
UNIVERSITY OF COLORADO
ENGINEERING CENTER NORTH TOWER & NORTH WING RENOVATION
Design Development
14 January 2020
AndersonMasonDale Architects

SCHEDULE & BUDGET

MICRO-MASTER PLAN & SITE PLAN

LANDSCAPE PLAN

GRADING AND DRAINAGE PLAN

ROOF PLAN

BUILDING ELEVATIONS & SECTIONS

SUSTAINABILITY

DISCUSSION

PROJECT SUMMARY

Description

The Engineering Center North Wing (the aerospace wing or ECAE) and the Engineering Center North Tower (ECNT) will be vacated in summer of 2019 as the Department of Aerospace Engineering Sciences moves to their new east campus facility. This project proposes a complete renovation of the north wing and north tower of 35,000 ASF/ 55,477 GSF

Budget

Professional Services:	$3.44M
Construction Building:	$20.51M
Construction Site	$1.07M
(includes utilities, site, and landscape)	
FFE, Communication, Misc	$4.13M
Contingency	$2.89M
Total Project Budget	$31.99M

Program

Lab Modules: 34
Offices: 56
GRA stations: 81
Bold Center: 3,500 sqft

Projected Occupancy: 505

Grad Students: 97
Faculty: 80
Lab Stations: 58
Lounge/Conference: 270

PROJECT GOALS / SCOPE

Landscape

- Narrow sidewalk north sidewalk
- Remove area wells.
- Create raised table for pedestrian preferred zone.
- Entrance plaza with seating benches.
- Create landscape buffer for loading dock
- Create pedestrian walk across parking lot.
- Relocate motorcycle and bicycle parking
- Relocate service parking
- Create landscape buffer from Colorado Ave.

Architecture

- Repurpose space to best meet the needs of the College of Engineering and Applied Science (CEAS)
- Connect to and enhance the rest of the Engineering Center complex.
- Bring the quality of both buildings up to meet campus goals for operational and energy efficiency
- Provide a building environment that supports occupant health and well-being.
- Provide a welcoming atmosphere
- Improve building systems
- Invite daylight inside
- Foster collaboration
- Create flexible spaces for research

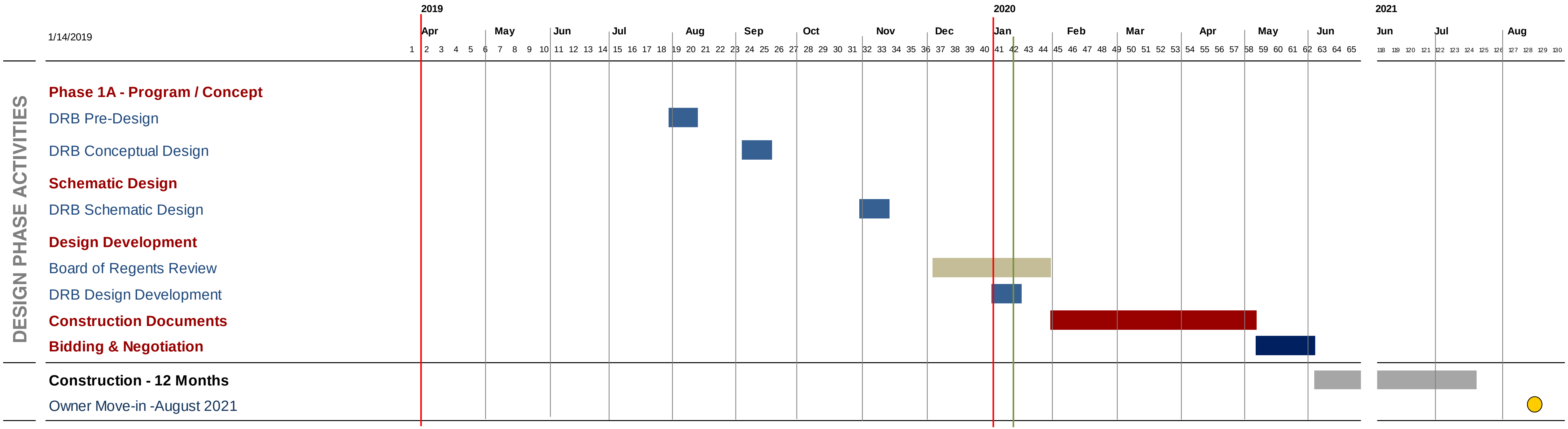
Sustainability

- LEED v4 Gold Certification
- 40% indoor water use reduction
- 50% outdoor water use reduction
- 38% energy cost savings
- Energy use intensity of 63 kBtu/sf/yr
- Improve occupant comfort by improving exterior envelope
- Increase natural daylighting

SCHEDULE

CP278574 ECAE ECNT Renovation

University of Colorado Boulder



PROJECT OVERVIEW

MICRO-MASTER PLAN & SITE PLAN

LANDSCAPE PLAN

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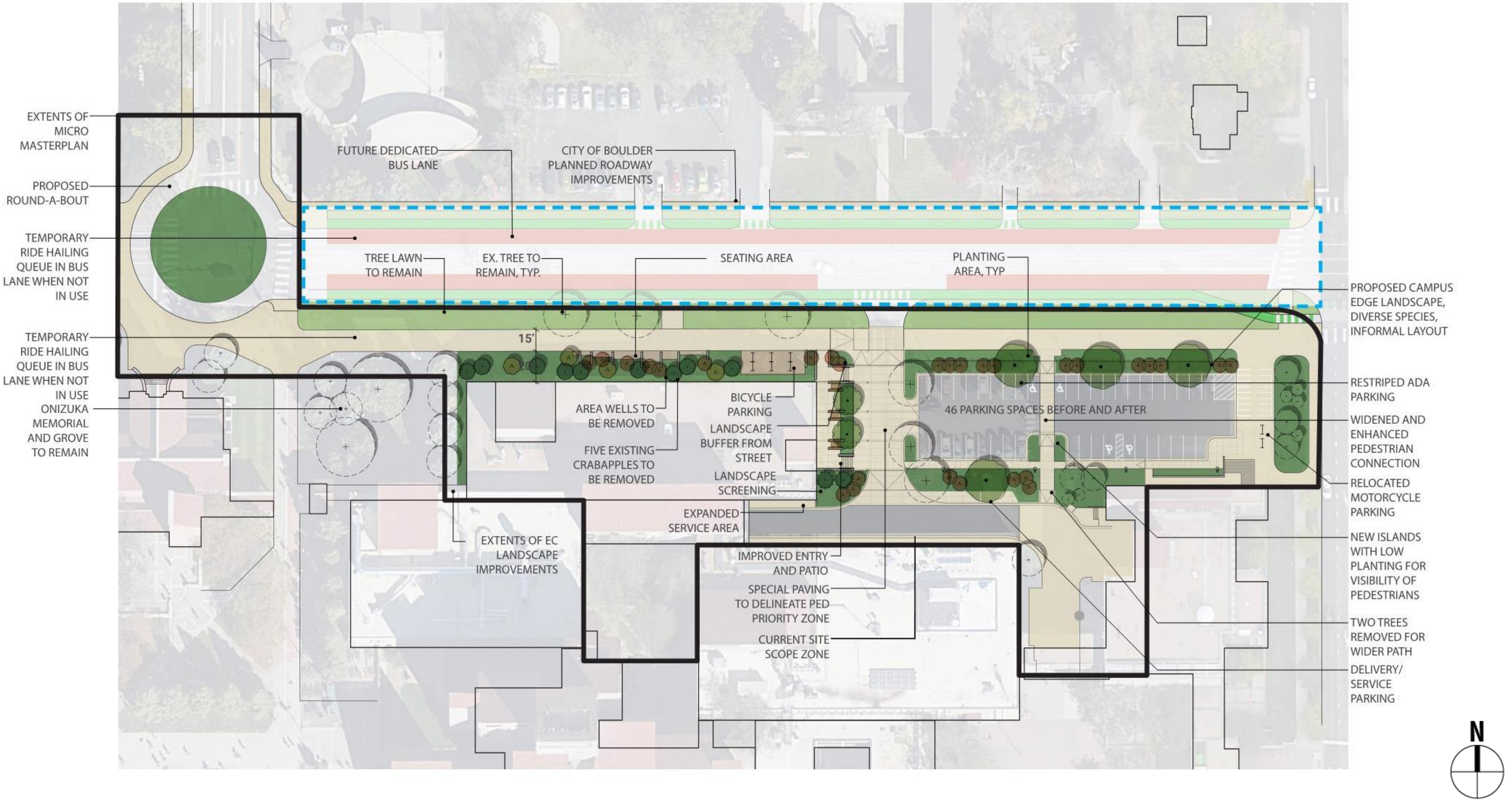
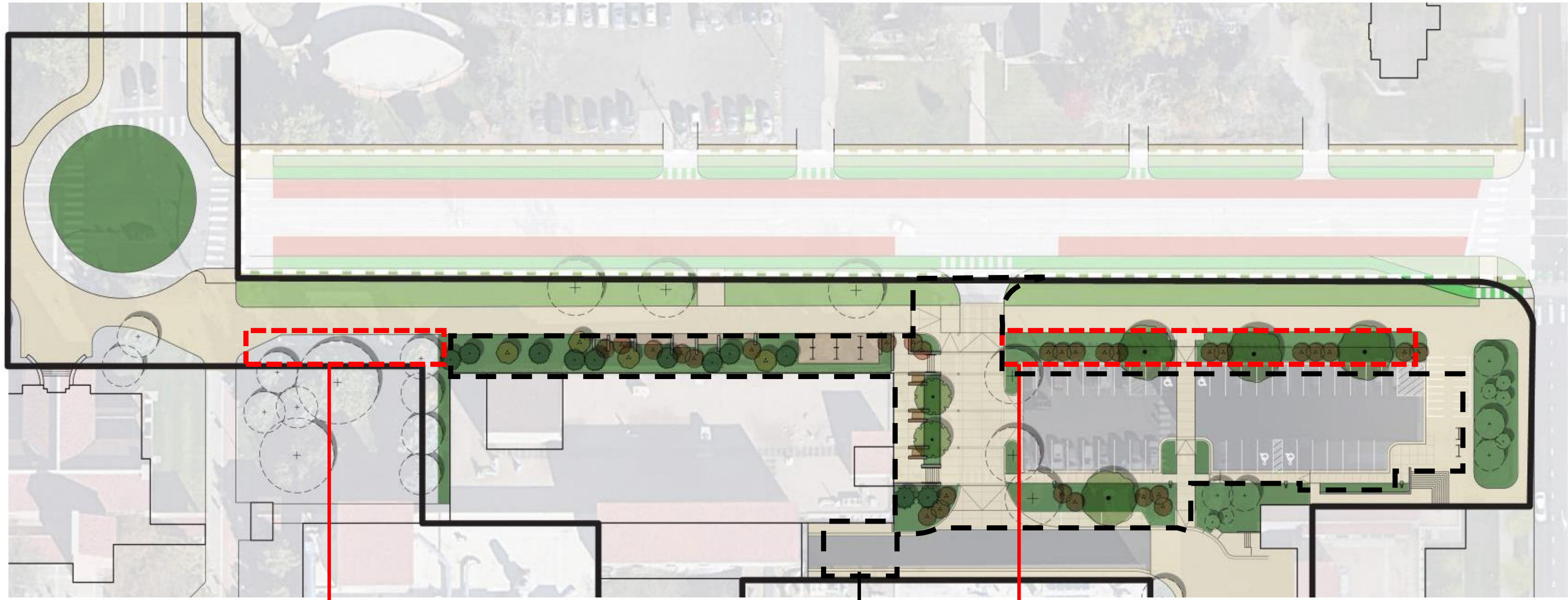
MICRO-MASTER PLAN



LANDSCAPE ALTERNATES



Add Alternate 2

Area = 1,800 SF
Estimated cost = $ 18,795
Reduce sidewalk width from 22' to 15'
New Landscape

BASE SCOPE

Add Alternate 1

Area = 3,540 SF
Estimated Cost = $ 37,590
Reduce sidewalk width from 22' to 15'
New Landscape

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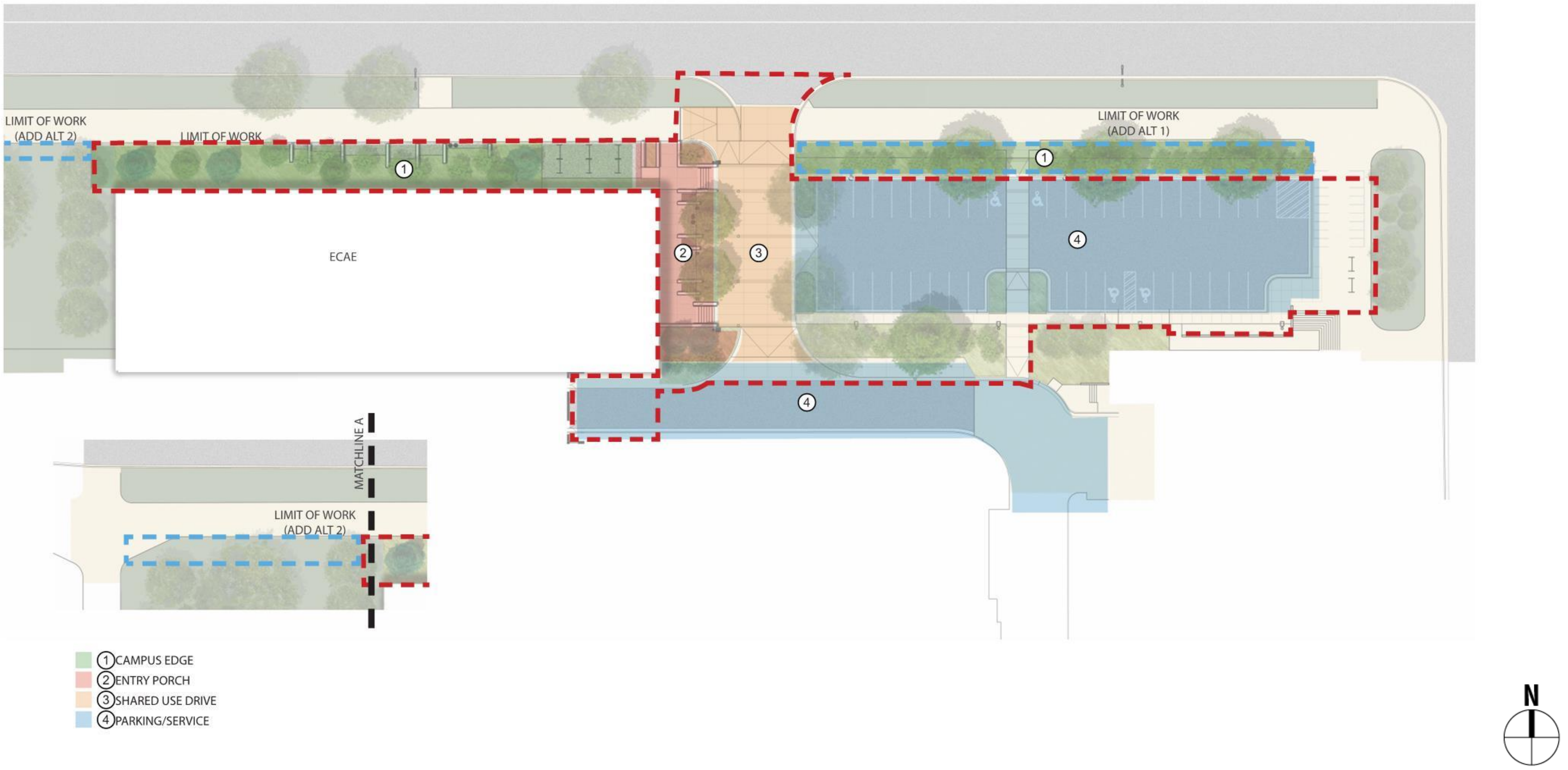
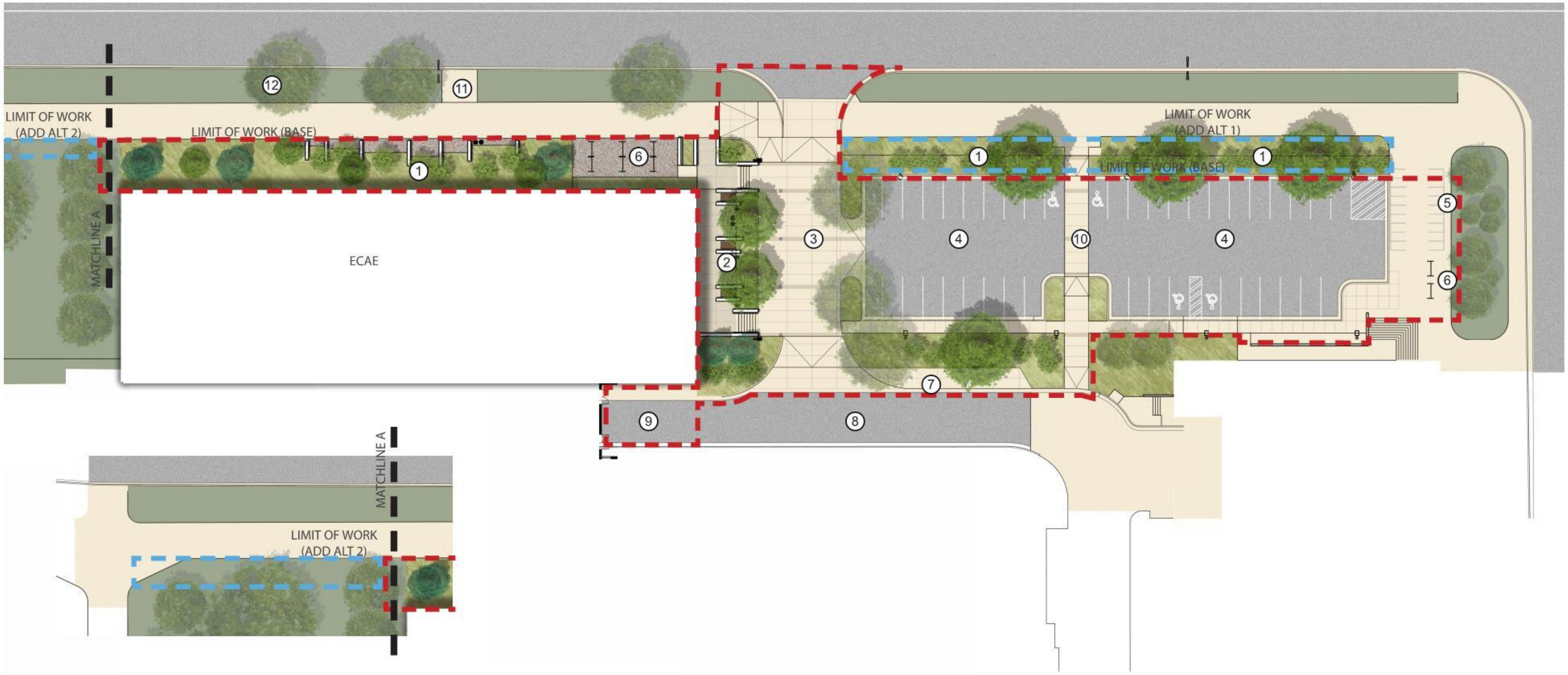
LANDSCAPE USE AND CHARACTER



