PZ-HIST-23-000235

Menu Reports Help

> File Date: 09/08/2023 Application Status: Pending

> > Assigned To: Alexander Castro

Description of Work: The rehabilitation of the former Underwood Computing Machine Company Factory will be undertaken in two phases. The majority of work comprising Phase I will be focus Hardening Department, Polishing & Plating Department, Cafeteria, and CMU Additions, and will include: • Interior rehabilitation of the existing RAW space • New or upgra systems within the Real Art Ways space • Construction of the proposed Addition • New roofs throughout & restoration of the existing rooftop signage • Elevator code upgri envelope and interior rehabilitation of the Main Block, including: • Exterior masonry cleaning, repairs, and repointing • Partial window replacement • Restoration of original to comply with the Connecticut and International Building Code Regulations • New hardwood floor in the Main Block lobby • New accessible lavatories on each floor of the Engagement spaces on first floor of the Main Block • New or updated mechanical, electrical, plumbing, and fire protection systems within the Main Block

Application Detail: Detail

Application Type: Historic Preservation

Documents: File Name Document Group Category Description Туре Docun PLNG_COA Photos Upload Existing condition ... application/pdf Underwood Computing Ph... PLNG COA Plans Existing & proposed... application/pdf Upload Underwood Computing Ex... PLNG_COA Plans Proposed renderings. application/pdf Uploac Underwood Computing Pr... Underwood Computing Li... PLNG_COA Other Exterior lighting p... application/pdf Upload PLNG_COA Other Figure 1, identifyi... application/pdf Upload Underwood Computing Fi... PLNG_COA Underwood Computing Ma... Other Masonry cleaning an... application/pdf Upload PLNG_COA Photos Survey & photograph... application/pdf Upload Underwood Computing Wi... PLNG_COA Product Specs Masonry specifications application/pdf Uploac Product Spec - Masonry... PLNG_COA Product Specs Lighting plan and p... application/pdf Uploac Product Spec - Lightin... PLNG_COA Underwood Computing HH... Other Narrative describin... application/pdf Uploac PLNG_COA Owners Authoriz... application/pdf Upload Owners Authorization F...

Show all

Address: 56 ARBOR ST, HARTFORD, CT 06106

Owner Name: 56 ARBOR STREET LLC

Owner Address: 56 ARBOR ST, HARTFORD, CT 06106

Application Name:

Parcel No: <u>158403076</u>

Contact Info: Name

Organization Name Contact Type Contact Primary Address Owner Active 56 ARBOR STREET LLC 56 ARBOR STREET... Mailing, 56 Arbor Stre... Licensed Professionals Info: Primary **Business Name** Business License # License Number License Type Name

Douglas L Brown

Status

DBVW Architects

Job Value: <u>\$0.00</u>

Total Fee Assessed: \$250.00 Total Fee Invoiced: \$250.00 Balance: \$0.00

Custom Fields: PLNG_COA_CF

Historic District

Zoning District Zoning Overlay **FEMA Flood Zone** Land Use Per Assessor

CX-1 **TOD**

ARCHITECT

NRZ Neighborhood Local Historic District

Historic Landmark/Site

PARKVILLE NRZ **PARKVILLE**

0007793

State Historic District

National Historic District Dispersion met? Identify Dispersion Parkville Historic District No

General Project Information

Is this application a result of a violation notice?

Zoning Enforcement Case ID #

No

Is this a contributing building or structure?

Is this proposed work visible from the street?

Historic Review Types

New Construction/Addition

Exterior Alteration

Yes

Yes

Demolition

Signage Yes Yes

Solar Panel

No

Other

Does this project include a demolition?

Yes

If a demolition request, what alternatives have you sought?

Demolition of the late 20th century CMU additions at the rear of the property. Because these were modern additions to the mill, alternative solutions were not required by the State Historic Preservation Office.

Exterior Alterations

Windows Doors

Porches/Walkways Siding

Roofs Mechanical Appurtenances

Other

Describe the existing conditions and materials

Windows - Most of the Main Block windows consist of aluminum replacement sash. Those along the west elevation are comprised of pairs of hung, six-over-six units positioned beneath 12-light fixed sash. The north, south, and east elevation windows are simpler, and typically feature pairs of one-over-one windows beneath a glazed transom. A limited assortment of historic wood sash remains throughout, including eight-over-eight, 10-over-10, and 20-over-20 hung units. A pair of nine-over-nine wood windows in rectangular openings flank the main entrance at the facade/west elevation. Along the second floor of the east elevation, many units were partially replaced; the lower halves contain sliding aluminum inserts positioned beneath the original 20-light wood sash. The historic wood was covered with metal panels, likely in an attempt to reduce exposure to the elements and continued deterioration.

Doors - The Underwood Computing Machine Company complex has a total of 15 exterior entrances; seven of these doors access the Main Block. Stair towers A and B have pairs of original, halflight, raised panel doors within round arch masonry openings. The north leaf of each pair and both transoms are covered/infilled with plywood. Access is provided by concrete walkways and brownstone or granite stairs.

At the center of the façade is the main entrance. Accessed by a concrete walkway and stair with flanking knee walls, the entrance is comprised of an aluminum storefront system with glazed a transom and sidelights.

Additional flush metal doors or aluminum storefront systems are located on the south and east elevations. Two at the east elevation are capped by canvas canopies anchored to the exterior masonry by steel rods.

A pair of paneled doors accesses the Boiler Room on its east elevation, and a modern rolling overhead garage door accesses the Coal Storage Addition on its south elevation.

The Polishing & Plating Department's CMU Addition has two entrances at its east elevation. The main entrance to the RAW space is comprised of steel doors and a glazed transom accessed by a former concrete loading dock. The entrance is capped by a standing seam shed roof supported by square metal posts. The secondary entrance at the south end of the elevation is a flush metal door and concrete stair surrounded by a modern metal enclosure.

Roofs - The Main Block has a tar and gravel roof pierced by various vents and mechanical equipment surrounded by a masonry parapet. The stair towers and rear water tower have hipped roofs clad in asphalt shingles. A copper vent hood caps the water tower. Signage is mounted to the roof's northeast corner.

The Boiler Room has a tar and gravel roof, and the Coal Storage Addition has a flat membrane with modern aluminum gutters and downsoouts.

The Hardening Department has flat tar and gravel roof and masonry parapet.

The Polishing & Plating Department has a flat membrane roof and masonry parapet, with condensing units mounted at its north and south ends. The CMU Addition has a flat membrane roof.

The Cafeteria has a flat membrane flat pierced by nine pyramidal skylights. The Addition has a flat membrane roof with mechanical units. A metal safety guardrail is mounted to the CMU north, south, and east masonry walls around the roof.

The Hyphen has a flat membrane roof pierced by a single skylight and masonry parapet walls. The roof and skylight remain in poor condition, due to continual water incursion and ponding around the opening.

Mechanicals - The mechanical and life safety, systems have been altered over the years and are outdated, including boilers, hot water heaters, the heating distribution system, and fire alarm systems.

Describe the proposed materials

Windows - Most of the Main Block aluminum replacement windows will be retained and repaired, as needed.

Masonry-infilled openings will be retained.

Security grilles will be removed and will not be replaced.

The pair of nine-over-nine wood sash flanking the main entrance will be restored.

All remaining wood sash and frames in the Main Block and Polishing & Plating Department, as well as the partially-replaced sash at the Main Block's east elevation, will be completely, removed and replaced with new Low-E, double-glazed, fixed over awning aluminum windows with spacer bars, exterior applied muntins and interior screens within the existing window openings. Extant original windows will be used to replicate the size, configuration, and profiles of the original windows as closely as possible. Custom aluminum brick molds will be fabricated to closely approximate the existing. Windows and brick molds will be green to match the historic color.

<u>Doors - Most of the existing exterior entrances will be retained and repaired as needed.</u>

The Main Block's historic stair tower doors will be restored, perdetails provided on Sheets AX52 and A52. The existing plywood will be removed, and the north leaves and transoms fit with new glass, Original/deteriorated hardware will be replaced with codecompliant handles and locks.

The fabric canopies capping the secondary entrances at the Main Block and Hyphen will be replaced with new aluminum canopies that are more compatible with the industrial character of the complex. Please see the Mapes Super Lumideck Flat Soffit Canopy product specification for additional information.

As noted above, the Polishing & Plating Department's CMU

Addition will be removed. The proposed Addition will have four fully glazed aluminum storefront systems at the east and south elevations.

Roofs - All existing roofs will be removed. New roofs will have rigid insulation above the decking and new TPO systems installed. The stair tower asphalt shingles will be replaced with new architectural asphalt shingles. New mechanical equipment will replace the existing in most locations.

The signage mounted to the Main Block's northeast corner will be retained and restored.

An equipment screen will be integrated into the existing guardrail system on the CMU Addition.

The Hyphen skylight will be infilled to ensure the existing electrical equipment in this space remains weatherproof and intact.

New mechanical equipment is proposed on the Addition roof.

Mechanicals - New or updated mechanical, plumbing, electrical and fire protection systems will be installed in the Main Block. All new or updated systems will comply with current building code requirements and will be sized appropriately. Existing rooftop mechanicals will be replaced in-kind approximately in their existing locations and new equipment added.

Hardships and Reason for Hardships

Is this an owner-occupied principal residence?

No

Is this a non-owner occupied residential building containing six (6) or fewer dwelling units?

Is this a commercial and industrial building?

Yes

Is this a request for demolition where there is no feasible and prudent alternative to demolition? $\underline{\text{Yes}}$

Other Payment Required

Green Infrastructure Fund Amount

_

City Tree Fund Amount

-

Complete Street Fund Amount

-

Describe Reason for Payments

_

Reason for Request

Reason for Request

Recommendation

Recommendation

-

Adverse Impacts on Neighboring Lands Suitability as Presently Zoned

-

-

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This is a dynamic label.

PLNG_COA_DIGEPLAN Enhanced Doc List

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Reason for Hardship

Cost of historic preservation recommendations:

Economic circumstances of the applicant:Lack of availa

Drawings Last Revised

Impact of the historic preservation recommendations on the district as a whole and on property value

Dates and Notices Application Received Open Hearing Deadline Close Hearing Deadline If yes, describe how the dates abo **Decision Deadline** Extensions Requested? Legal Ad #2 Notice sent to NRZ/CRCOG Legal Ad #1 Sign Affidavit Received Certificate of Mailings Returned Notice of Decision Published Recordation Date Approval Expiration Date Sign Deposit Check # Sign Deposit Date Received Sign Deposit Check Amount Public Hearing Date Document Link Public Hearing Time Meeting Link or Location Certificate of Compliance As-Built Drawing Date Type of Bond Escrow Account # Bonding Contact Name Bonding Primary Phone # Bonding Company Name

Prior Approvals

Bonding Email

Type of Permit/Authorization Issued By

Issued Date Expiration Date

Date

Drawings Number of Sheets

Other State Permit

State Historic Preservation Office 08/23/2023

Resolution Clauses

Type Comment

Workflow Status: Task Assigned To Status Status Date Action By

Application Intake Alexander Castro

<u>Application Intake</u>
Planning and Zoning Re...

Public Notice
Historic Commission
Notice of Decision
Appeal Period
Permit Issuance
Permit Status

Certificate of Plannin...

Case Complete

Condition Status: Name Short Comments Status Apply Date Severity Action By

Application Comments: View ID Comment

Initiated by Product: ACA

Scheduled/Pending Inspections: Inspection Type Scheduled Date Inspector Status Comments

Resulted Inspections: Inspection Type Inspection Date Inspector Status Comments

56 ARBOR STREET RENOVATION AND EXPANSION

HISTORIC TAX CREDIT APPLICATION **EXISTING CONDITIONS**

06/23/23



DRAWING LIST

AX00	COVER SHEET
AX10	EXISTING SITE PLAN
AX20	EXISTING BOILER ROOM PLAN
AX21A	EXISTING FIRST FLOOR PLAN
AX21B	EXISTING FIRST FLOOR PLAN
AX21C	EXISTING FIRST FLOOR PLAN
AX22A	EXISTING SECOND FLOOR PLAN
AX22B	EXISTING SECOND FLOOR PLAN
AX23A	EXISTING THIRD FLOOR PLAN
AX23B	EXISTING THIRD FLOOR PLAN
AX24A	EXISTING FOURTH FLOOR PLAN
AX24B	EXISTING FOURTH FLOOR PLAN
AX25A	EXISITING ROOF PLAN
AX25B	EXISTING ROOF PLAN
AX25C	EXISTING ROOF PLAN
AX30	EXISTING ELEVATIONS
AX31	EXISTING ELEVATIONS
AX32	EXISTING ELEVATIONS
AX33	EXISTING ELEVATIONS
AX50	EXISTING WINDOW DETAILS
AX51	EXISTING STAIR DETAILS
AX52	EXISTING HISTORIC FEATURES





56 ARBOR, LLC 56 ARBOR STREET HARTFORD, CT 06106 WILL K. WILKINS & TRICIA HAGGERTY WENZ

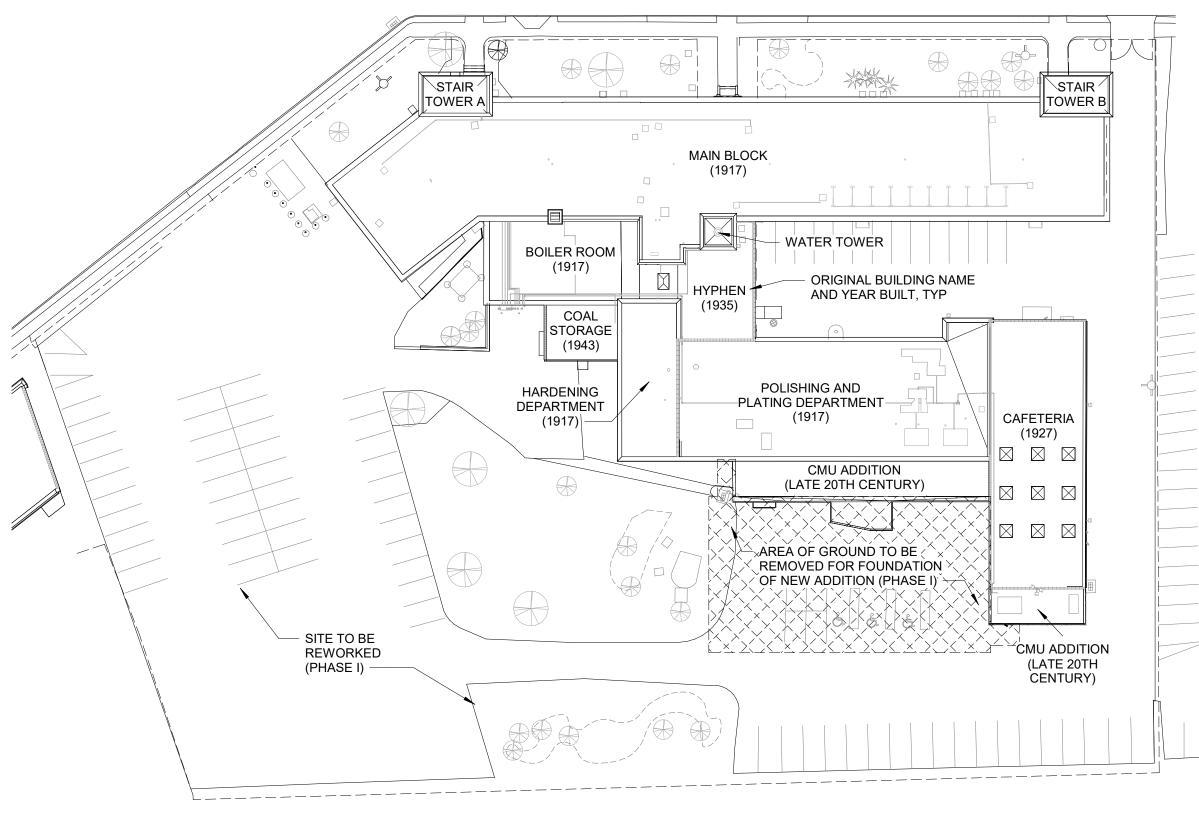
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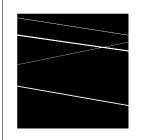
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REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 **COVER SHEET**

ISSUED FOR: Historic Tax Credits DATE ISSUED: 07.05.22 REVISION DATE: 01.13.23, 07.05.23



1 EXISTING SITE PLAN
1" = 40'-0"



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56 ARBOR, LLC 56 ARBOR STREET HARTFORD, CT 06106

