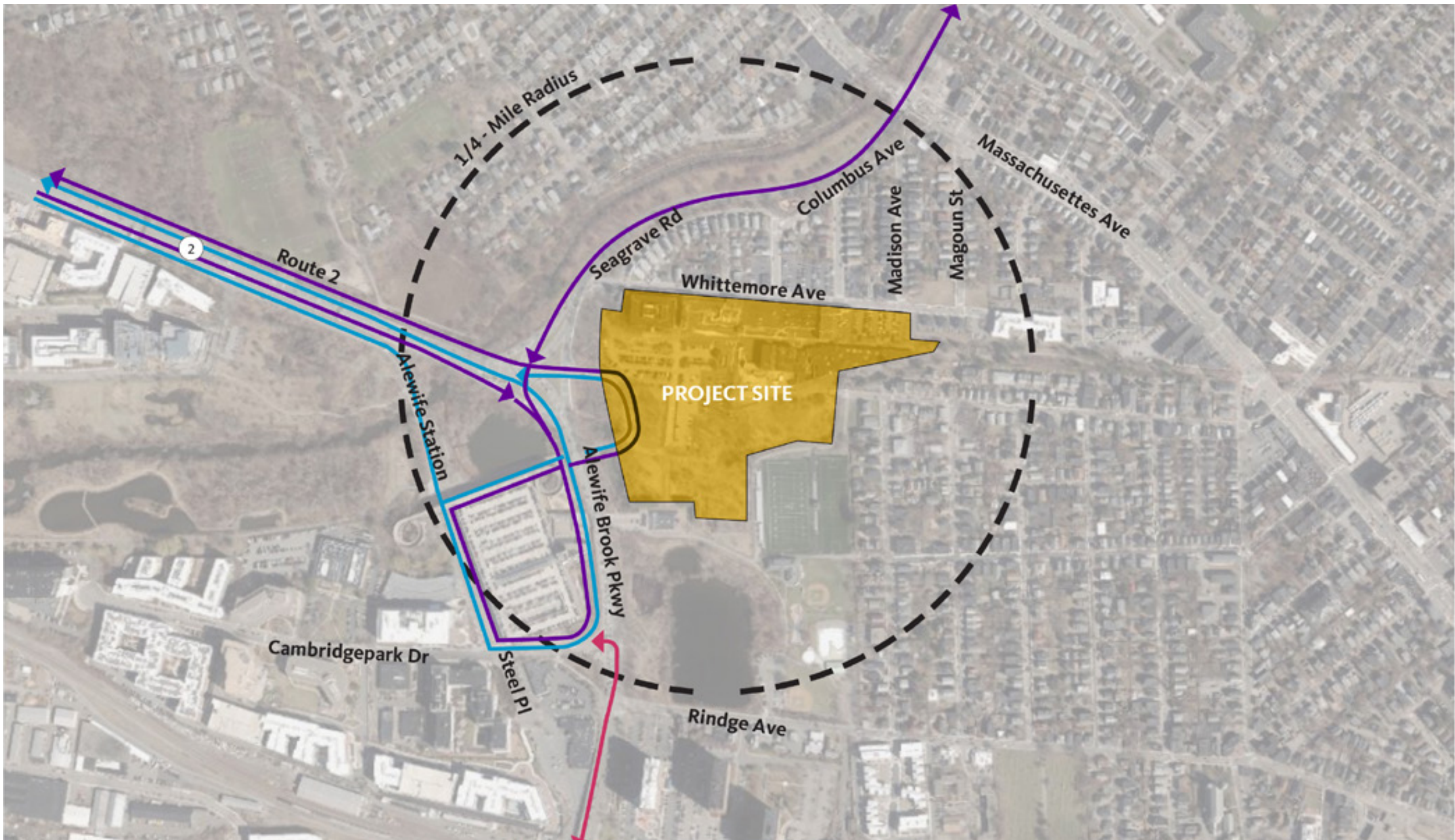
36-64 WHITTEMORE AVE.

STUDY AREA INTERSECTIONS



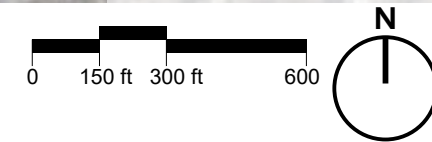
36-64 WHITTEMORE AVE.

PUBLIC TRANSIT



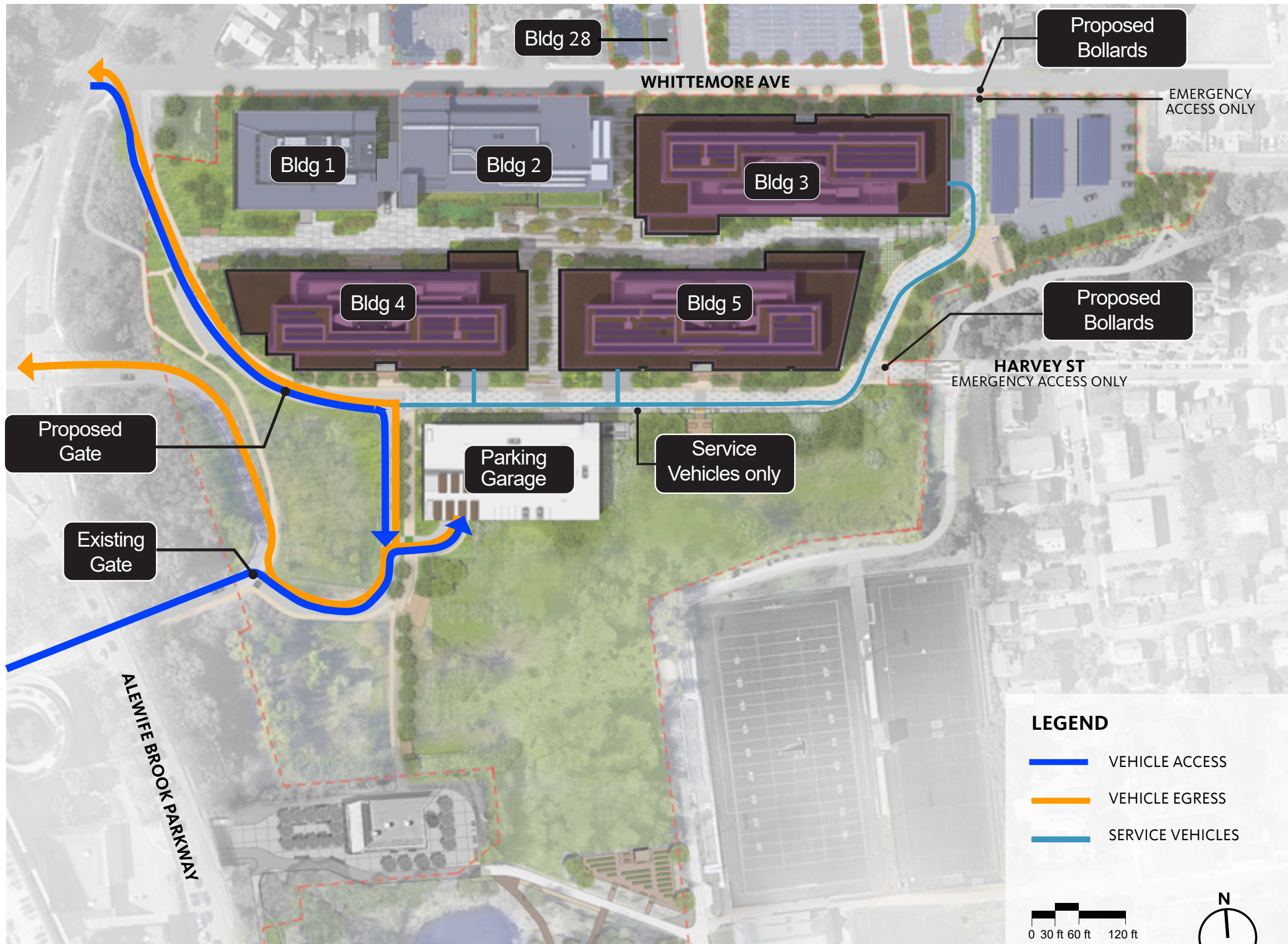
36-64 WHITTEMORE AVE.

PRIVATE TRANSIT SERVICES



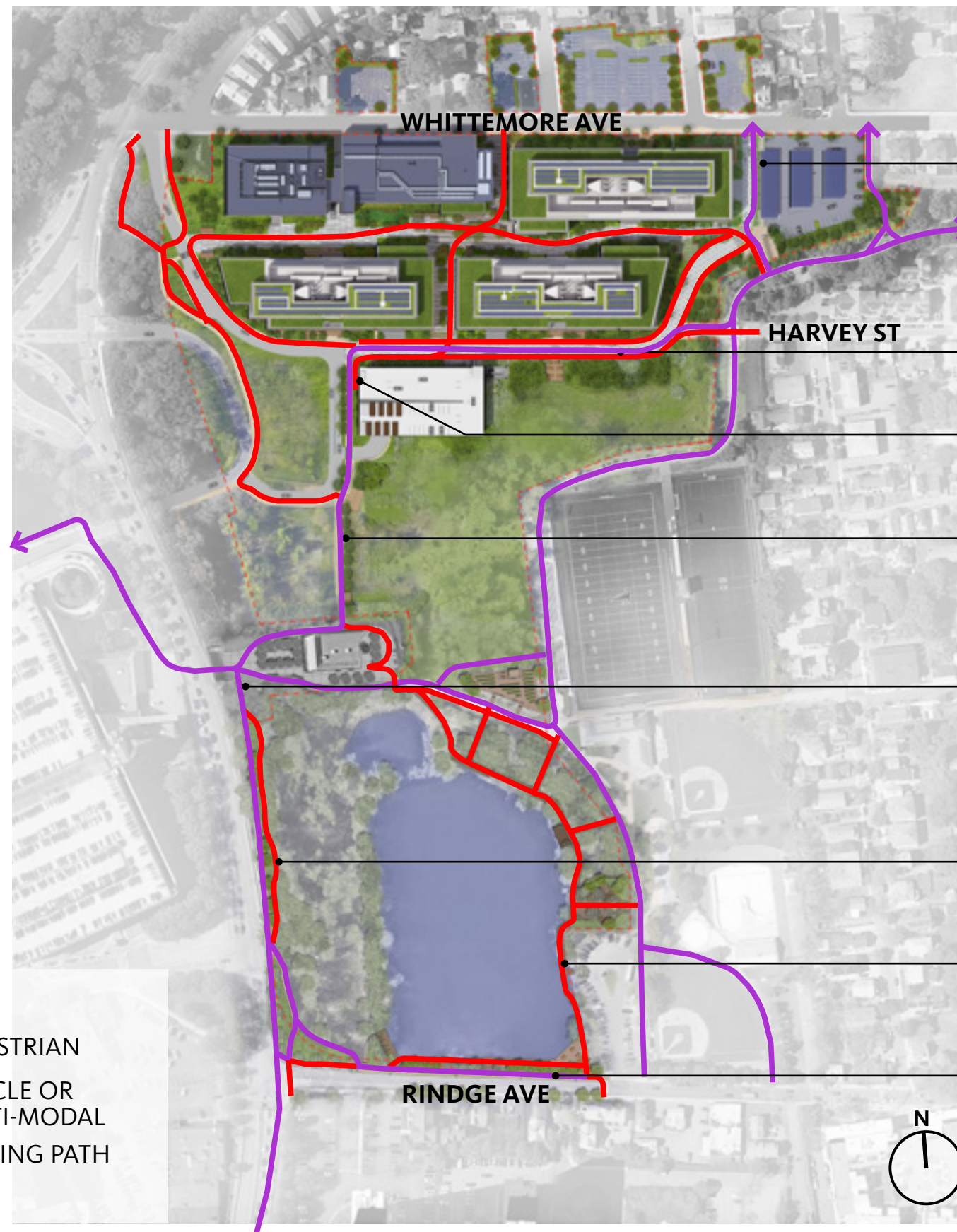
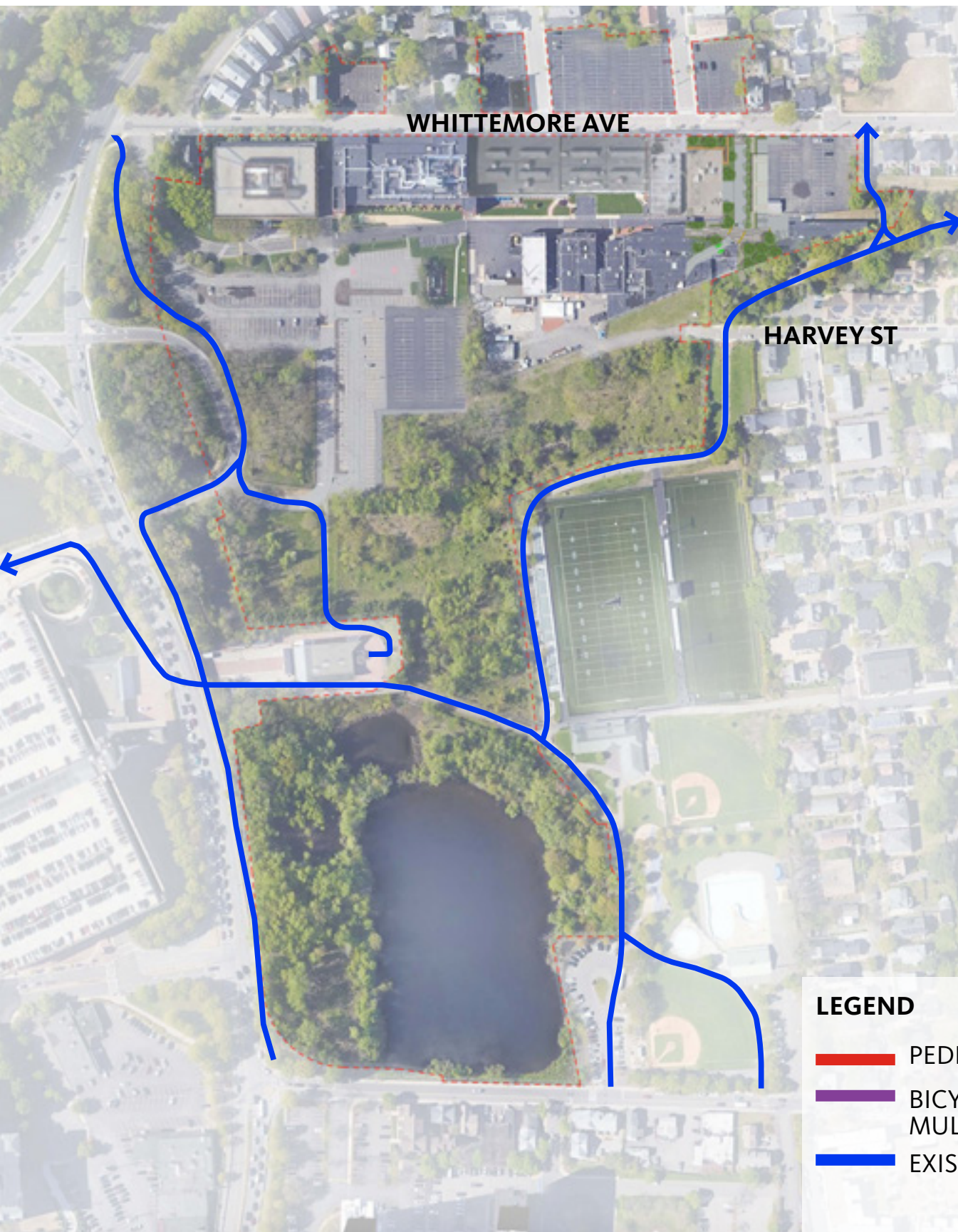
36-64 WHITTEMORE AVE.