SITE PLAN

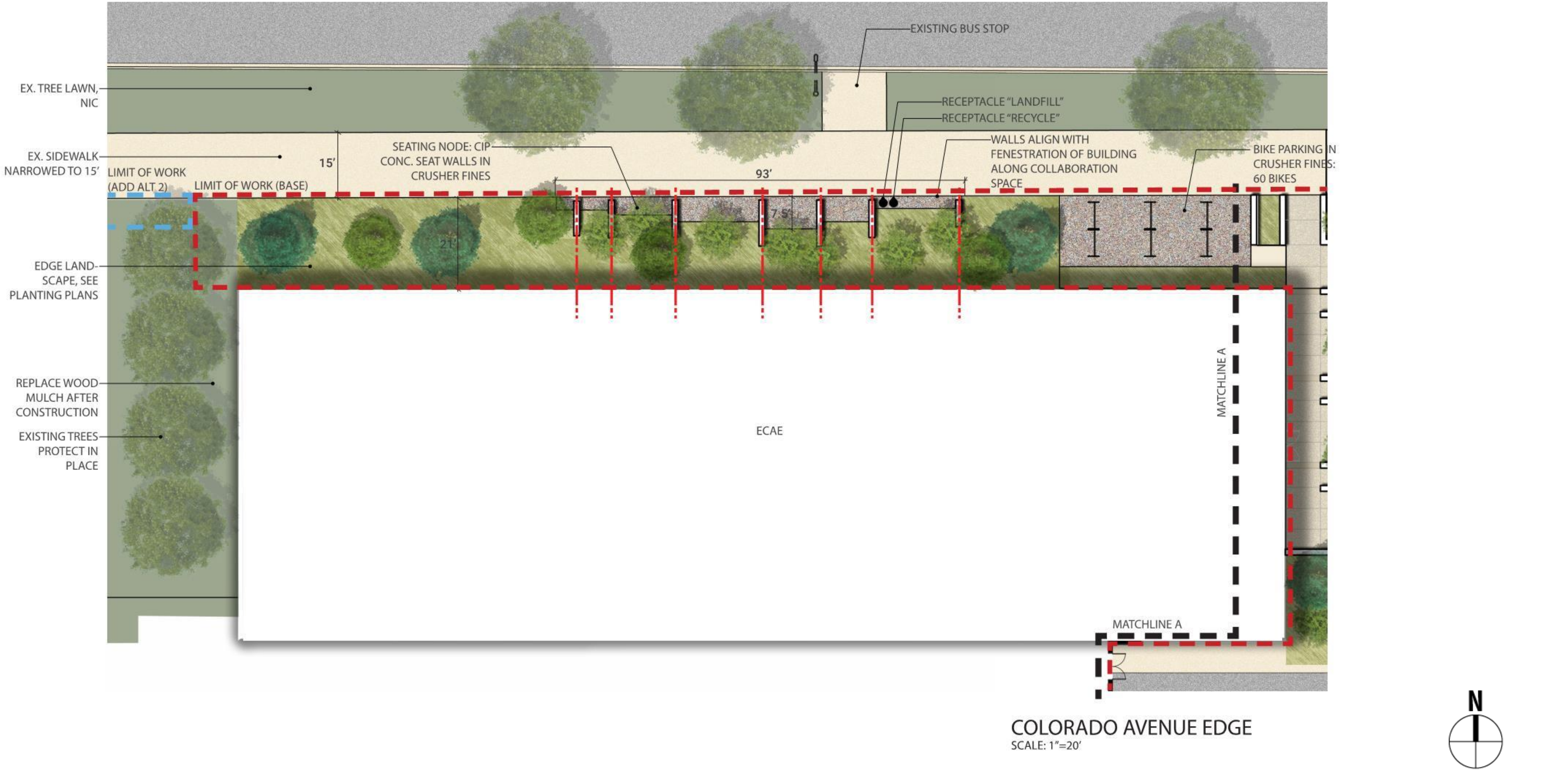


1 COLORADO AVENUE EDGE
2 EAST ENTRY
3 ENTRY DRIVE
4 RESURFACED & RESTRIPED PARKING LOT
5 MOTORCYCLE PARKING
6 BICYCLE PARKING

7 PEDESTRIAN/VEHICULAR TRANSITION ZONE
8 SERVICE LANE
9 LOADING DOCK
10 ENHANCED PEDESTRIAN CONNECTION
11 EXISTING BUS STOP
12 EXISTING TREE, TYP

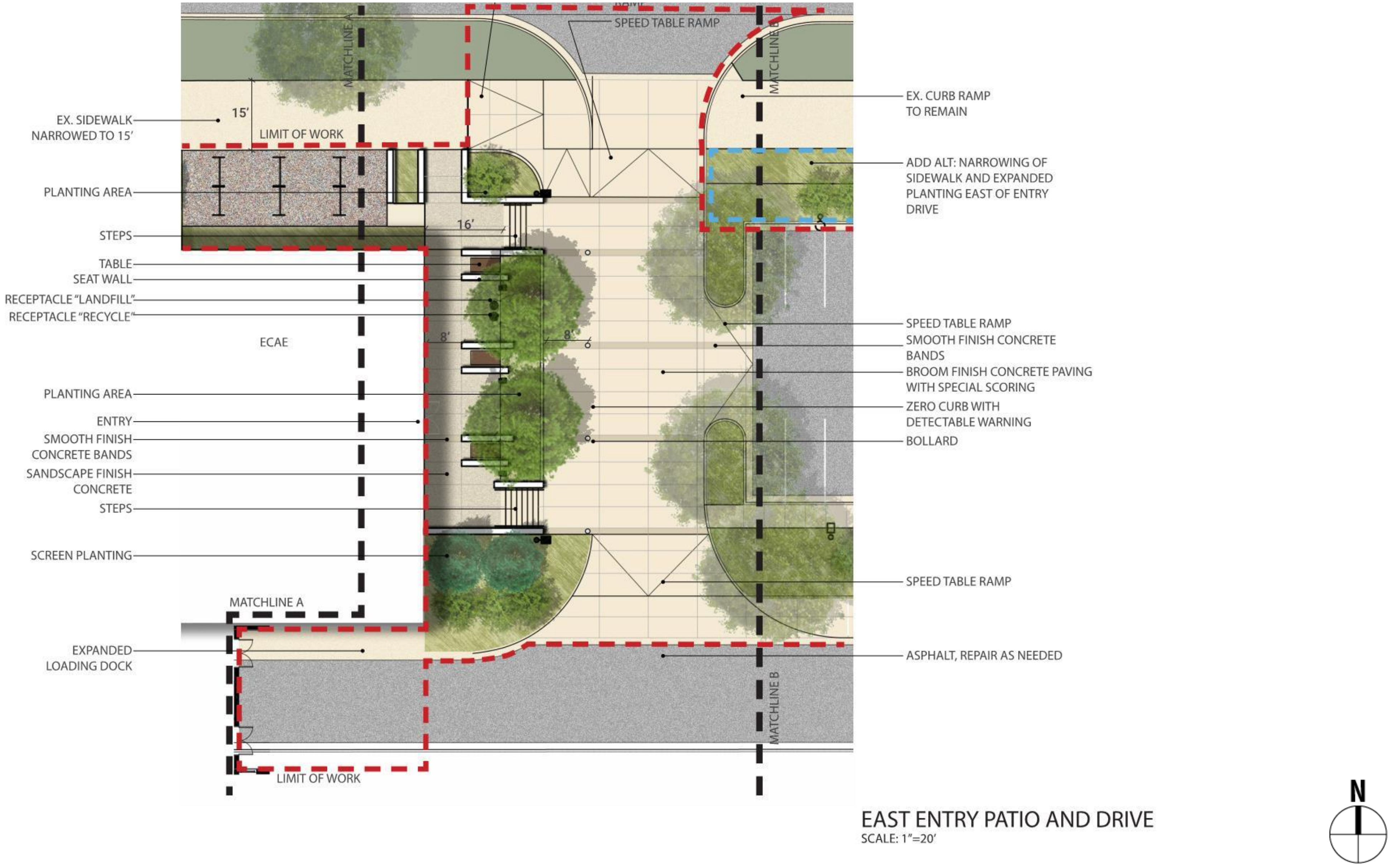
N

LANDSCAPE PLAN – NORTH EDGE



COLORADO AVENUE EDGE
SCALE: 1"=20'

LANDSCAPE PLAN – EAST ENTRY

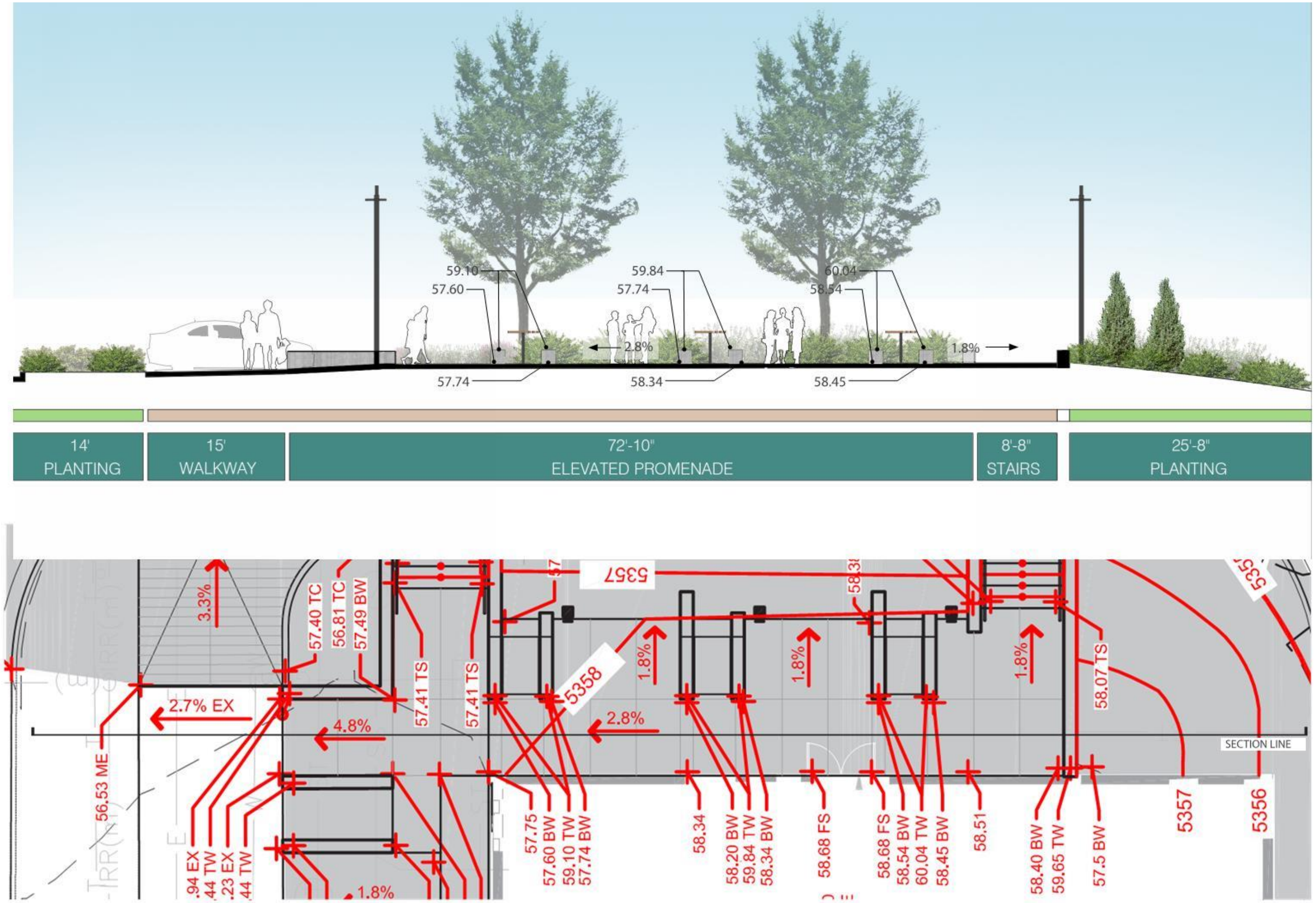


EAST ENTRY PATIO AND DRIVE
SCALE: 1"=20'

LANDSCAPE PLAN – PARKING LOT

PARKING LOT
SCALE: 1"=20'

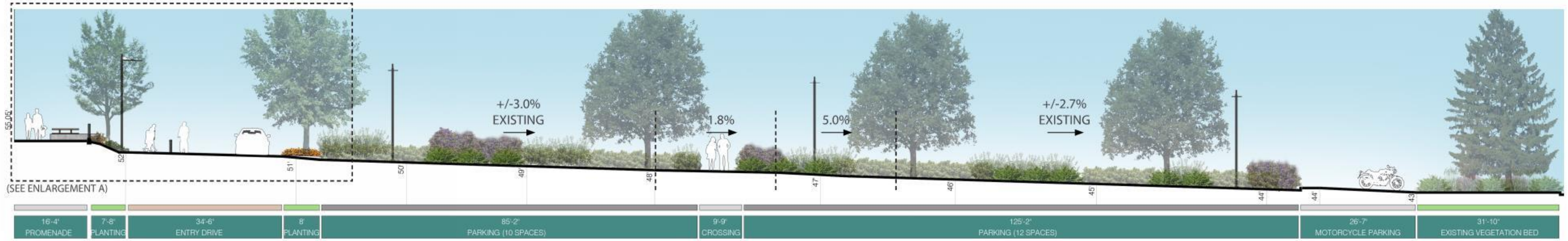
SITE SECTION

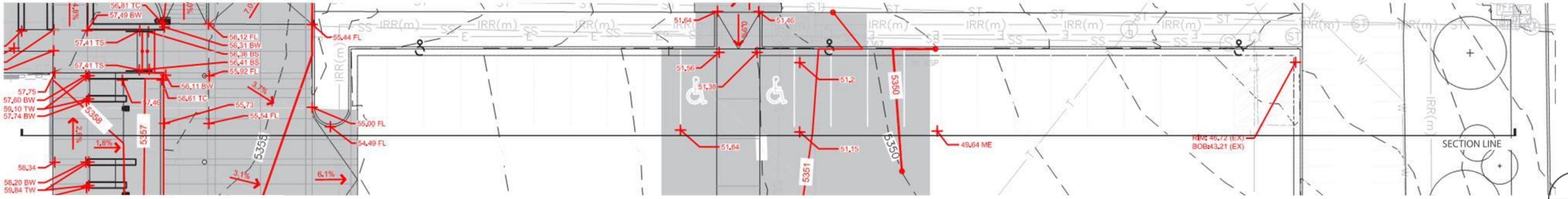


SECTION TRHOUGH
EAST ENTRY PLAZA
SCALE: 1"=10'

SITE SECTION

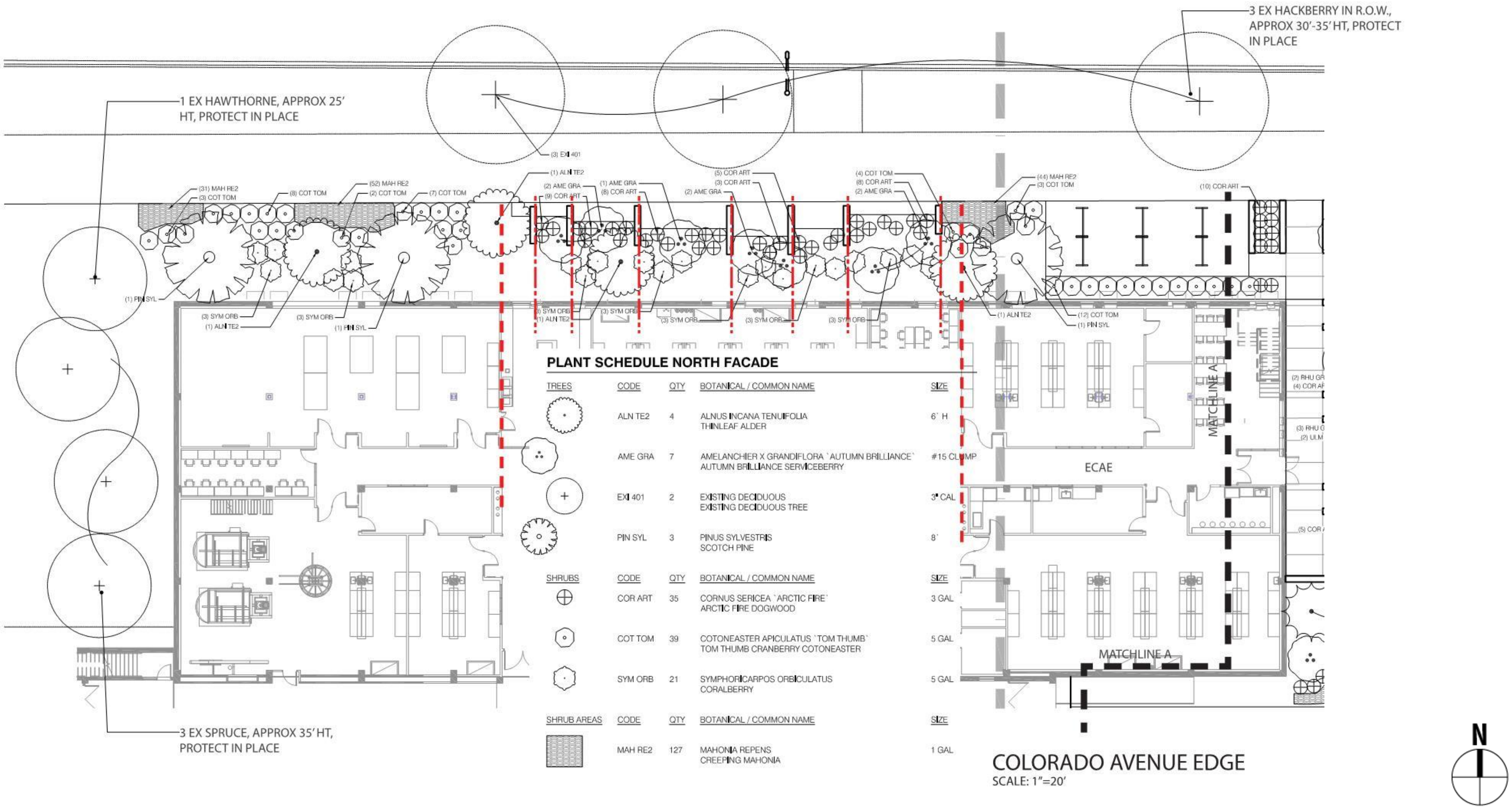
SEE ENLARGEMENT A
SCALE: 1"=10'





SECTION TRHOUGH
RESURFACED PARKING LOT
SCALE: 1"=20'

PLANTING PLAN – NORTH EDGE



PLANT SCHEDULE NORTH FACADE

TREES	CODE	QTY	BOTANICAL / COMMON NAME	SIZE
	ALN TE2	4	ALNUS INCANA TENUIFOLIA THINLEAF ALDER	6` H
	AME GRA	7	AMELANCHIER X GRANDIFLORA `AUTUMN BRILLIANCE` AUTUMN BRILLIANCE SERVICEBERRY	#15 CLUMP
	EXI 401	2	EXISTING DECIDUOUS EXISTING DECIDUOUS TREE	3" CAL
	PIN SYL	3	PINUS SYLVESTRIS SCOTCH PINE	8`
SHRUBS	**CODE**	**QTY**	**BOTANICAL / COMMON NAME**	**SIZE**
	COR ART	35	CORNUS SERICEA `ARCTIC FIRE` ARCTIC FIRE DOGWOOD	3 GAL
	COT TOM	39	COTONEASTER APICULATUS `TOM THUMB` TOM THUMB CRANBERRY COTONEASTER	5 GAL
	SYM ORB	21	SYMPHORICARPOS ORBICULATUS CORALBERRY	5 GAL
SHRUB AREAS	**CODE**	**QTY**	**BOTANICAL / COMMON NAME**	**SIZE**
	MAH RE2	127	MAHONIA REPENS CREEPING MAHONIA	1 GAL