WILL K. WILKINS & TRICIA HAGGERTY WENZ

SCALE:	1" = 40'-0"	
DRAWN:	BB, KG	
JOB NO:	2126	
	NAME AND DESCRIPTION OF THE PROPERTY OF THE PR	DE DOLUMETE

REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 EXISTING SITE PLAN

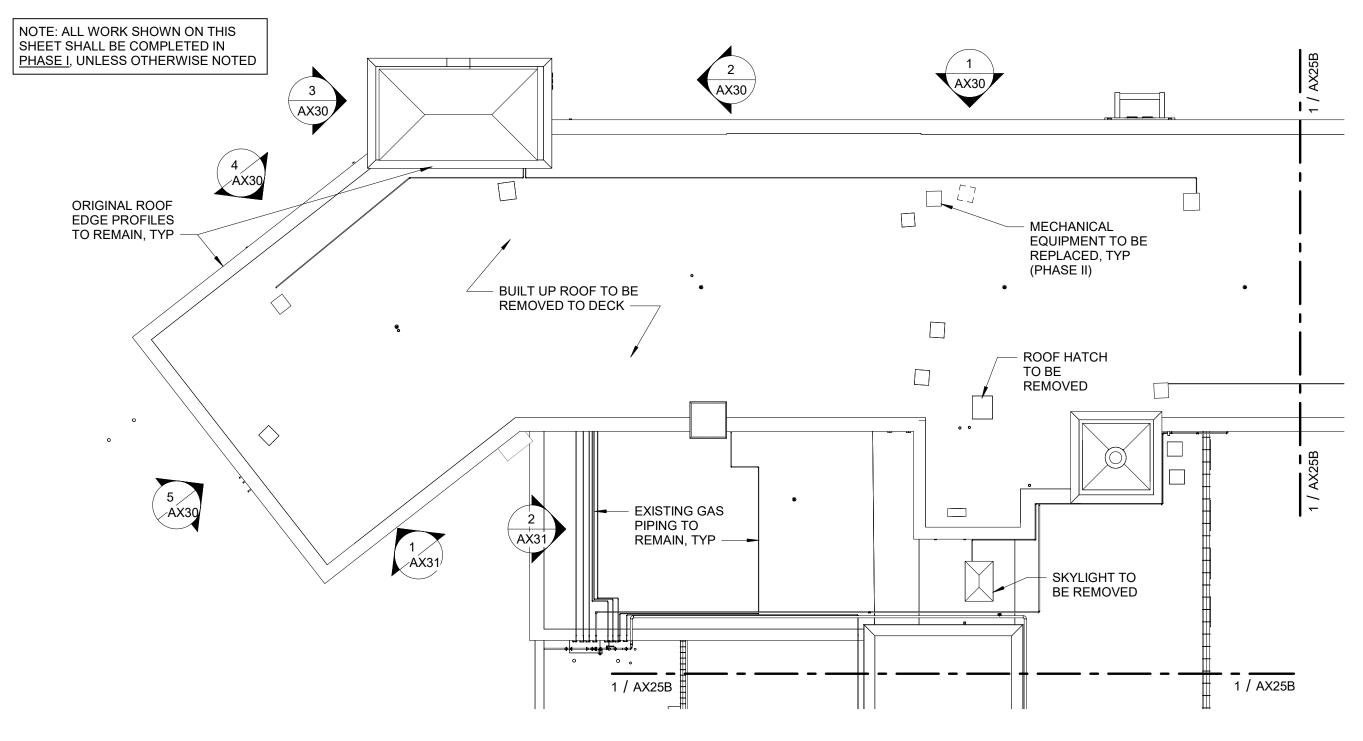
 ISSUED FOR:
 Historic Tax Credits

 DATE ISSUED:
 07.05.22

 REVISION DATE:
 01.13.23, 07.05.23

AX10

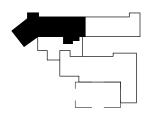
PROJECT NORTH



1 EXISTING ROOF PLAN - 56 ARBOR - SOUTH 1/16" = 1'-0"









56 ARBOR, LLC 56 ARBOR STREET HARTFORD, CT 06106 WILL K. WILKINS & TRICIA HAGGERTY WENZ

SCALE:	1/16" = 1'-0"	
DRAWN:	BB, KG	
JOB NO:	2126	
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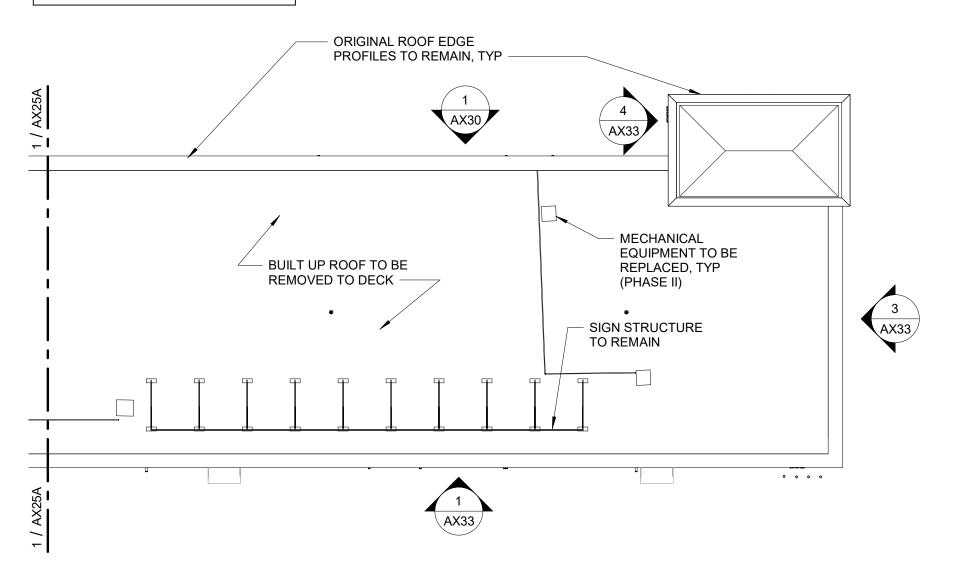
REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 EXISITING ROOF PLAN

ISSUED FOR: Historic Tax Credits
DATE ISSUED: 07.05.22

REVISION DATE: 01.13.23, 07.05.23

AX25A

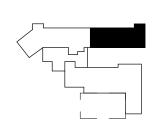
NOTE: ALL WORK SHOWN ON THIS SHEET SHALL BE COMPLETED IN PHASE I, UNLESS OTHERWISE NOTED



1 EXISTING ROOF PLAN - 56 ARBOR - NORTH









56 ARBOR, LLC 56 ARBOR STREET HARTFORD, CT 06106

WILL K. WILKINS & TRICIA HAGGERTY WENZ

SCALE:	1/16" = 1'-0"	
DRAWN:	BB, KG	
JOB NO:	2126	

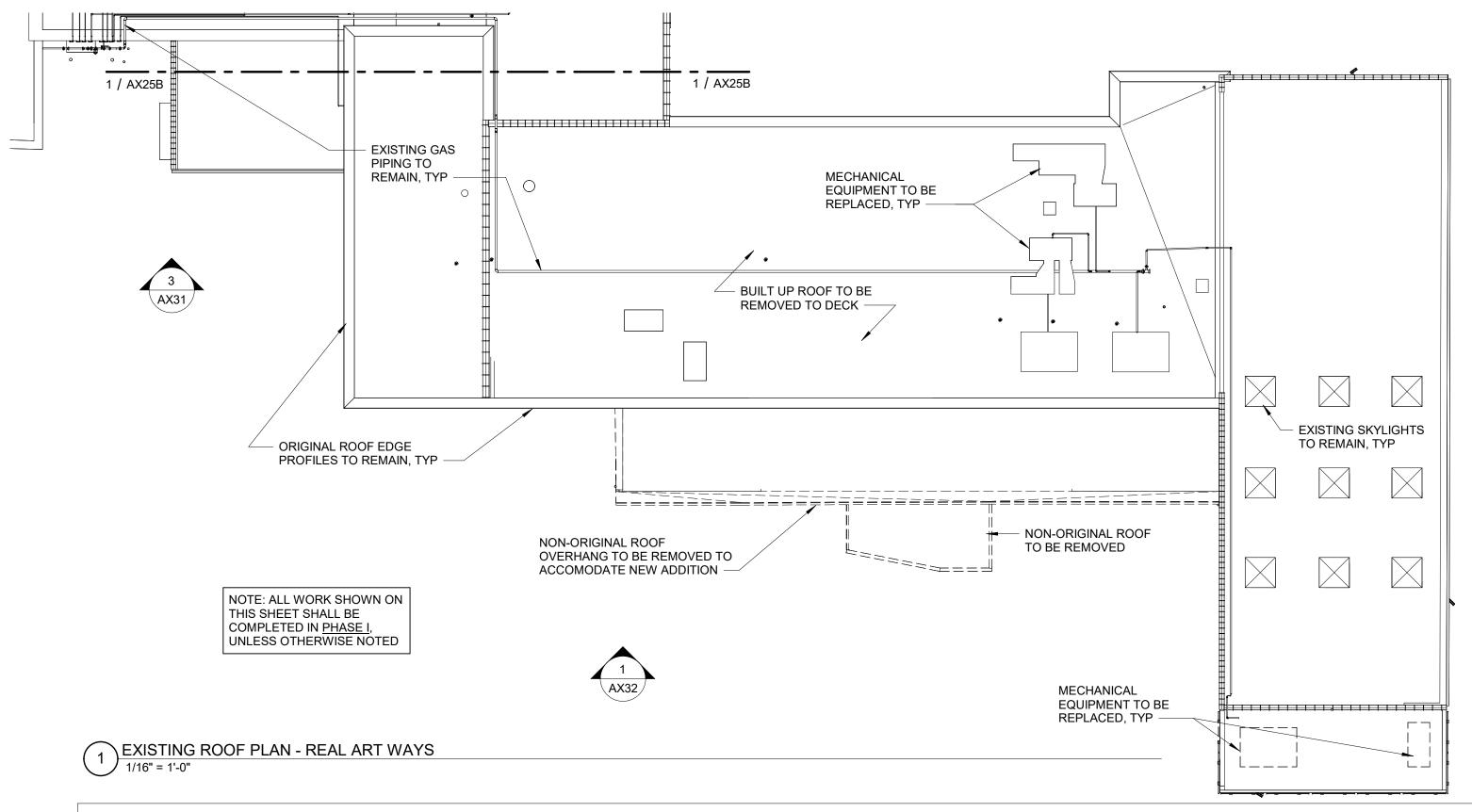
REAL ART WAYS
56 ARBOR STREET HARTFORD, CT 06106
EXISTING ROOF PLAN

 ISSUED FOR:
 Historic Tax Credits

 DATE ISSUED:
 07.05.22

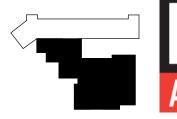
 REVISION DATE:
 01.13.23, 07.05.23

AX25B











56 ARBOR, LLC 56 ARBOR STREET HARTFORD, CT 06106

WILL K. WILKINS & TRICIA HAGGERTY WENZ

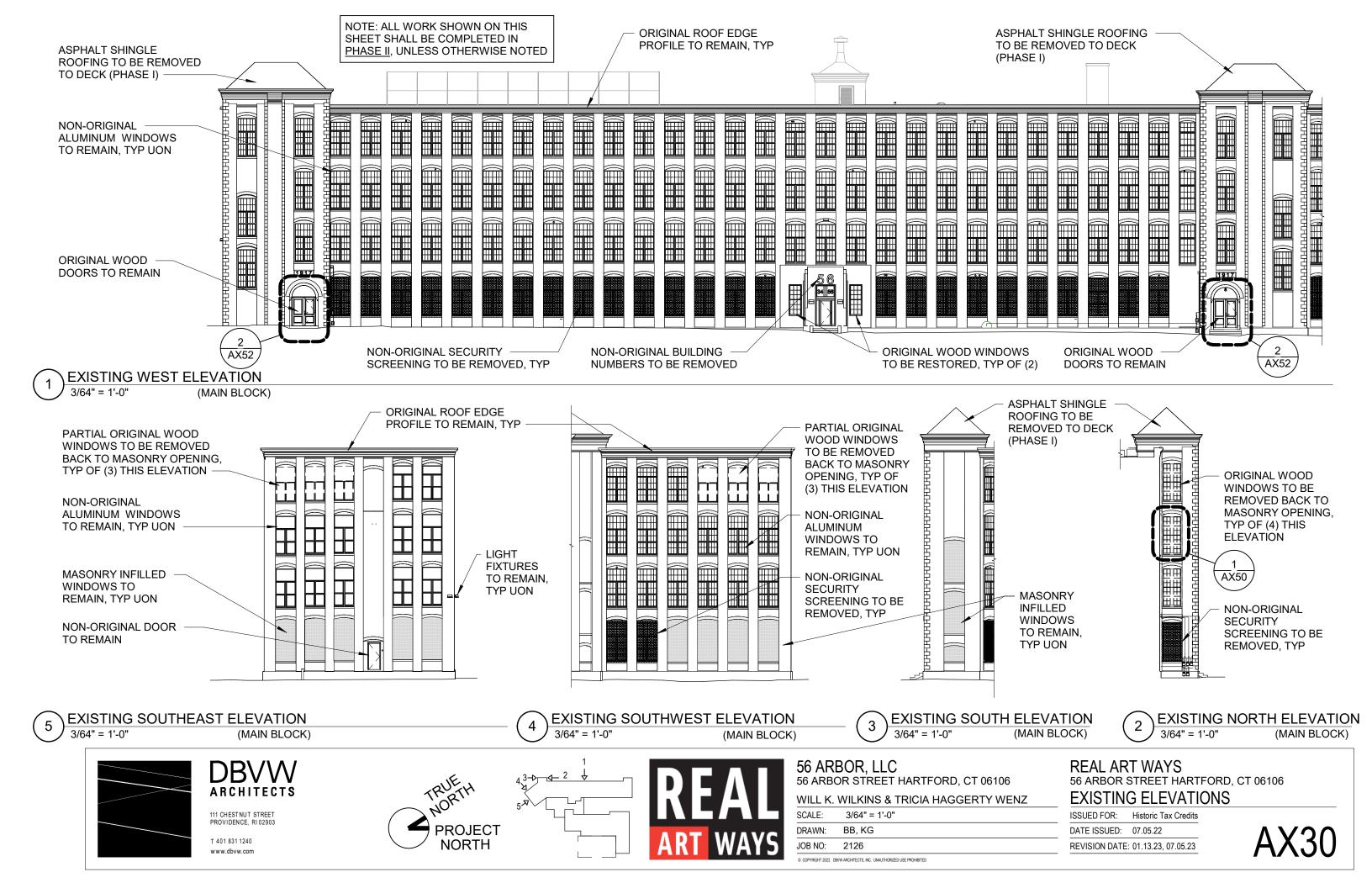
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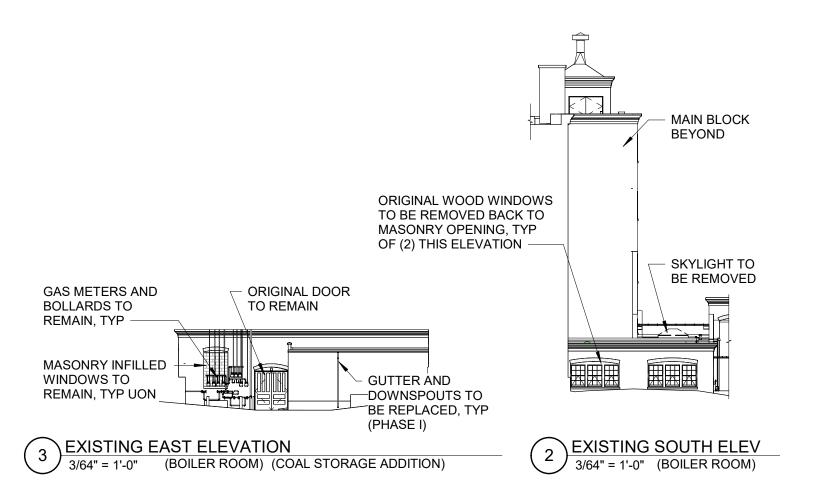
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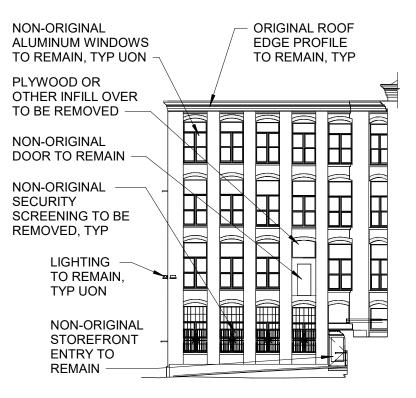
REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 EXISTING ROOF PLAN

ISSUED FOR: Historic Tax Credits
DATE ISSUED: 07.05.22
REVISION DATE: 01.13.23, 07.05.23

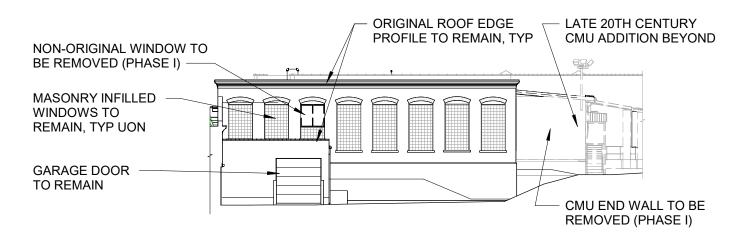
AX25C

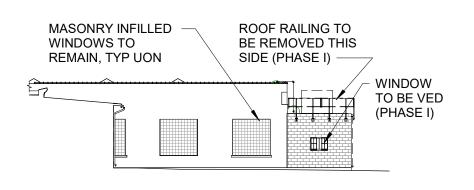






1 EXISTING NORTHEAST ELEVATION
3/64" = 1'-0" (MAIN BLOCK)





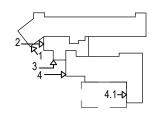
EXISTING SOUTH ELEVATION

3/64" = 1'-0" (COAL STORAGE ADDITION) (HARDENING DEPT)

(4.1) EXISTING SOUTH ELEVATION
3/64" = 1'-0" (CAFETERIA)