BIKE AND CAR SHARING SERVICES



36-64 WHITTEMORE AVE.

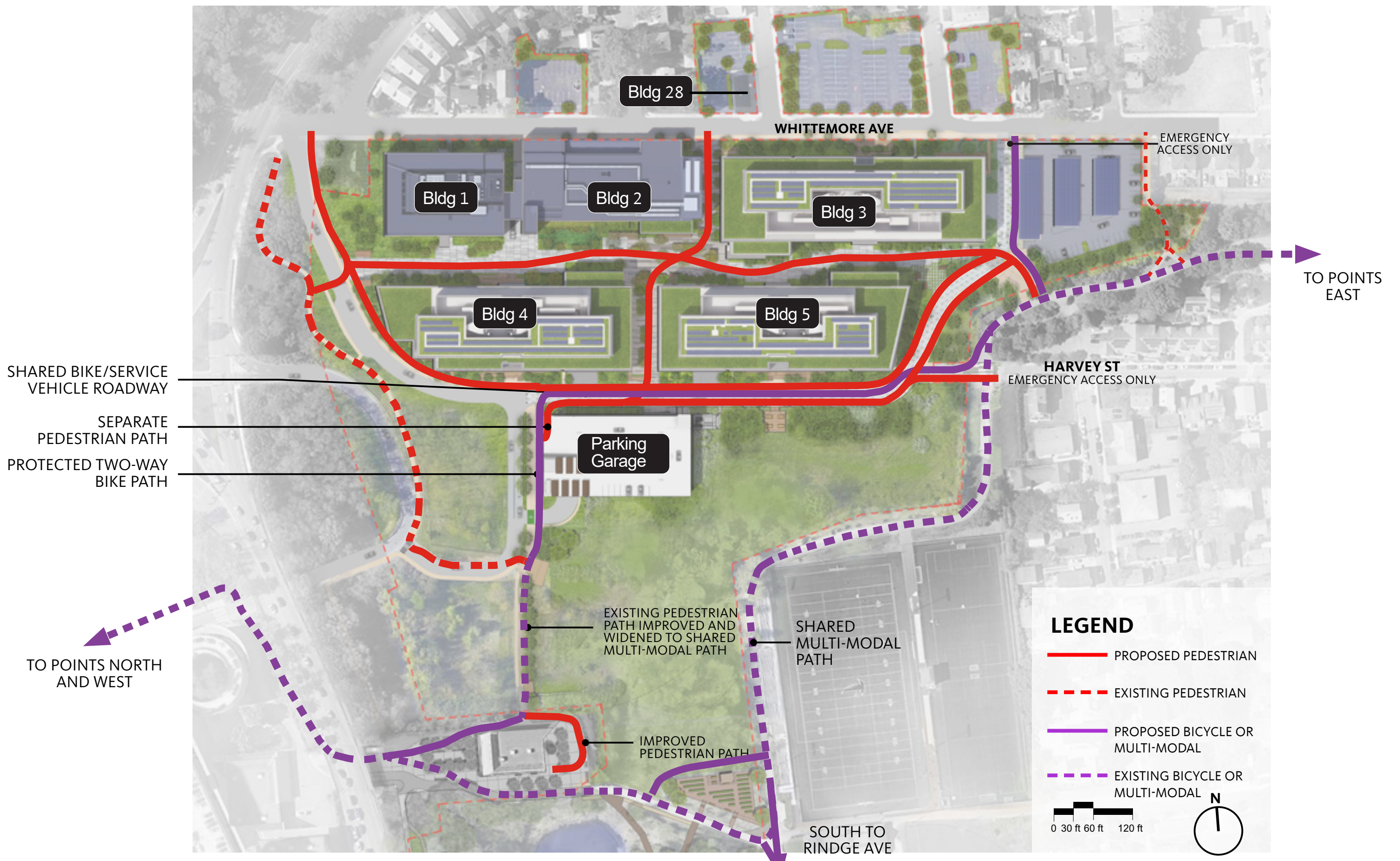
VEHICULAR ACCESS/CIRCULATION



- Added separate pedestrian and bike paths to connect Whittemore and Linear Path
- Added separate pedestrian and bike paths
- Added separate pedestrian path at intersection
- Widened existing path to accommodate a multi-modal path
- Added multi-modal path width along RT16
- Added separate pedestrian path along Rt 16
- Added separate pedestrian path
- Added multi-modal path

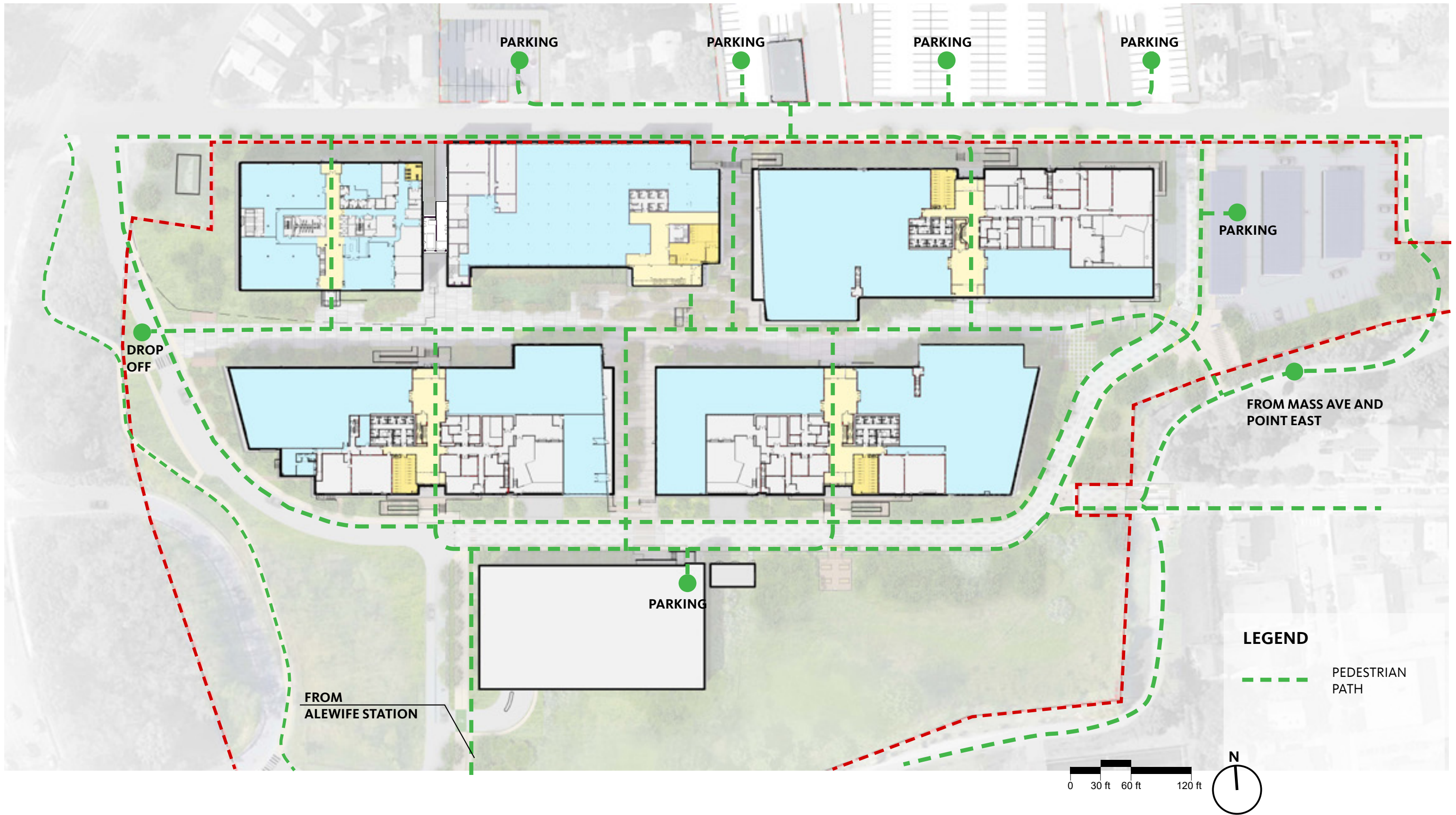
36-64 WHITTEMORE AVE.

OVERALL SITE CIRCULATION



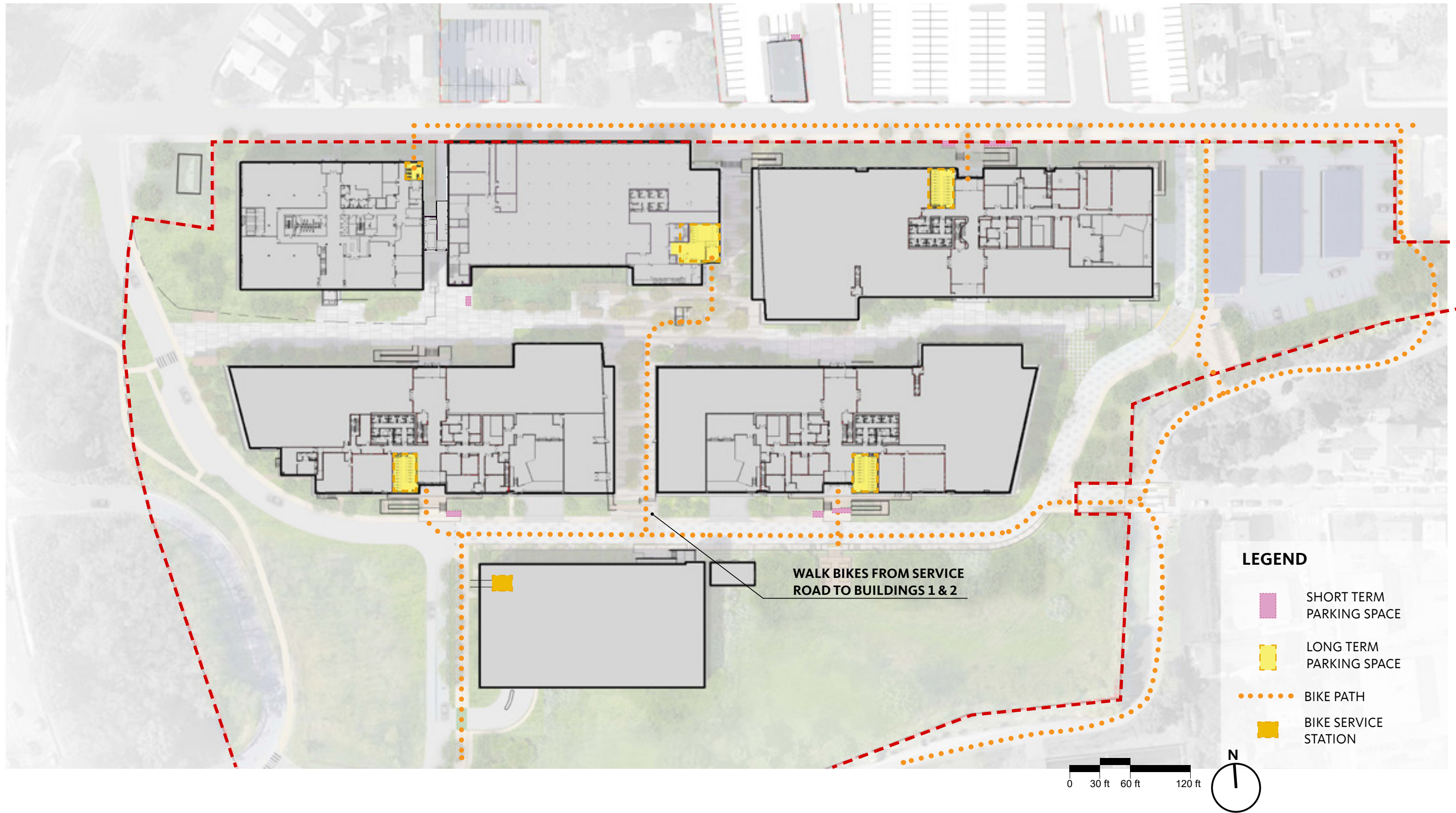
36-64 WHITTEMORE AVE.

ENLARGED SITE CIRCULATION



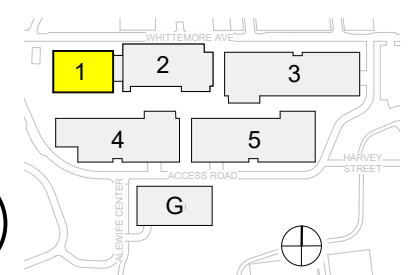
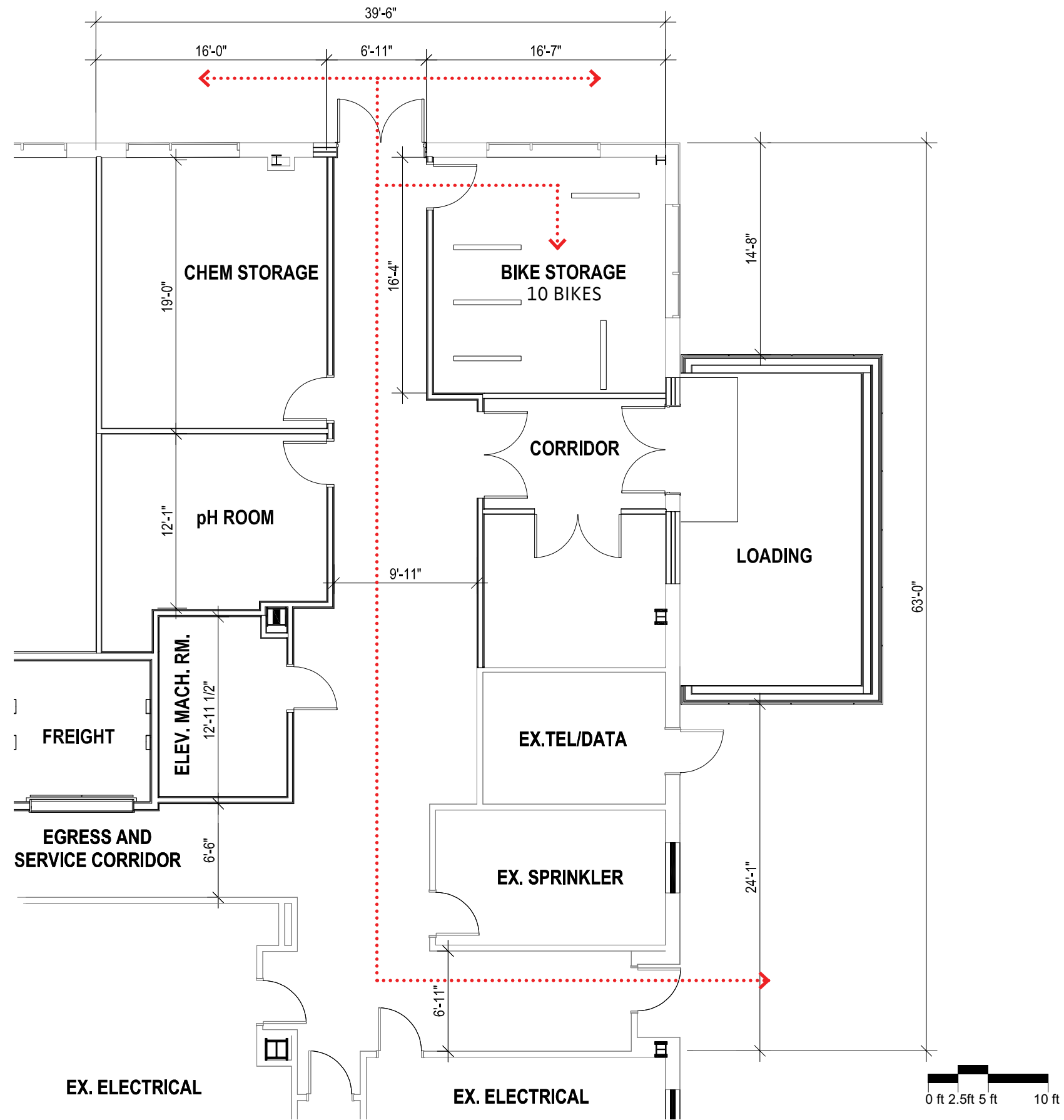
36-64 WHITTEMORE AVE.