PLANTING DIAGRAM – NORTH EDGE

Thin Leaf Alder

Red Coralberry

Tom Thumb Cotoneaster

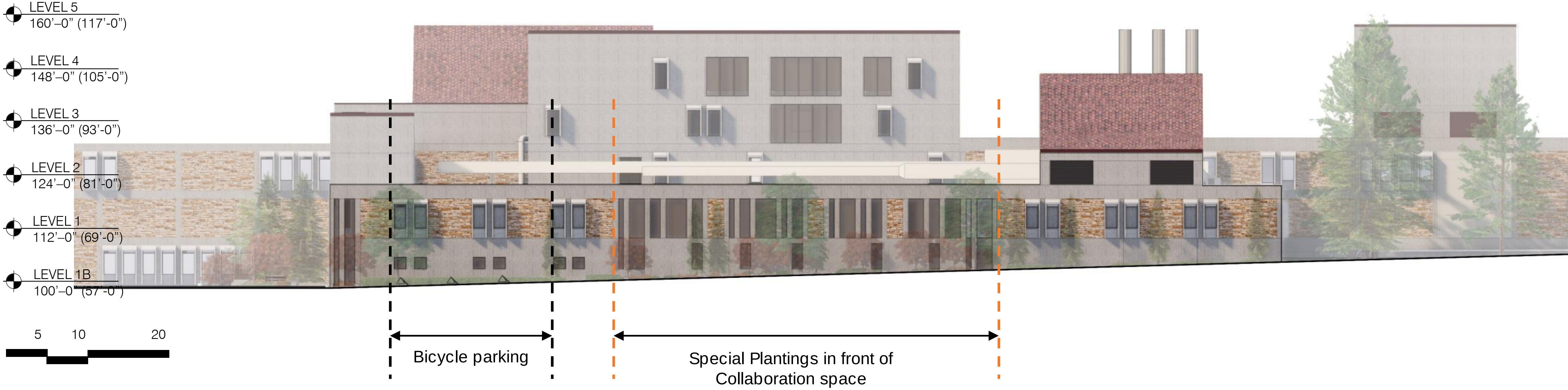
Scotch Pine

Mahonia Repens

Arctic Fire Dogwood

Autumn Brilliance
Serviceberry

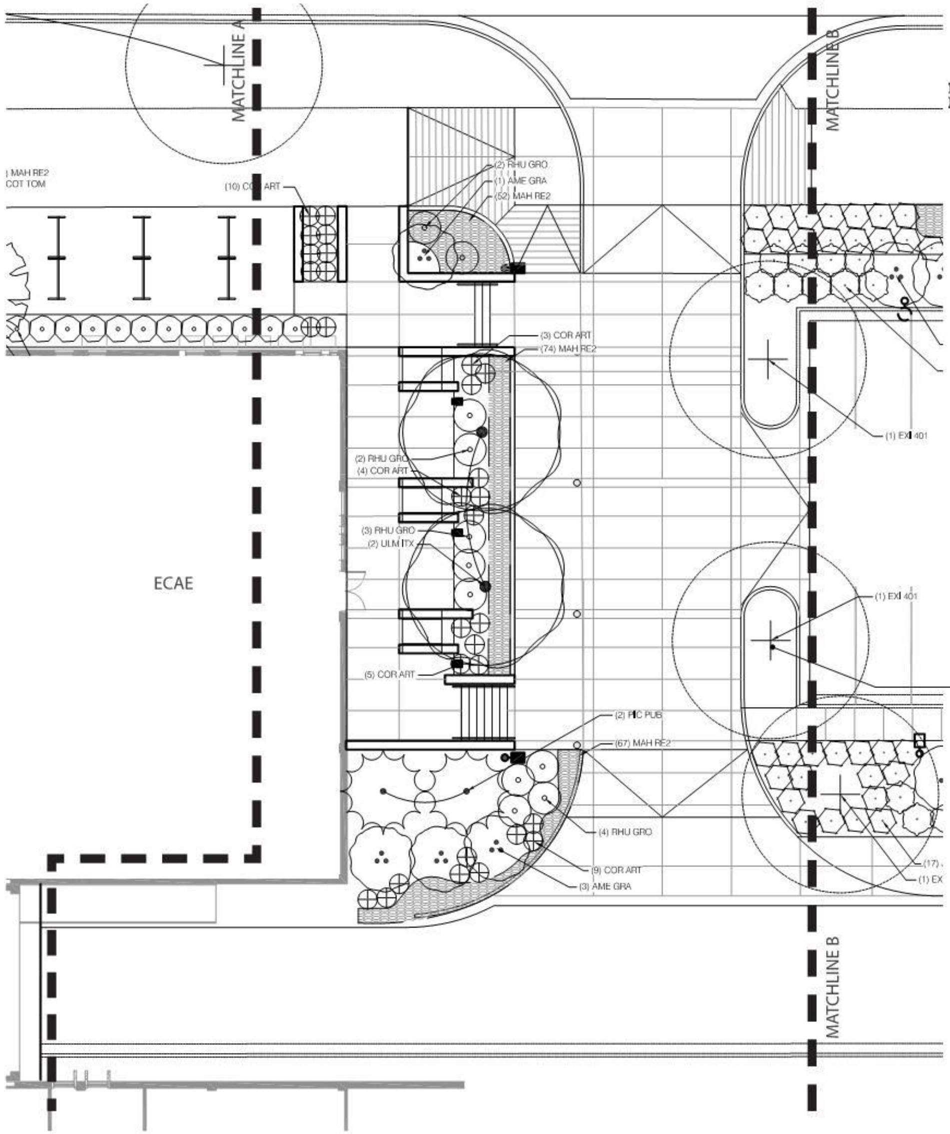
PLANTING ELEVATION – NORTH EDGE



PLANTING PLAN – EAST ENTRY

PLANT SCHEDULE EAST ENTRY

TREES	CODE	QTY	BOTANICAL / COMMON NAME	SIZE
	AME GRA	4	AMELANCHIER X GRANDIFLORA `AUTUMN BRILLIANCE` AUTUMN BRILLIANCE SERVICEBERRY	#15 CLUM
	PIC PUB	2	PICEA PUNGENS `BAKERI` BAKER BLUE SPRUCE	6` TALL
	ULM ITX	2	ULMUS X `TRIUMPH` TRIUMPH ELM	2" CAL.
SHRUBS	**CODE**	**QTY**	**BOTANICAL / COMMON NAME**	**SIZE**
	COR ART	21	CORNUS SERICEA `ARCTIC FIRE` ARCTIC FIRE DOGWOOD	3 GAL
	RHU GRO	11	RHUS AROMATICA `GRO-LOW` GRO-LOW FRAGRANT SUMAC	5 GAL
SHRUB AREAS	**CODE**	**QTY**	**BOTANICAL / COMMON NAME**	**SIZE**
	MAH RE2	193	MAHONIA REPENS CREEPING MAHONIA	1 GAL



EAST ENTRY PATIO AND DRIVE PLANTING

SCALE: 1"=20'

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PLANTING DIAGRAM – EAST ENTRY


Bakeri Blue Spruce


Arctic Fire Dogwood

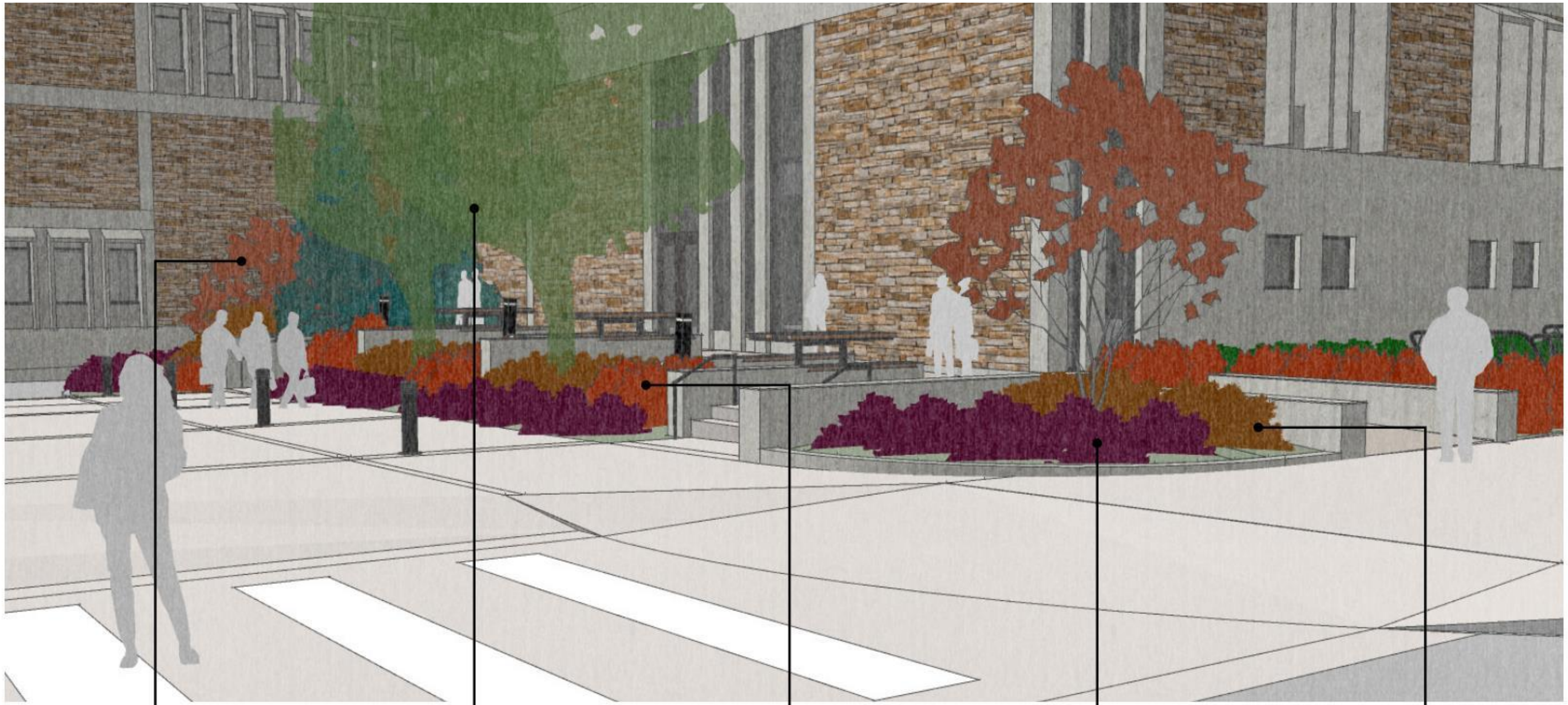

Mahonia Repens


Autumn Brilliance Serviceberry


Gro-Low Sumac


Triumph Elm

PLANTING DIAGRAM – EAST ENTRY



Autumn Brilliance Serviceberry

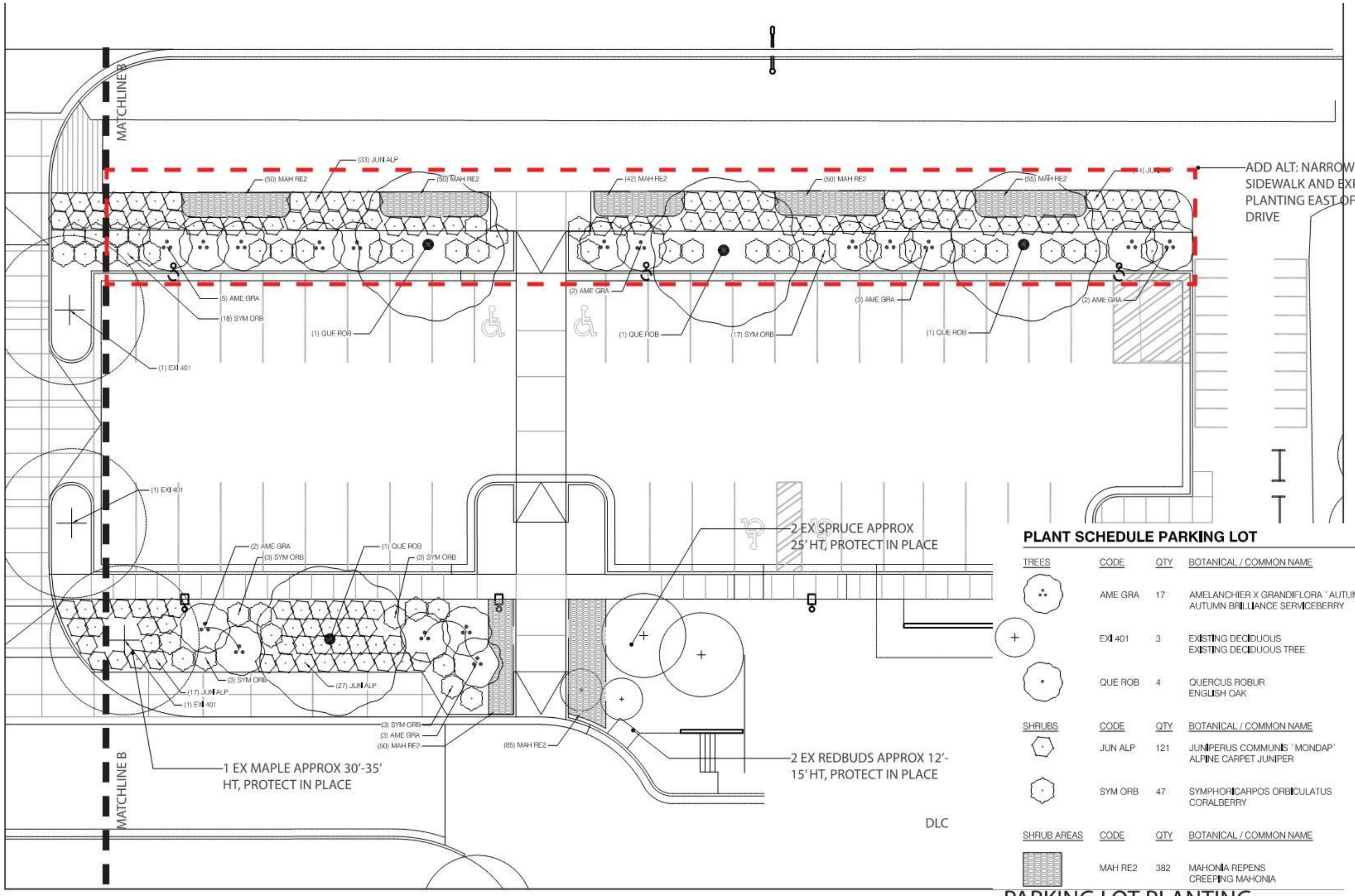
Triumph Elm

Arctic Fire Dogwood

Mahonia Repens

Gro-Low Sumac

PLANTING PLAN – PARKING LOT



PLANT SCHEDULE PARKING LOT

TREES	CODE	QTY	BOTANICAL / COMMON NAME	SIZE
	AME GRA	17	AMELANCHIER X GRANDIFLORA `AUTUMN BRILLIANCE` AUTUMN BRILLIANCE SERVICEBERRY	#15 CLUM
	EXI 401	3	EXISTING DECIDUOUS EXISTING DECIDUOUS TREE	3" CAL
	QUE ROB	4	QUERCUS ROBUR ENGLISH OAK	2" CAL
SHRUBS	**CODE**	**QTY**	**BOTANICAL / COMMON NAME**	**SIZE**
	JUN ALP	121	JUNIPERUS COMMUNIS `MONDAP` ALPINE CARPET JUNIPER	5 GAL
	SYM ORB	47	SYMPHORICARPOS ORBICULATUS CORALBERRY	5 GAL
SHRUB AREAS	**CODE**	**QTY**	**BOTANICAL / COMMON NAME**	**SIZE**
	MAH RE2	382	MAHONIA REPENS CREEPING MAHONIA	1 GAL

PARKING LOT PLANTING
SCALE: 1"=20'

HARDSCAPE MATERIALS

BOARDFORM CONCRETE WALLS

WITH SANDSCAPE BANDING

(AT ENTRY DRIVE)

WASTE RECEPTACLE

BIKE RACK

(CAMPUS STANDARD)

BOLLARD

(CAMPUS STANDARD) (AT ENTRY DRIVE)

WOOD FOR BENCHES AND TABLE TOPS

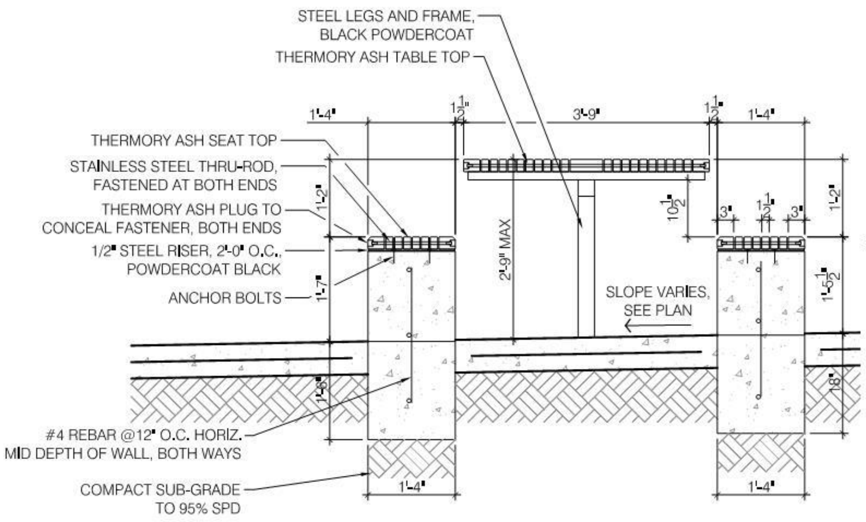
(THERMALLY MODIFIED ASH "THERMORY" NEW)

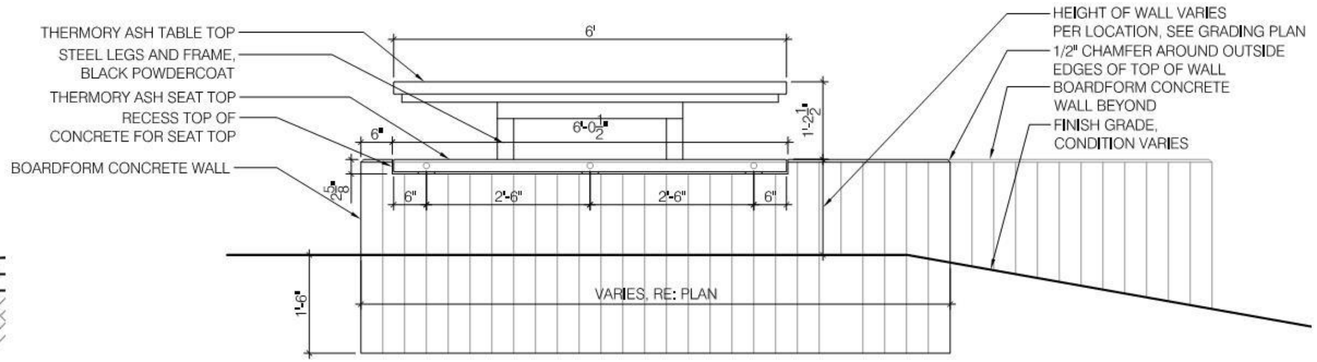
(THERMALLY MODIFIED ASH "THERMORY" AGED)

SITE FURNISHINGS

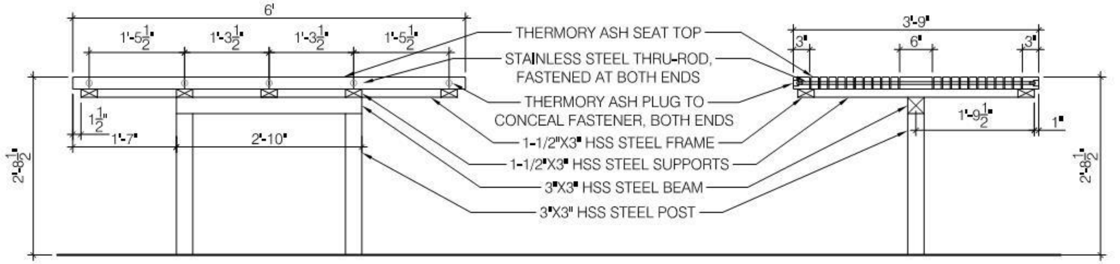
SITE FURNISHINGS

COLLABORATION BENCH DETAIL





COLLABORATION TABLE DETAIL



NOTES:
1. ALL HSS STEEL TO RECEIVE BLACK POWDERCOAT FINISH
2. TABLE TO BE EMBED MOUNTED

0 1' 2' 4'

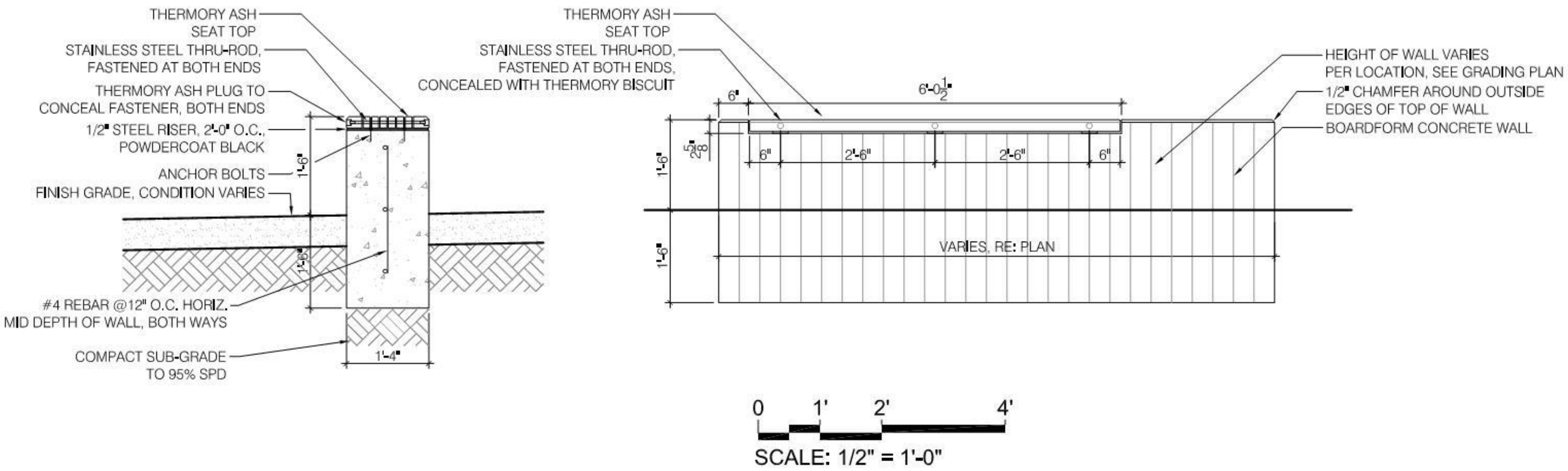
SCALE: 1/2" = 1'-0"