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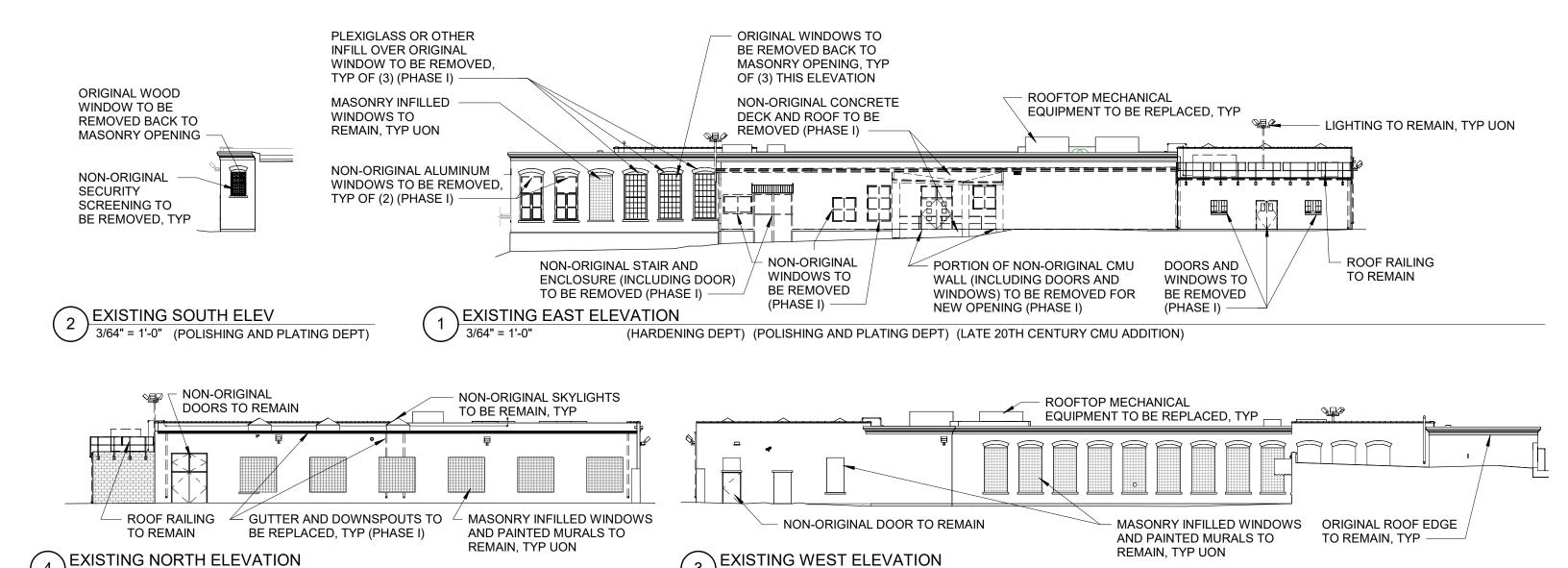
WILL K.	WILKINS & TRICIA HAGGERTY WENZ	
SCALE:	3/64" = 1'-0"	
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REAL ART WAYS
56 ARBOR STREET HARTFORD, CT 06106
EXISTING ELEVATIONS

DATE ISSUED: 07.05.22
REVISION DATE: 01.13.23, 07.05.23

AX31

NOTE: ALL WORK SHOWN ON THIS SHEET SHALL BE COMPLETED IN PHASE II, UNLESS OTHERWISE NOTED

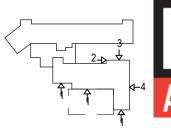


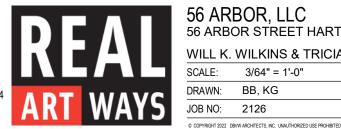


3/64" = 1'-0"



(LATE 20TH CENTURY CMU ADDITION) (CAFETERIA)





3/64" = 1'-0" (CAFETERIA) (POLISHING AND PLATING DEPARTMENT)

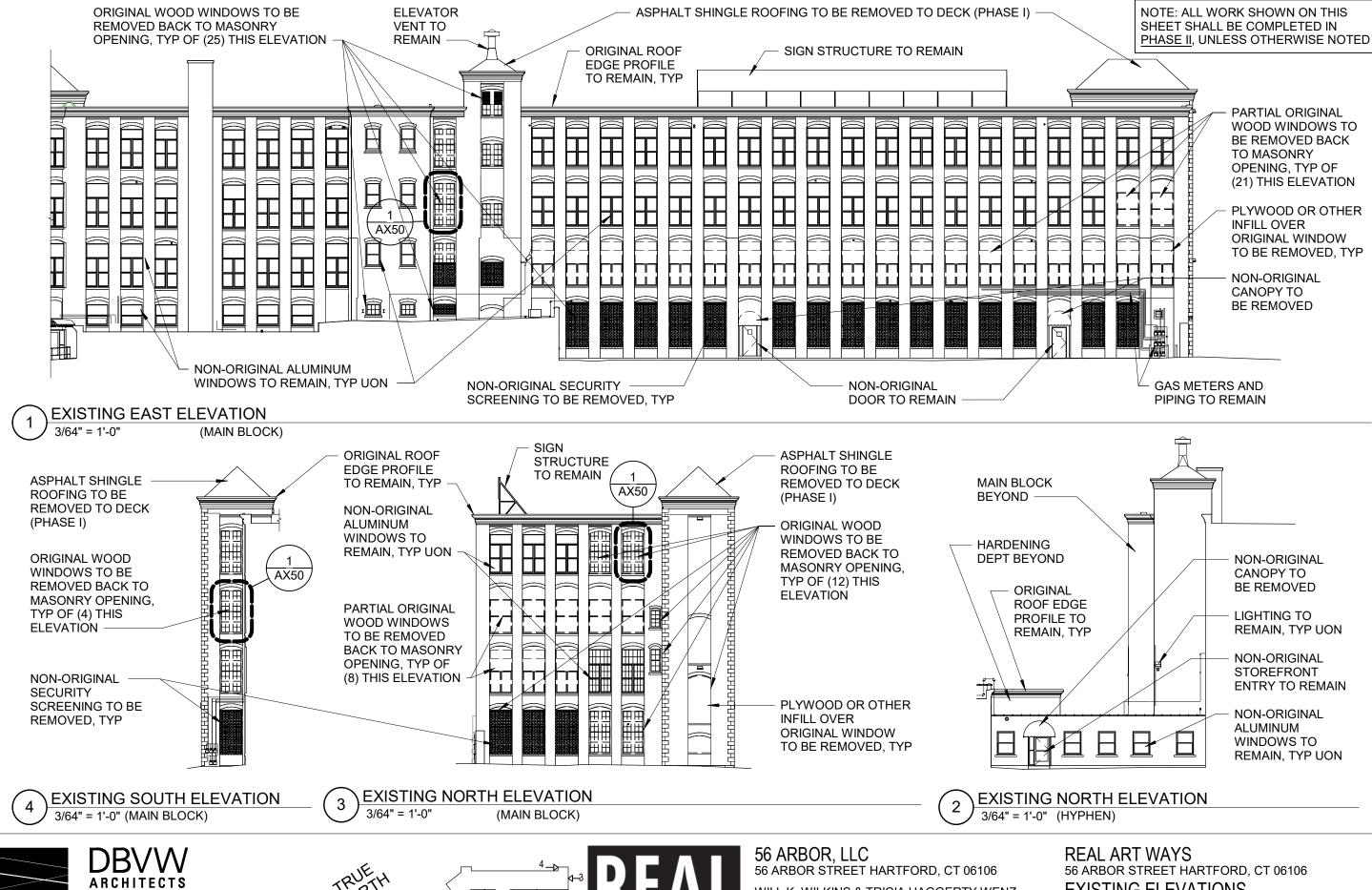
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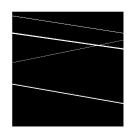
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REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 **EXISTING ELEVATIONS**

ISSUED FOR: Historic Tax Credits DATE ISSUED: 07.05.22 REVISION DATE: 01.13.23, 07.05.23

(HARDENING DEPARTMENT)





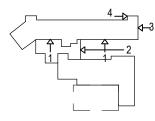
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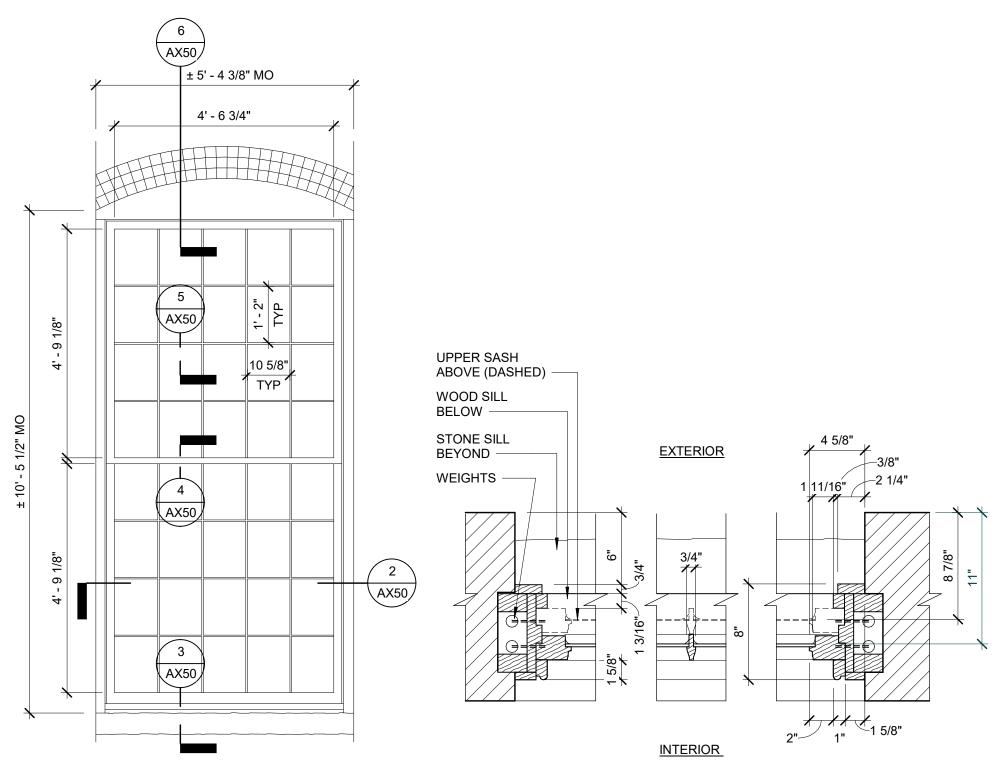


WILL K. WILKINS & TRICIA HAGGERTY WENZ

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EXISTING ELEVATIONS

ISSUED FOR: Historic Tax Credits DATE ISSUED: 07.05.22 REVISION DATE: 01.13.23, 07.05.23



BRICK ARCH HEADER

INTERIOR

INTERIOR

SUBJECT

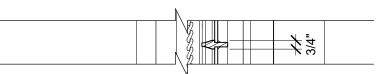
BRICK ARCH

HEADER

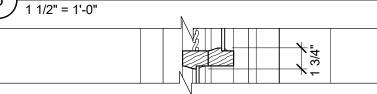
EXTERIOR

8 7/8"

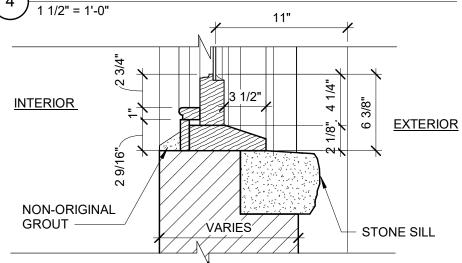
6 HISTORIC WOOD WINDOW - HEAD DETAIL



DOUBLE HUNG WINDOW - MUNTIN DETAIL



4 DOUBLE HUNG WINDOW - MEETING RAIL DETAIL



3 DOUBLE HUNG WINDOW - SILL DETAIL 1 1/2" = 1'-0"

1 DOUBLE HUNG WINDOW - EXTERIOR ELEV

2 DOUBLE HUNG WINDOW - JAMB DETAIL 1 1/2" = 1'-0"





56 ARBOR, LLC 56 ARBOR STREET HARTFORD, CT 06106

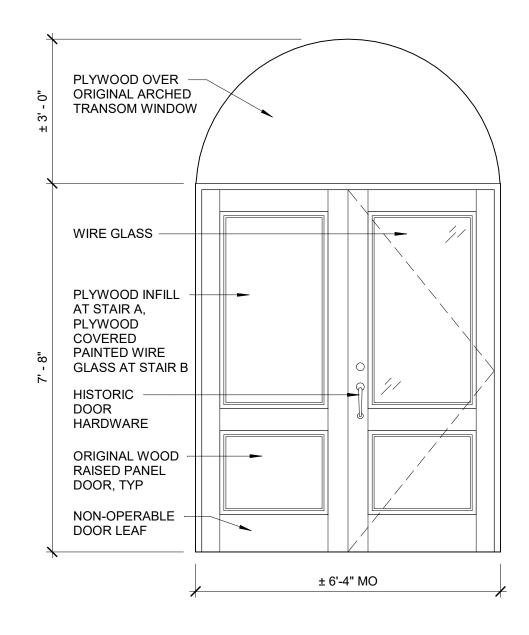
WILL K. WILKINS & TRICIA HAGGERTY WENZ
SCALE: As indicated

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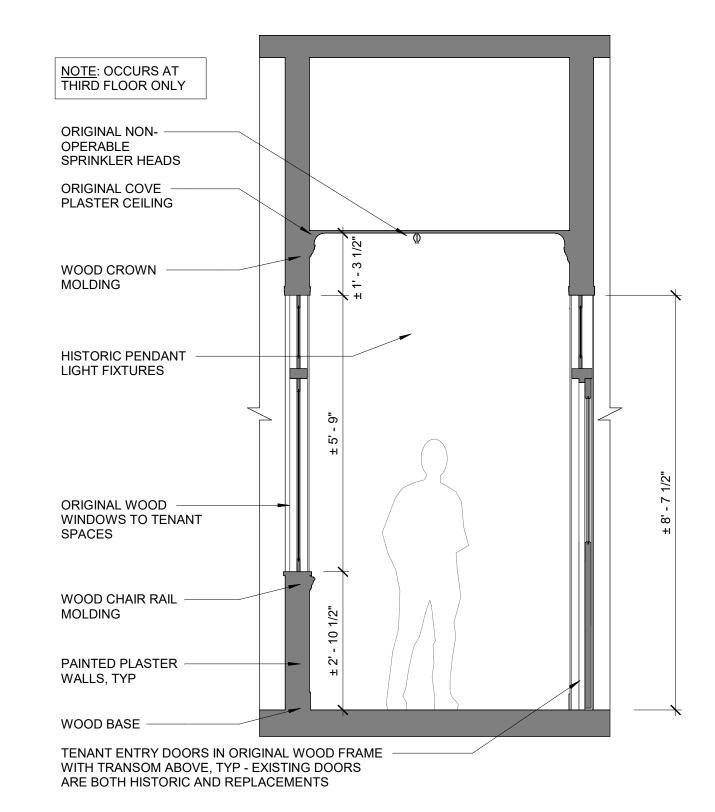
REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 EXISTING WINDOW DETAILS

DATE ISSUED: 07.05.22
REVISION DATE: 01.13.23, 07.05.23

AX50



2 HISTORIC STAIR DOOR 1/2" = 1'-0"



1 HISTORIC CORRIDOR SECTION
1/2" = 1'-0"





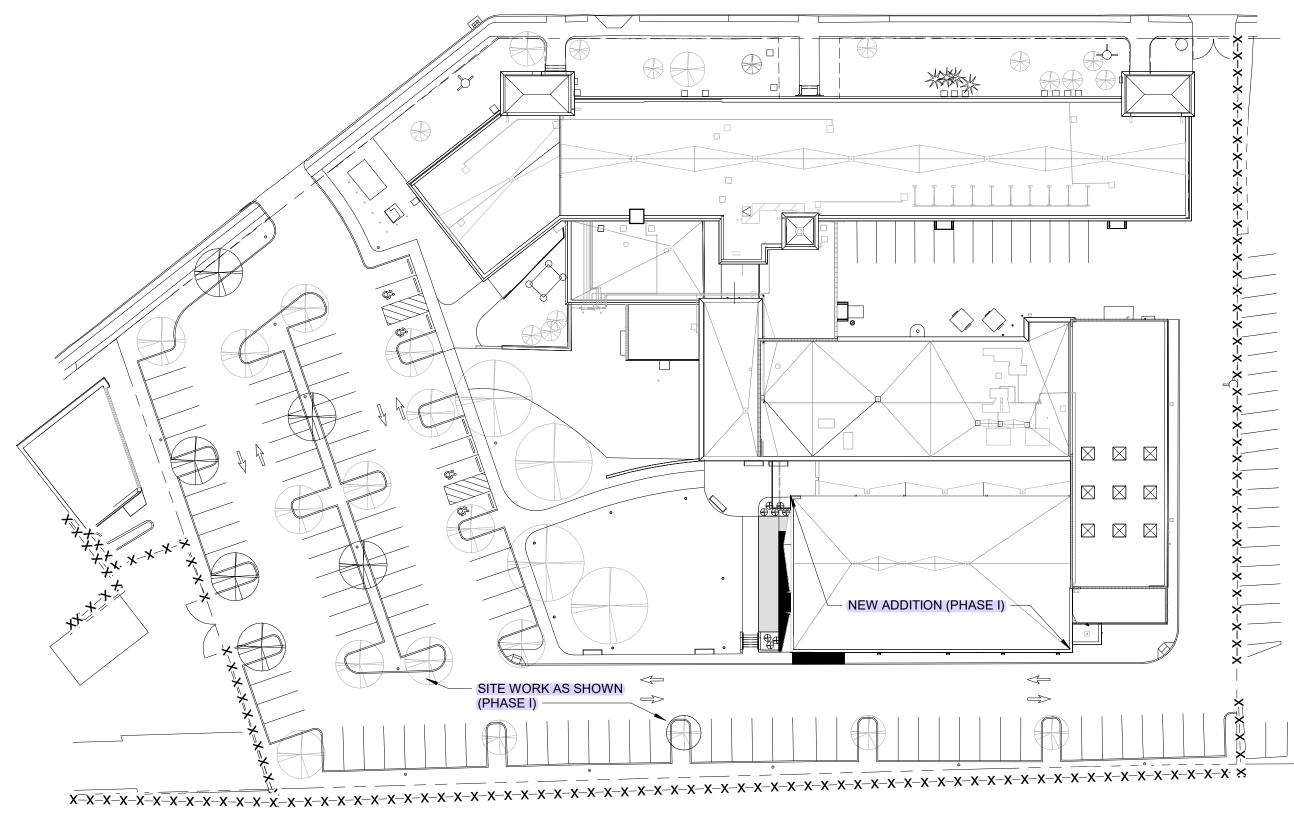
56 ARBOR, LLC 56 ARBOR STREET HARTFORD, CT 06106 WILL K. WILKINS & TRICIA HAGGERTY WENZ