ENLARGED SITE PEDESTRIAN CIRCULATION



36-64 WHITTEMORE AVE.

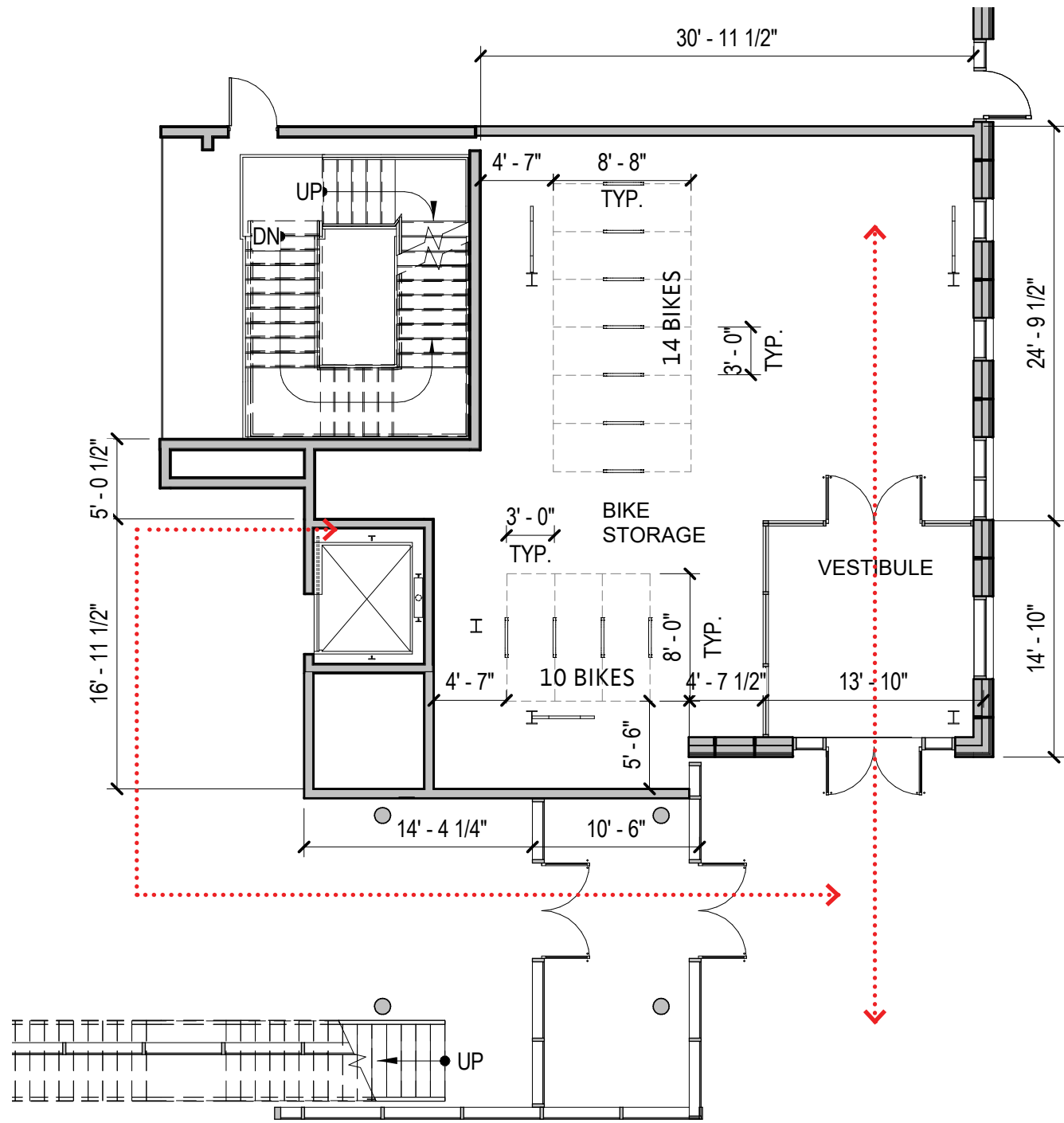
ENLARGED SITE BIKE CIRCULATION



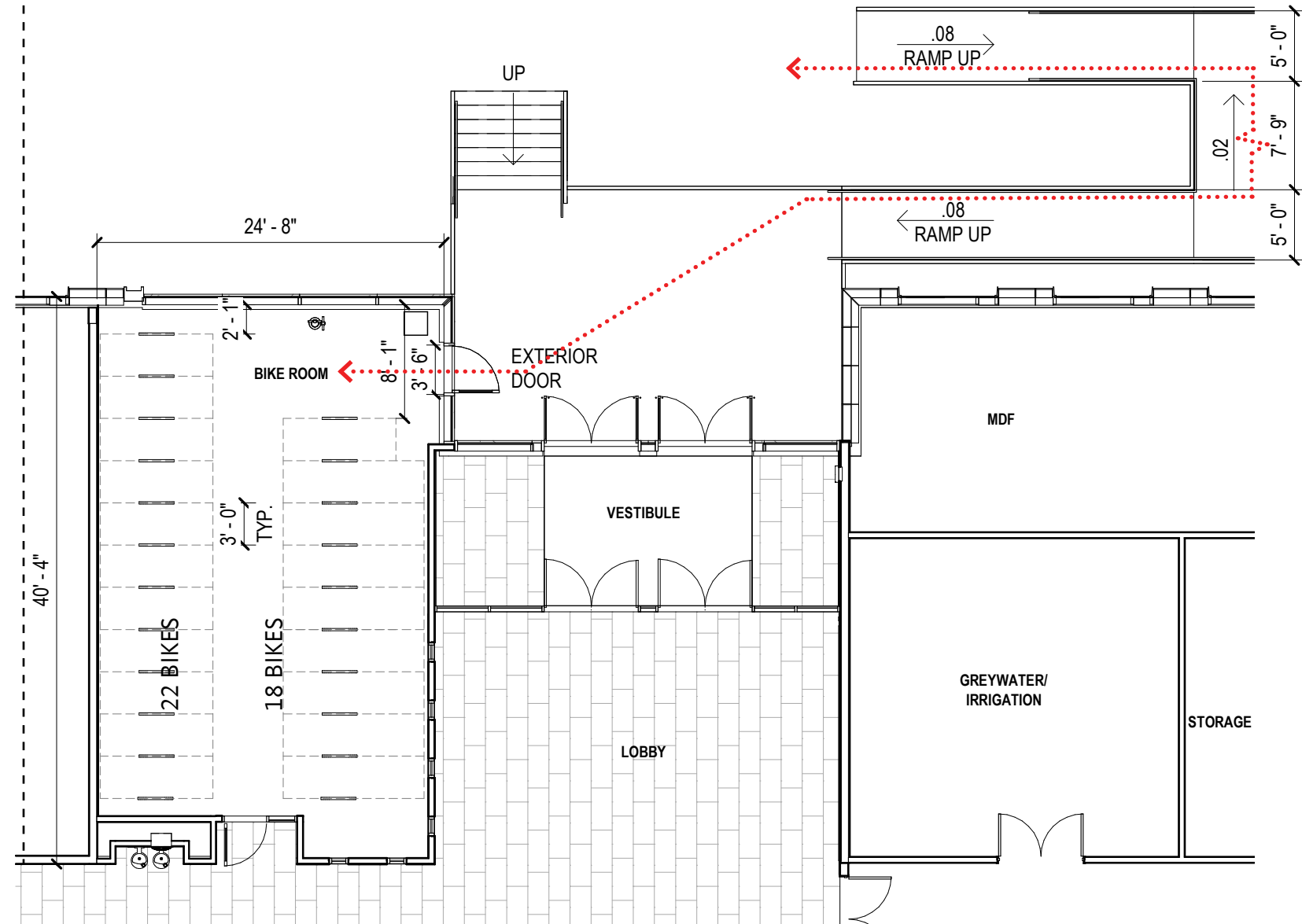
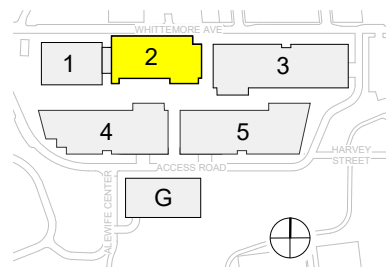
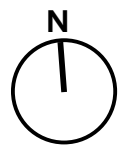
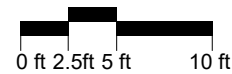
BUILDING 1
TOTAL SPACES: 10

36-64 WHITTEMORE AVE.

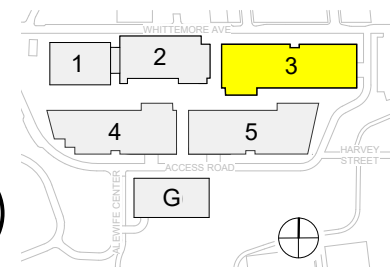
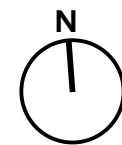
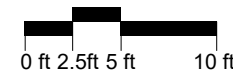
PROPOSED LONG-TERM BIKE STORAGE - BUILDING 1