SITE FURNISHINGS

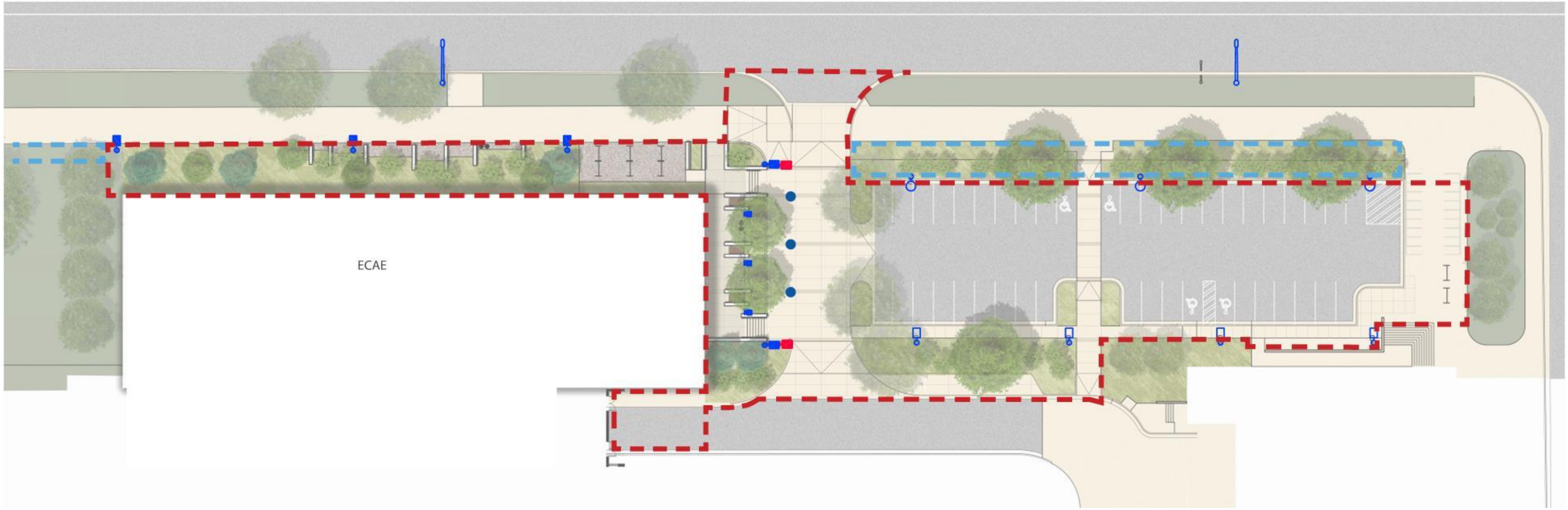
CONCRETE SEAT WALLS
ALONG COLORADO AVE

SITE FURNISHINGS

COLORADO AVENUE BENCH DETAIL



LIGHTING PLAN



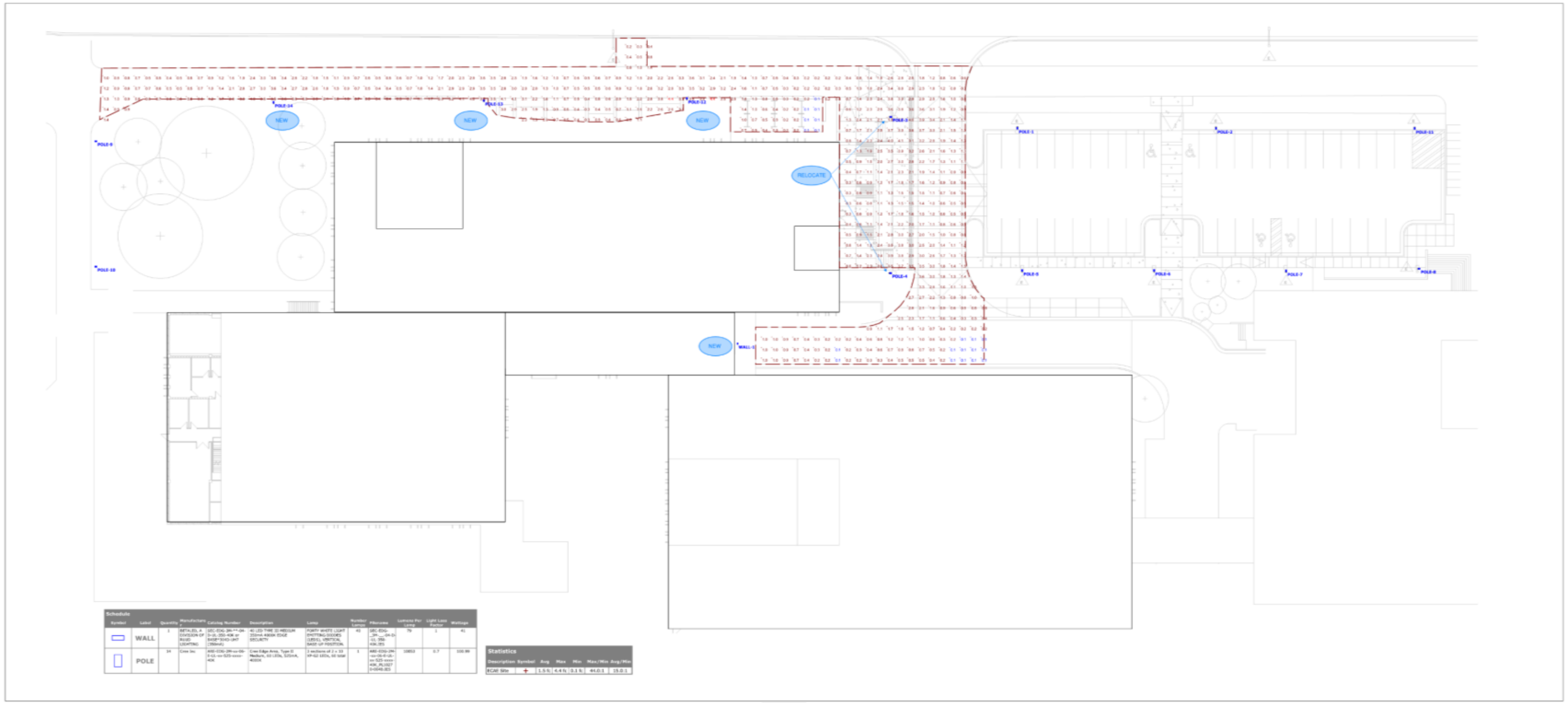
LIGHTING KEY
- EX. PARKING LOT LIGHT (REMAIN)
- EX. PED LIGHT (REMAIN)
- EX. STREET LIGHT (REMAIN)
- PED LIGHT (CAMPUS STANDARD)
- BOLLARD LIGHT (CAMPUS STANDARD)
- CHARGING BOLLARD
- PED LIGHT (REMOVE)

BOLLARD LIGHT
(CAMPUS STANDARD)

PED LIGHT
(CAMPUS STANDARD)

CHARGING BOLLARD
(WITH LIGHT)

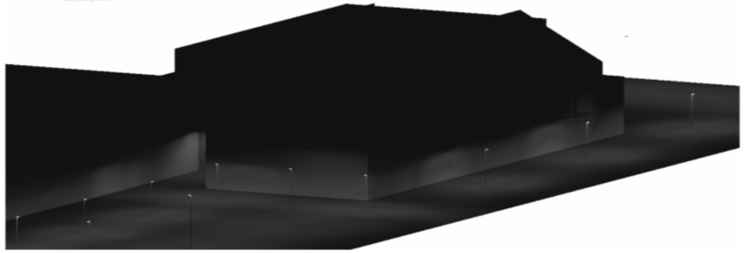
SITE PHOTOMETRICS



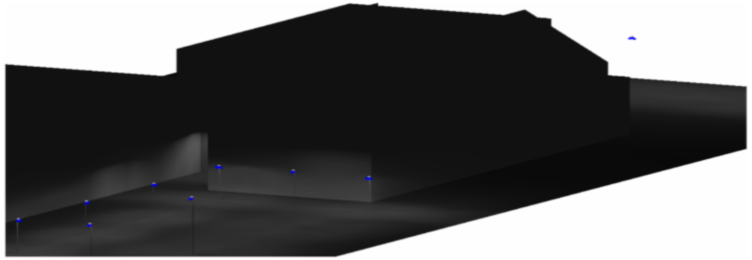
WALL LUMINAIRE

POLE LUMINAIRE

RENDERING WITH ADDED POLES ALONG COLORADO

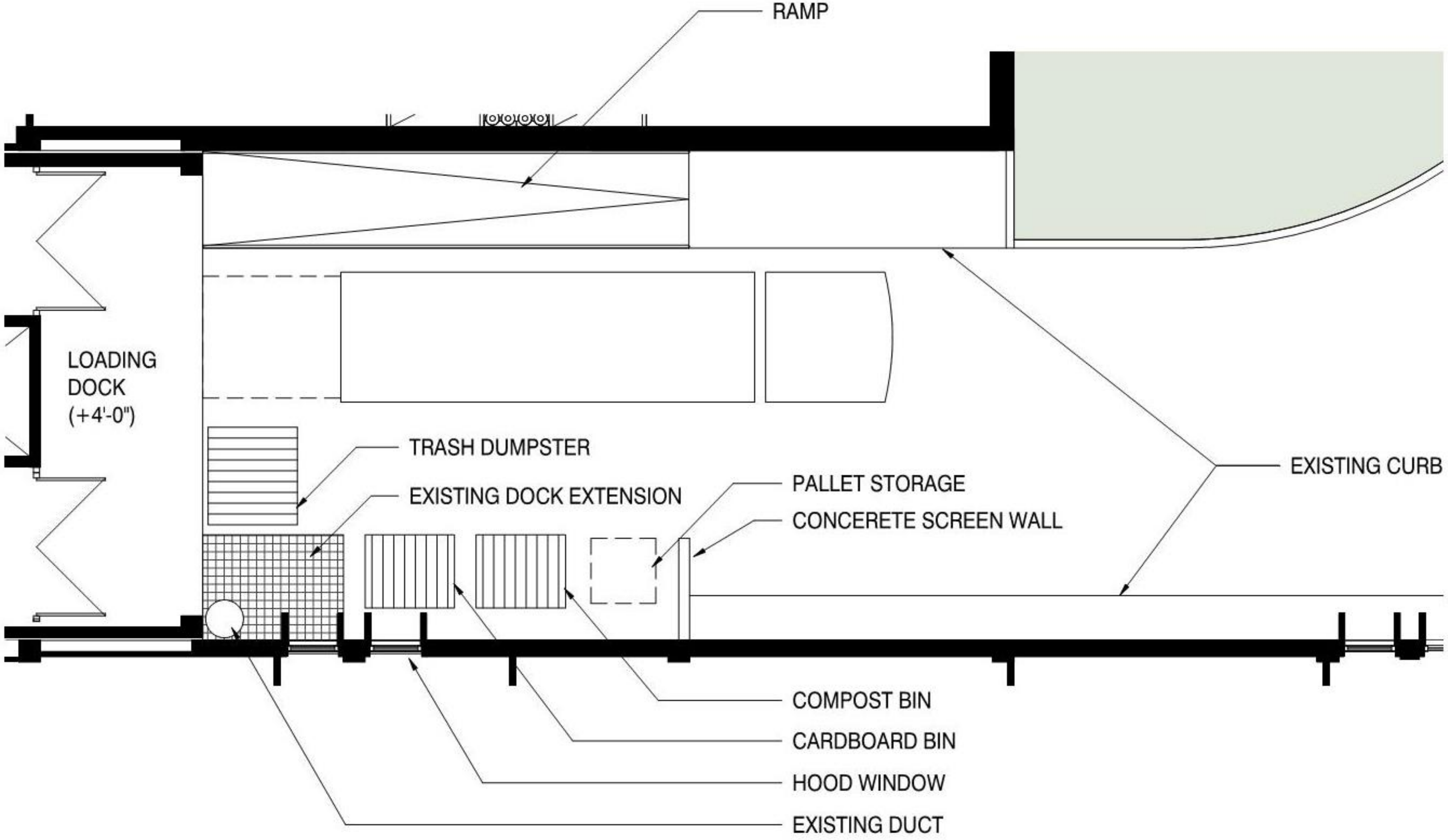


RENDERING WITHOUT ADDED POLES ALONG COLORADO



LOADING DOCK

- Add new bins and pallet storage behind new screen on south edge
- Add ramp to north side



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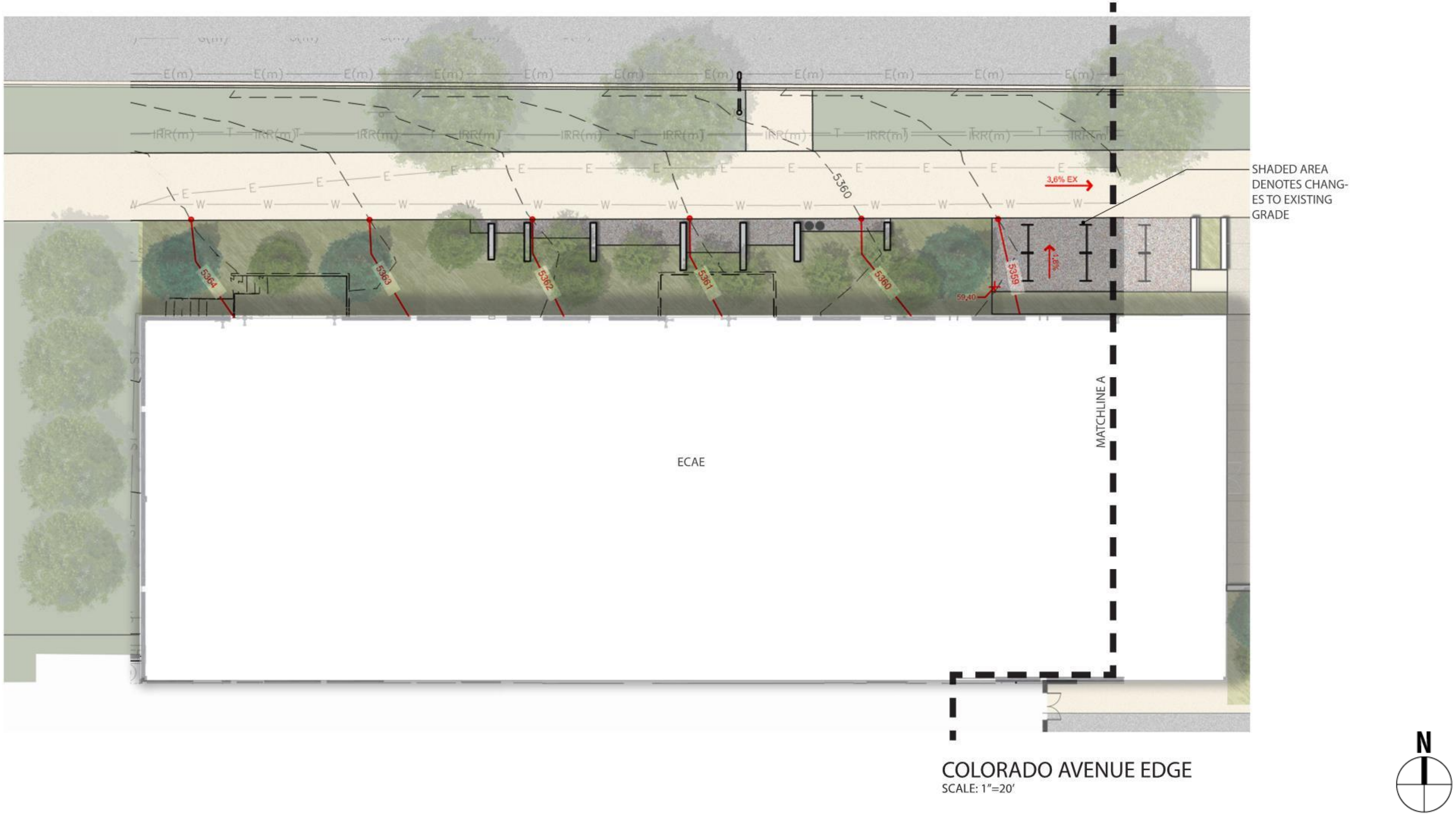
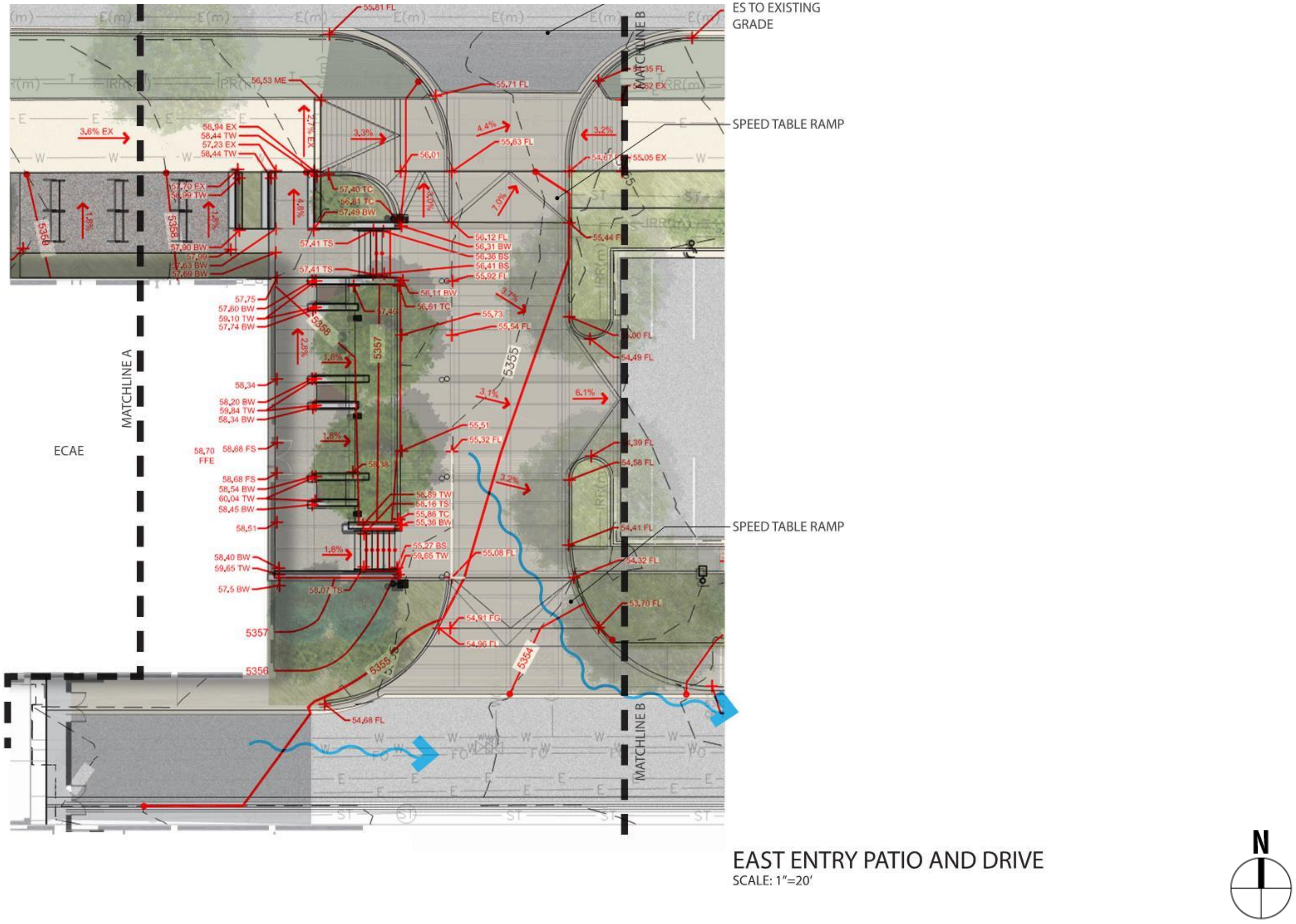
GRADING AND DRAINAGE PLAN – NORTH EDGE