SCALE:	1/2" = 1'-0"	
DRAWN:	BB, KG	
JOB NO:	2126	

REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 EXISTING HISTORIC FEATURES

ISSUED FOR:	Historic Tax Credits
DATE ISSUED:	07.05.22
REVISION DATE:	01.13.23, 07.05.23

AX52



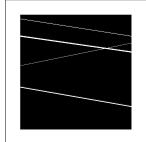
1) PROPOSED SITE PLAN
1" = 40'-0"

DBVW ARCHITECTS

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56 ARBOR, LLC 56 ARBOR STREET HARTFORD, CT 06106

WILL K. WILKINS & TRICIA HAGGERTY WENZ

SCALE: 1" = 40'-0"

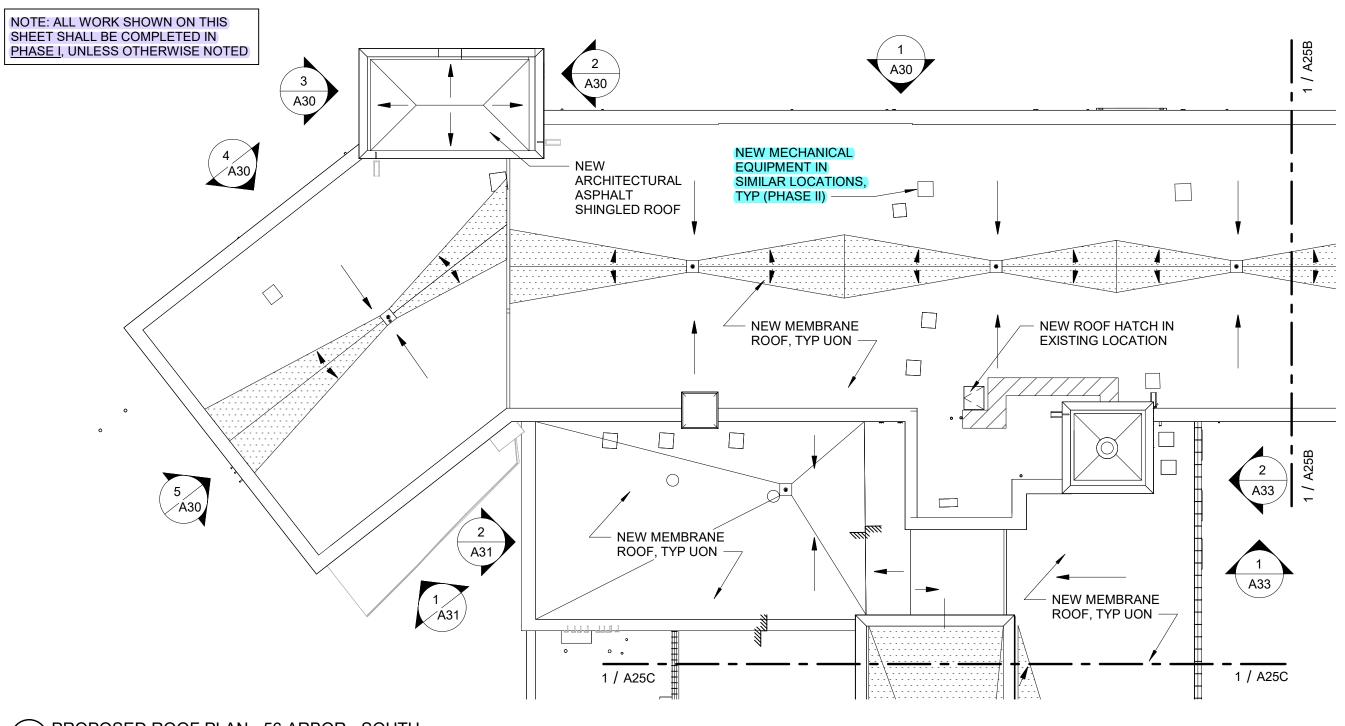
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REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 PROPOSED SITE PLAN

ISSUED FOR: Historic Tax Credits
DATE ISSUED: 07.05.22
REVISION DATE: 01.13.23, 07.05.23

A10

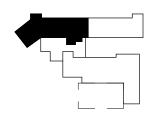
PROJECT













56 ARBOR, LLC 56 ARBOR STREET HARTFORD, CT 06106

WILL K. WILKINS & TRICIA HAGGERTY WENZ

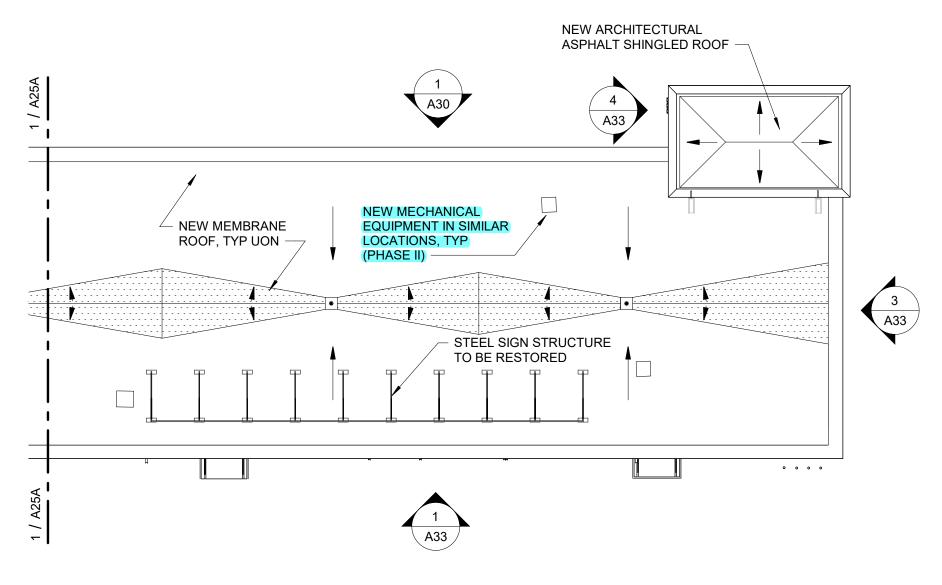
B, KG
126

REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 PROPOSED ROOF PLAN

ISSUED FOR: Historic Tax Credits
DATE ISSUED: 07.05.22
REVISION DATE: 01.13.23, 07.05.23

A25A

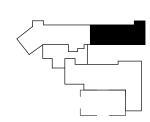
NOTE: ALL WORK SHOWN ON THIS SHEET SHALL BE COMPLETED IN PHASE I, UNLESS OTHERWISE NOTED



PROPOSED ROOF PLAN - 56 ARBOR - NORTH









56 ARBOR, LLC 56 ARBOR STREET HARTFORD, CT 06106

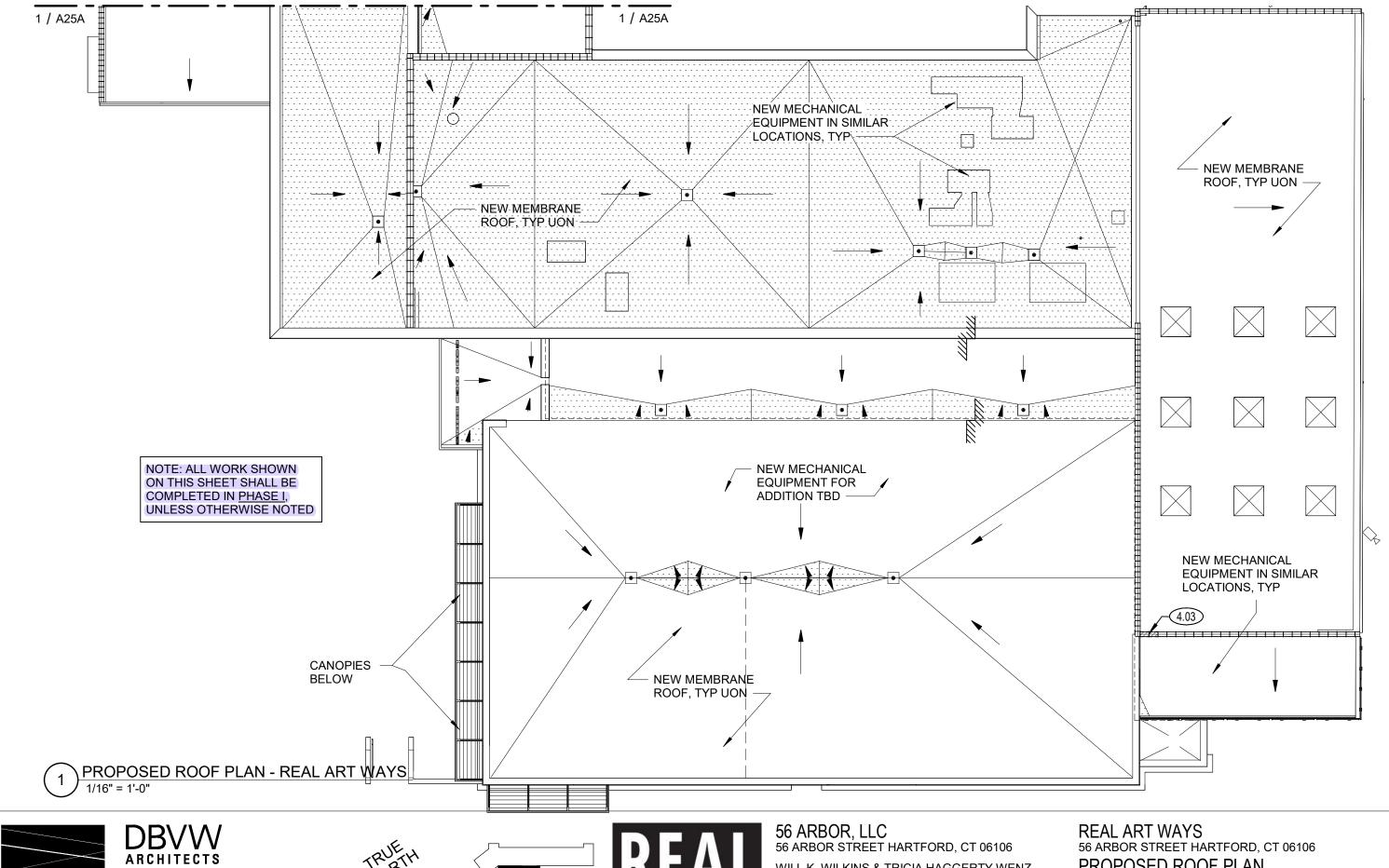
WILL K. WILKINS & TRICIA HAGGERTY WENZ
SCALE: 1/16" = 1'-0"

SCALE:	1/16" = 1'-0"							
DRAWN:	BB, KG							
JOB NO:	2126							
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REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 PROPOSED ROOF PLAN

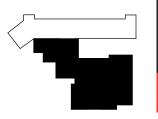
DATE ISSUED: 07.05.22
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A25B









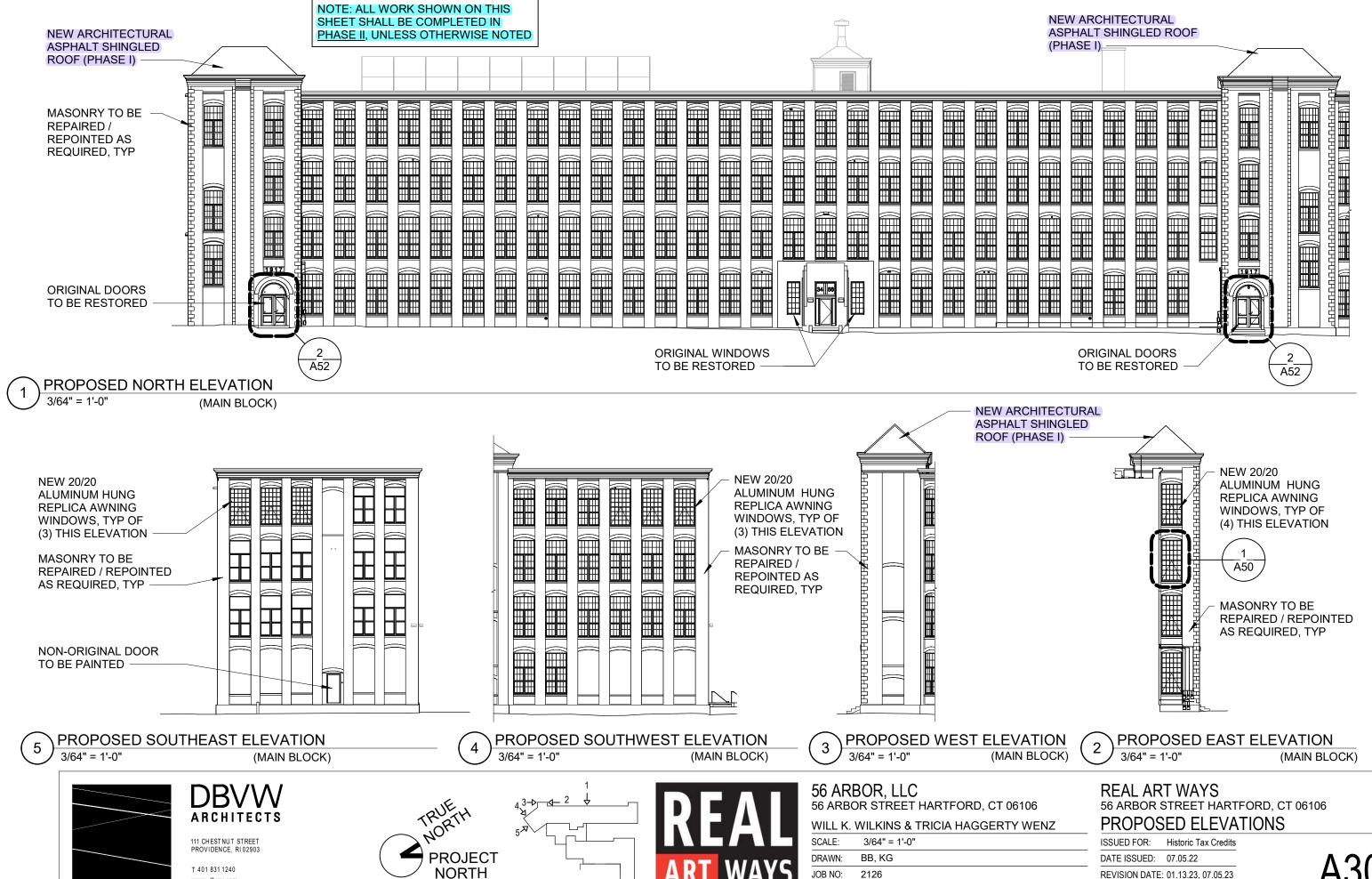


WILL K. WILKINS & TRICIA HAGGERTY WENZ

SCALE:	1/16" = 1'-0"	
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PROPOSED ROOF PLAN

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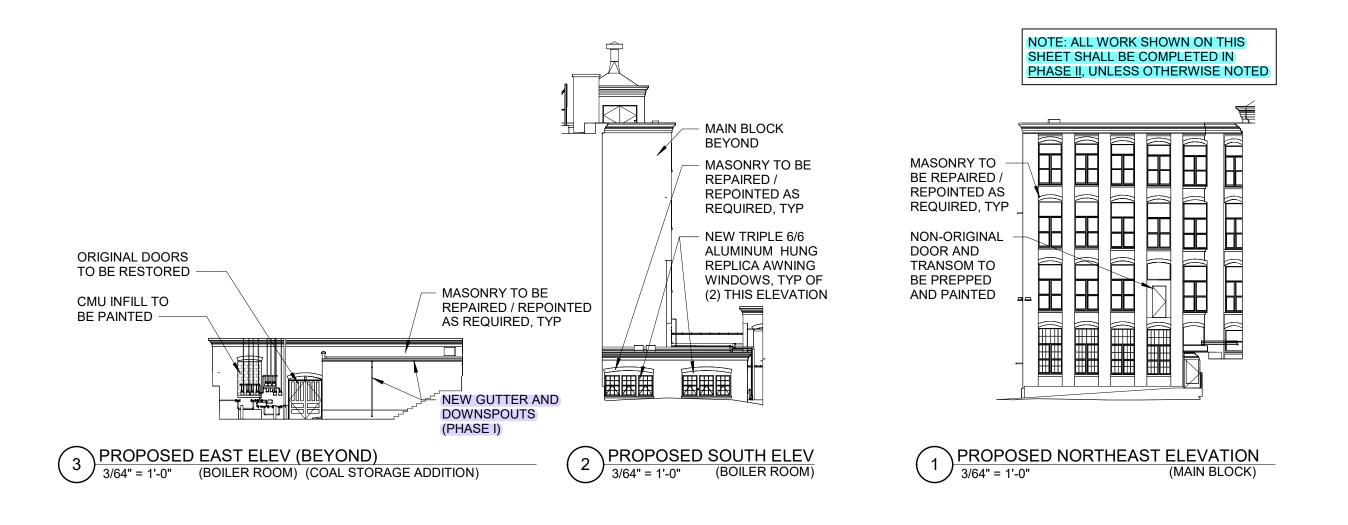
www.dbvw.com