BUILDING 2
TOTAL SPACES: 24

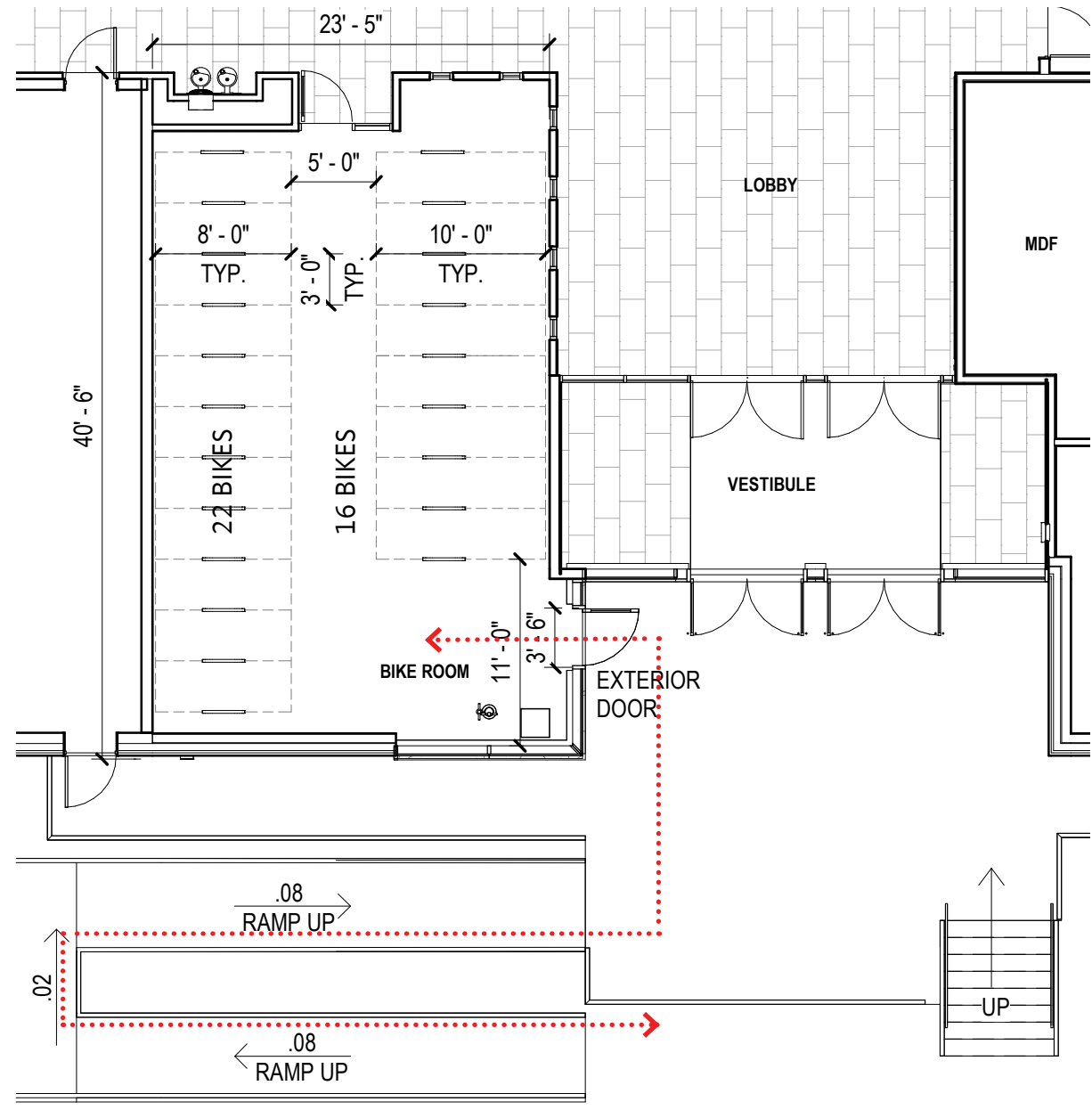


BUILDING 3
TOTAL SPACES: 40

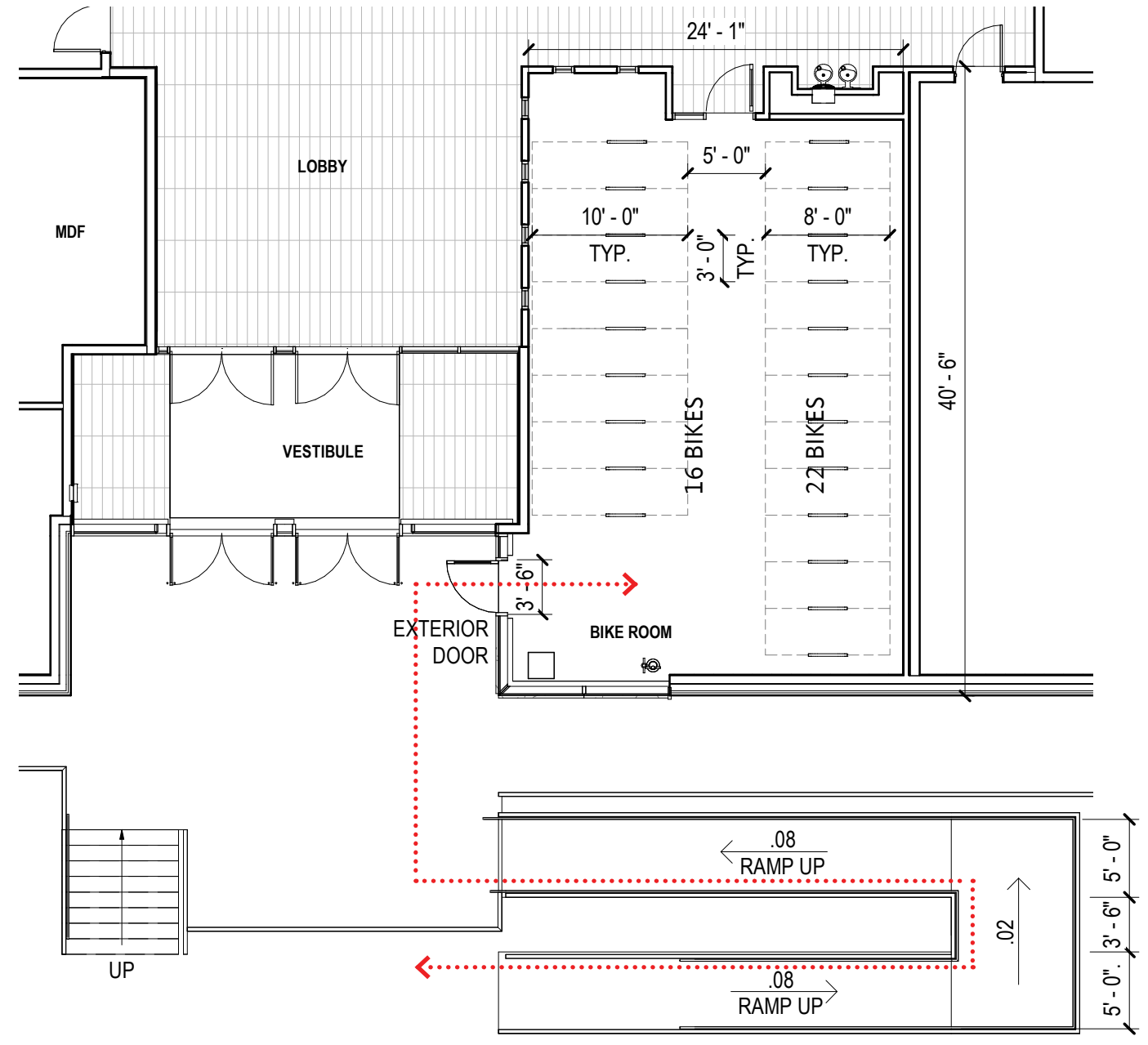
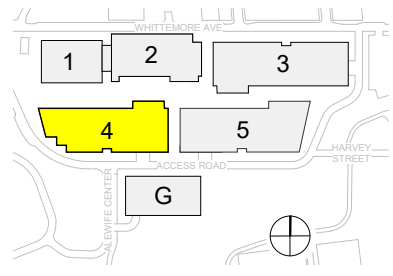
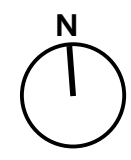
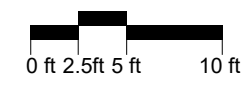


36-64 WHITTEMORE AVE.

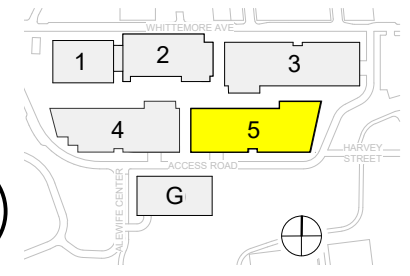
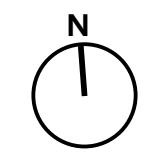
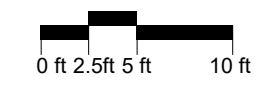
PROPOSED LONG-TERM BIKE STORAGE - BUILDING 2 & 3



BUILDING 4
TOTAL SPACES: 38

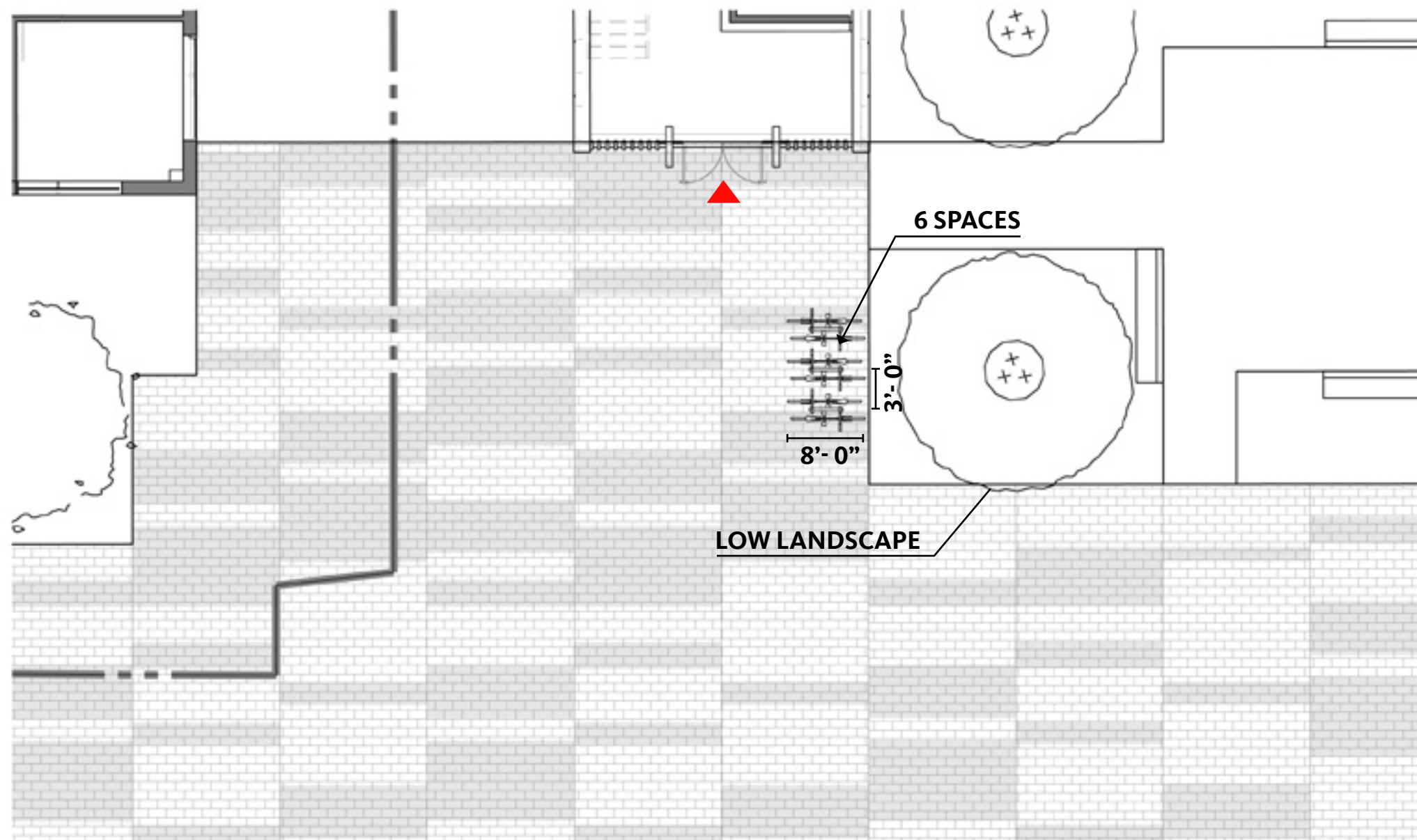


BUILDING 5
TOTAL SPACES: 38

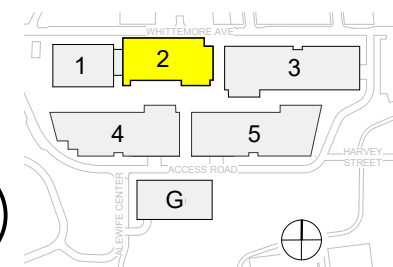
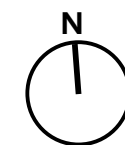
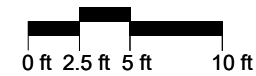


36-64 WHITTEMORE AVE.

LONG-TERM BIKE STORAGE - BUILDING 4 & 5



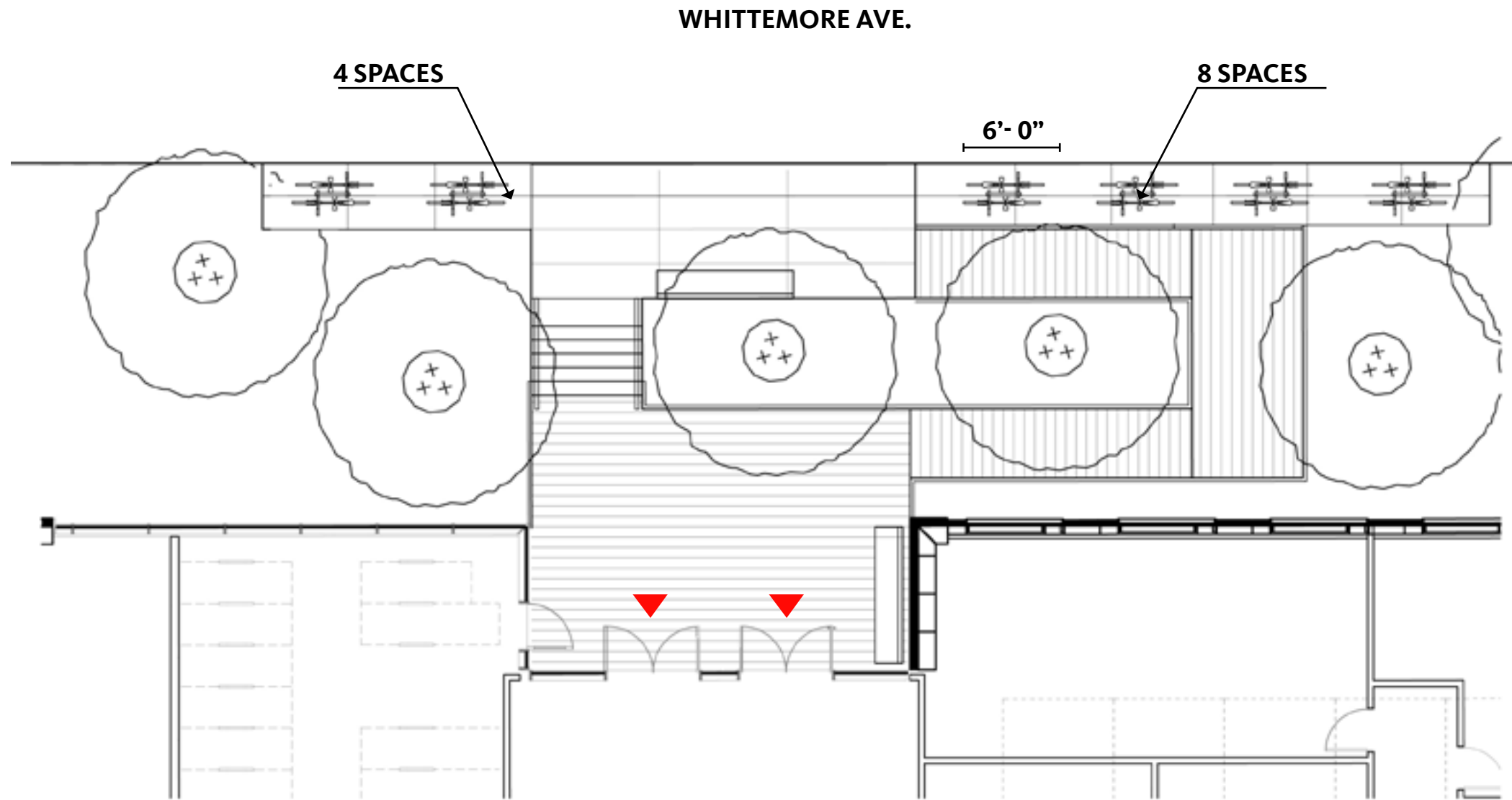
BUILDING 2
TOTAL SPACES: 6



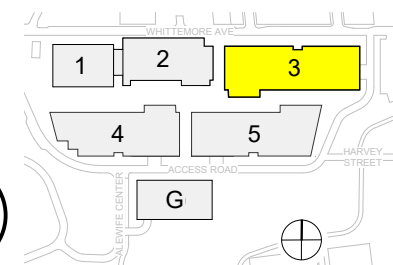
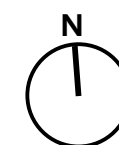
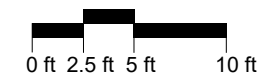
36-64 WHITTEMORE AVE.

PROPOSED SHORT-TERM BIKE STORAGE SPACES, BUILDING 2

REVISED

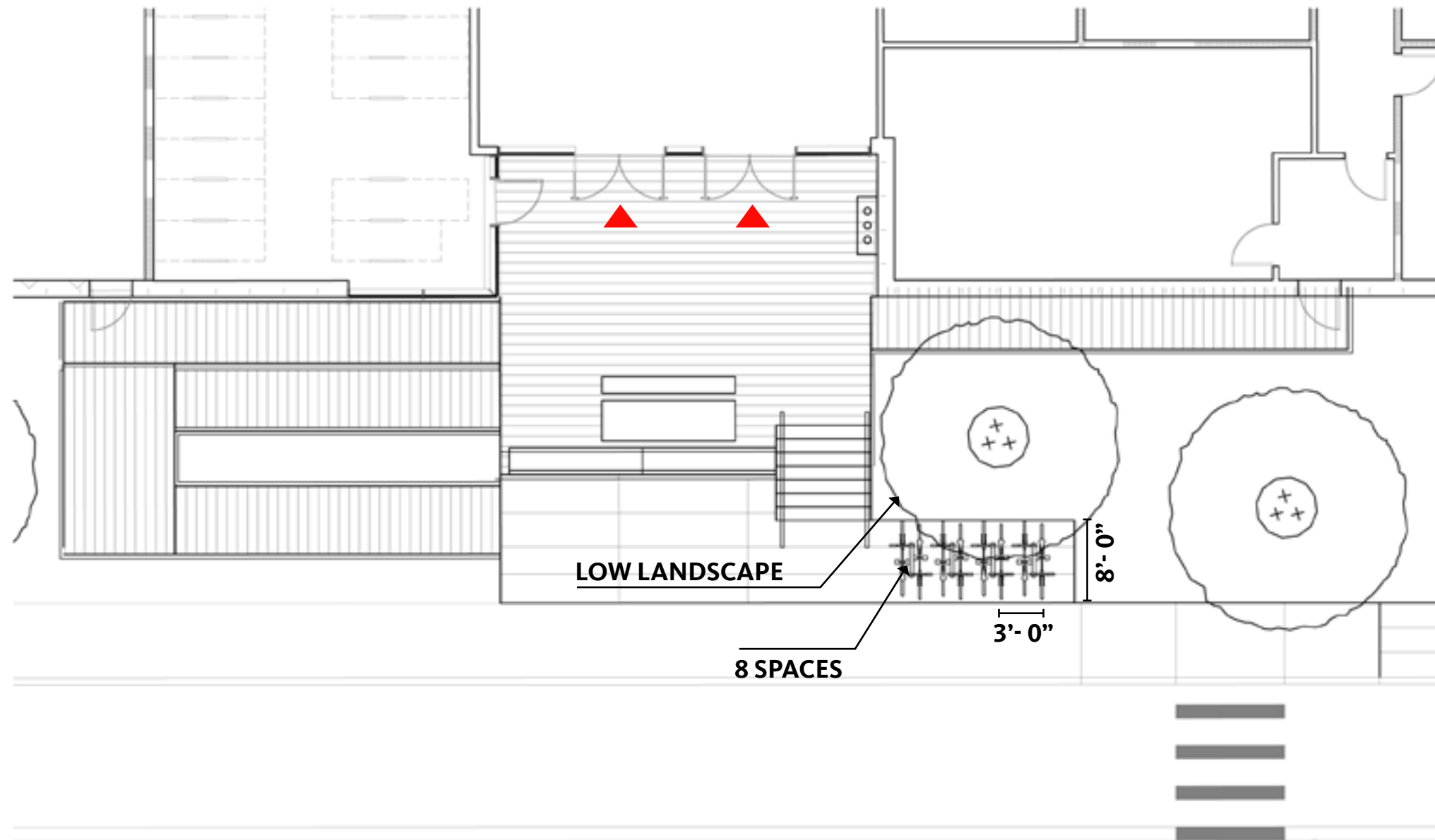


BUILDING 3
TOTAL SPACES: 12

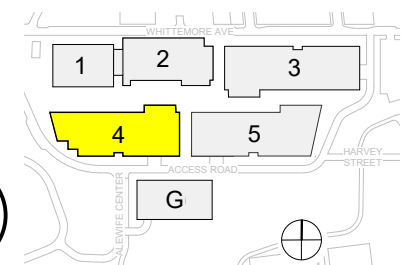
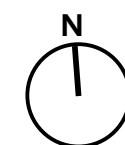
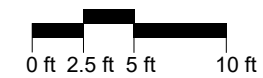


36-64 WHITTEMORE AVE.