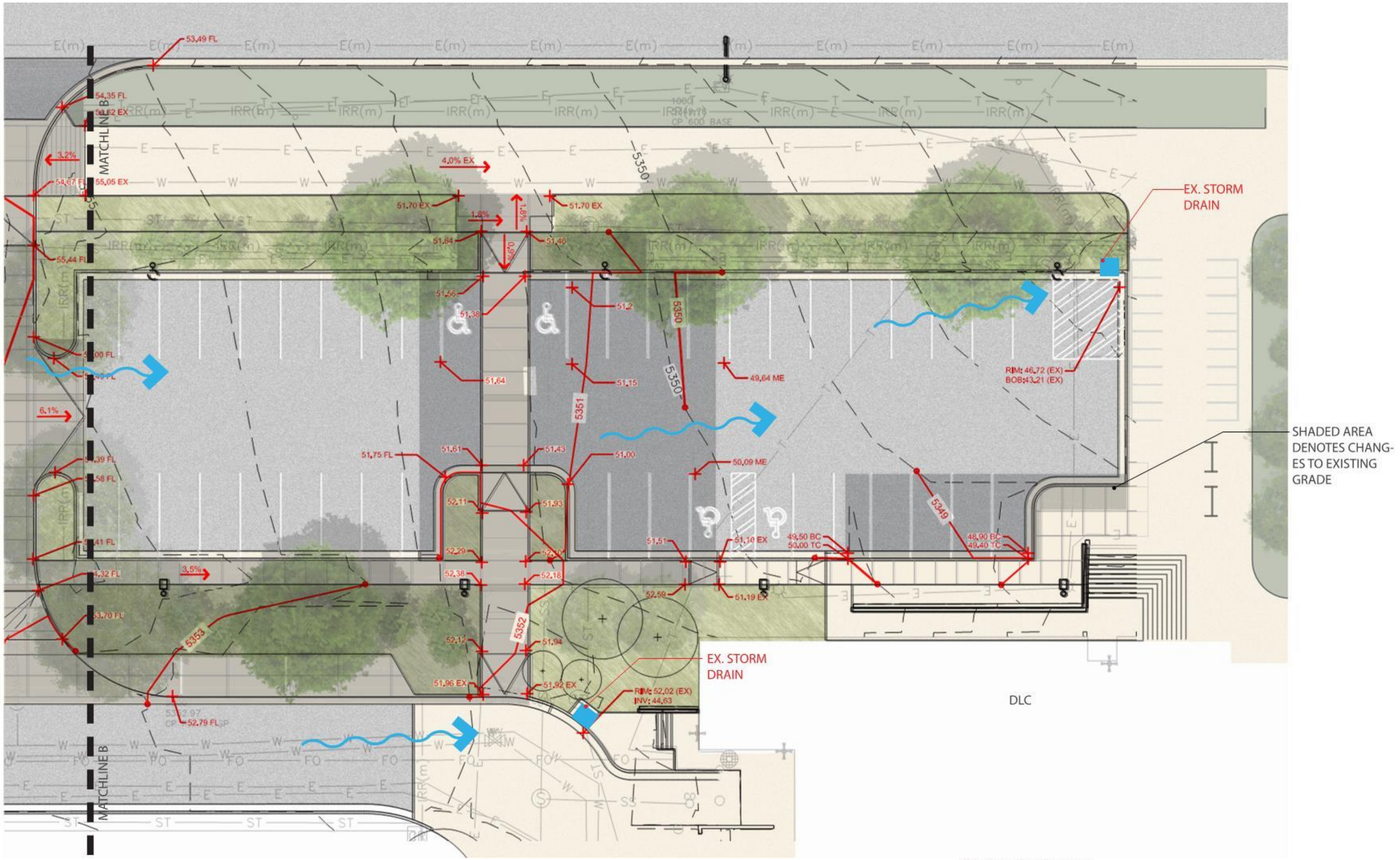
COLORADO AVENUE EDGE
SCALE: 1"=20'

GRADING AND DRAINAGE PLAN – EAST ENTRY



EAST ENTRY PATIO AND DRIVE
SCALE: 1"=20'

GRADING AND DRAINAGE PLAN – PARKING LOT



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PARKING LOT
SCALE: 1″=20′

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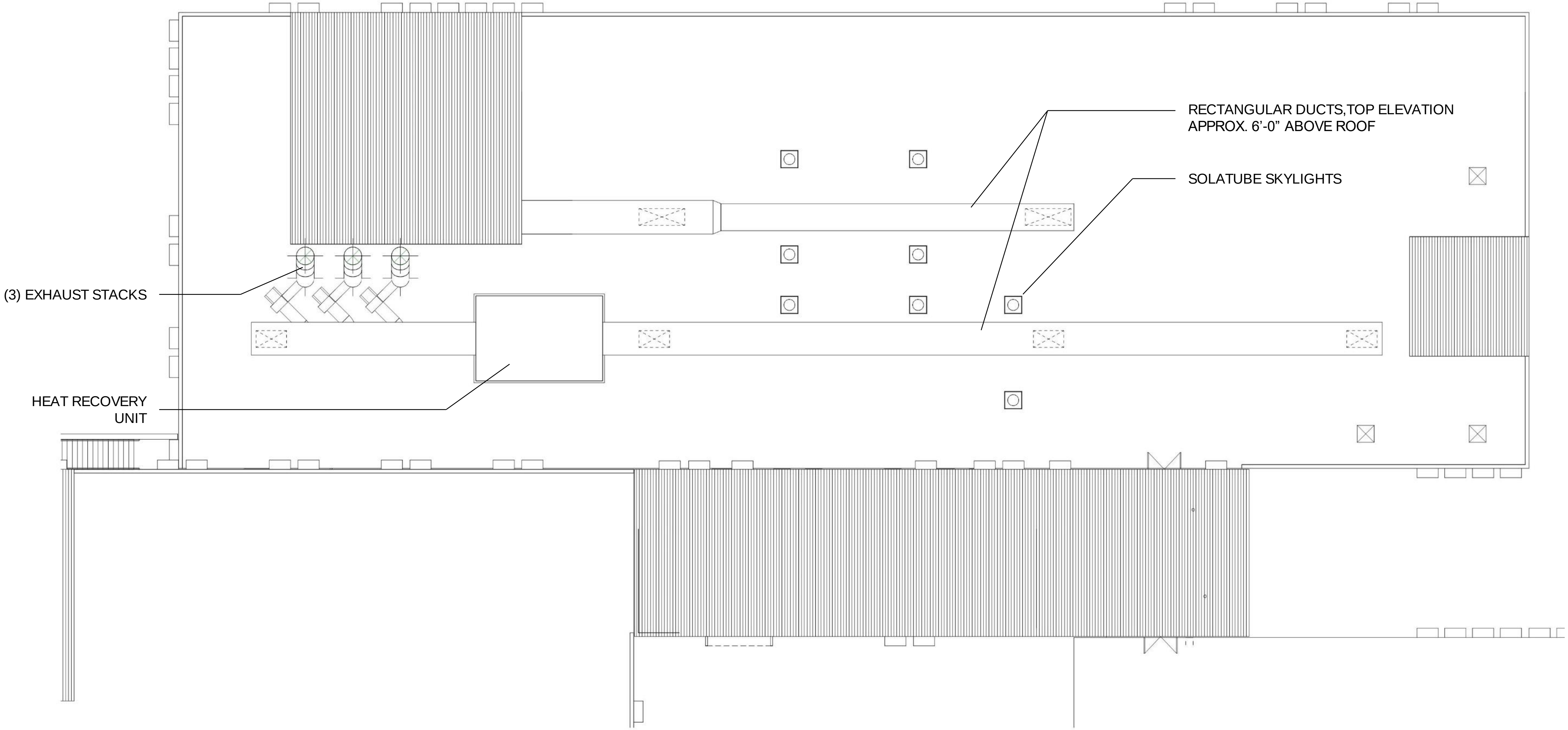
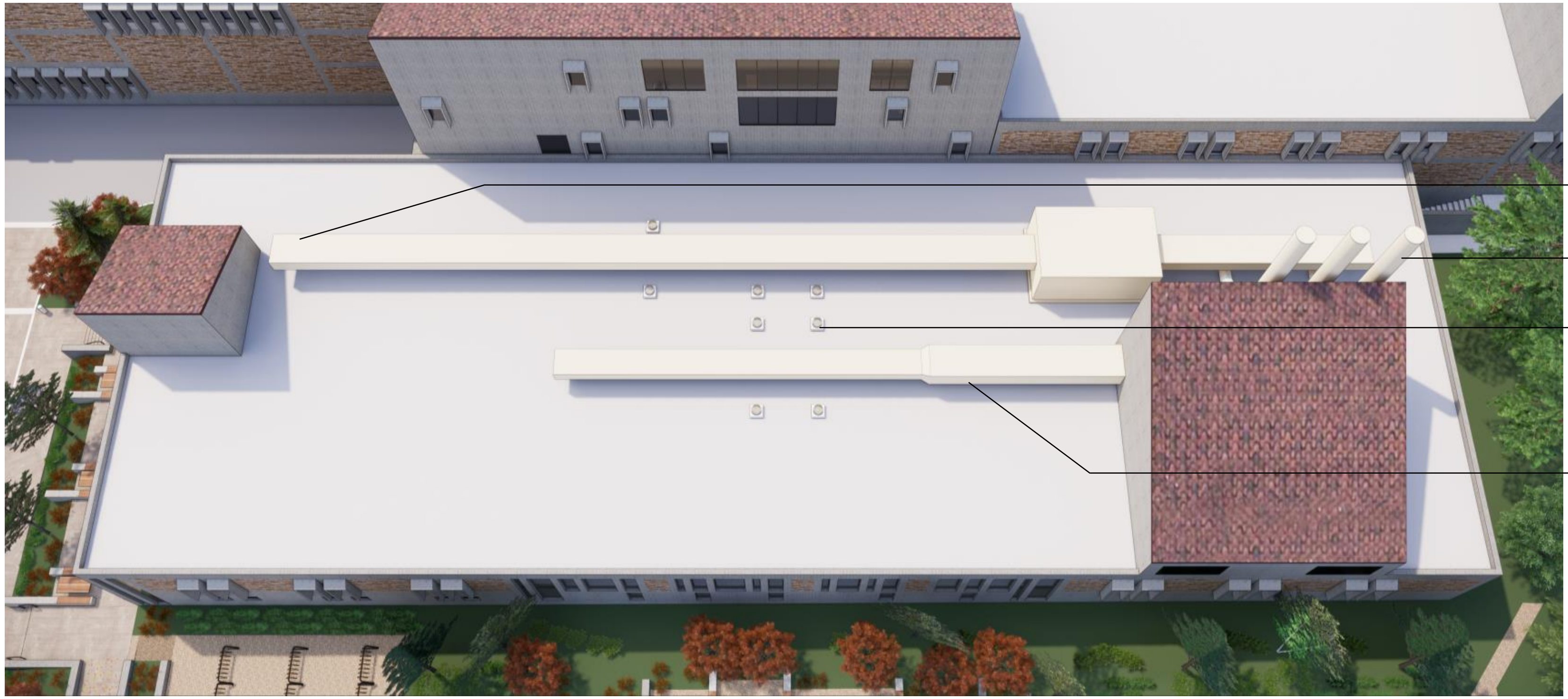


RECTANGULAR DUCTS,TOP ELEVATION
APPROX. 6’-0” ABOVE ROOF
SOLATUBE SKYLIGHTS
(3) EXHAUST STACKS
HEAT RECOVERY
UNIT

ROOF PLAN



ALL DUCTWORK AND ROOFTOP EQUIPMENT TO BE PAINTED CAMPUS STANDARD COLOR

ALIGN DUCT WITH WEST PENTHOUSE TO HIDE IN VIEW FROM THE EAST

EXHAUST STACKS, PARTIALLY HIDDEN BEHIND PENTHOUSE

SOLATUBES SKYLIGHTS

RECTANGULAR DUCTS TO MAINTAIN LOWER PROFILE

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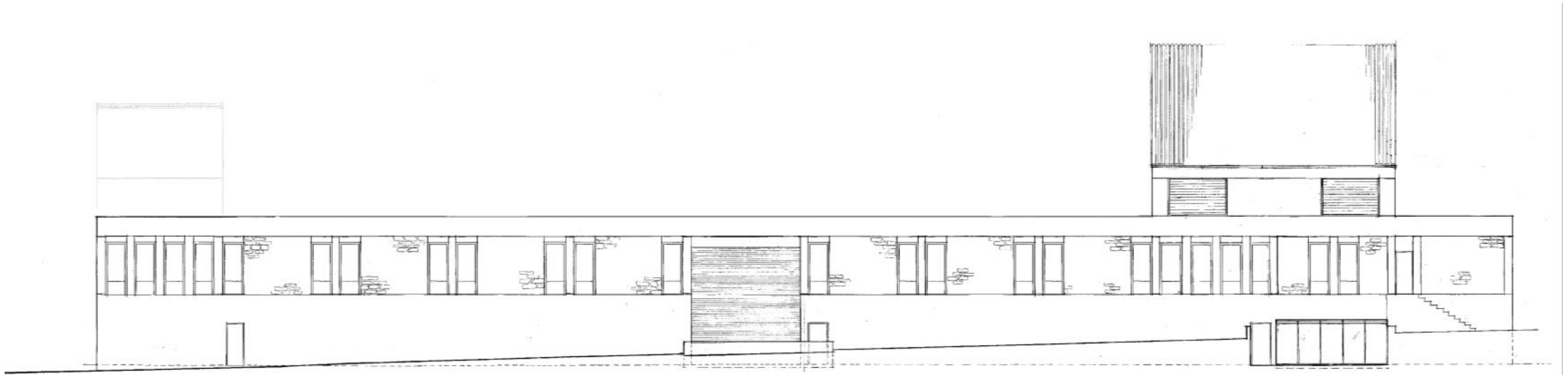
BUILDING ELEVATIONS



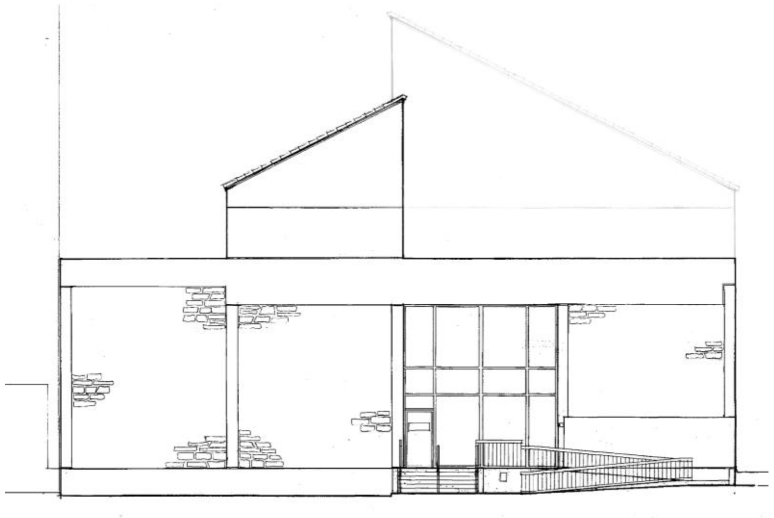
Existing

Proposed

PERSPECTIVE VIEW: LOBBY COLLABORATION INTERIOR

BUILDING ELEVATIONS

EAST



Existing

LEVEL 5
160'–0" (117'-0")

LEVEL 4
148'–0" (105'-0")

LEVEL 3
136'–0" (93'-0")

LEVEL 2
124'–0" (81'-0")

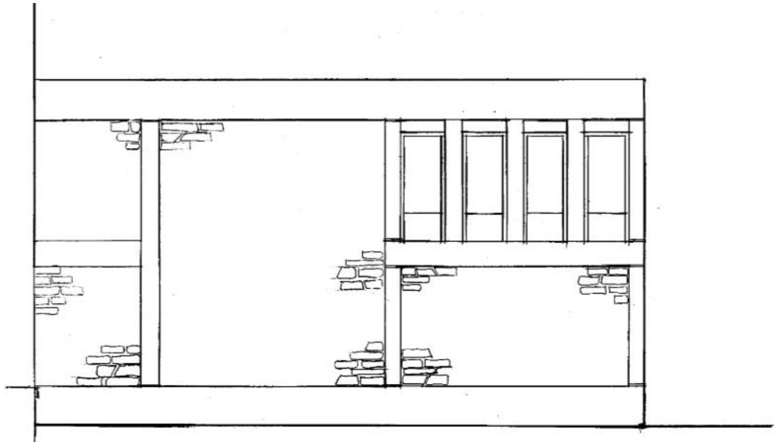
LEVEL 1
112'–0" (69'-0")

LEVEL 1B
100'–0" (57'-0")