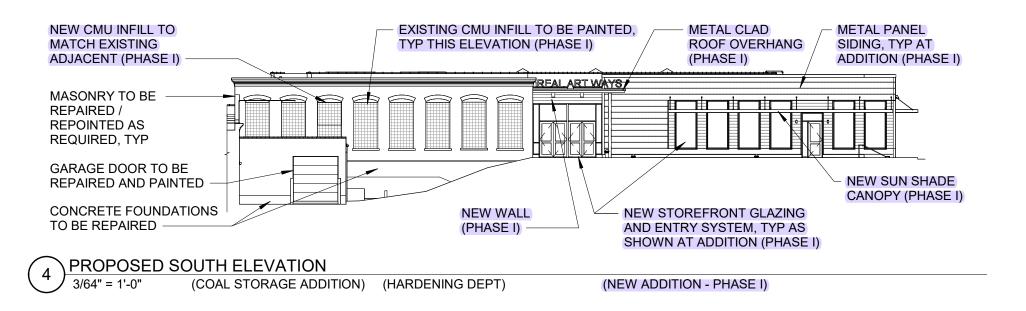
JOB NO:

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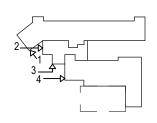
REVISION DATE: 01.13.23, 07.05.23













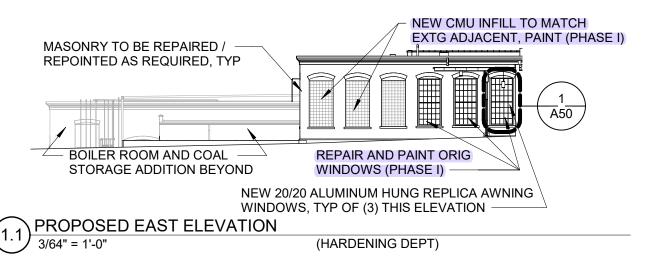
56 ARBOR, LLC 56 ARBOR STREET HARTFORD, CT 06106

WILL K. WILKINS & TRICIA HAGGERTY WENZ

SCALE:	3/64" = 1'-0"						
DRAWN:	BB, KG						
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REAL ART WAYS
56 ARBOR STREET HARTFORD, CT 06106
PROPOSED ELEVATIONS

A31



MASONRY TO
BE REPAIRED /
REPOINTED AS
REQUIRED, TYP

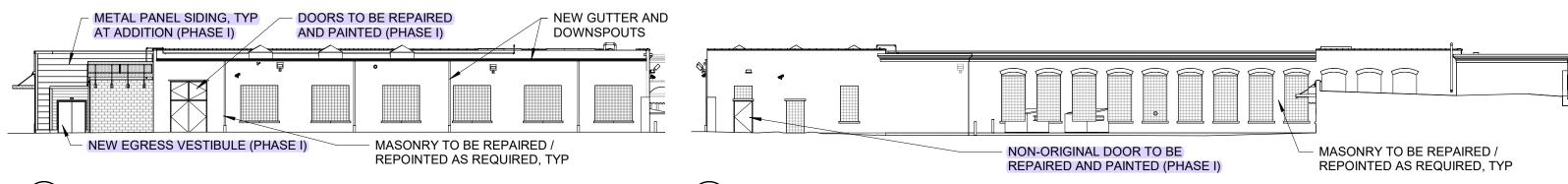
METAL CLAD ROOF **NEW SUN SHADE NEW EGRESS NEW GUTTER AND OVERHANG (PHASE I) CANOPY (PHASE I) VESTIBULE (PHASE I)** DOWNSPOUTS (PHASE I) MECHANICAL SCREEN TO BE ADDED TO EXTG RAILING (PHASE I) **EXISTING NON-HISTORIC** WINDOWS BEYOND TO CMU ADDITION TO BE BE INFILLED (PHASE I) PAINTED (PHASE I) NEW WINDOW (PHASE I) HARDENING DEPT BEYOND NEW STOREFRONT GLAZING SYSTEM, METAL PANEL SIDING, TYP DOORS TO BE REPLACED TYP AS SHOWN AT ADDITION (PHASE I) AT ADDITION (PHASE I) (PHASE I)

2 PROPOSED SOUTH ELEV
3/64" = 1'-0" (POLISHING AND PLATING DEPT)

PROPOSED EAST ELEVATION

3/64" = 1'-0" (NEW ADDITION)

(LATE 20TH CENTURY CMU ADDITION)



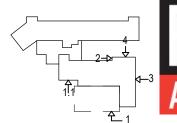
4 PROPOSED NORTH ELEVATION
3/64" = 1'-0" (NEW ADDITION) (LATE 20TH CENTURY CMU ADDITION) (CAFETERIA)

3 PROPOSED WEST ELEVATION
3/64" = 1'-0" (CAFETERIA) (POLISHING AND PLATING DEPARTMENT)

(HARDENING DEPARTMENT)









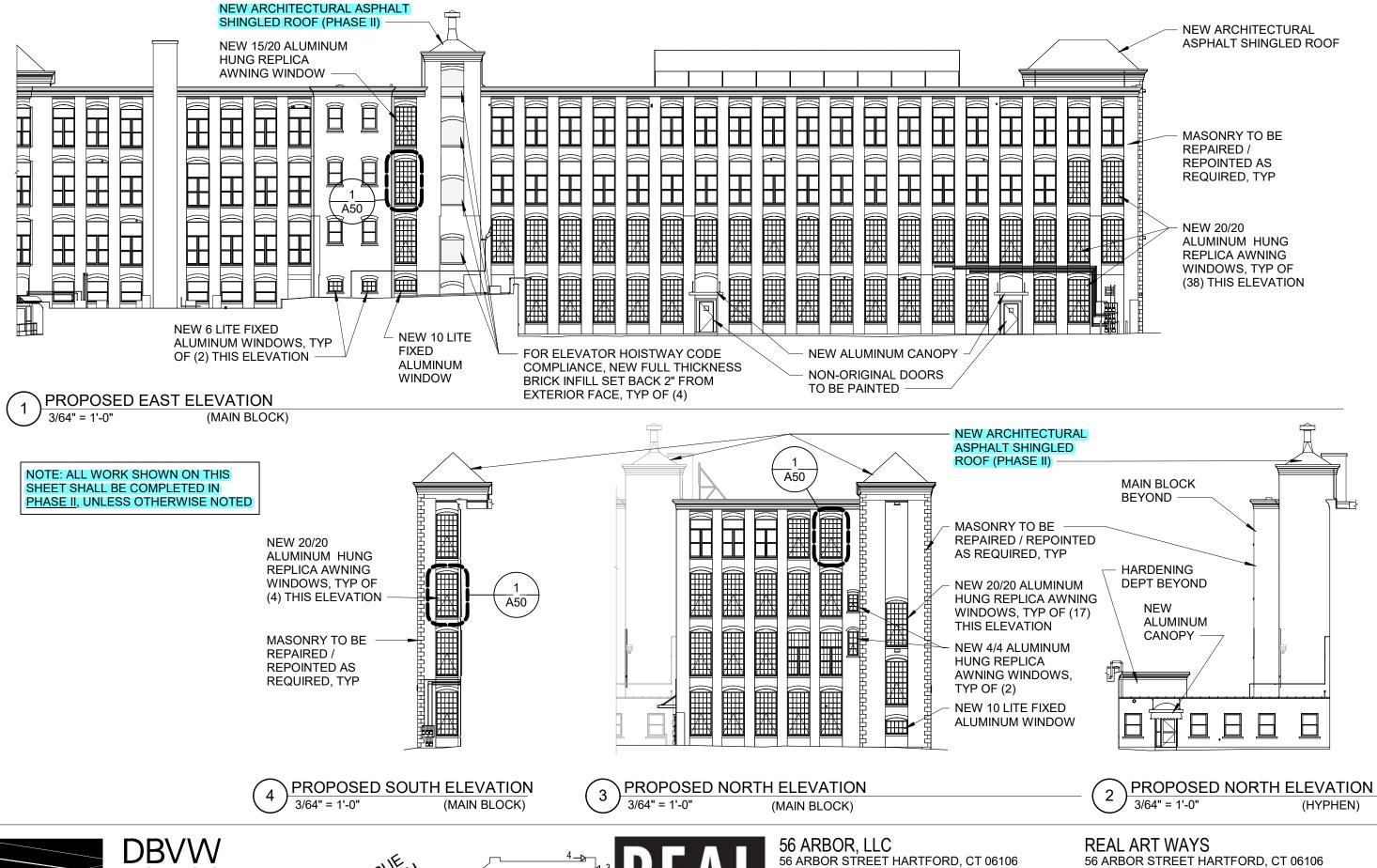
56 ARBOR, LLC 56 ARBOR STREET HARTFORD, CT 06106 WILL K. WILKINS & TRICIA HAGGERTY WENZ

SCALE:	3/64" = 1'-0"	
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REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 PROPOSED ELEVATIONS

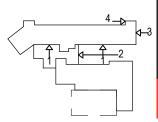
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A32









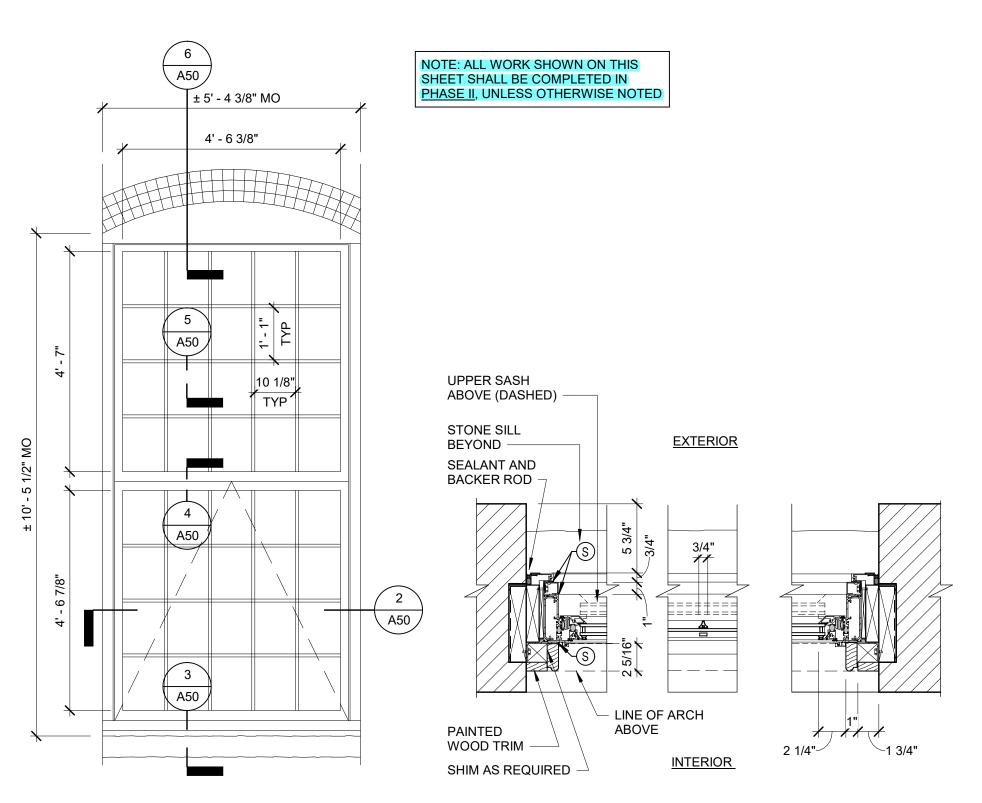


WILL K. WILKINS & TRICIA HAGGERTY WENZ

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PROPOSED ELEVATIONS

ISSUED FOR: Historic Tax Credits DATE ISSUED: 07.05.22 REVISION DATE: 01.13.23, 07.05.23



BRICK ARCH HEADER

FIELD APPLIED 0.062"
FLAT PLATE SCRIBED
TO MEET ARCH
ALUM CHANNEL BY
WINDOW INSTALLER

WOOD TRIM

BRICK ARCH HEADER

FIELD APPLIED 0.062"
FLAT PLATE SCRIBED
TO MEET ARCH
ALUM CHANNEL BY
WINDOW INSTALLER

BRICK ARCH HEADER

FIELD APPLIED 0.062"
FLAT PLATE SCRIBED
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WINDOW INSTALLER

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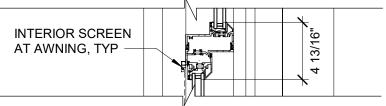
TO MEET ARCH
ALUM CHANNEL BY
WINDOW INSTALLER

BRICK ARCH HEADER

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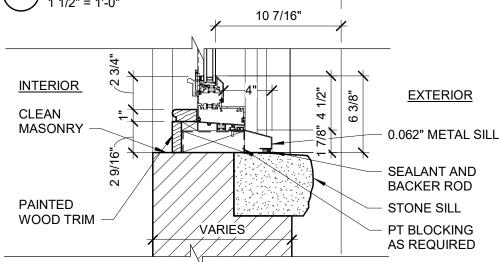
1 11 1 0

5 PROPSOED AWNING WINDOW - MUNTIN DETAIL
1 1/2" = 1'-0"



PROPOSED AWNING WINDOW - MEETING RAIL DETAIL

1 1/2" = 1'-0"



PROPSOED AWNING WINDOW - SILL DETAIL
1 1/2" = 1'-0"

1 PROPOSED AWNING WINDOW - EXTERIOR ELEV

PROPOSED AWNING WINDOW - JAMB DETAIL
1 1/2" = 1'-0"





56 ARBOR, LLC 56 ARBOR STREET HARTFORD, CT 06106 WILL K WILKINS & TRICIA HAGGERTY WENZ

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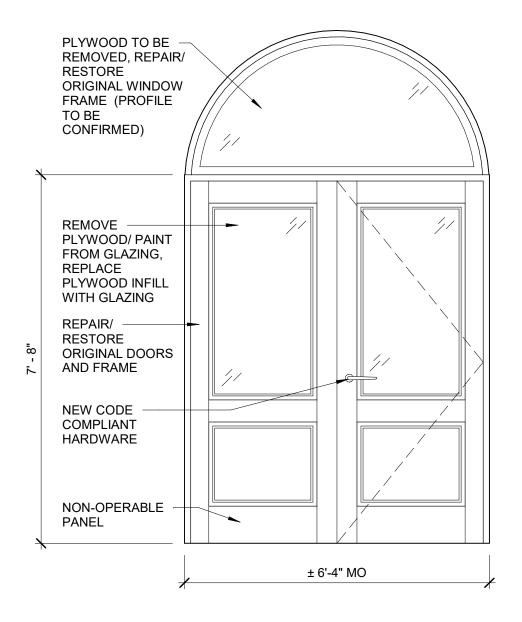
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OB NO:	2126	

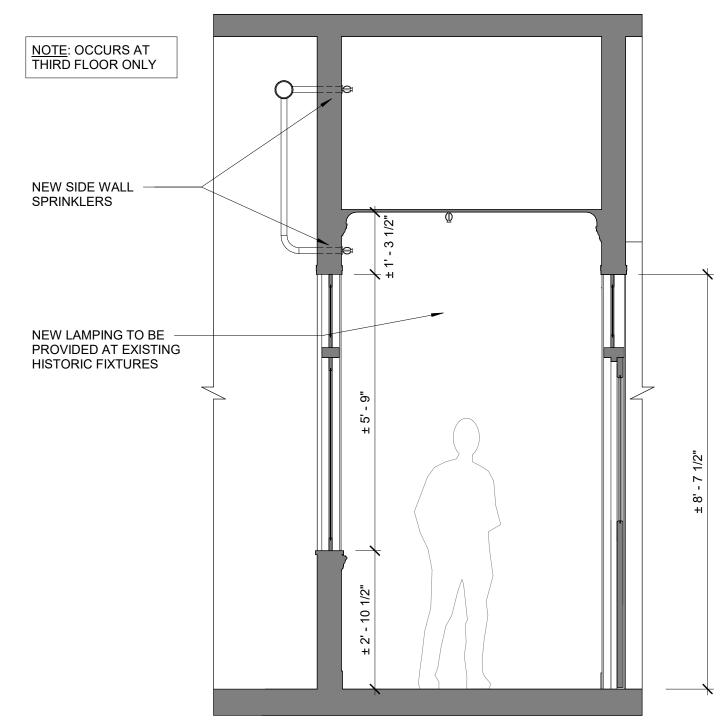
REAL ART WAYS 56 ARBOR STREET HARTFORD, CT 06106 PROPOSED WINDOW DETAILS

DATE ISSUED: 07.05.22
REVISION DATE: 01.13.23, 07.05.23

A50

NOTE: ALL WORK SHOWN ON THIS SHEET SHALL BE COMPLETED IN PHASE II, UNLESS OTHERWISE NOTED





HISTORIC STAIR DOOR-PROPOSED
1/2" = 1'-0"







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WILL K. WILKINS & TRICIA HAGGERTY WENZ