PROPOSED SHORT-TERM BIKE STORAGE SPACES, BUILDING 3

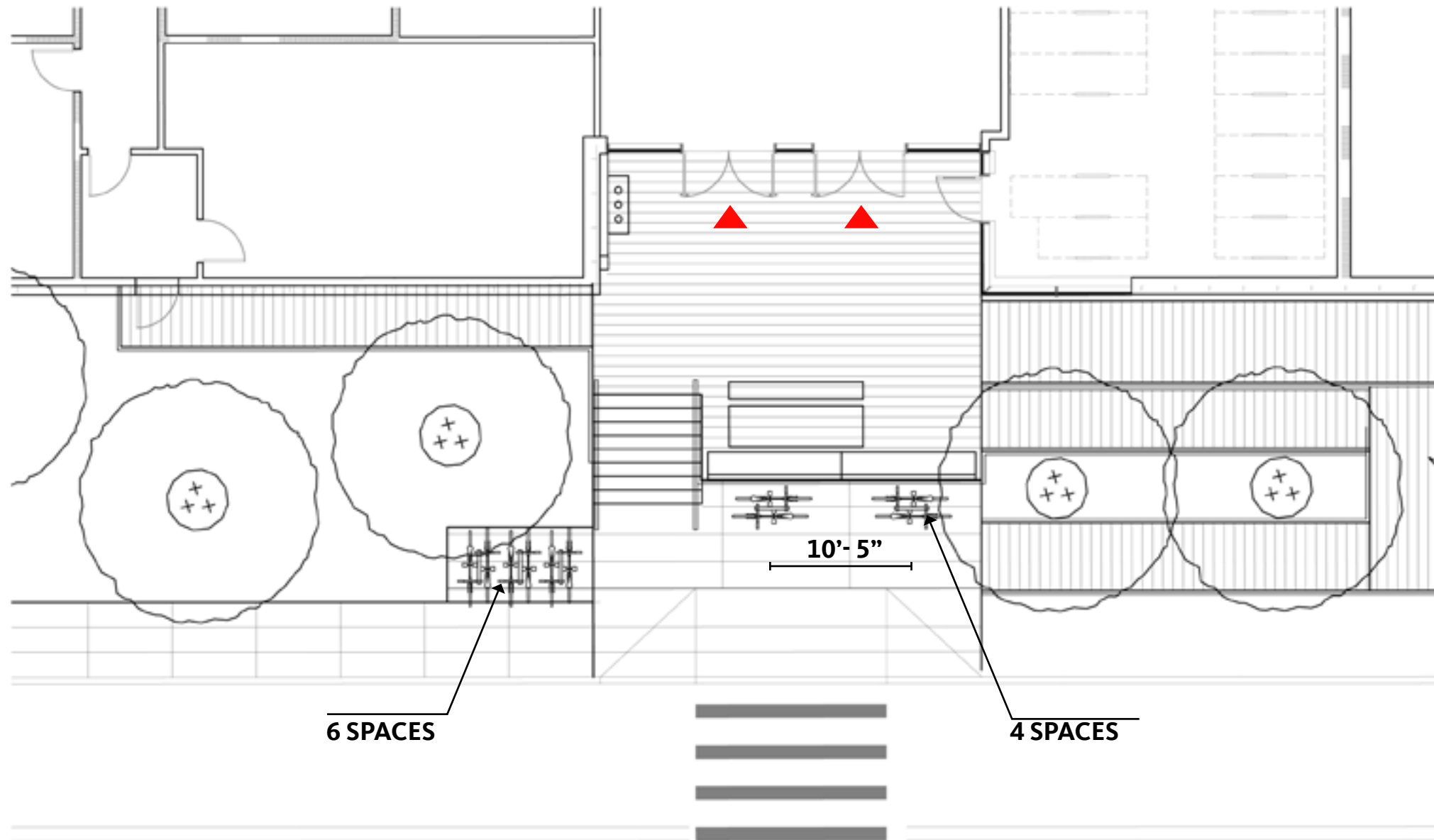


BUILDING 4
TOTAL SPACES: 8

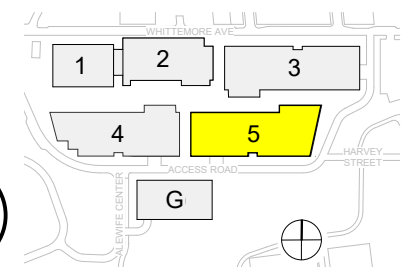
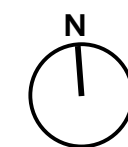
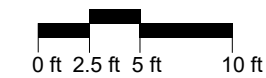


36-64 WHITTEMORE AVE.

PROPOSED SHORT-TERM BIKE STORAGE SPACES, BUILDING 4

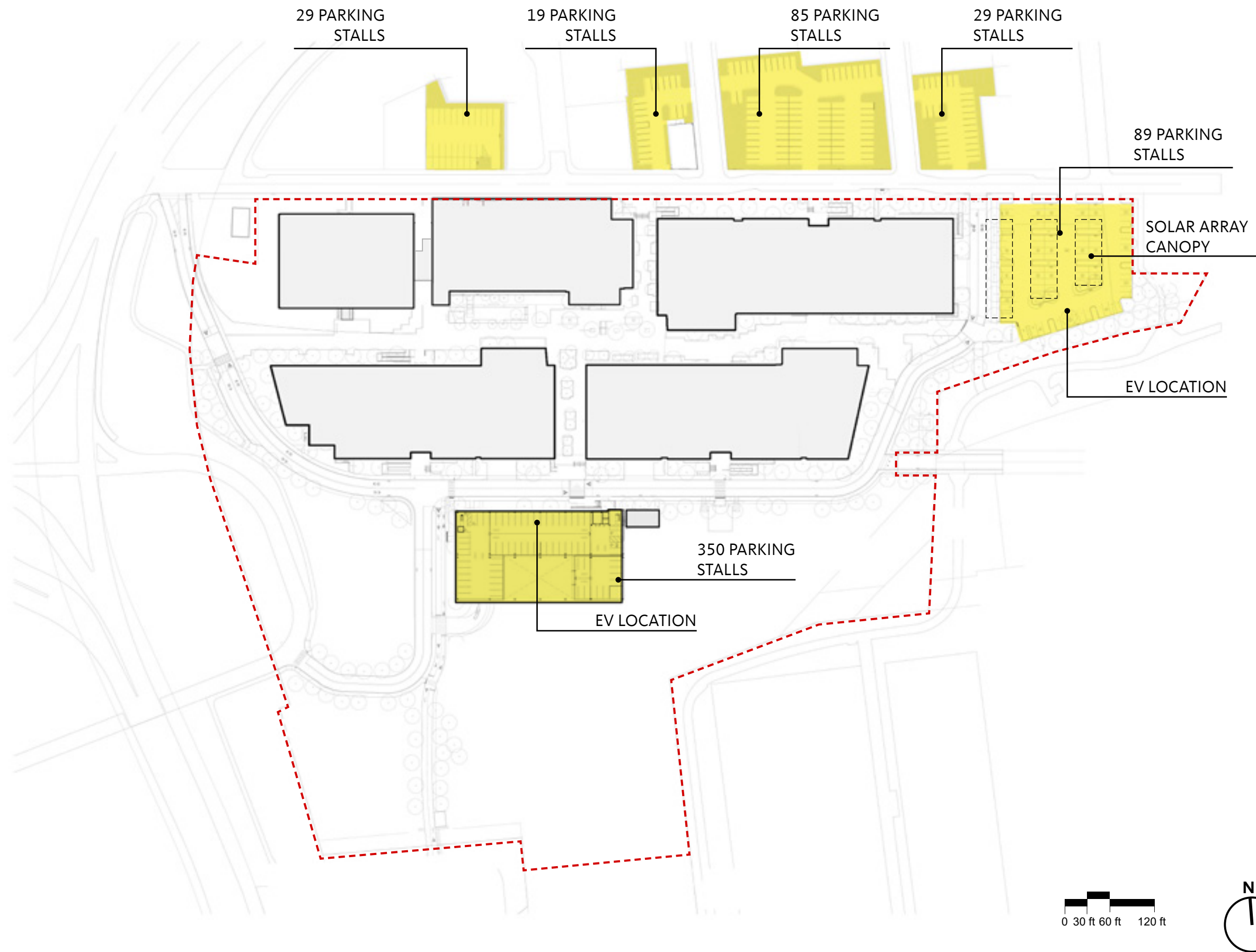


BUILDING 5
TOTAL SPACES: 10

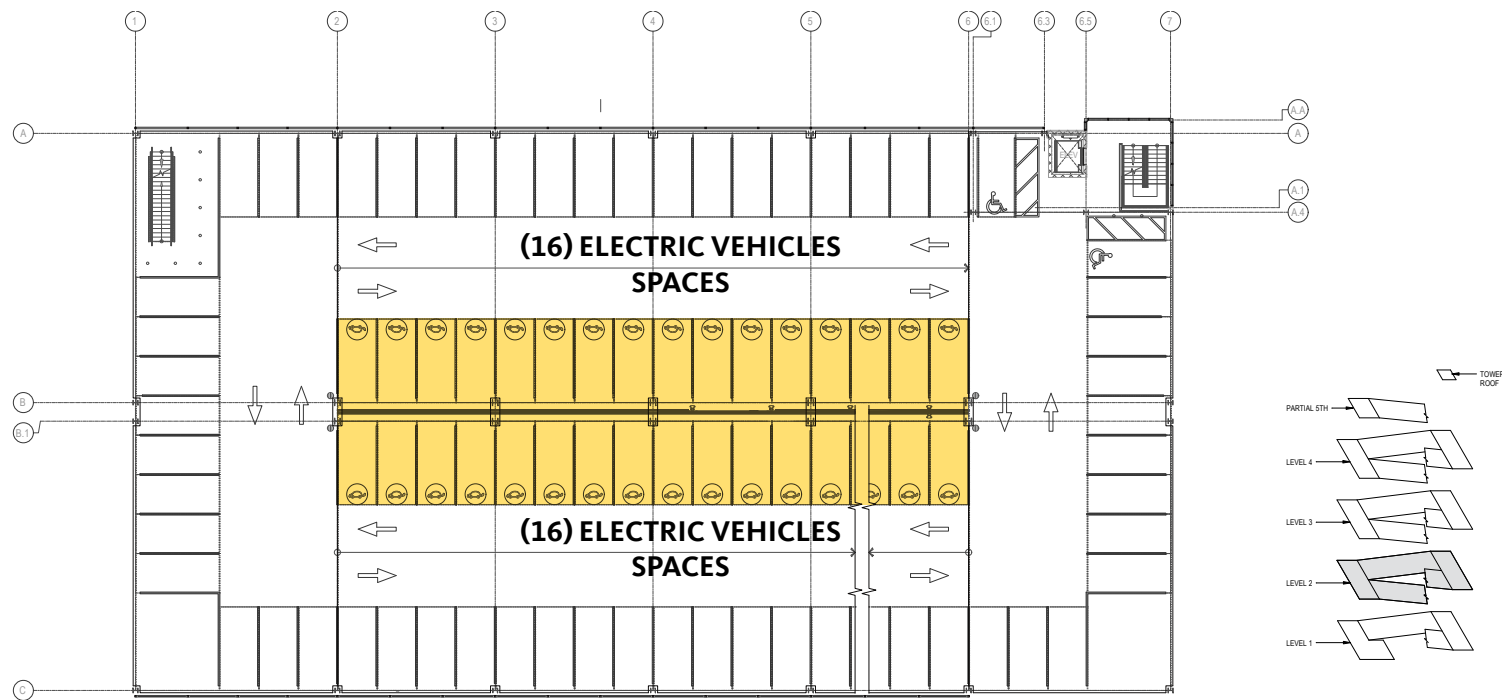


36-64 WHITTEMORE AVE.