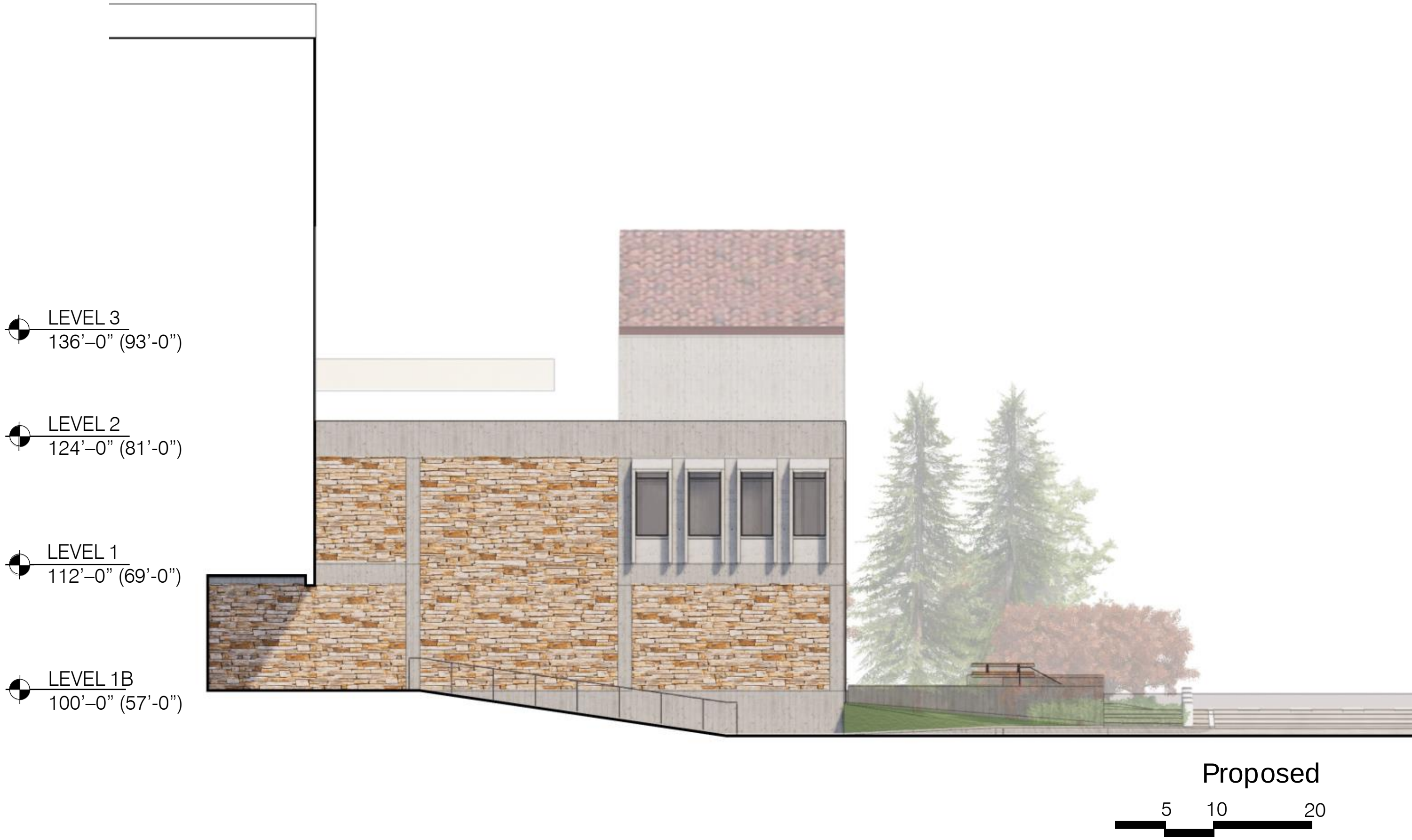
Proposed

5 10 20

BUILDING ELEVATIONS
SOUTH LOADING DOCK

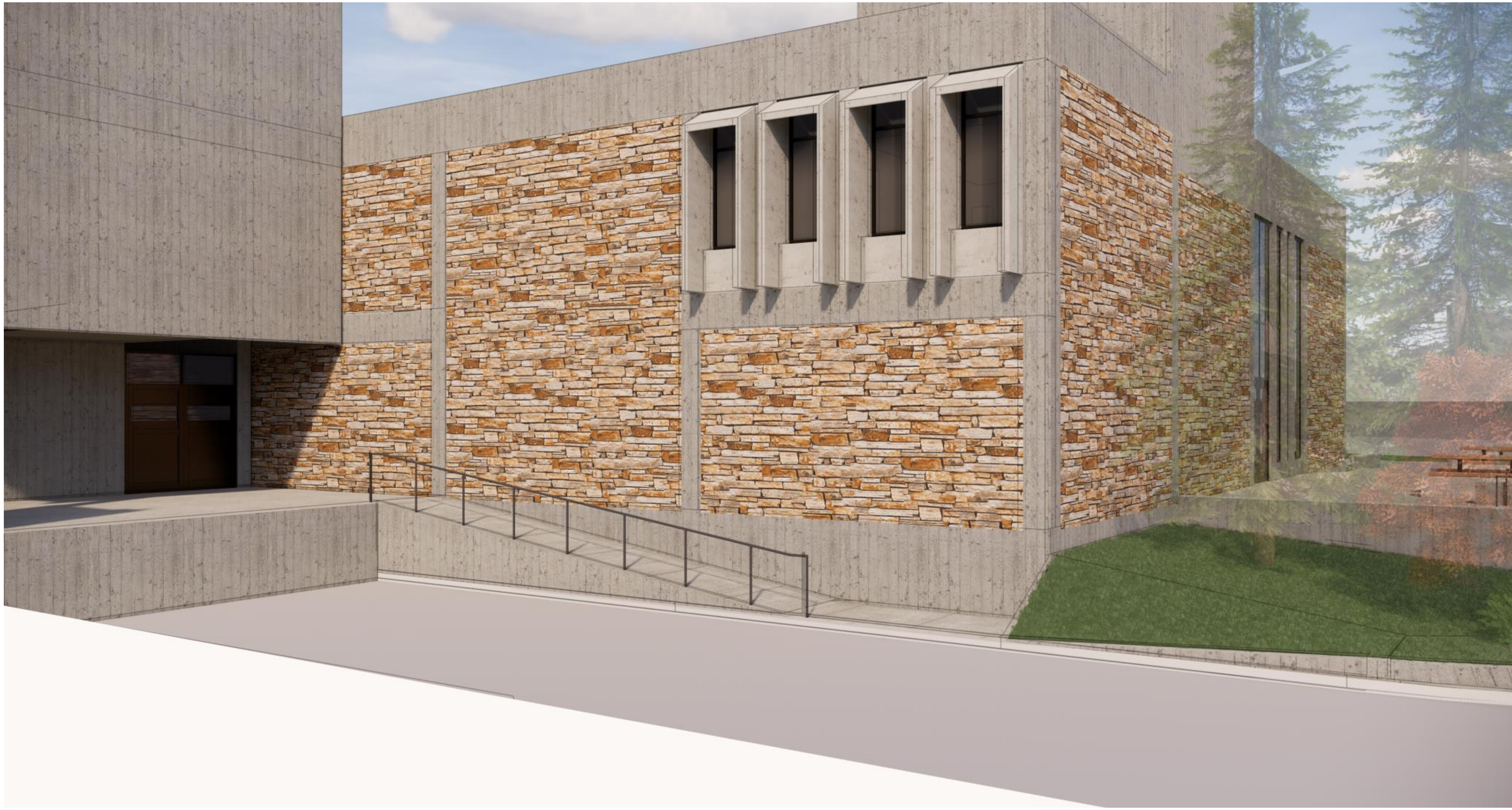


Existing



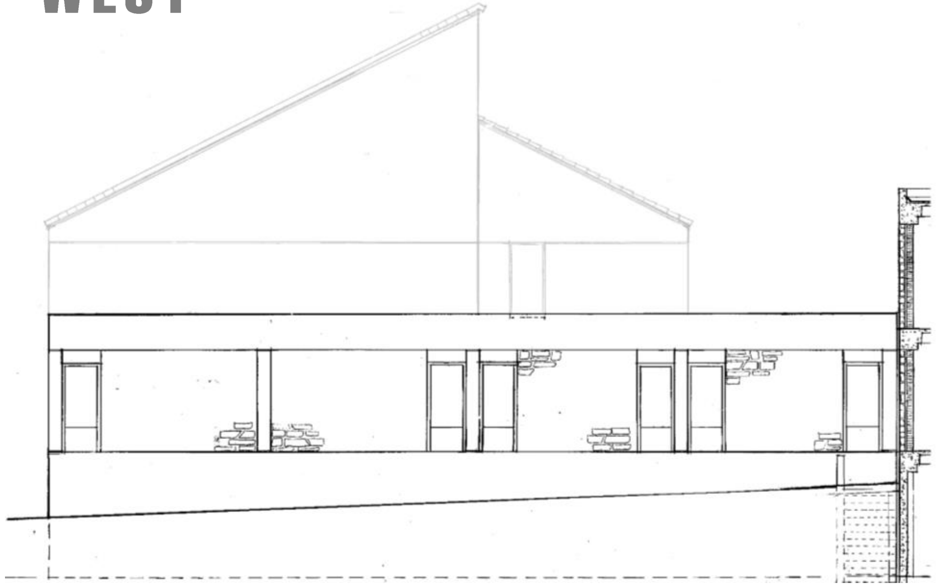
Proposed

BUILDING ELEVATIONS
SOUTH LOADING DOCK

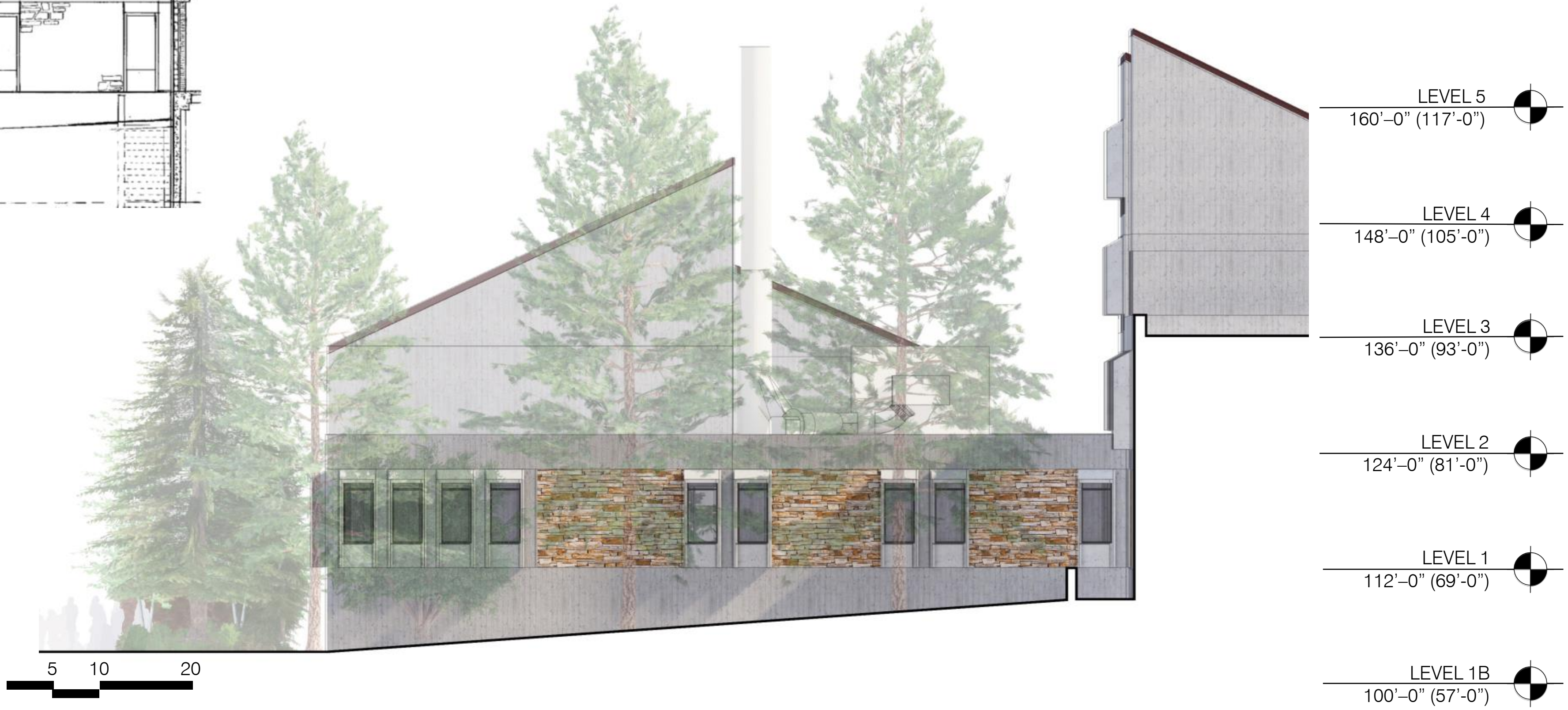


BUILDING ELEVATIONS

WEST



Existing



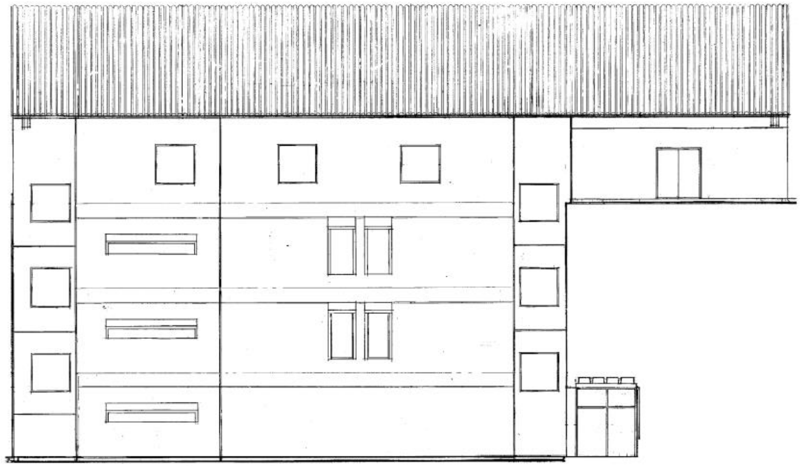
Proposed

BUILDING ELEVATIONS
WEST

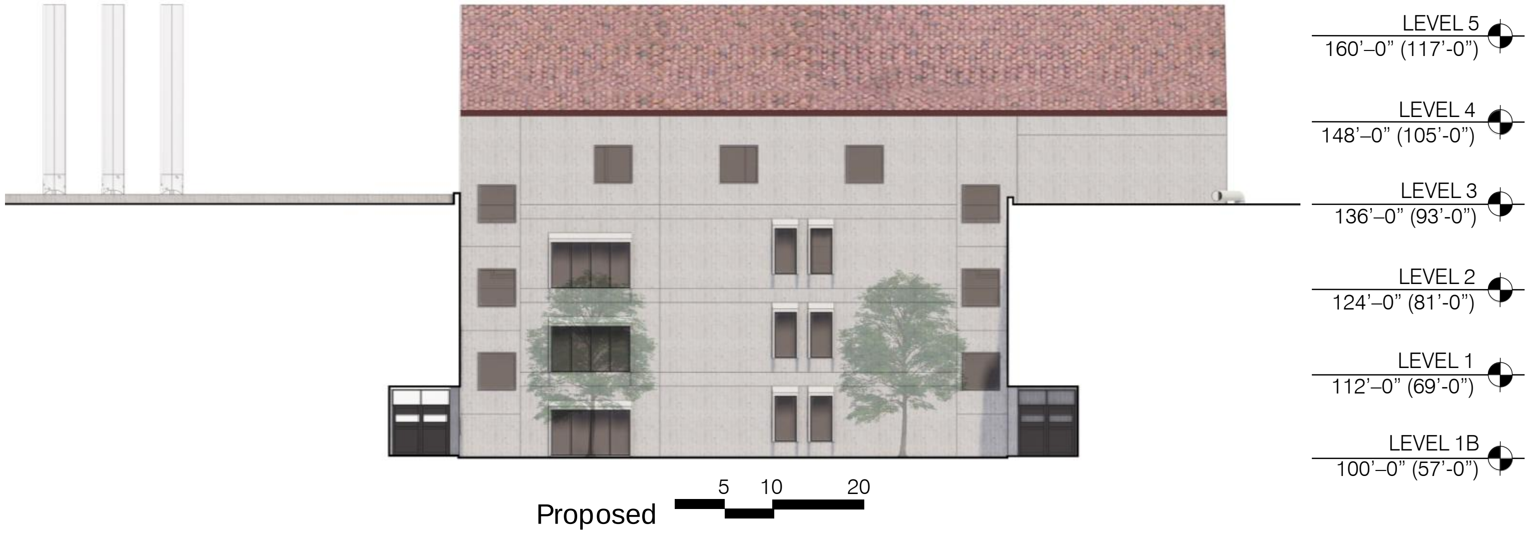
BUILDING ELEVATIONS

SOUTH NT

- Enlarge clerestory hooded windows by extending sill to floor
- Add two new hood windows to Level 1B



Existing



Proposed

BUILDING ELEVATIONS

SOUTH NT

PERSPECTIVE – COLORADO AVE.

PERSPECTIVE – NORTHEAST CORNER

PERSPECTIVE – EAST APPROACH

PERSPECTIVE – EAST ENTRY

PERSPECTIVE – NORTH EDGE

EXISTING BUILDING MATERIAL PALETTE

Curtain Wall

Concrete – Board Form

Stone

Concrete – Precast

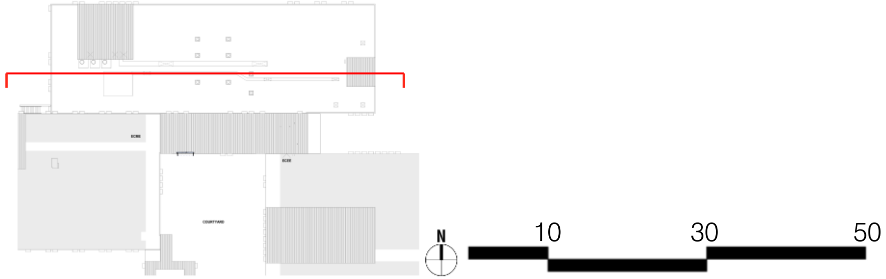
Clay Tile

Concrete – Smooth (Interior)