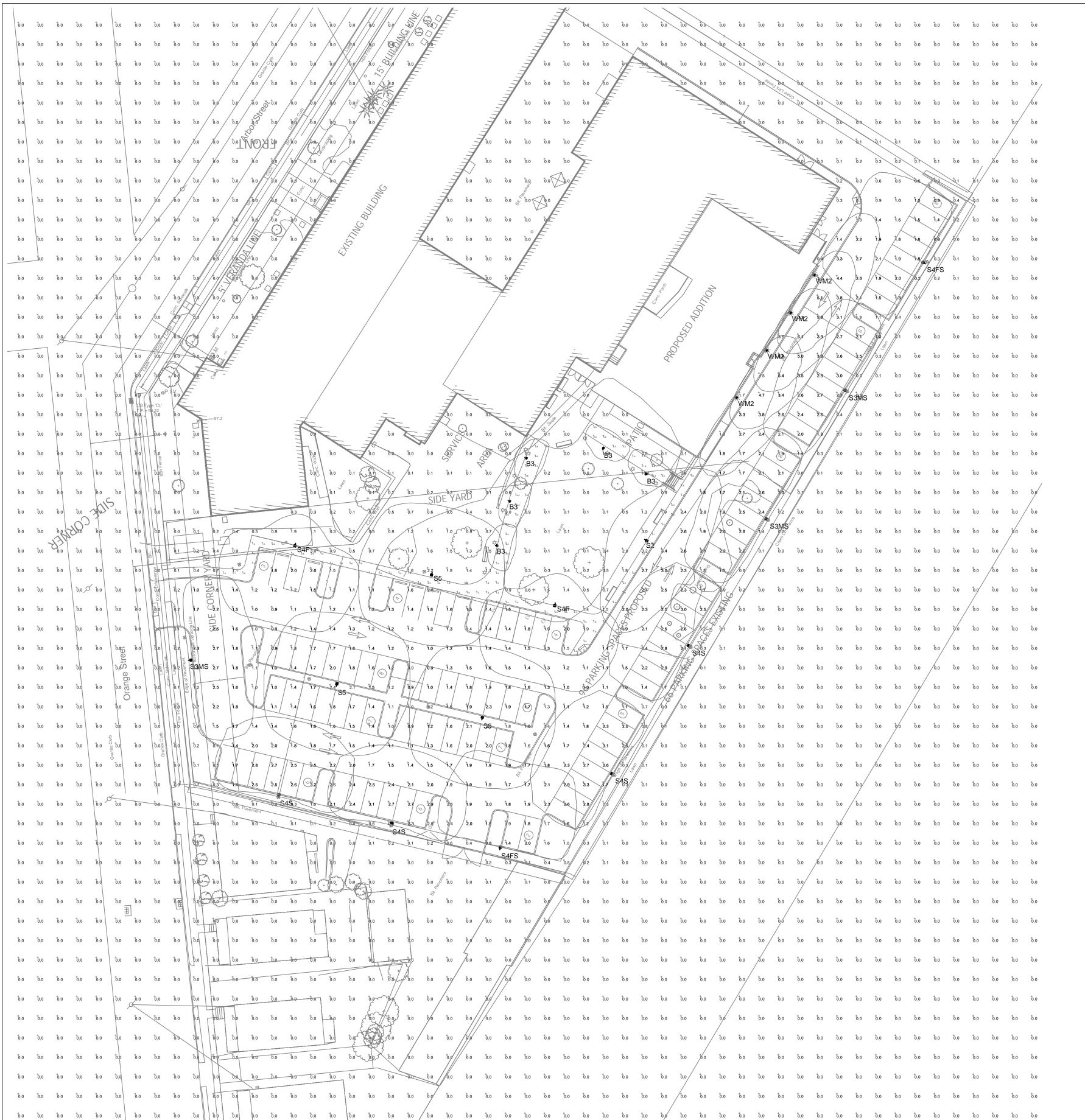
SCALE:	1/2" = 1'-0"	
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REAL ART WAYS
56 ARBOR STREET HARTFORD, CT 06106
PROPOSED HISTORIC FEATURES

A52







JOB NAME: REAL ART WAYS - HARTFORD, CT APEX LIGHTING SOLUTIONS WORKPLANE/CALC PLANE: AT FINISH GRADE MOUNTING HEIGHT: SEE LUMINAIRE SCHEDULE APPS: LED SALES: SP SPECIFIER: FREEMAN COMPANIES

Lumina	Luminaire Schedule										
Qty	Label	Arrangement	Lumens	Input Watts	LLF	BUG Rating	Description				
5	В3	Single	1734	11	0.900	B1-U0-G1	USAL RZRB1-PLED-III-M-20LED-175mA-WW-VOLT-FINISH				
1	S2	Single	6774	55.9	0.900	B2-U0-G2	USAL RZRM-PLED-II-24LED-700mA-30K-VOLT-1-FINISH / MOUNTED TO SNTS 164-11-1-FINISH				
3	S3MS	Single	5012	55.9	0.900	B0-U0-G2	USAL RZRM-PLED-III-M-24LED-700mA-30K-VOLT-1-FINISH-HS-PLED / MOUNTED TO SNTS 164-11-1-FINISH				
2	S4F	Single	6231	55.9	0.900	B1-U0-G2	USAL RZRM-PLED-IV-FT-24LED-700mA-30K-VOLT-1-FINISH / MOUNTED TO SNTS 164-11-1-FINISH				
2	S4FS	Single	4893	55.9	0.900	B0-U0-G2	USAL RZRM-PLED-IV-FT-24LED-700mA-30K-VOLT-1-FINISH-HS-PLED / MOUNTED TO SNTS 164-11-1-FINISH				
4	S4S	Single	5177	55.9	0.900	B0-U0-G2	USAL RZRM-PLED-IV-24LED-700mA-30K-VOLT-1-FINISH-HS-PLED / MOUNTED TO SNTS 164-11-1-FINISH				
3	S5	Single	7011	55.9	0.900	B3-U0-G1	USAL RZRM-PLED-VSQ-M-24LED-700mA-30K-VOLT-1-FINISH / MOUNTED TO SNTS 164-11-1-FINISH				
4	WM2	Single	3206	32.4	0.900	B0-U0-G1	USAL RZR-WM1-PLED-II-20LED-525mA-WW-VOLT-FINISH-HS-PLED / WALL MOUNTED @ 14.5FT AFG TO BOF				

Calculation Summary								
Label	Grid Height	Avg	Max	Min	Avg/Min	Max/Min		
PARKING & DRIVE LANES	0	1.94	6.1	0.3	6.47	20.33		
SIDEWALK	0	3.13	15.4	0.9	3.48	17.11		
SITE	0	0.16	16.2	0.0	N.A.	N.A.		

GENERAL DISCLAIMER:

Calculations have been performed according to IES standards and good practice Some differences between measured values and calculated results may occur due to tolerances in calculation methods, testing procedures, component performance, measurement techniques and field conditions such as voltage and temperature variations. Input data used to generate the attached calculations such as room dimensions, reflectances, furniture and architectural elements significantly affect the lighting calculations. If the real environment conditions do not match the input data, differences will occur between measured values and calculated values.

* LLF Determined Using Current Published Lamp Data

NOTE TO REVIEWER:

Total Light Loss Factor (LLF) applied at time of design is determined by applying the Lamp Lumen Depreciation (LLD) from current lamp manufacturer's catalog, a Luminaire Dirt Depreciation Factor (LDD) based on IES recommended values and a Ballast Factor (BF) from current ballast specification sheets. Application of an incorrect Light Loss Factor (LLF) will result in forecasts of performance that will not accurately depict actual results.

For proper comparison of photometric layouts, it is essential that you insist all designers use correct Light Loss Factors.



20-30 BEAVER ROAD, WETHERSFIELD, CT 06109 TELEPHONE 860.632.8766 / WWW.APEXLTG.COM PHOTOMETRIC CALCULATION

PROJECT TITLE:

DRAWING TITLE: INTERIOR LIGHTING SCALE: 1"=30'-0" DATE: 7/28/23

DRAWN BY: LED

SHEET:

FILE NAME: 2023-07-28 SL-1 REAL ART WAYS - HARTFORD, CT-LED.dwg

REAL ART WAYS

HARTFORD, CT

SOLID STATE LIGHTING

FIXTURE TYPE:

RAZAR BOLLARD-LED

SPECIFICATIONS

OPTICAL HOUSING

Heavy cast low copper aluminum (A356 alloy; <0.2% copper) assembly with integral cooling fins. The Optical Panel mounting surface is milled flat (surface variance <± .003") to facilitate thermal transfer of heat to housing and cooling fins. Minimum wall thickness is .188".

SHAFT & BASE

Extruded aluminum (6061-T6 alloy) riser welded to heavy cast aluminum (A356 alloy; <0.2% copper) base. Riser has minimum wall thickness of .188". Electrical assembly including LED mains driver, LED Emergency driver (optional LED-EM) with batteries, and quick connectors suspended inside riser. Concealed bolts attach the Optical Housing bolts to Riser.

ANCHOR BOLTS

Four 3/8" x 10" x 2" galvanized anchor bolts with couplings, leveling nuts, washers, template, and stainless bolts.

PLED™ OPTICAL MODULES

Emitters (LED's) are arrayed on a metal core PCB panel with each emitter located on a copper thermal transfer pad and enclosed by an LED refractor. The asymmetric distributions have a micro-reflector inside the refractor that re-directs the house side emitter output towards the street side and functions as a house side shielding element. Refractors are injection molded H12 acrylic. Each LED refractor is sealed to the PCB over an emitter and all refractors are retained by an aluminum frame. All refractors in a Panel have the same optical pattern. LED refractors produce standard site/area distributions – Type II, and Type IV. Panels are field replaceable and field rotatable in 90° increments.

LED DRIVER(S)

Constant current electronic with a power factor of >.90 and a minimum operating temperature of -40°F/-40°C. Driver(s) is/are UL and cUL recognized and mounted directly against the Electrical Housing to facilitate thermal transfer, held down by universal clamps to facilitate easy removal. In-line terminal blocks facilitate wiring between the driver and optical arrays. Drivers accept an input of 120-277V, 50/60Hz or 347V-480V, 50,60Hz. (0 - 10V dimmable driver is standard. Driver has a minimum of 3KV internal surge protection. Luminaire supplied with 20KV surge protector for field accessible installation.)

LED EMITTERS

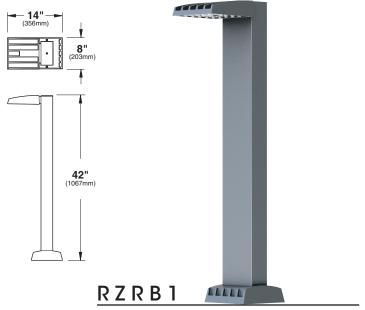
High output LED's are utilized with drive currents ranging from 175mA to 350mA. 70CRI Minimum. LED's are available in standard Neutral White (4000K), or optional Cool White (5000K) or Warm White (3000K). Consult Factory for other LED options.

AMBER LED's

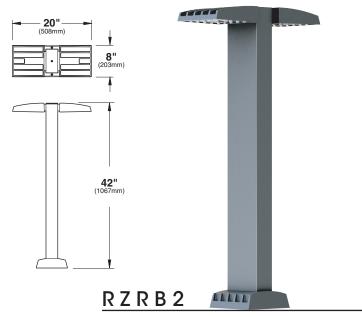
PCA (Phosphor Converted Amber) LED's utilize phosphors to create color output similar to LPS lamps and have a slight output in the blue spectral bandwidth. **TRA** (True Amber) LED's utilize material that emits light in the amber spectral bandwidth only without the use of phosphors.

FINISH

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at 140°F. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. 400°F bake for maximum hardness and durability.



PATENT PENDING



PATENT PENDING

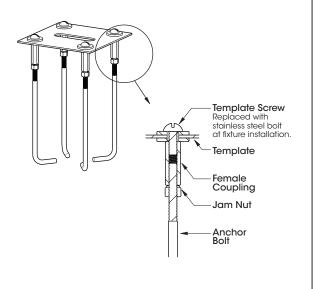




2023080

RAZAR BOLLARD SERIES - LED

ANCHOR BOLT ASSEMBLY



OVERVIEW

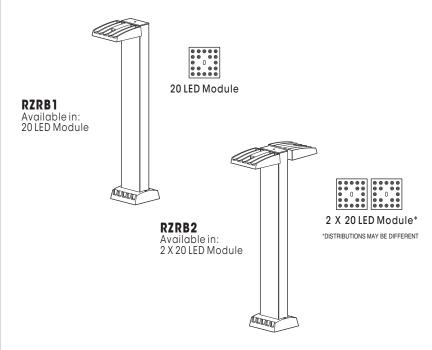
PRECISE CAST ALUMINUM LED MODULE. HOUSING IS VENTED TO PROVIDE AIR FLOW FOR THERMAL MANAGEMENT.

LED DRIVER ACCEPTS FROM 100-277 VAC INPUT VOLTAGE.

PLED® MODULES

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S



MAX INPUT WATTAGE

OF DRIVE CURRENT
LED's 175mA HID EQIV. 350mA HID EQIV.
40 22W 50W 44W 70W
20 12W 50W 22W 70W

Spec/Order Example: RZRB1/PLED-IV/20LED-350mA/CW/277/RAL-8019-S/DF

			mple: RZRB1/PLED-IV/20	DLED-350mA/CW/277/RAL-8019-S/DF		
S P	EC/OF	D E	RIN	G I N	I F O R N	ATION
MODEL	OPTICS		LED MODE		FINISH	OPTIONS
MODEL	OPTICS		LED		FINISH	OPTIONS
RZRB1	PLED® DISTRIBUTION TYPE TYPE II PLED-II	No. LEDs RZRB1¹ □ 20LED RZRB2 □ 40LED	DRIVE CURRENT 175mA¹ 350mA VOLTAGE 120 208 240 277 347 480	COLOR NW (4000K)* *STANDARD CW (5000K) WW (3000K) OTHER LED COLORS AVAILABLE CONSULT FACTORY AMBER ² PHOSPHOR CONVERTED AMBER PCA TRUE AMBER TRA	STANDARD TEXTURED FINISH BLACK RAL-9005-T WHITE RAL-9003-T GREY RAL-7004-T DARK BRONZE RAL-8019-T GREEN RAL-6005-T FOR SMOOTH FINISH REPLACE SUFFIX "T" WITH SUFFIX "S" (EXAMPLE: RAL-9500-S)	HOUSE SIDE SHIELDING
			OT AVAILABLE IN RZRB1 AT 1 AND AMBERS HAVE NO DEFII			☐ 30" ☐ 36"





LED COUNT	SOURCE TYPE	SOURCE	INITIAL LUMENS - 4000K	INITIAL LUMENS - 3000K	INITIAL LUMENS - 5000K	L70 GREATER THAN (HR)	STARTING TEMP.	SYSTEM WATTS	VOLTS	MAX INPUT AMPS
20	LED	20 PLED ° Optical Module - 175mA	1,401 - 1,404	1,226 - 1,229	1,434 - 1,438	60,000+	-20°F	12	120 277	0.24 0.10
20	LED	20 PLED [®] Optical Module - 350mA	2,501 - 2,508	2,190 - 2,196	2,561 - 2,568	60,000+	-20°F	22	120 277	0.34 0.15
40	LED	40 PLED Optical Module - 175mA	2,801 - 2,808	2,452 - 2,459	2,561 - 2,568	60,000+	-20°F	22	120 277	0.38 0.17
40	LED	40 PLED [®] Optical Module - 350mA	5,002 - 5,015	4,379 - 4,391	5,122 - 5,136	60,000+	-20°F	44	120 277	0.38 0.17

NOTES:

- 1. Max Input Amps is the highest of starting, operating, or open circuit currents
- 2. Lumen values for LED Modules vary according to the distribution type
- System Watts includes the source watts and all driver components.
- Fuse value should be sufficient to protect all wiring components. For electronic driver and LED component protection, use 10KV 20KV surge suppressors.
- 5. L70(10K) TM-21 6x rule applied

WARNING: All fixtures must be installed in accordance with local codes or the National Electrical Code. Failure to do so may result in serious personal injury.





RAZAR SERIES - LED LOW PROFILE AREA LUMINAIRE

Optical Housing

Heavy cast, low copper aluminum assembly (A356 alloy, <.2% copper) minimum wall thickness .188". LED Module mounting area is machined to within a 0.002" surface flatness variance for maximum surface contact and thermal conductivity from the LED modules to the radiating fins. Passive radiating fins above the LED Optics provide superior thermal management and long LED life. The optical and electrical compartments are integrated with the support arm to create one assembly. Cast and hinged driver compartment cover allows access to the drivers and wiring.

Electrical Housing w/ Integrated Arm

Heavy cast low copper aluminum (A356 alloy; <0.2% copper) assembly with integral cooling ribs surrounding the electrical compartment and a flat surface on the top of the arm to accommodate a photocell receptacle. Solid barrier wall separates optical and electrical compartments. The optical compartment and electrical compartment with the integrated support arm combine to create one assembly. Minimum wall thickness is .188". Cast and hinged driver assembly cover is integrated with wiring compartment cover.

PLED™ Optics

Emitters (LED's) are arrayed on a metal core PCB panel with each emitter located on a copper thermal transfer pad and enclosed by an LED refractor. LED optics completely seal each individual emitter to meet an IP66 rating. In asymmetric distributions, a micro-reflector inside the refractor re-directs the house side emitter output towards the street side and functions as a house side shielding element. Refractors are injection molded H12 acrylic. Each LED refractor is sealed to the PCB over an emitter and all refractors are retained by an aluminum frame. Any one Panel, or group of Panels in a luminaire, have the same optical pattern. LED refractors produce standard site/area distributions. Panels are field replaceable and field rotatable in 90° increments.

LED Driver(s)

Constant current electronic with a power factor of >.90 and a minimum operating temperature of -40°F/-40°C. Driver(s) is/are UL and cUL recognized and mounted directly against the Electrical Housing to facilitate thermal transfer, held down by universal clamps to facilitate easy removal. In-line terminal blocks facilitate wiring between the driver and optical arrays. Drivers accept an input of 120-277V, 50/60Hz or 347V-480V, 50,60Hz, (0 - 10V dimmable driver is standard. Driver has a minimum of 3KV internal surge protection. Luminaire supplied with 20KV surge protector for field accessible installation.)