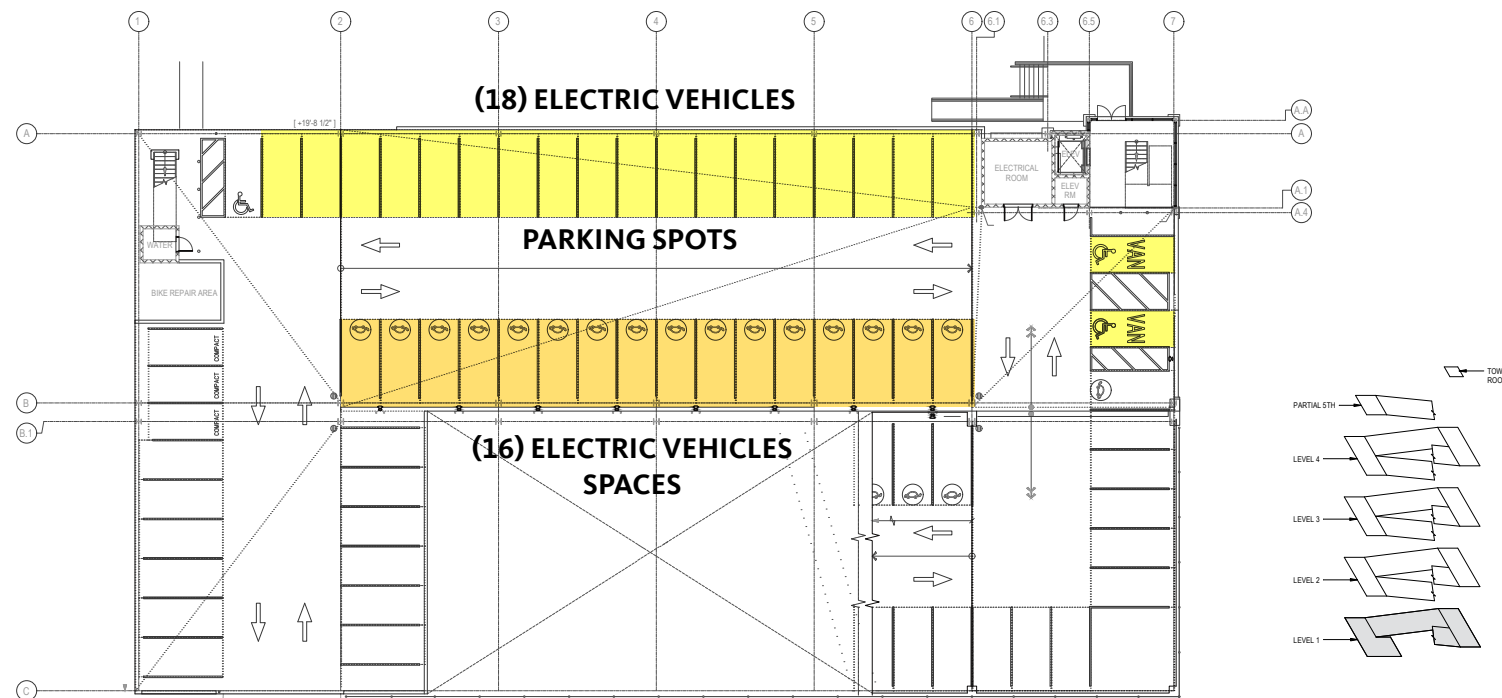
PROPOSED SHORT-TERM BIKE STORAGE SPACES, BUILDING 5



36-64 WHITTEMORE AVE. PARKING PLAN



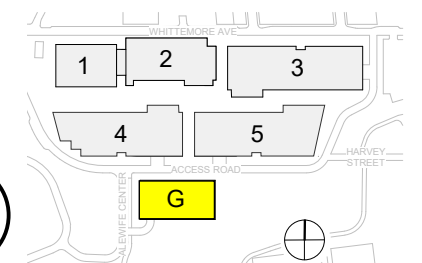
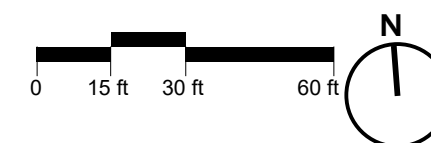
Garage - Level 2

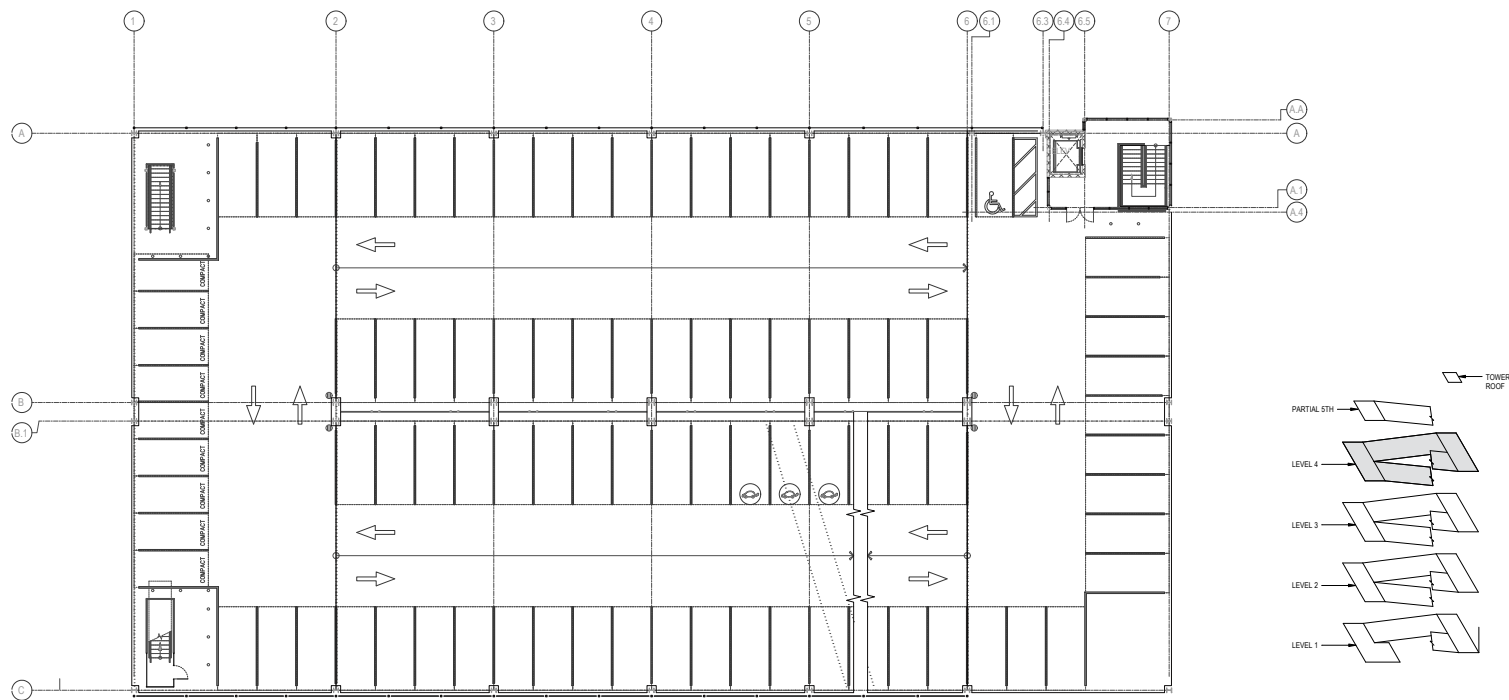


Garage - Level 1

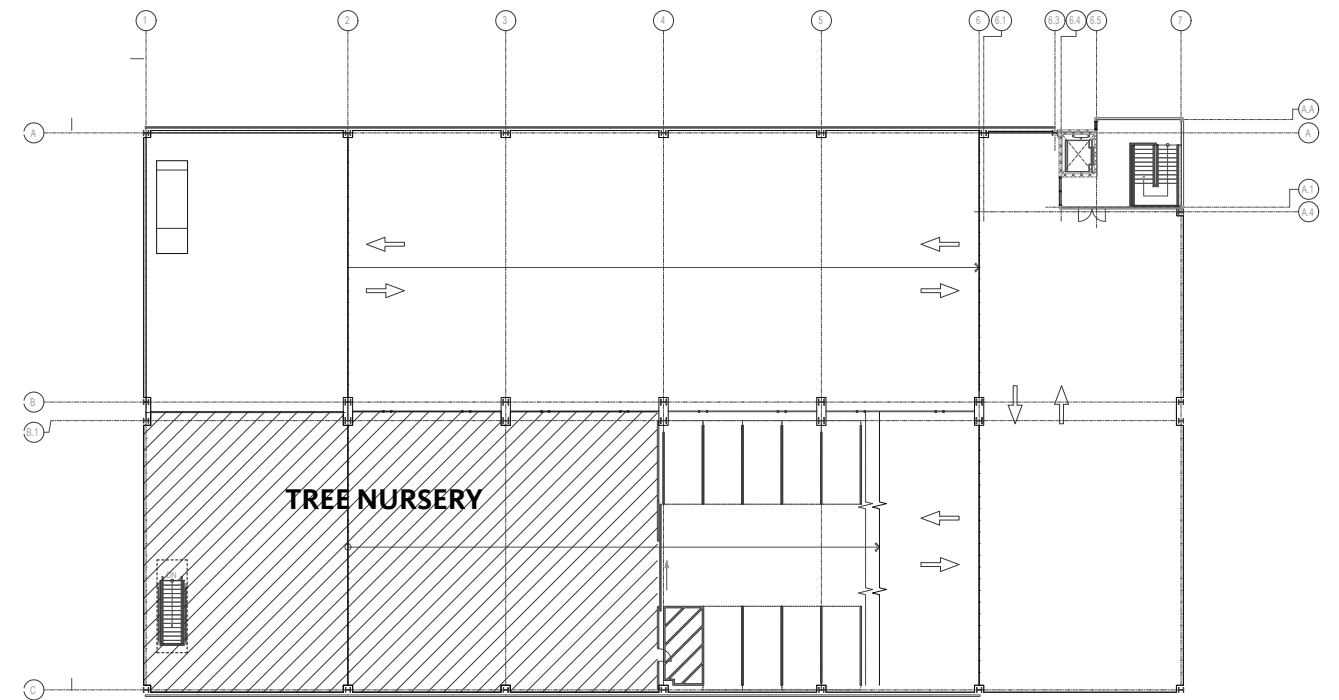
PARKING SUMMARY		
PARKING LEVEL	SPACES	DESCRIPTION
P4 LEVEL	101	
P3 LEVEL	91	
P2 LEVEL	91	
P1 LEVEL	67	

Grand total: 350

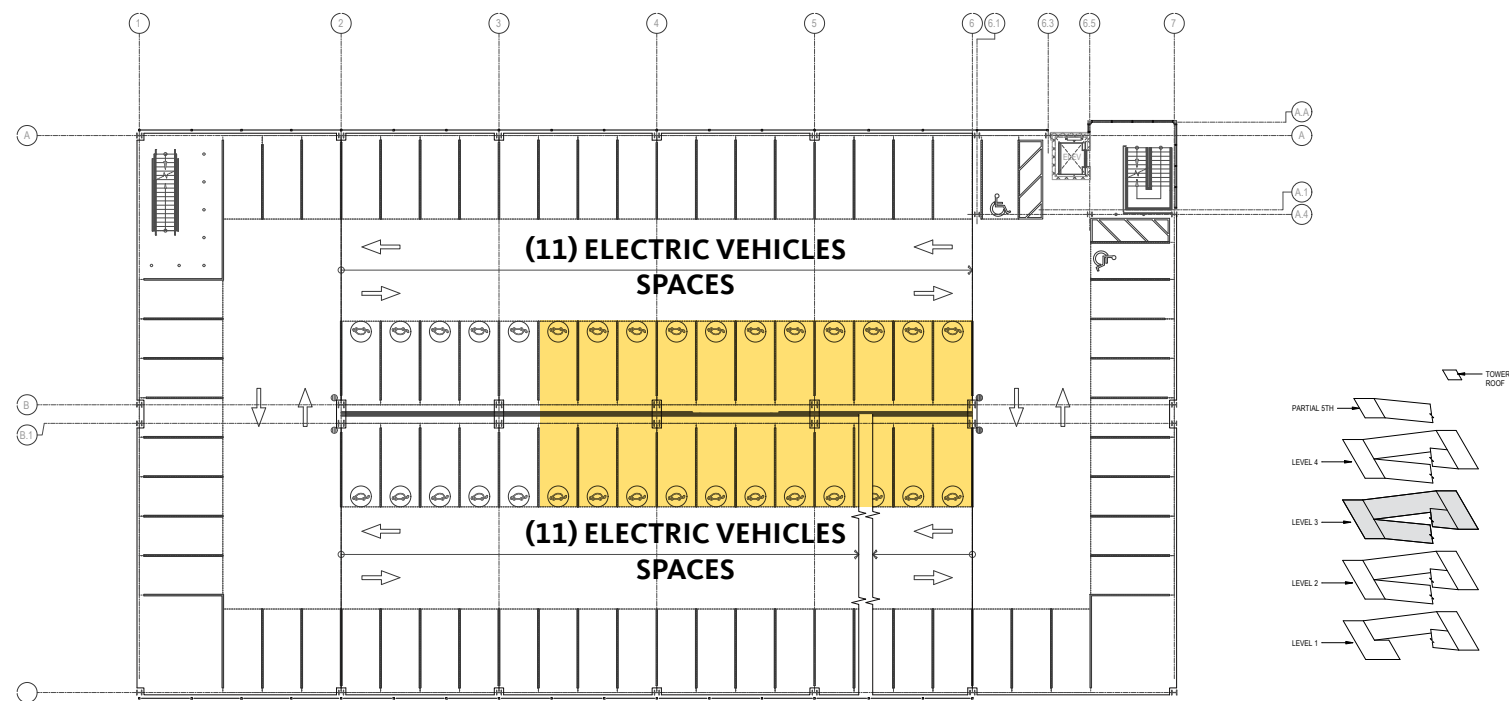




Garage - Level 4



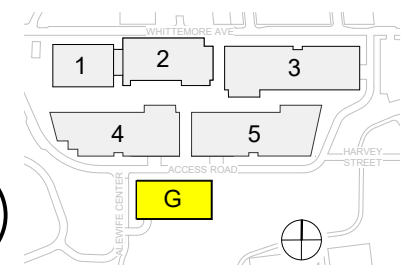
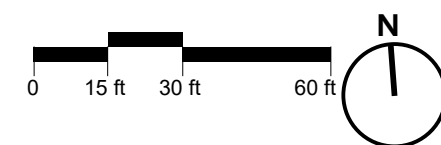
Garage - Partial 5th Level



Garage - Level 3

PARKING SUMMARY		
PARKING LEVEL	SPACES	DESCRIPTION
P4 LEVEL	109	
P3 LEVEL	91	
P2 LEVEL	91	
P1 LEVEL	67	

Grand total: 358H



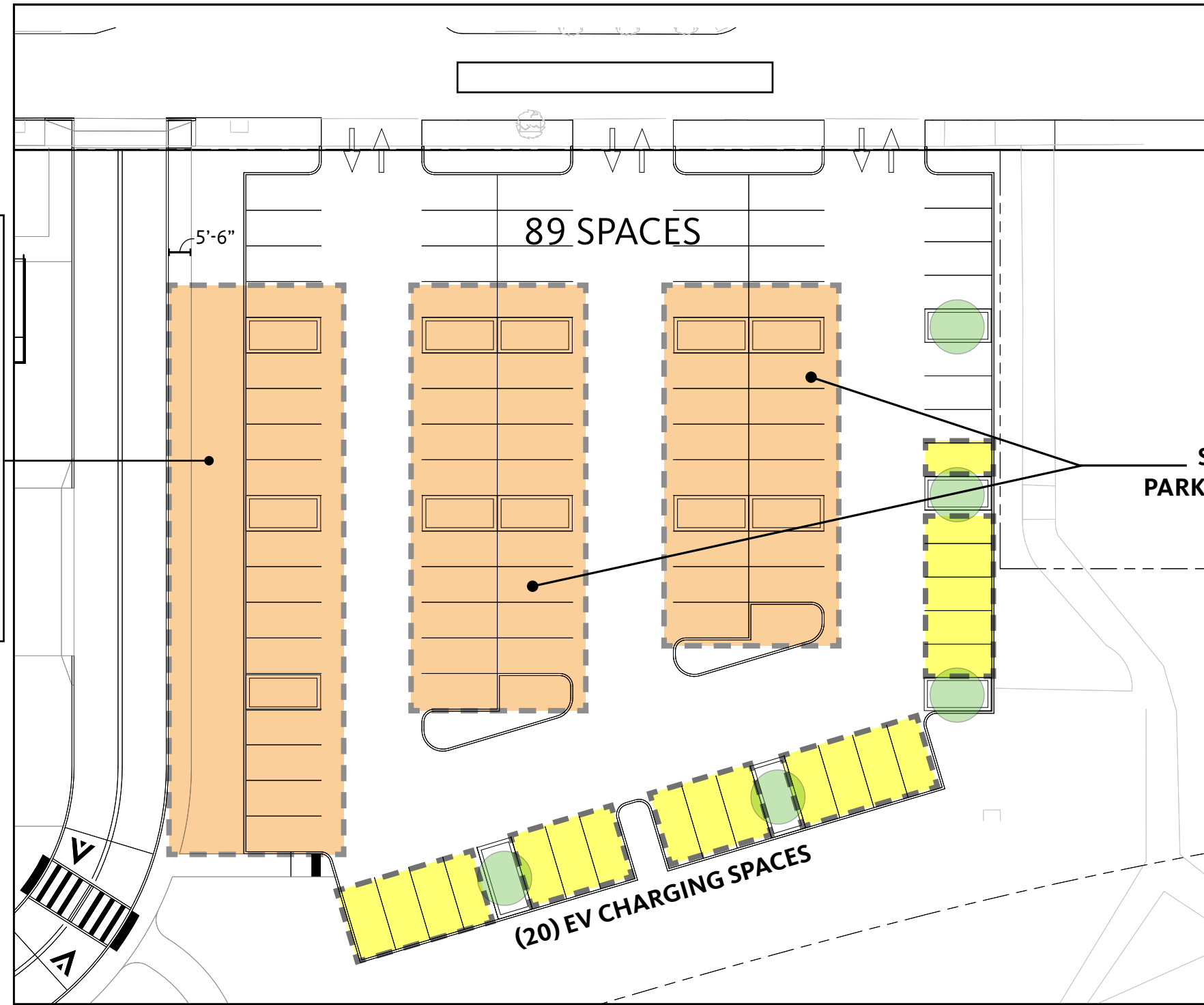
36-64 WHITTEMORE AVE.