Metal – Dark Bronze

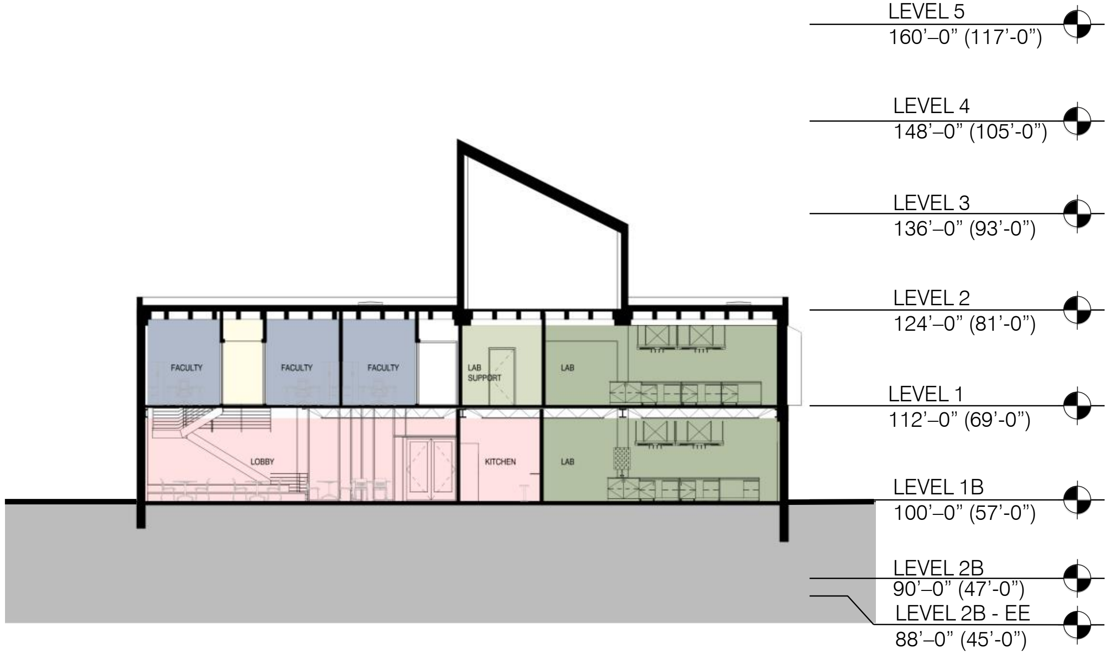
BUILDING SECTIONS

1. LABS



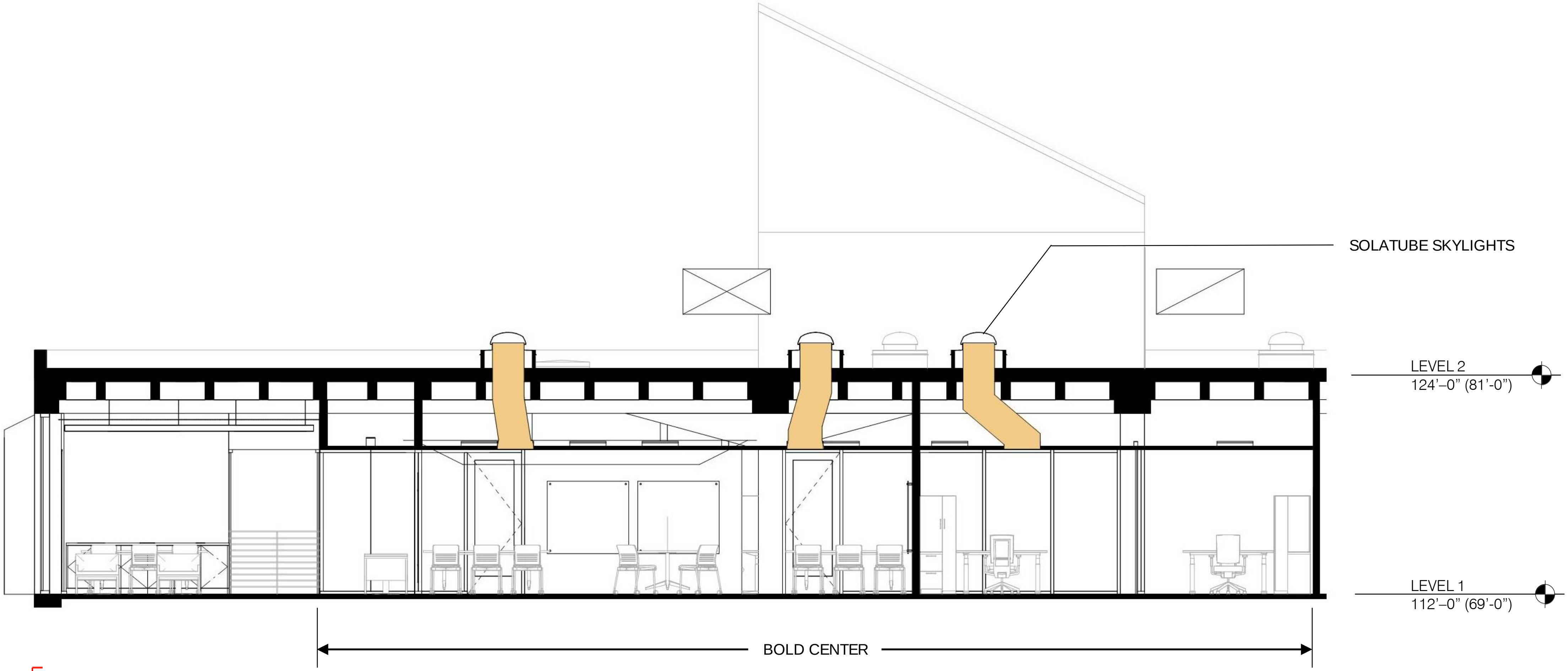
BUILDING SECTIONS

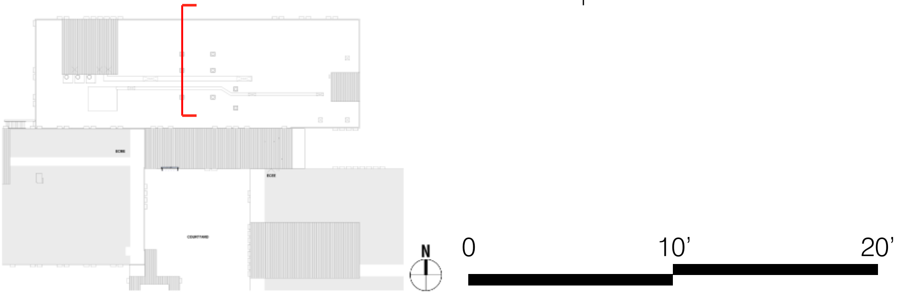
2. BOLD CENTER AND NT



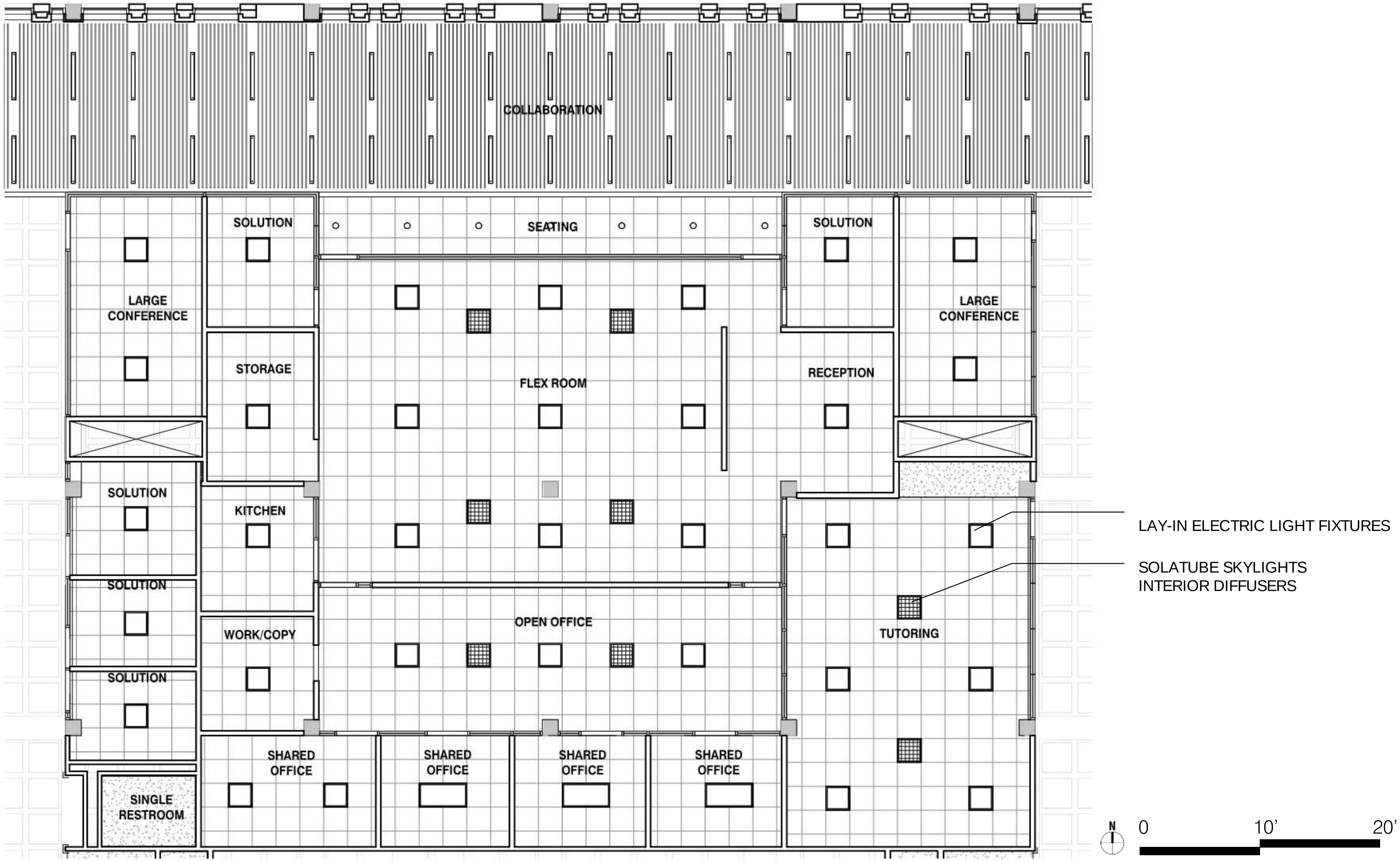
3. LOBBY

BUILDING SECTIONS



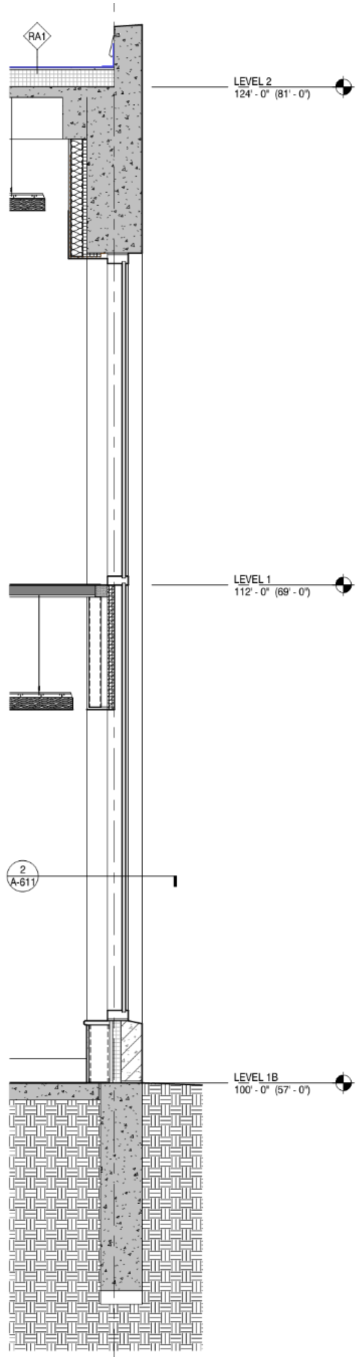


BUILDING SECTIONS – BOLD CENTER RCP



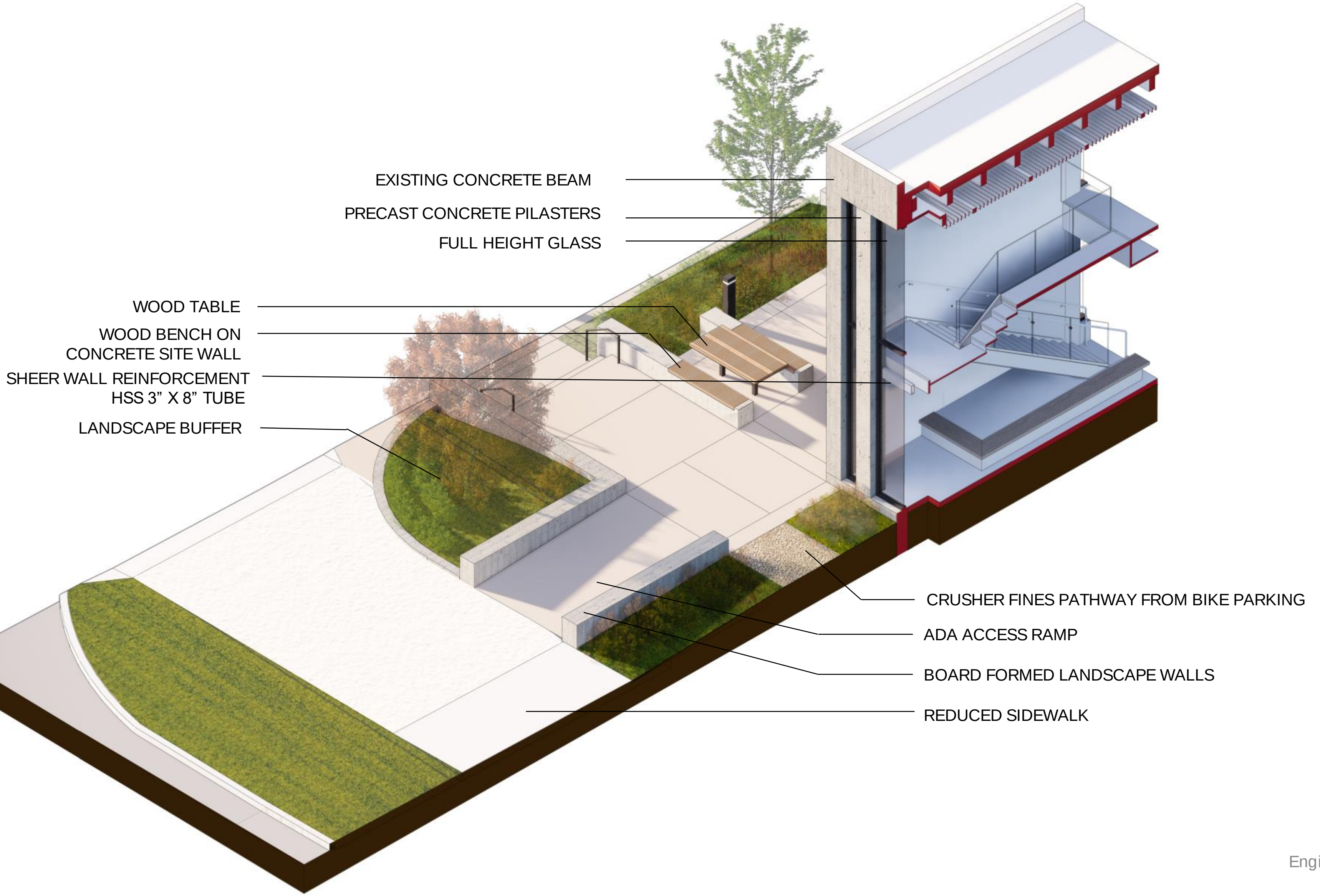
EXTERIOR DESIGN

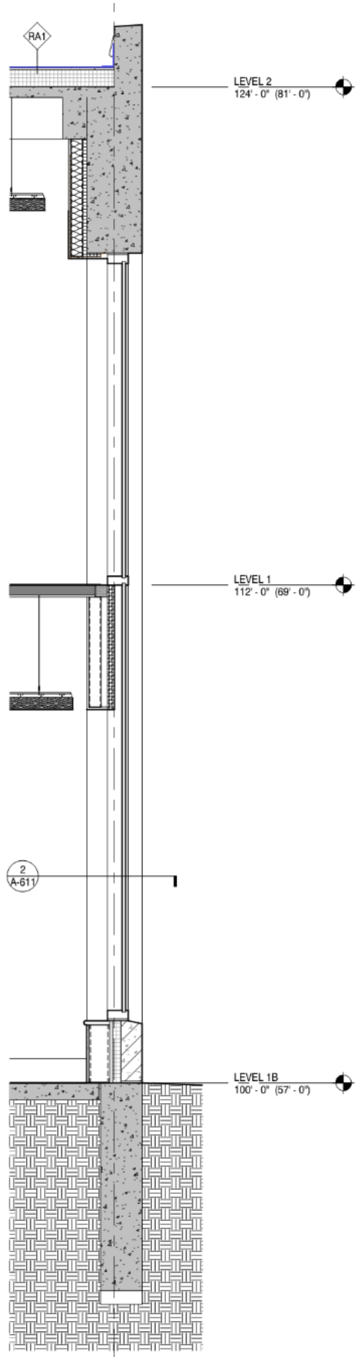
East Entry



EXTERIOR DESIGN

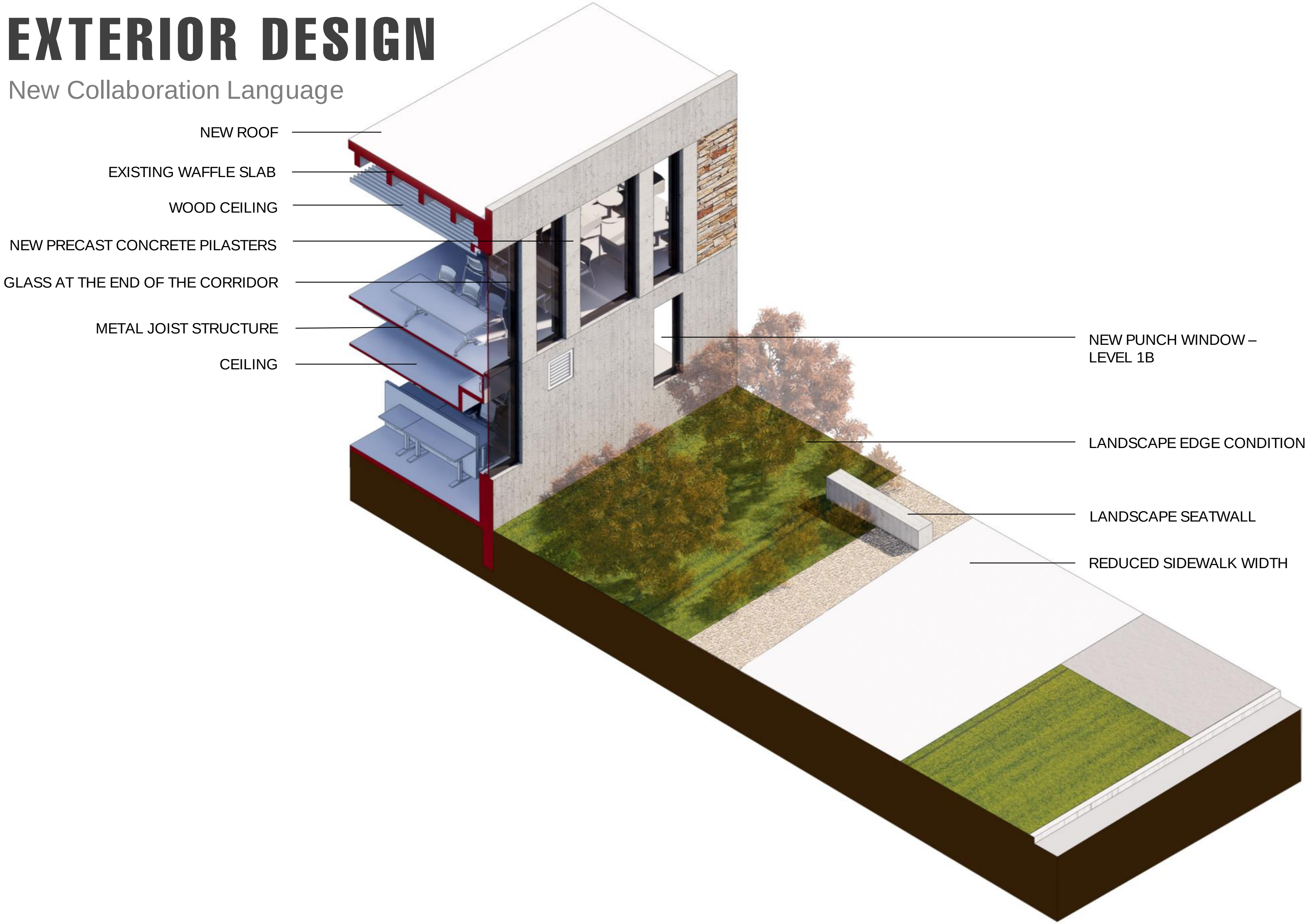
East Corner

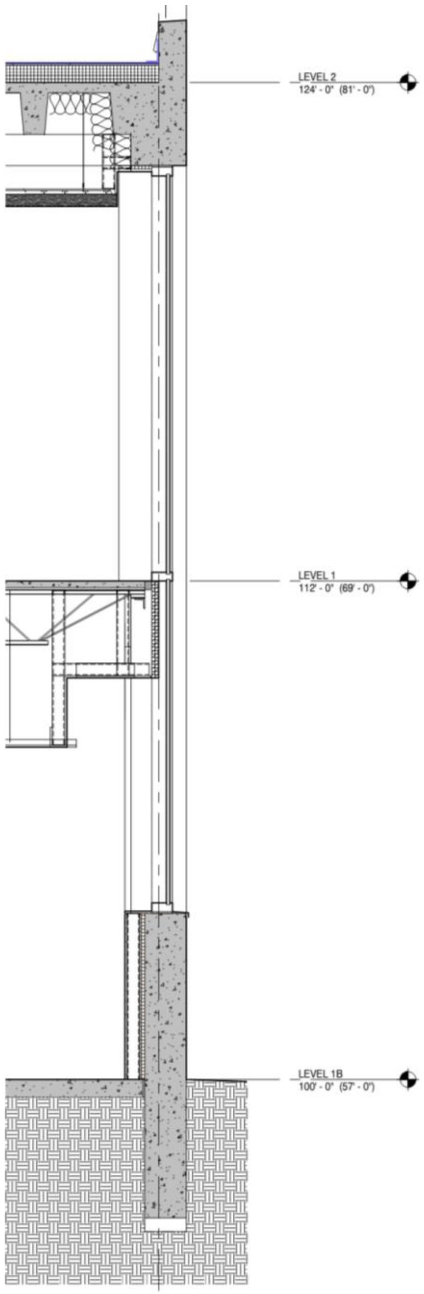




EXTERIOR DESIGN

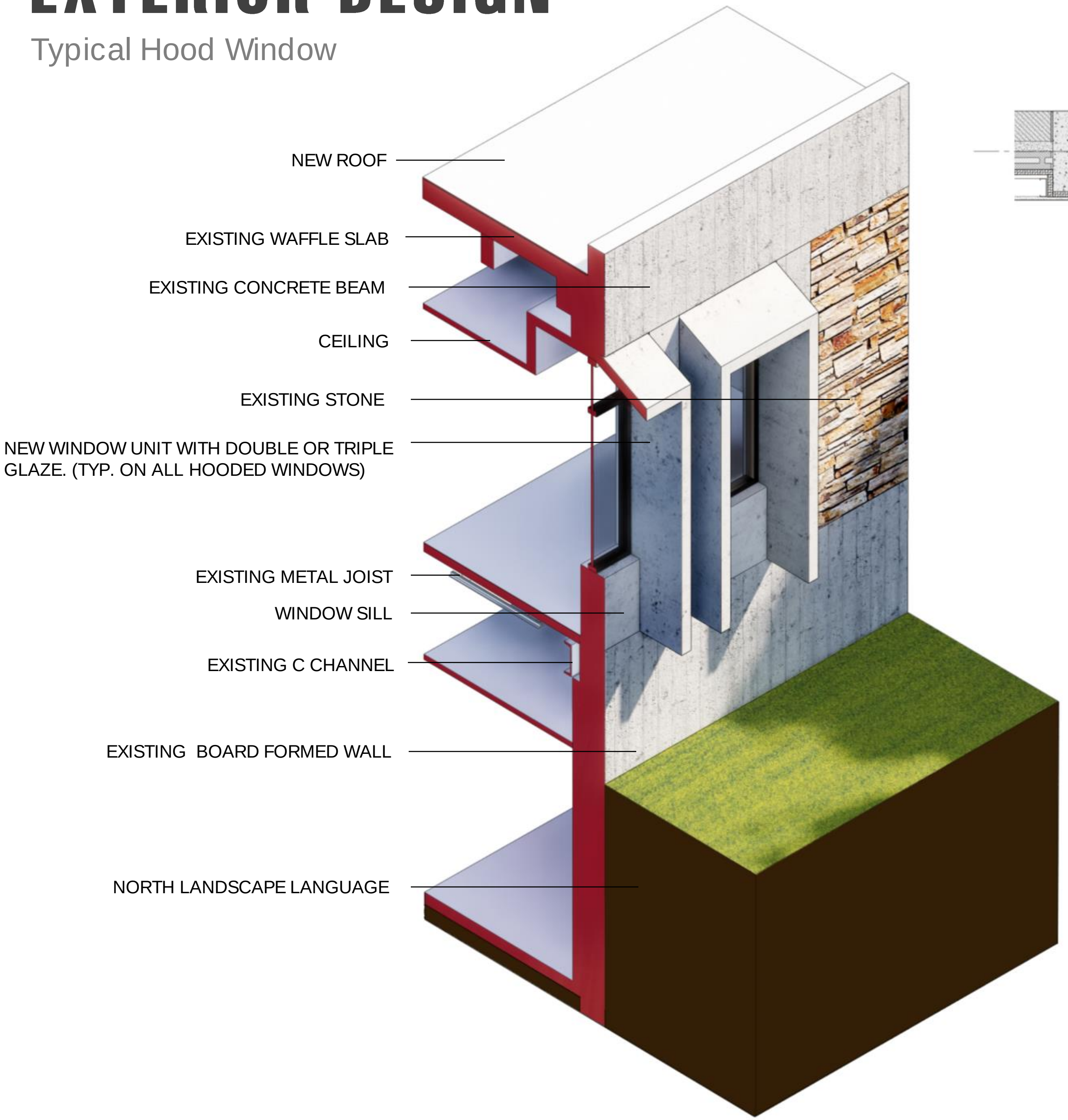
New Collaboration Language

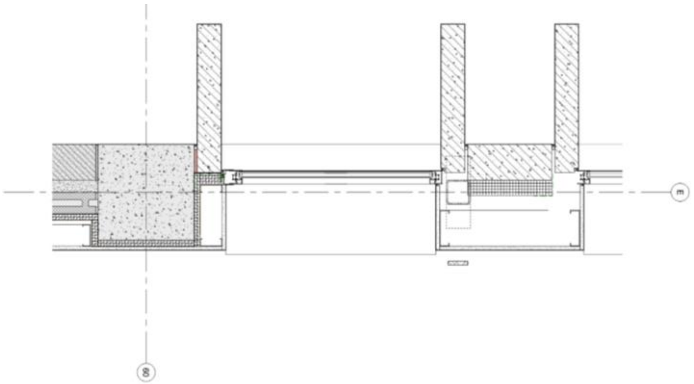


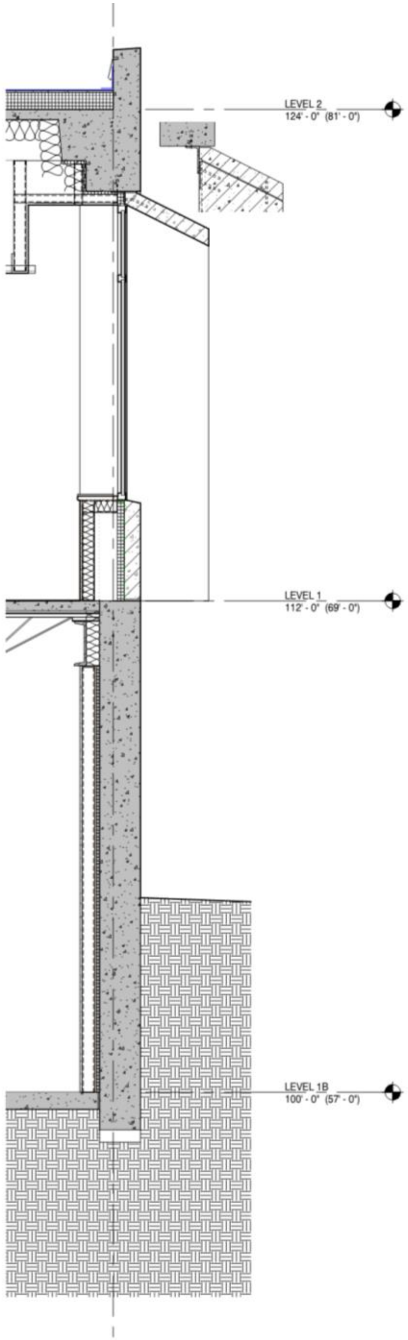


EXTERIOR DESIGN

Typical Hood Window







SCHEDULE & BUDGET

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LEED v4 for ID+C: Commercial Interiors
Project Scorecard