LED Emitters

High output LED's are utilized with drive currents ranging from 350mA to 1050mA. 70CRI Minimum. LED's are available in standard Neutral White (4000K), or optional Cool White (5000K) or Warm White (3000K). Consult Factory for other LED options.

TRA (True Amber) LED's utilize material that emits light in the amber spectral bandwidth only without the use of phosphors.

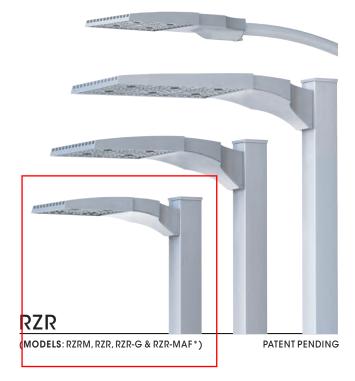
Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at 140°F. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. 400°F bake for maximum hardness and durability.

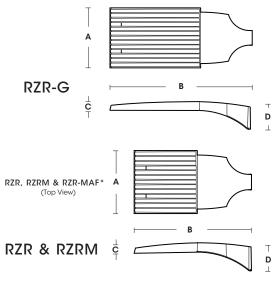
Mast Arm Fitter/Electrical Housing

Replaces standard Electrical Housing. Fits standard 2 3/8" O.D. horizontal tenon. Two (2) straps with two (2) bolts each encircle the lower half of the tenon. Upper half of the tenon rests on self-centering steps that position the angle of the luminaire at 0° , +1.5°, +1.5 or +3° up from the horizontal. All hardware is stainless steel.

PROJECT NAME:

PROJECT TYPE:





FIXTURE	Α	В	С	D	
RZR-G	15"	36.5"	3"	7"	
	381mm	927mm	76mm	187mm	
RZR	14.75"	28.25"	2.75 "	6.5 "	
	375mm	718mm	70mm	165mm	
RZRM	11.5"	22"	2.5"	5.25 "	
	292mm	559mm	64mm	133mm	
RZR-MAF	15"	28.25"	2.5"	4"	
	381mm	724mm	64mm	102mm	



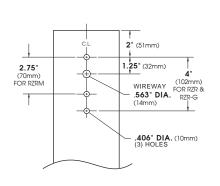
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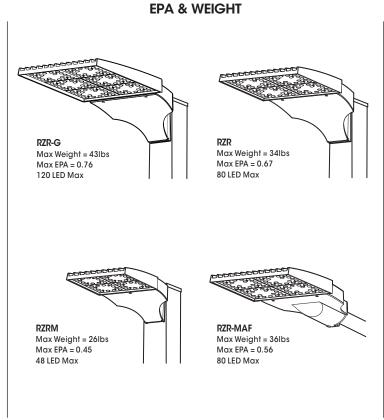


RZR-MAF*

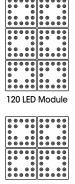
SPECIFICATIONS

POLE DRILLING TEMPLATE





PLED™ MODULES



80 LED Module



48 LED Module



24 LED Module

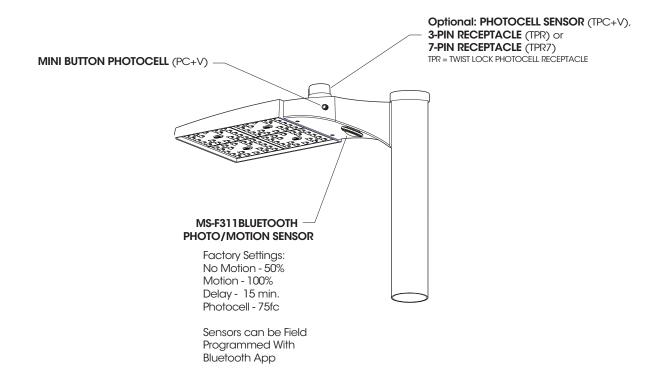
ORDERING INFORMATION

Spec/Order Example: RZR/PLED-IV/80LED-700mA/CW/277/RAL-8019-S

Luminaire	Optics		LED Mode		Voltage	Mounting	Finish	Options		
						,				
Luminaire	Optics		LED		Voltage	Mounting	Finish	Options		
	PLED™ Distribution Type		# of LEDs RZR-G	Drive Current	Color Temp - CCT		Arm Mount	Standard Textured Finish	☐ Internal House Side :	
☐ RZR-G	Type II PLED-II		☐ 120LED	☐ 1050mA¹ ☐ 875mA¹	☐ 27K (2700K) ☐ 30K (3000K)	☐ 120 ☐ 208	□ 1 = -	□ Black RAL-9005-T	(Example: HS-PLED/48) External Glare Shield 4 Sided	HS-PLED EGS4
	Type II Front Row PLED-II-FR		_	☐ 700 mA¹	☐ 40K (4000K)	□ 240	□ 2-180	☐ White RAL-9003-T	External Glare Shield3 Sided Rear Wedge	
	Type III Median			☐ 525mA	□ 50K (5000K)	□ 277	☐ 2-90 —	Grey RAL-7004-T	Round Pole Adapter	
☐ RZR	PLED-II-MIL		RZR/RZR-MA		☐ TRA True Amber²	□ 347 □ 480		☐ Dark Bronze RAL-8019-T	Twist Lock Receptab Only	TPR
☐ RZR-MAF	Type III Med. PLED-III		☐ 80LED ☐ 40LED		Consult Factory		□ 3-90	☐ Green	7-Pin Twist Lock Receptable Only	TPR7
	Type III Wide		40110		for Other LED Color, CCT, & CRI Options		□ 3-120	RAL-6005-T	☐ High-Low Dimming for Switch by Others/Select Levels 50/100 or 25/10	ct
	☐ Type IV						☐ 4-90 ■ 1 ■	Premium Finishes	(Example: HLSW/25)	HLSW
☐ RZRM	PLED-IV		RZRM	NOTES:	l 1050mA not for use			☐ Rust	Twist Lock Photocell (Example: TPC347V)	TPC+V
	Type IV PLED-IV-FT		48LED with TRA LED's 2-Available in 3 drive current		D's		Wall Mount	☐ Patina Copper	Photo Cell + Voltage (Example: PC120V)	PC+V
	Type V Narrow PLED-VSQ-N						 □ wm ■	PC	Single Fuse (120V, 277V)	SF
	Type V Med.		Consult Factory for Other Drive Currents					For smooth finish replace suffix "T"	Double Fuse (208V, 240V)	DF
	Type V Wide					WM - Wall Mount provided with mounting bracket and cover.	with suffix "S" (Example: RAL-9500-S)	Blue-Tooth Programs Photo/Motion Senso (Factory - Motion 50/100	or	
	PLED-V-SQ-W							Consult factor for custom colors	Photo 75fc)	MS-F311



OPTIONS



High Low Dimming For Switches (HLSW)

The HLSW is a Small Electronic Switch which Provides High Low Dimming Control Through the LED Driver's 0-10V Control. Switching is Done by Adding a Seconday AC Switched Hot Trigger Line to the HLSW in Addition to the Normal AC Power Line. When the Secondary Trigger Line is Powered, the Fixture will go to 100% Dimming. With no Power to the Trigger, the Fixture will operate at 50% or 25% Dimming. Switches for the Trigger Line can be a Normal AC Switch/Breaker or Timed Switch/Breaker.

Wireless and Other Fixture Controls

Contact Factory for Wireless and Other Fixture Controls and Recomendations. Most Controls Can be Integrated and Factory Installed.

EXTERNAL GLARE SHIELDS



EGS4 - 4 Sided Shield

Minimum Cutoff = 12° Average Cutoff = 23°



EGS3W - 3 Sided Shield

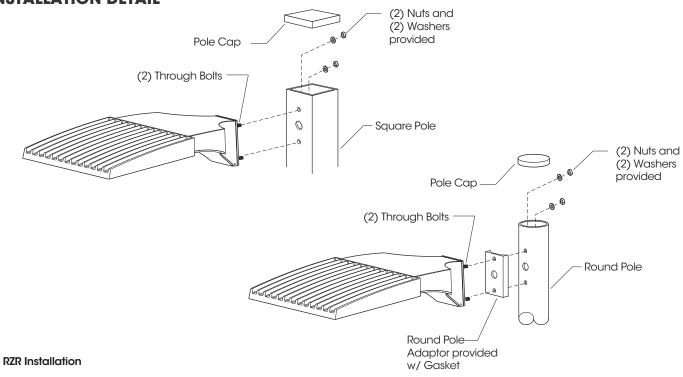
Minimum Rear Cutoff = 12° Average Rear Cutoff = 23° Minimum Side Cutoff = 4° Average Side Cutoff = 16°

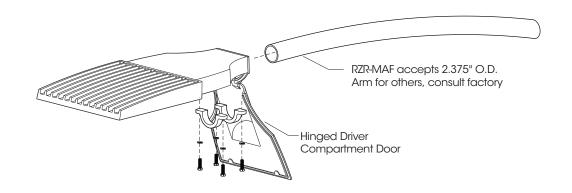
Glare Shields are rotatable on RZR and RZRM. Consult factory for custom applications.

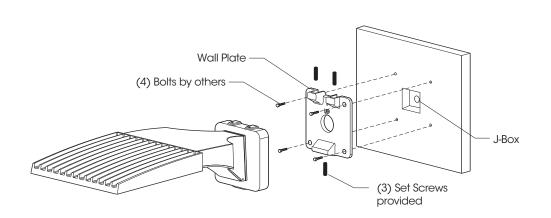




INSTALLATION DETAIL







RZR-WM Installation

RZR-MAF Installation





PHOTOMETRIC DATA GUIDE - LM-80 LUMEN MAINTENANCE

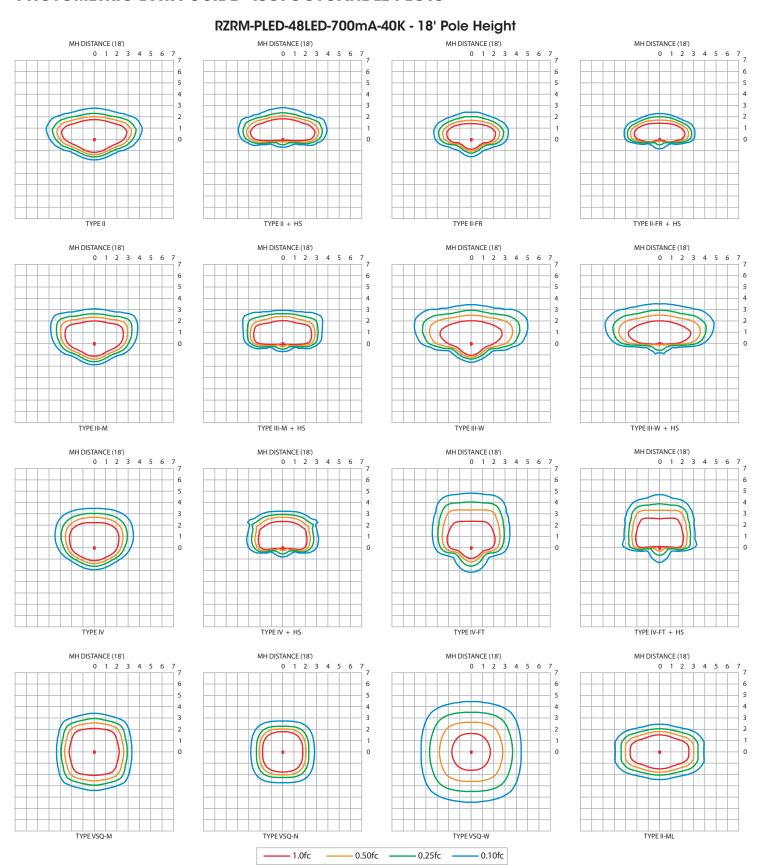
LED Life / Operating Hours	Lumen Depreciation	Lumen Depreciation Scale Factor
60,000 (10x Test Time Calculated)	L94	0.94x
100,000 (Theoretical Calculated)	L92	0.92x
150,000 (Theoretical Calcualted)	L89	0.89x

Lumen Depreciation Calculations Done in Accordance With IESNA TM-21 & LM-80 (25°C Ambient) TM-21 6x Test Time Dicatates that L94 > 60,000 Hours.

ELECTRICAL DATA GUIDE - AMPERAGE CHARTS

# of LEDs	mA	System Watts	120V	208V	277V	347V	480V
24	350	28	0.24	0.14	0.10	0.08	0.06
24	525	42	0.35	0.20	0.15	0.12	0.09
24	700	56	0.47	0.27	0.20	0.16	0.12
24	875	68	0.57	0.33	0.24	0.20	0.14
24	1050	82	0.68	0.39	0.30	0.24	0.17
48	350	53	0.44	0.25	0.19	0.15	0.11
48	525	79	0.66	0.38	0.29	0.23	0.16
48	700	105	0.88	0.51	0.38	0.30	0.22
48	875	132	1.10	0.63	0.48	0.38	0.27
48	1050	160	1.33	0.77	0.58	0.46	0.33
40	350	43	0.36	0.21	0.15	0.12	0.09
40	525	65	0.54	0.31	0.23	0.19	0.13
40	700	87	0.72	0.42	0.31	0.25	0.18
40	875	108	0.90	0.52	0.39	0.31	0.23
40	1050	128	1.07	0.62	0.46	0.37	0.27
80	350	85	0.71	0.41	0.31	0.25	0.18
80	525	129	1.08	0.62	0.47	0.37	0.27
80	700	174	1.45	0.83	0.63	0.50	0.36
80	875	216	1.80	1.04	0.78	0.62	0.45
80	1050	256	2.14	1.23	0.93	0.74	0.53
120	350	130	1.08	0.63	0.47	0.37	0.27
120	525	192	1.60	0.92	0.69	0.55	0.40
120	700	260	2.17	1.25	0.94	0.75	0.54
120	875	329	2.74	1.58	1.19	0.95	0.69
120	1050	398	3.32	1.91	1.44	1.15	0.83



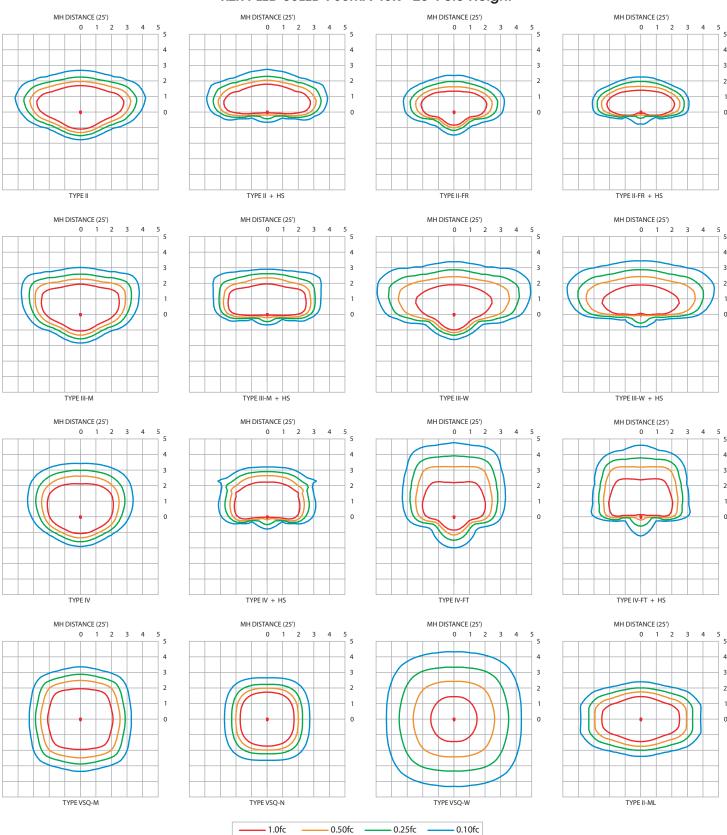


IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html





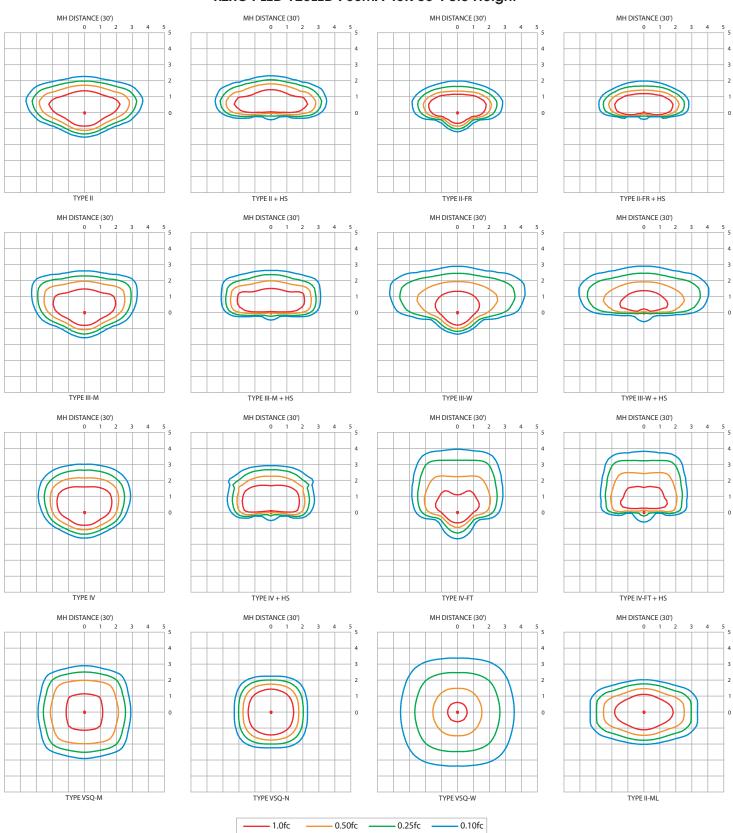
RZR-PLED-80LED-700mA-40K - 25' Pole Height