PARKING GARAGE - LEVEL 3 & 4



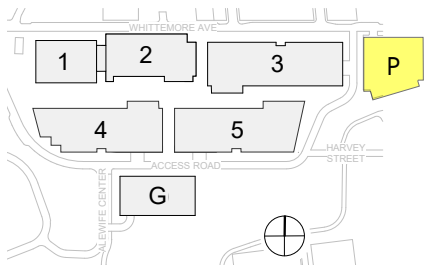
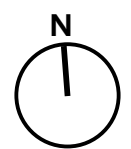
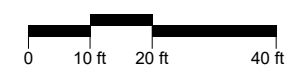
EXISTING PARKING LOT EAST

*EXISTING PARKING LOTS WITH EXISTING STRIPING

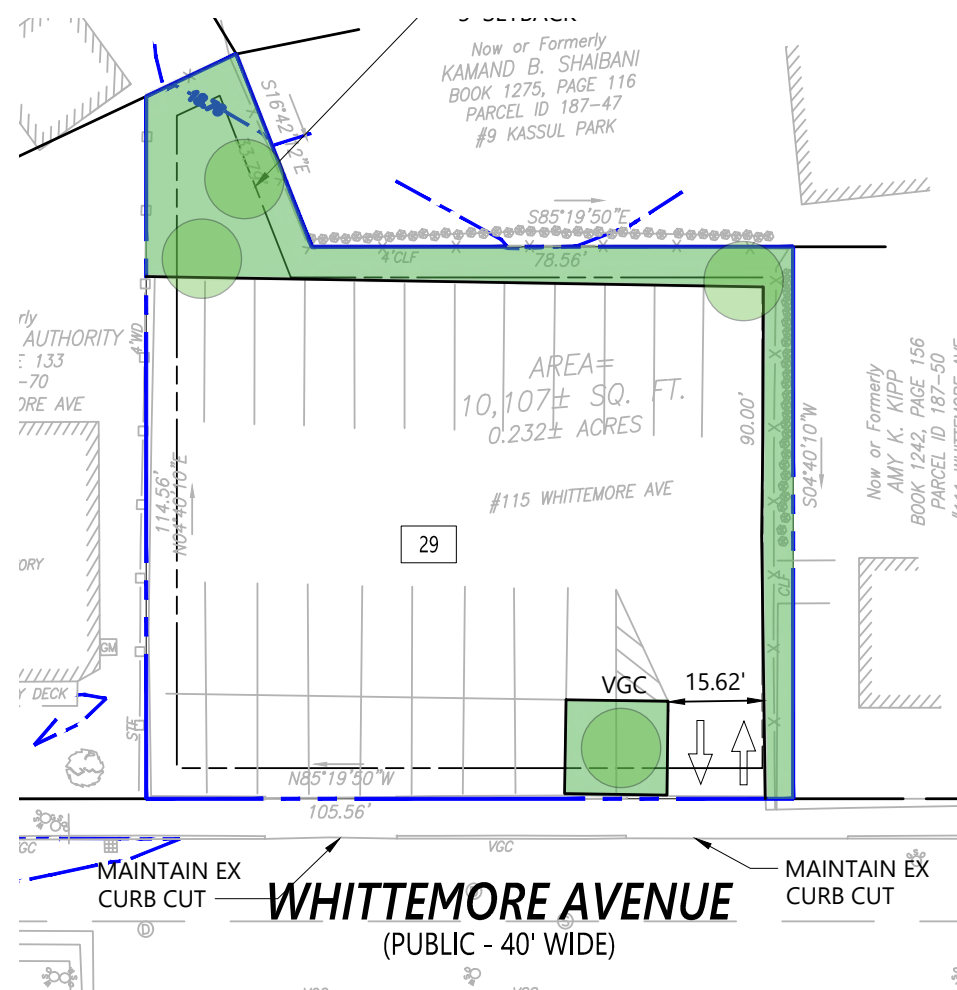


SOLAR PANEL PARKING CANOPY

(20) EV CHARGING SPACES



36-64 WHITTEMORE AVE.
PARKING LOT - EAST LOT



29 SPACES

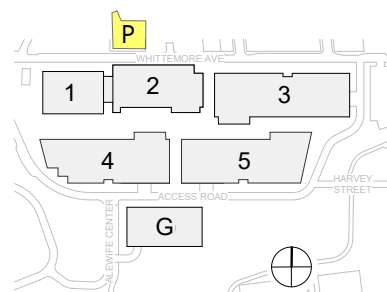
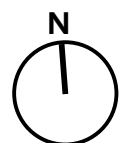
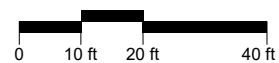


19 SPACES

EXISTING PARKING LOT 1

*EXISTING PARKING LOTS WITH NEW STRIPING

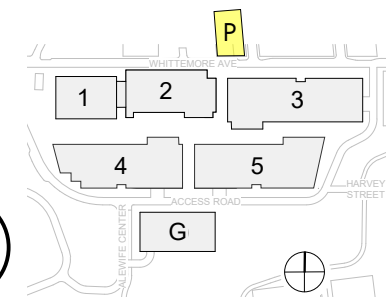
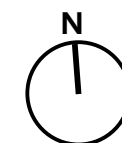
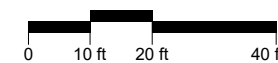
● NEW TREE



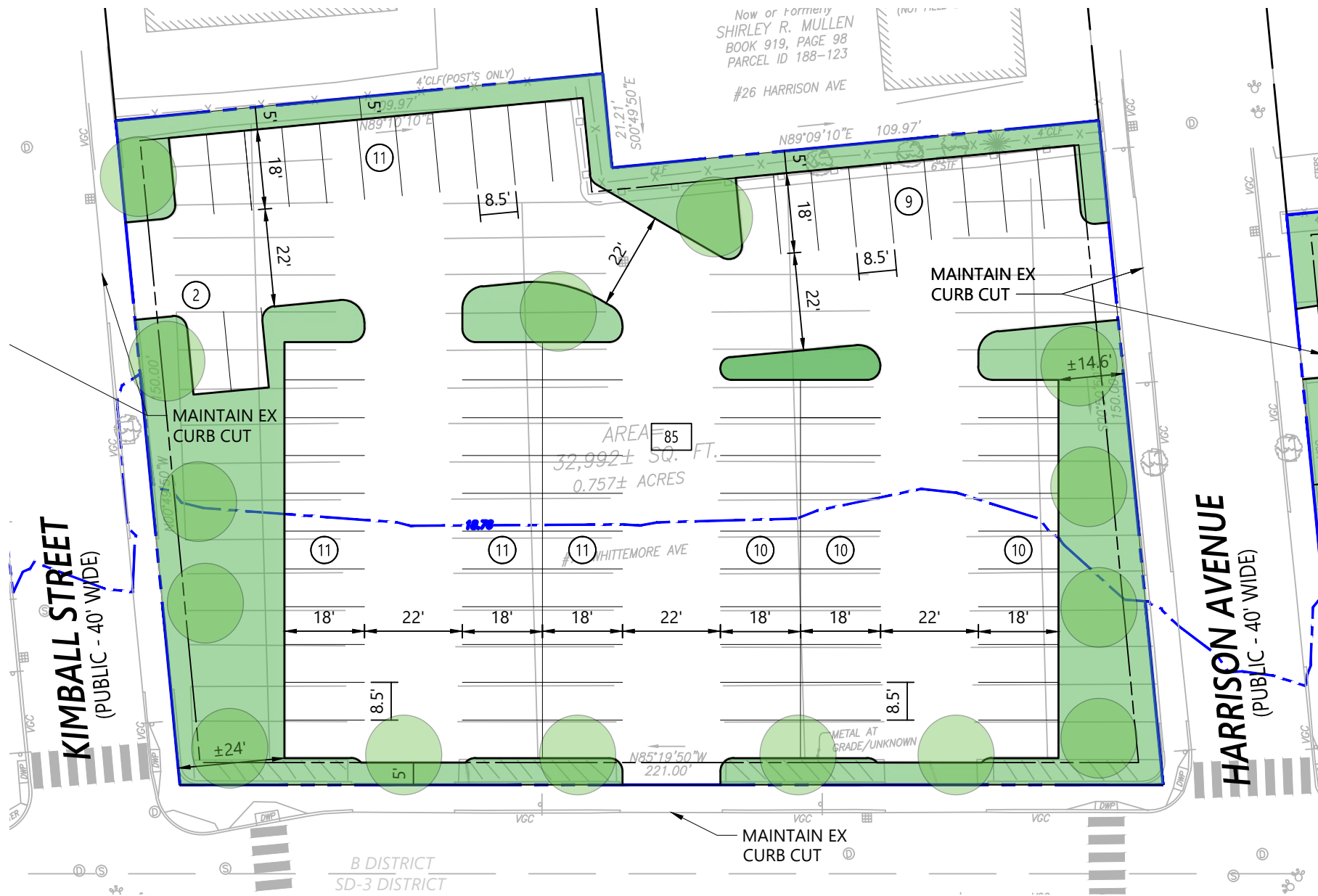
EXISTING PARKING LOT 2

*EXISTING PARKING LOTS WITH NEW STRIPING

● NEW TREE



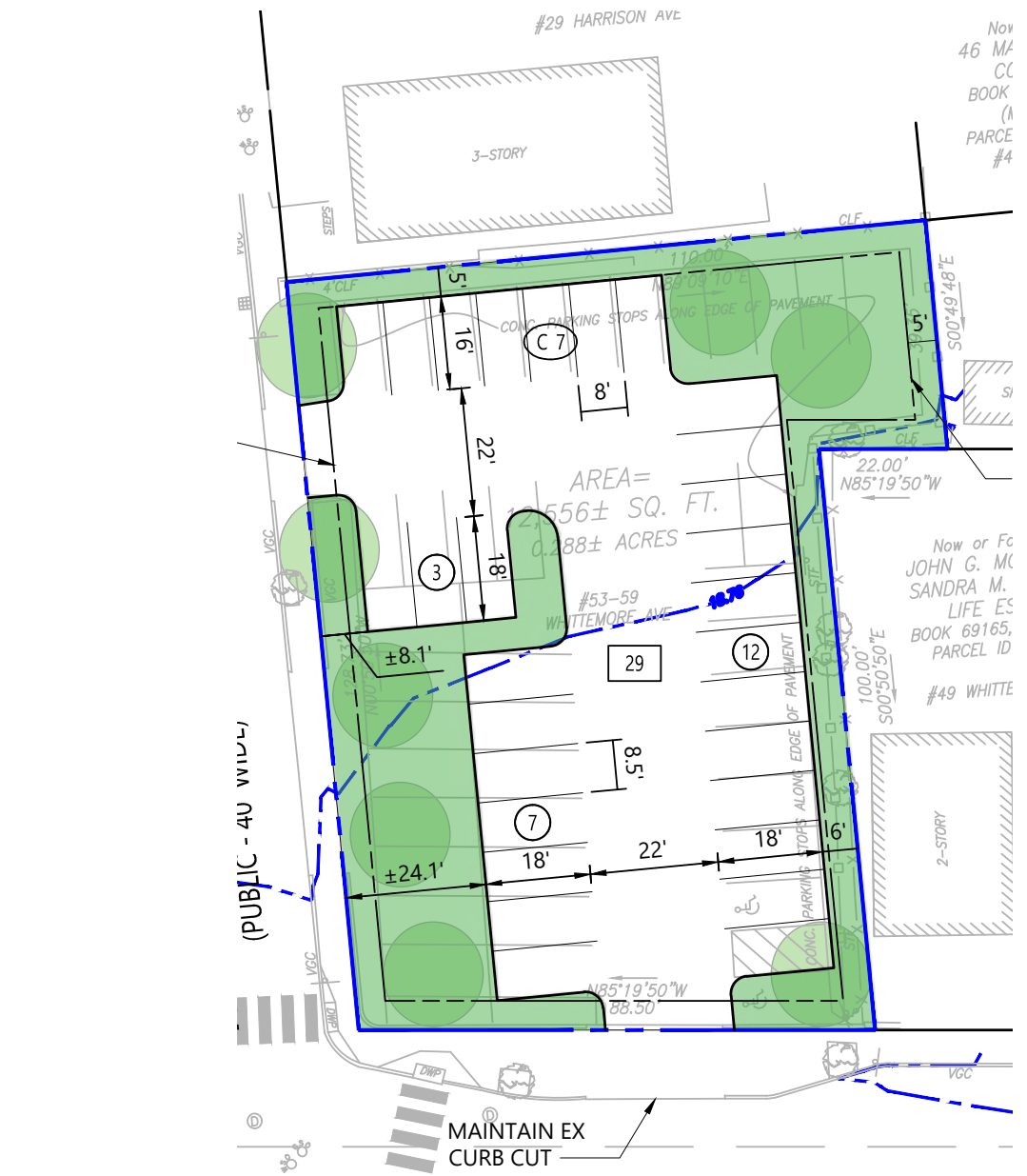
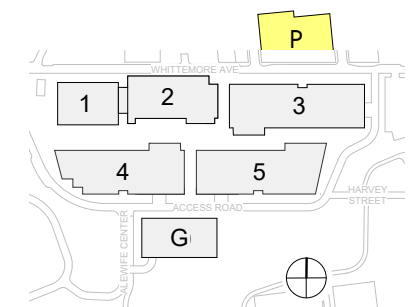
**36-64 WHITTEMORE AVE.
PARKING LOT - NORTH WHITTEMORE LOT**