CU Engineering ECAE ECNT Renovations
December 17, 2019

Group 14 ENGINEERING

Y	?	N			
1			**INTEGRATIVE PROCESS**	Possible Points:	1
1			Credit 1	Integrative Process	1

Y	?	N			
6	3	24	**LOCATION & TRANSPORTATION**	Possible Points:	18
		18	Credit 1	LEED for Neighborhood Development Location	18
2	2	2	Credit 2	Surrounding Density and Diverse Uses	8
2	1	4	Credit 3	Access to Quality Transit	7
1			Credit 4	Bicycle Facilities	1
1			Credit 5	Reduced Parking Footprint (v4.1)	2

Y	?	N			
4	2	6	**WATER EFFICIENCY**	Possible Points:	12
Y			Prereq 1	Indoor Water Use Reduction	Required
4	2	6	Credit 1	Indoor Water Use Reduction	12

Y	?	N			
31	4	2	**ENERGY & ATMOSPHERE**	Possible Points:	38
Y			Prereq 1	Fundamental Commissioning and Verification	Required
Y			Prereq 2	Minimum Energy Performance	Required
Y			Prereq 3	Fundamental Refrigerant Management	Required
5			Credit 1	Enhanced Commissioning	5
25			Credit 2	Optimize Energy Performance	25
	1		Credit 3	Advanced Energy Metering	2
1	2		Credit 4	Renewable Energy Production	3
	1		Credit 5	Enhanced Refrigerant Management	1
		2	Credit 6	Green Power and Carbon Offsets	2

Y	?	N			
7	4	1	**MATERIALS & RESOURCES**	Possible Points:	14
Y			Prereq 1	Storage and Collection of Recyclables	Required
Y			Prereq 2	Construction and Demolition Waste Management Planning	Required
1			Credit 1	Long-Term Commitment	1
1	1	1	Credit 2	Building Life-Cycle Impact Reduction (v4.1)	5
1	1		Credit 3	Building Product Disclosure and Optimization - Environmental Product Declarations (v4.1)	2
1	1		Credit 4	Building Product Disclosure and Optimization - Sourcing of Raw Materials (v4.1)	2
1	1		Credit 5	Building Product Disclosure and Optimization - Material Ingredients (v4.1)	2
2			Credit 6	Construction and Demolition Waste Management	2

Y	?	N			
6	7	2	**INDOOR ENVIRONMENTAL QUALITY**	Possible Points:	17
Y			Prereq 1	Minimum Indoor Air Quality Performance	Required
Y			Prereq 2	Environmental Tobacco Smoke Control	Required
2			Credit 1	Enhanced Indoor Air Quality Strategies	2
2	1		Credit 2	Low-Emitting Materials (v4.1)	3
1			Credit 3	Construction Indoor Air Quality Management Plan	1
	2		Credit 4	Indoor Air Quality Assessment	2
	1		Credit 5	Thermal Comfort	1
1			Credit 6	Interior Lighting	2
	1	2	Credit 7	Daylight	3
	1		Credit 8	Quality Views	1
	1		Credit 9	Acoustic Performance (v4.1)	2

Y	?	N			
6			**INNOVATION**	Possible Points:	6
1			Credit 1.1	IN: Public Education	1
1			Credit 1.2	IN: Exemplary Performance Heat Island Reduction	1
1			Credit 1.3	IN: Exemplary Performance TBD	1
1			Credit 1.4	IN: Walkable Project Site	1
1			Credit 1.5	IN: Pilot Credit	1
1			Credit 2	LEED® Accredited Professional	1

Y	?	N			
2	2		**REGIONAL PRIORITY**	Possible Points:	4
	1		Bonus 1	RP: LT Surrounding Density (6 Pts)	1
1			Bonus 2	RP: LT Reduced Parking Footprint (2 Pts)	1
	1		Bonus 3	RP: WE Indoor Water Use (8 Pts)	1
1			Bonus 4	RP: EA Optimize Energy Performance (10 Pts)	1

Y	?	N			
63	22	35	**TOTALS**	Possible Points:	110

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110

SUSTAINABILITY SUMMARY AND LEED PROJECT CHECKLIST

To align the project's goals more consistently with the LEED checklist, the design team has created an alternate checklist under the LEEDv4 ID+C rating system. This eliminates the Sustainable Sites category since the scope has limited site work and increases the credit for energy and water efficiency strategies. . CU has set a goal of LEED Gold+ for the project. To meet this goal, the following checklist has been established as a guideline for the project. The project is tracking 63 points; a minimum of 60 points are needed for Gold certification. With additional points being vetted, the team is confident in our ability to deliver a LEED Gold project.

Integrative Process

- In early design, the team will identify opportunities to achieve synergies across disciplines to improve energy efficiency and water savings.

Location and Transportation

- By utilizing an exisiting building, the project will meet the sensitive land protection credit. The team will utilize the CU Master Site LEED credits to capture points for development density and community connectivity and quality transit. The project will also benefit from CU's extensive bicycle and pedestrian paths and will install bike racks and provide shower facilities to encourage public transit. There is no new parking in the scope of the project in order to continually reduce the campus's parking footprint.

Water Efficiency

- Irrigation demand will be minimized, and ditch water will be utilized to reduce the need for potable water use
- High efficiency flow and flush fixtures will be installed to maximize indoor water use savings
- Domestic hot water and the industrial water from labs will be submetered

SUSTAINABILITY SUMMARY AND LEED PROJECT CHECKLIST

Materials and Resources

- Materials with high levels of recycled content, FSC wood, sourced regionally and those that provide transparency regarding human health effects and environmental impacts will be given preference.
- Materials that carry Environmental Product Declarations (EDPs) will provide the opportunity for comparison of embodied carbon
- A construction and demolition waste management plan will be established and a diversion rate of >75% has been set as a goal

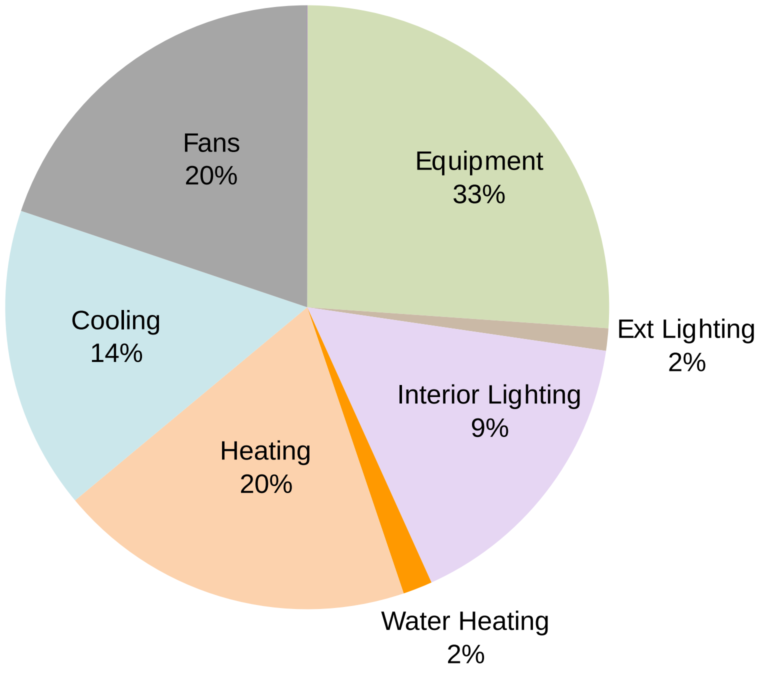
Indoor Environmental Quality

- In order to promote superior indoor air quality – entry way systems will be installed, interior cross contamination prevention will be designed for, MERV13 filters will be installed, and CO2 monitors will be provided in densely occupied spaces.
- Paints, coatings, adhesives, sealants, composite wood, insulation, and flooring will all be specified as low emitting and will meet the California Department of Public Health Standard Method v1.1 2010
- A construction indoor air quality management plan will be established to ensure SMACNA guidelines are followed and absorptive materials are protected.
- A high level of controllability will be provided to building occupants for lighting and thermal comfort and ASHRAE 55-2010 will be met.
- The team is evaluating further opportunities for views, daylighting, and acoustic performance.

ENERGY GOALS AND CURRENT DESIGN

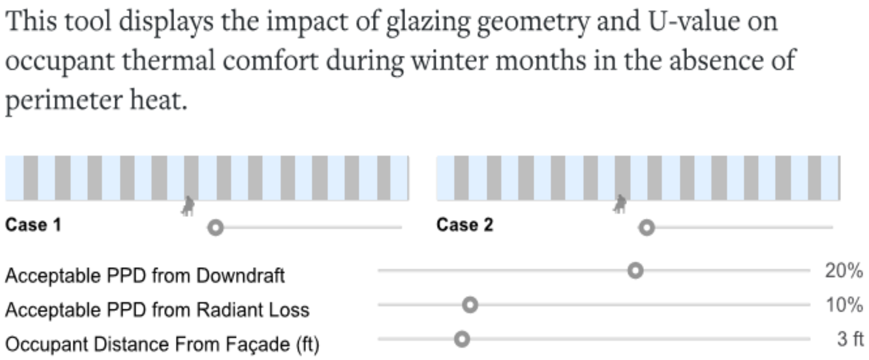
- 38% energy cost savings
- Target site EUI of 100 kBtu/sf/yr for labs and 25 kBtu/sf/yr for offices
  - 63 kBtu/sf/yr
- Current design
  - R-38 roof
  - Existing concrete and sandstone with 3 5/8" steel studs and R-13 batt + 1.5 in continuous mineral wool U-0.044
  - New Glazing: Triple pane with low-e on surface 2 and 4 with argon fill
  - Building average LPD of 0.5 W/sf
  - Daylighting in closed offices
  - Energy Star computers in computer labs
  - High performance VAV system
    - Campus chilled water and steam
    - Direct evaporative cooling on non-lab VAV
    - Low pressure duct design
    - Wind driven exhaust
    - Energy recovery on laboratory exhaust

- Current Design
  - 22% energy cost savings
  - EUI of 82.5 kBtu/sf/yr
  - 23 ID+C energy points



Annual Energy Costs by End Use

ENVELOPE



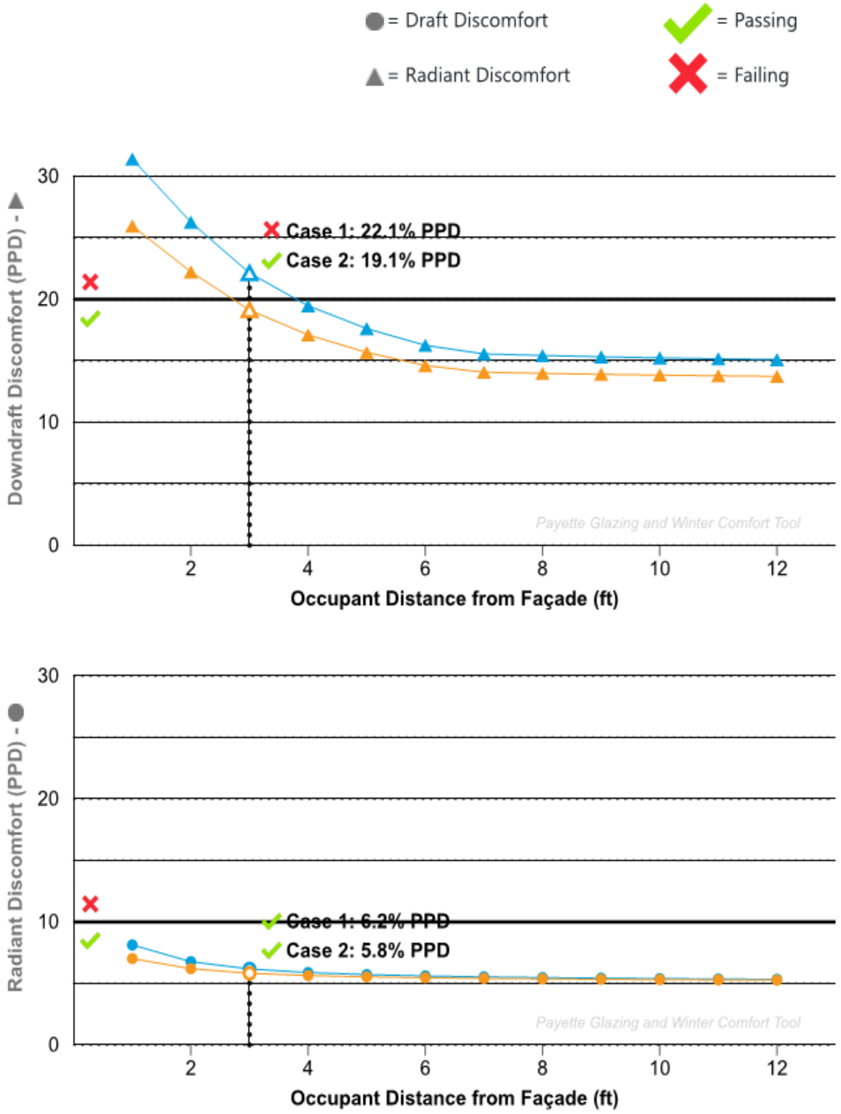
- Double pane low-e glazing with argon fill in thermally broken aluminum framing

  - Convectors

  VS

- Triple pane low-e (surfaces 2 & 4) glazing with argon fill in thermally broken aluminum framing with warm-edge spacer

  - No convectors



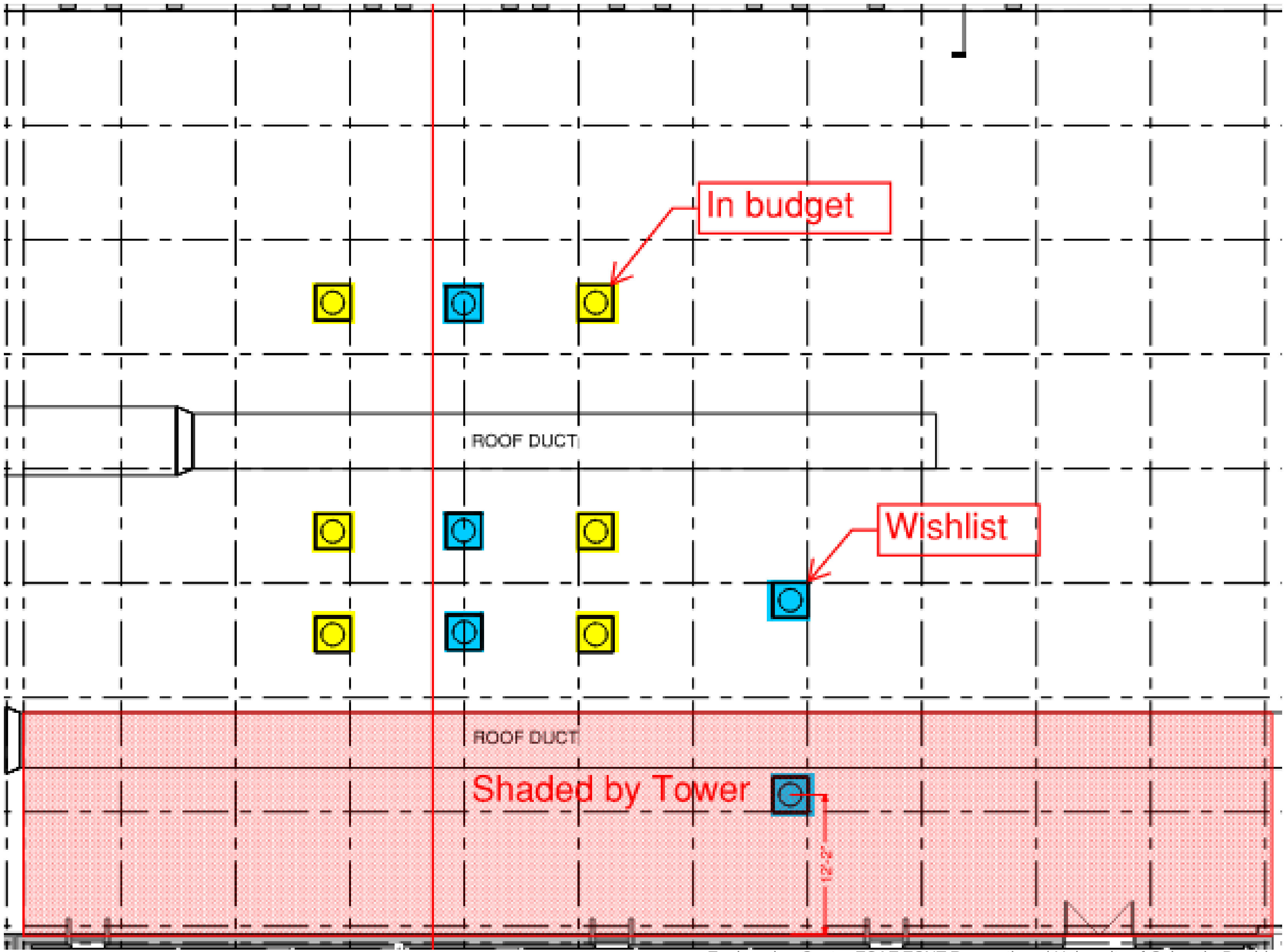
DAYLIGHTING

Sidelighting Strategies

- Glazing added to increase daylight
- Specify a glazing with a Tvis of >45%
- South windows: Provide interior blinds for additional glare control

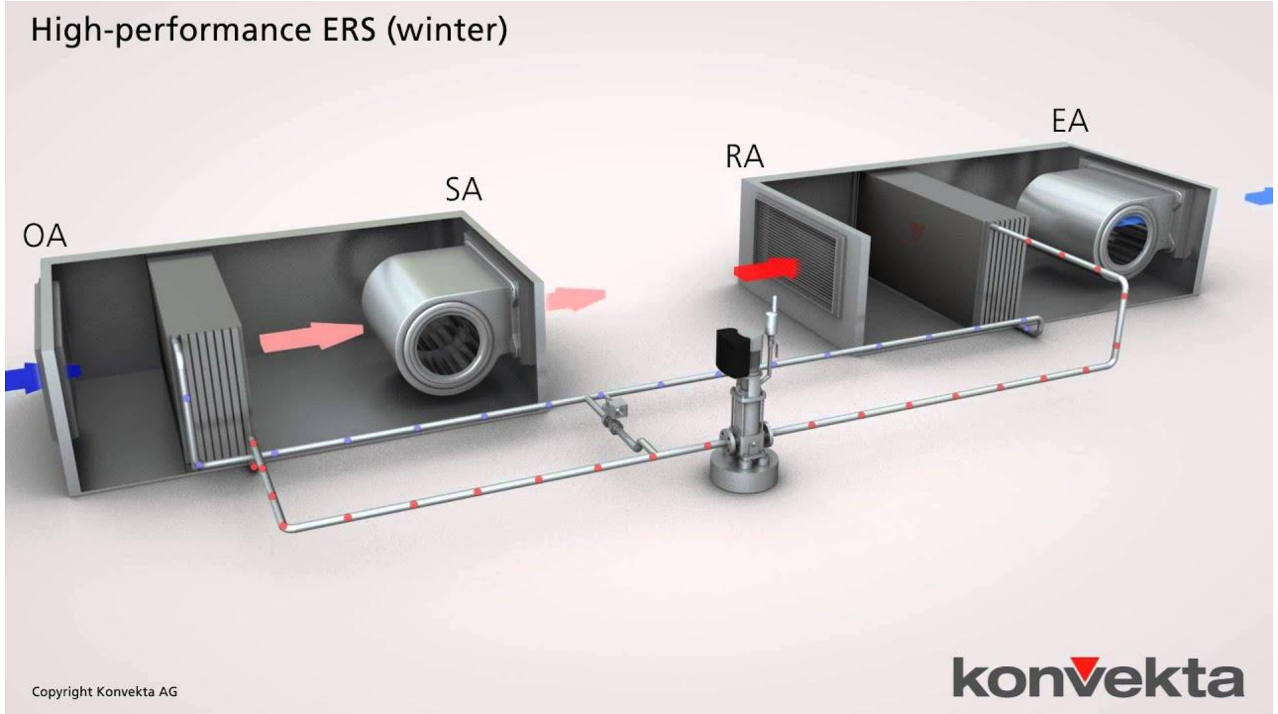
Toplighting Strategies

- Space tubular daylighting devices at 1 to 1.25 X the ceiling height
- Tubular daylighting devices in areas that are shaded by the tower will have reduced light output



KONVEKTA – HIGH PERFORMANCE ENERGY RECOVERY

- Current Design + Konvekta
  - 39% energy cost savings
  - EUI of 63 kBtu/sf/yr
  - 25 ID+C energy points
- High first cost
  - Simple payback of 12 years
- Required to meet energy cost savings and EUI goals



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