85 SPACES

EXISTING PARKING LOT 3

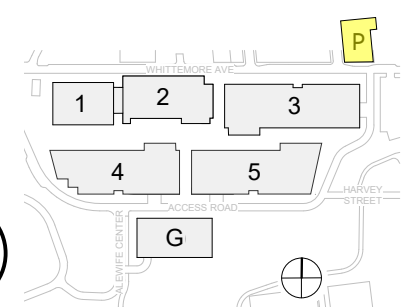
*EXISTING PARKING LOTS WITH NEW STRIPING



29 SPACES

EXISTING PARKING LOT 4

*EXISTING PARKING LOTS WITH NEW STRIPING



**36-64 WHITTEMORE AVE.
PARKING LOT - NORTH WHITTEMORE LOT**

LOADING DOCKS PER ARTICLE 6:
BUILDING 1 - 91,150 SF
BUILDING 2 - 100,000 SF
REQUIRED:
TWO (2) LOADING BAYS
PROPOSED:
TWO (2) LOADING BAYS
ONE (1) TRASH/RECYCLING BAY

LOADING DOCKS PER ARTICLE 6:
BUILDING 4 - 130,000 SF
REQUIRED:
TWO (2) LOADING BAYS
PROPOSED:
TWO (2) LOADING BAYS
ONE (1) TRASH/RECYCLING BAY

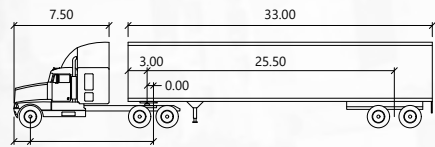
LOADING DOCKS PER ARTICLE 6:
BUILDING 3 - 147,500 SF
REQUIRED:
TWO (2) LOADING BAYS
PROPOSED:
TWO (2) LOADING BAYS
ONE (1) TRASH/RECYCLING BAY

LOADING DOCKS PER ARTICLE 6:
BUILDING 5 - 140,000 SF
REQUIRED:
TWO (2) LOADING BAYS
PROPOSED:
TWO (2) LOADING BAYS
ONE (1) TRASH/RECYCLING BAY

LOADING DOCKS PROVIDE ENOUGH DEPTH TO ALLOW A WB40 TO LOAD/UNLOAD FULLY INSIDE THE BUILDING

NO TRUCK PARKING ALONG SERVICE ROAD

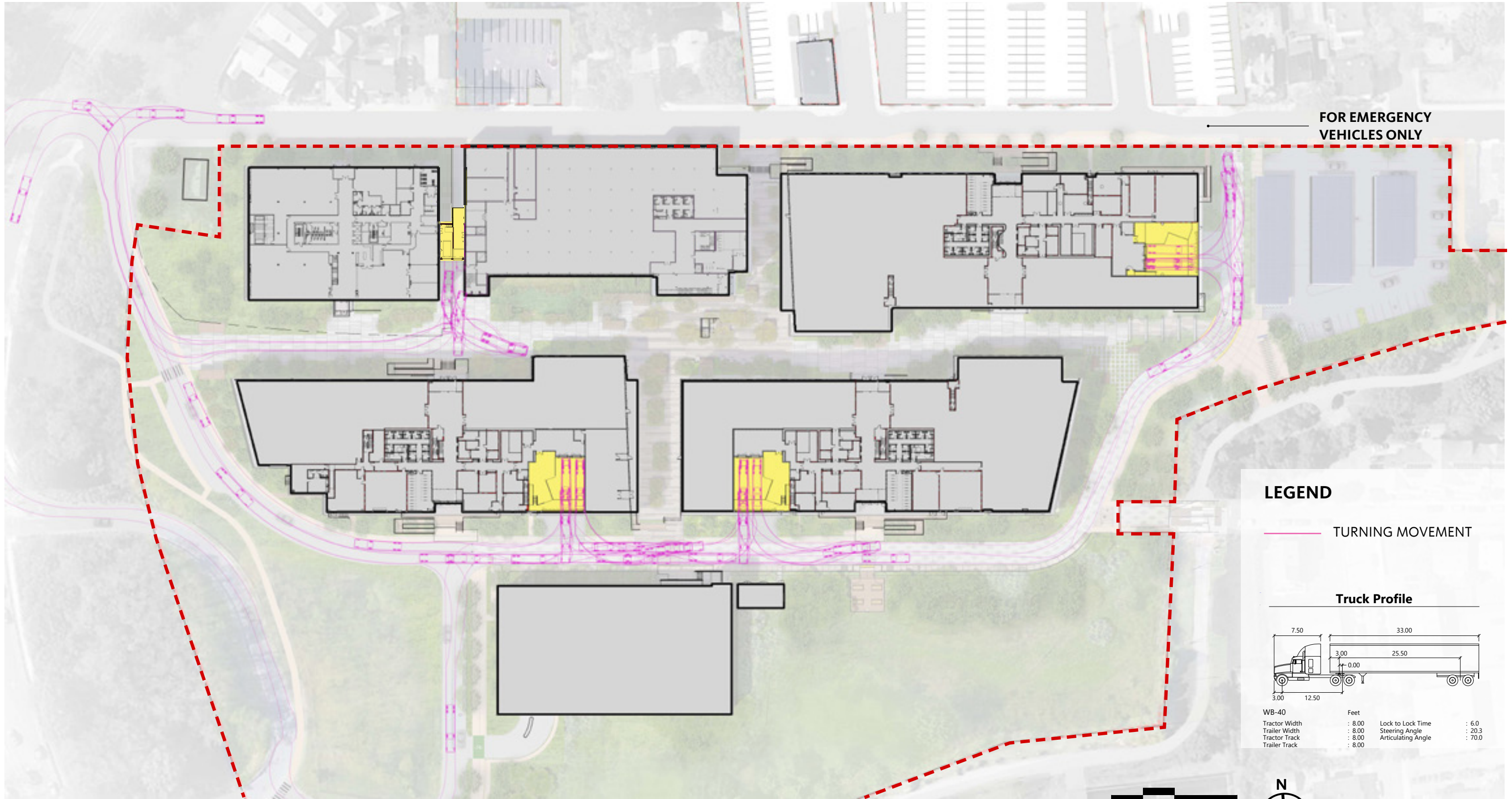
Truck Profile



WB-40		Feet	
Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.00	Steering Angle	: 20.3
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.00		



36-64 WHITTEMORE AVE. LOADING PLAN

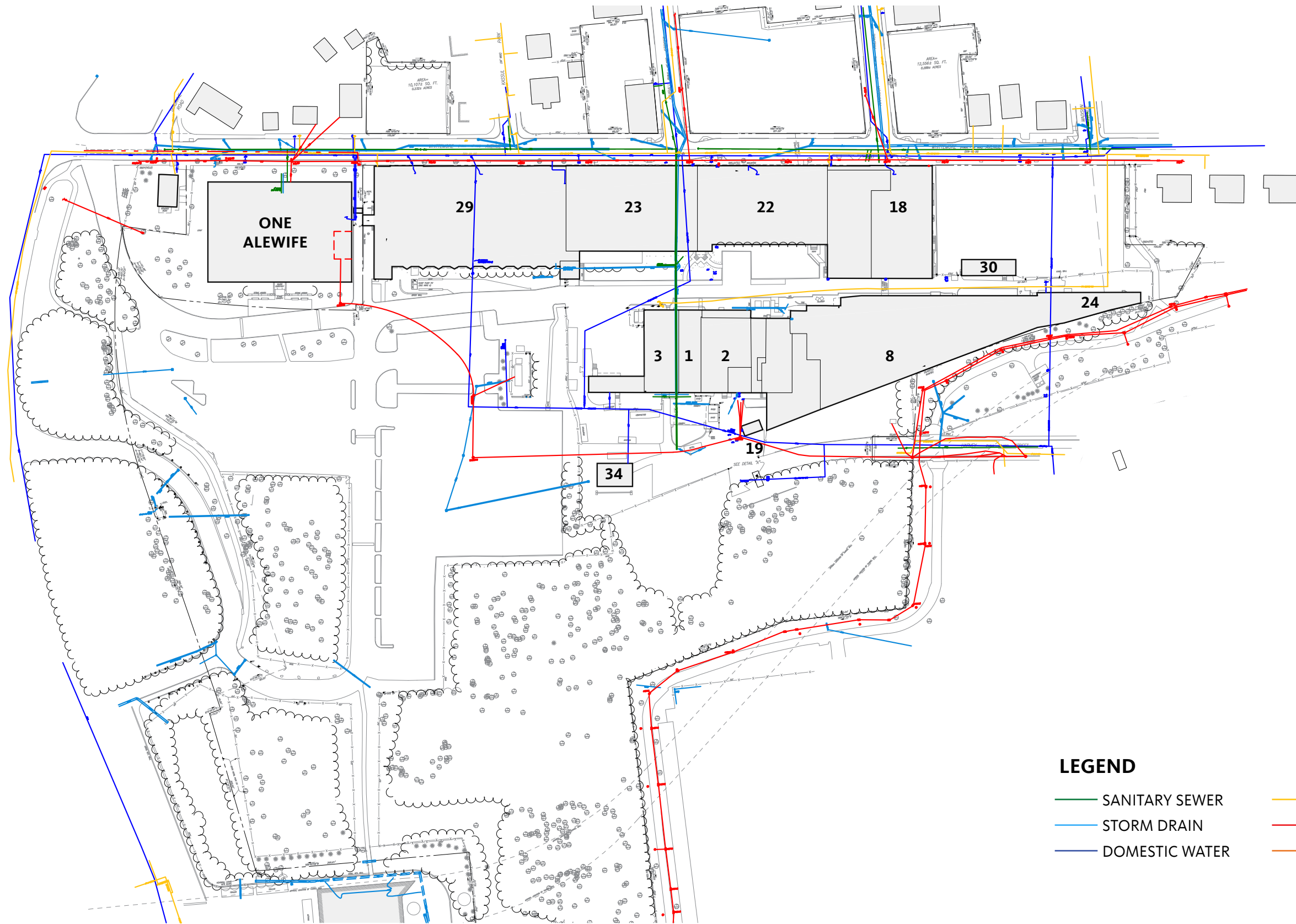


36-64 WHITTEMORE AVE.

LOADING SERVICE

INFRASTRUCTURE

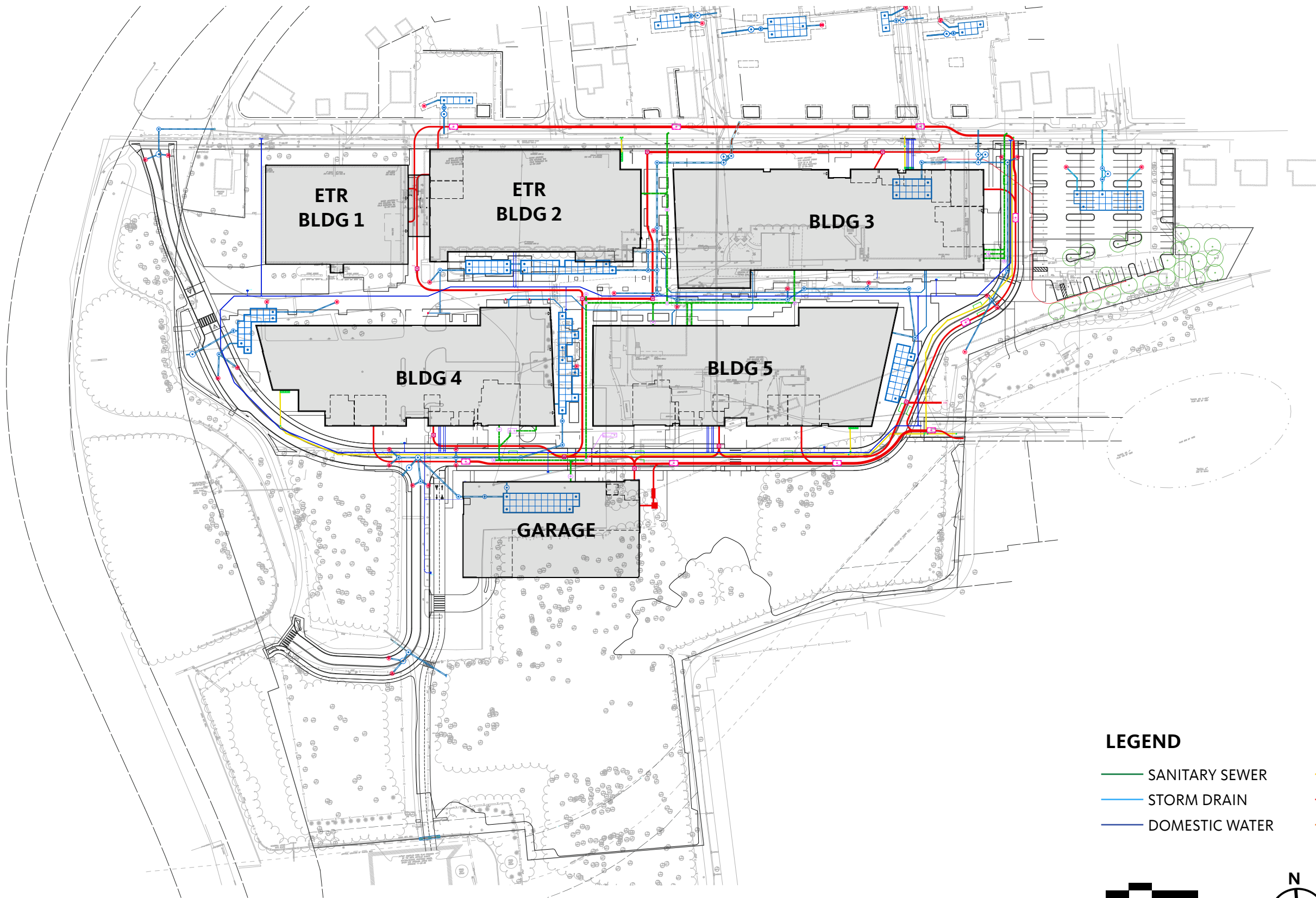
36-64 WHITTEMORE AVE.



LEGEND

- | | |
|------------------|---------------|
| — SANITARY SEWER | — NATURAL GAS |
| — STORM DRAIN | — ELECTRIC |
| — DOMESTIC WATER | — TELECOM |

36-64 WHITTEMORE AVE.
EXISTING INFRASTRUCTURE



LEGEND

- SANITARY SEWER
- NATURAL GAS
- STORM DRAIN
- ELECTRIC
- DOMESTIC WATER
- TELECOM

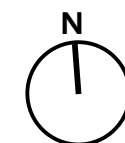
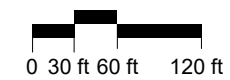


36-64 WHITTEMORE AVE.
 PROPOSED INFRASTRUCTURE



LEGEND

- PROPOSED BUILDING
- PROPOSED GARAGE
- EXISTING BUILDING TO REMAIN
- AREA BELOW FLOODPLAIN ELEVATION 18.76 CCB
- SURVEY FLOODPLAIN ELEVATION 18.76 CCB
- 100-FOOT WETLAND BUFFER
- WETLAND BOUNDARY



36-64 WHITTEMORE AVE.
WETLAND RESOURCE AREA