RZRG-PLED-120LED-700mA-40K 30' Pole Height







PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRM-PLED)

									RZ	R-M-PL	.ED								
LED	Drive	System	Dist'n	27	K (2700I	(- 70CRI)	30K	(3000K	- 70CRI)	40k	(4000K	- 70CRI)	50K	(5000K -	- 70CRI)	System	Т	RA (590	nm)
Count	Current (mA)	Watts	Туре	LUMENS	LPW	BUG RATING	LUMENS	LPW	BUG RATING	LUMENS	LPW	BUG RATING	LUMENS	LPW	BUG RATING	Watts	LUMENS	LPW	BUG RATING
			II	3436	122	B1-U0-G1	3709	132	B1-U0-G1	3904	138	B1-U0-G1	4100	145	B1-U0-G1		1363	68	B1-U0-G1
			II-FR II-ML	3459	123	B1-U0-G1	3734 3709	132	B1-U0-G1	3930 3905	139	B1-U0-G1	4127 4100	146 145	B1-U0-G1	ļ	1372	69 68	B1-U0-G0
			II-IVIL	3436 3496	122 124	B2-U0-G2 B1-U0-G1	3709	132 134	B2-U0-G2 B1-U0-G1	3905	138 141	B2-U0-G2 B1-U0-G1	4100	145	B2-U0-G2 B1-U0-G1	-	1363 1387	69	B1-U0-G1 B1-U0-G0
			III-W	3246	115	B1-U0-G1	3505	124	B1-U0-G1	3689	131	B1-U0-G1	3873	137	B1-U0-G1	1	1289	64	B0-U0-G1
			IV	3469	123	B1-U0-G1	3746	133	B1-U0-G1	3943	140	B1-U0-G1	4140	147	B1-U0-G1]	1377	69	B1-U0-G1
			IV-FT	3161	112	B1-U0-G1	3412	121	B1-U0-G1	3592	127	B1-U0-G1	3771	134	B1-U0-G1		1254	63	B0-U0-G1
24	350	28.2	VSQ-N VSQ-M	3627 3556	129 126	B2-U0-G0 B2-U0-G1	3915 3838	139 136	B2-U0-G0 B2-U0-G1	4121 4041	146 143	B2-U0-G0 B2-U0-G1	4327 4242	153 150	B2-U0-G1 B3-U0-G1	20.0	1439 1410	72 71	B1-U0-G0 B1-U0-G0
			VSQ-W	3471	123	B3-U0-G1	3748	133	B3-U0-G1	3945	140	B3-U0-G1	4142	147	B3-U0-G1	ĺ	1377	69	B1-U0-G1
			II-HS	2513	89	B0-U0-G1	2713	96	B0-U0-G1	2856	101	B0-U0-G1	2998	106	B0-U0-G1]	997	50	B0-U0-G0
			II-FR-HS	2556 2543	91 90	B0-U0-G0 B0-U0-G1	2759 2745	98 97	B0-U0-G0 B0-U0-G1	2905 2889	103 102	B0-U0-G0 B0-U0-G1	3050 3034	108 108	B0-U0-G0 B0-U0-G1		1014 1008	51 50	B0-U0-G0 B0-U0-G0
			III-W-HS	2488	88	B0-00-G1	2686	95	B0-00-G1	2827	100	B0-00-G1	2969	105	B0-U0-G1	1	987	49	B0-00-G0 B0-U0-G1
			IV-HS	2626	93	B0-U0-G1	2835	101	B0-U0-G1	2984	106	B0-U0-G1	3133	111	B0-U0-G1	İ	1042	52	B0-U0-G0
			IV-FT-HS	2481	88	B0-U0-G1	2679	95	B0-U0-G1	2820	100	B0-U0-G1	2961	105	B0-U0-G1		985	49	B0-U0-G1
			II-FR	4908 4941	118 119	B1-U0-G1 B1-U0-G1	5298 5334	128 129	B1-U0-G1	5577 5614	134 135	B1-U0-G1	5856 5895	141	B2-U0-G1		1586 1598	51 52	B1-U0-G1
			II-FIX	4941	118	B1-00-G1 B2-U0-G2	5299	129	B1-U0-G1 B2-U0-G2	5578	135	B2-U0-G1 B2-U0-G2	5856	142	B2-U0-G1 B3-U0-G3		1598	51	B1-U0-G0 B1-U0-G1
			III-M	4994	120	B1-U0-G1	5392	130	B1-U0-G1	5675	137	B1-U0-G1	5959	144	B1-U0-G2	İ	1615	52	B1-U0-G0
			III-W	4637	112	B1-U0-G2	5005	121	B1-U0-G2	5269	127	B1-U0-G2	5533	133	B1-U0-G2		1500	48	B0-U0-G1
			IV-FT	4956 4515	119 109	B1-U0-G1 B1-U0-G2	5350 4875	129 117	B1-U0-G1 B1-U0-G2	5632 5131	136 124	B1-U0-G1 B1-U0-G2	5913 5388	142 130	B1-U0-G2 B1-U0-G2		1602 1460	52 47	B1-U0-G1 B0-U0-G1
			VSQ-N	5180	125	B1-00-G2 B2-U0-G1	5592	135	B1-00-G2 B2-U0-G1	5886	142	B1-00-G2 B2-U0-G1	6181	149	B2-U0-G1		1676	54	B1-U0-G0
24	525	41.5	VSQ-M	5080	122	B3-U0-G1	5484	132	B3-U0-G1	5772	139	B3-U0-G1	6061	146	B3-U0-G1	31.0	1643	53	B1-U0-G0
			VSQ-W	4959	119	B3-U0-G2	5353	129	B3-U0-G2	5635	136	B3-U0-G2	5917	143	B3-U0-G2		1603	52	B1-U0-G1
			II-HS II-FR-HS	3589 3652	86 88	B0-U0-G1 B0-U0-G1	3875 3942	93 95	B0-U0-G1 B0-U0-G1	4079 4150	98 100	B0-U0-G1 B0-U0-G1	4282 4357	103 105	B0-U0-G1 B0-U0-G1	-	1161 1181	37 38	B0-U0-G0 B0-U0-G0
			III-M-HS	3631	88	B0-00-G1	3920	94	B0-00-G1	4127	99	B0-00-G1	4333	103	B0-U0-G1	1	1174	38	B0-U0-G0
			III-W-HS	3555	86	B0-U0-G2	3838	92	B0-U0-G2	4040	97	B0-U0-G2	4242	102	B0-U0-G2	1	1150	37	B0-U0-G1
			IV-HS	3751	90	B0-U0-G1	4050	98	B0-U0-G1	4263	103	B0-U0-G1	4476	108	B0-U0-G1		1213	39	B0-U0-G0
			IV-FT-HS	3545 6275	85 112	B0-U0-G2 B2-U0-G1	3827 6774	92 121	B0-U0-G2 B2-U0-G2	4029 7130	97 128	B0-U0-G2 B2-U0-G2	4230 7487	102 134	B0-U0-G2 B2-U0-G2		1146	37	B0-U0-G1
			II-FR	6317	113	B2-U0-G1	6819	122	B2-U0-G1	7178	128	B2-U0-G1	7537	135	B2-U0-G1	1			
			II-ML	6275	112	B3-U0-G3	6774	121	B3-U0-G3	7130	128	B3-U0-G3	7487	134	B3-U0-G3]			
			III-W	6385 5928	114 106	B2-U0-G2 B1-U0-G2	6893	123 114	B2-U0-G2	7256	130	B2-U0-G2	7618	136	B2-U0-G2	ļ			
			IV	6337	113	B1-U0-G2 B2-U0-G2	6399 6841	122	B1-U0-G2 B2-U0-G2	6736 7201	121 129	B1-U0-G2 B2-U0-G2	7073 7561	127 135	B1-U0-G2 B2-U0-G2	-			
			IV-FT	5772	103	B1-U0-G2	6231	111	B1-U0-G2	6559	117	B1-U0-G2	6887	123	B1-U0-G2	1			
24	700	55.9	VSQ-N	6624	118	B2-U0-G1	7151	128	B2-U0-G1	7527	135	B2-U0-G1	7903	141	B3-U0-G1	N/A		N/A	
			VSQ-M VSQ-W	6494 6340	116 113	B3-U0-G1 B3-U0-G2	7011	125 122	B3-U0-G1 B3-U0-G2	7380 7204	132 129	B3-U0-G1 B3-U0-G2	7749	139 135	B3-U0-G2	,		,	
			II-HS	4589	82	B3-00-G2 B1-U0-G1	6844 4954	89	B3-U0-G2 B1-U0-G2	5215	93	B3-U0-G2 B1-U0-G2	7565 5475	98	B3-U0-G2 B1-U0-G2	-			
			II-FR-HS	4668	84	B0-U0-G1	5040	90	B0-U0-G1	5305	95	B0-U0-G1	5570	100	B0-U0-G1	İ			
			III-M-HS	4643	83	B0-U0-G2	5012	90	B0-U0-G2	5276	94	B0-U0-G2	5539	99	B0-U0-G2				
			III-W-HS	4544 4796	81 86	B0-U0-G2 B0-U0-G2	4906 5177	88 93	B0-U0-G2 B0-U0-G2	5164 5450	92 97	B0-U0-G2 B0-U0-G2	5422 5722	97 102	B0-U0-G2 B0-U0-G2	-			
			IV-FT-HS	4532	81	B0-U0-G2	4893	88	B0-U0-G2	5150	92	B0-U0-G2	5408	97	B0-U0-G2	1			
			II	7406	109	B2-U0-G2	7995	118	B2-U0-G2	8416	124	B2-U0-G2	8837	130	B2-U0-G2				
			II-FR II-ML	7456	110 109	B2-U0-G1	8049	119	B2-U0-G1	8473	125	B2-U0-G1	8896	131	B2-U0-G1				
			II-IVIL	7406 7536	111	B3-U0-G3 B2-U0-G2	7995 8135	118 120	B3-U0-G3 B2-U0-G2	8416 8563	124 126	B3-U0-G3 B2-U0-G2	8837 8992	130 133	B3-U0-G3 B2-U0-G2				
			III-W	6997	103	B1-U0-G2	7553	111	B1-U0-G2	7951	117	B2-U0-G2	8348	123	B2-U0-G2	İ			
			IV	7479	110	B2-U0-G2	8073	119	B2-U0-G2	8498	125	B2-U0-G2	8923	132	B2-U0-G2				
			IV-FT VSQ-N	6813 7817	100 115	B1-U0-G2 B2-U0-G1	7355 8439	108 124	B2-U0-G2 B3-U0-G1	7742 8883	114 131	B2-U0-G2 B3-U0-G1	8129 9327	120 138	B2-U0-G2 B3-U0-G1				
24	875	67.8	VSQ-M	7665	113	B3-U0-G1	8275	122	B3-U0-G1	8711	128	B3-U0-G1 B3-U0-G2	9146	135	B3-U0-G1	N/A		N/A	
			VSQ-W	7482	110	B3-U0-G2	8078	119	B3-U0-G2	8503	125	B4-U0-G2	8928	132	B4-U0-G2				
			II-HS	5417	80	B1-U0-G2	5847	86	B1-U0-G2	6155	91	B1-U0-G2	6463	95	B1-U0-G2				
			II-FR-HS III-M-HS	5510 5480	81 81	B0-U0-G1 B0-U0-G2	5948 5916	88 87	B1-U0-G1 B0-U0-G2	6261 6227	92 92	B1-U0-G1 B0-U0-G2	6574 6538	97 96	B1-U0-G1 B0-U0-G2				
			III-W-HS	5363	79	B0-00-G2 B0-U0-G2	5790	85	B0-00-G2 B0-U0-G2	6095	90	B0-00-G2 B0-U0-G2	6399	94	B0-U0-G2	1			
			IV-HS	5660	83	B0-U0-G2	6110	90	B0-U0-G2	6432	95	B0-U0-G2	6753	100	B0-U0-G2				
			IV-FT-HS	5349	79	B0-U0-G2	5775	85	B0-U0-G2	6078	90	B0-U0-G2	6382	94	B0-U0-G2				
			II-FR	8513 8570	104 105	B2-U0-G2 B2-U0-G1	9190 9252	112	B2-U0-G2 B2-U0-G1	9674 9739	118 119	B2-U0-G2 B2-U0-G1	10157 10225	124 125	B2-U0-G2 B2-U0-G1				
			II-ML	8513	103	B3-U0-G3	9190	112	B3-U0-G3	9674	118	B3-U0-G3	10157	124	B3-U0-G3				
			III-M	8662	106	B2-U0-G2	9351	114	B2-U0-G2	9843	120	B2-U0-G2	10335	126	B2-U0-G2				
			III-W	8042 8596	98 105	B2-U0-G2 B2-U0-G2	8682 9280	106 113	B2-U0-G2 B2-U0-G2	9139 9768	111	B2-U0-G3 B2-U0-G2	9595 10256	117 125	B2-U0-G3				
			IV-FT	7831	95	B2-U0-G2 B2-U0-G2	9280 8454	103	B2-U0-G2 B2-U0-G2	8899	109	B2-U0-G2 B2-U0-G3	9344	114	B2-U0-G2 B2-U0-G3				
24	1050	82.0	VSQ-N	8985	110	B3-U0-G1	9700	118	B3-U0-G1	10210	125	B3-U0-G1	10721	131	B3-U0-G1	B3-U0-G2 N/A N/A			
24	1000	02.0	VSQ-M	8811	107	B3-U0-G2	9512	116	B3-U0-G2	10012	122	B3-U0-G2	10513	128			IN/A		
			VSQ-W II-HS	8601 6226	105 76	B4-U0-G2 B1-U0-G2	9285 6721	113 82	B4-U0-G2 B1-U0-G2	9773 7075	119	B4-U0-G3 B1-U0-G2	10262	125 91	125 B4-U0-G3				
			II-HS II-FR-HS	6333	77	B1-U0-G2 B1-U0-G1	6837	83	B1-U0-G2 B1-U0-G1	7075	86 88	B1-U0-G2 B1-U0-G1	7429 7557	91	B1-U0-G2 B1-U0-G1				
			III-M-HS	6299	77	B0-U0-G2	6799	83	B0-U0-G2	7158	87	B0-U0-G2	7515	92	B1-U0-G2				
			III-W-HS	6165	75	B0-U0-G2	6655	81	B0-U0-G2	7005	85	B0-U0-G2	7356	90	B0-U0-G2				
			IV-HS IV-FT-HS	6506 6148	79 75	B0-U0-G2 B0-U0-G2	7023 6637	86 81	B0-U0-G2 B0-U0-G2	7393 6986	90 85	B1-U0-G2 B1-U0-G3	7762 7336	95 89	B1-U0-G2 B1-U0-G3	1-U0-G2			
			1 V 1 1-113	0140		50-00-02	5057	υı	1 20-00-02	J700	00	D1-00-G3	/ 550	07	D1-00-G0				

IES File downloads for this product can be found at www.usaltg.com/downloads/asr.html





PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRM-PLED)

									RZ	R-M-PL	.ED								
LED	Drive	System	Dist'n	271	K (2700I	K - 70CRI)	301	(3000	K - 70CRI)	401	(4000l	(- 70CRI)	50k	(5000)	(- 70CRI)	System	1	TRA (590	Onm)
Count	Current (mA)	Watts	Туре	LUMENS	LPW	BUG RATING	Watts	LUMENS	LPW	BUG RATING									
			II	6836	130	B2-U0-G2	7380	141	B2-U0-G2	7769	148	B2-U0-G2	8157	155	B2-U0-G2		2713	66	B1-U0-G1
			II-FR	6882	131	B2-U0-G1	7430	142	B2-U0-G1	7821	149	B2-U0-G1	8212	156	B2-U0-G1		2731	67	B1-U0-G1 B1-U0-G1
			II-ML III-M	6837 6956	130 132	B3-U0-G3 B2-U0-G2	7380 7509	141	B3-U0-G3 B2-U0-G2	7769 7905	148 151	B3-U0-G3 B2-U0-G2	8157 8300	155 158	B3-U0-G3 B2-U0-G2		2713 2760	66 67	B1-U0-G1
			III-W	6459	123	B1-U0-G2	6972	133	B1-U0-G2	7339	140	B1-U0-G2	7706	147	B1-U0-G2		2563	63	B1-U0-G1
			IV-FT	6903 6289	131 120	B2-U0-G2 B1-U0-G2	7453 6789	142 129	B2-U0-G2 B1-U0-G2	7845 7146	149 136	B2-U0-G2 B1-U0-G2	8237 7503	157 143	B2-U0-G2 B2-U0-G2		2740 2496	67 61	B1-U0-G1 B1-U0-G1
48	350	52.5	VSQ-N	7216	137	B1-00-G2 B2-U0-G1	7790	148	B2-U0-G1	8200	156	B3-U0-G1	8610	164	B3-U0-G1	41.0	2864	70	B1-00-G1
40	330	32.3	VSQ-M	7076	135	B3-U0-G1	7639	146	B3-U0-G2	8041	153	B3-U0-G2	8443	161	B3-U0-G2	41.0	2808	68	B2-U0-G1
			VSQ-W II-HS	6907 5000	132 95	B3-U0-G2 B1-U0-G2	7456 5398	142	B3-U0-G2 B1-U0-G2	7849 5682	150 108	B3-U0-G2 B1-U0-G2	8242 5966	157 114	B3-U0-G2 B1-U0-G2		2741 1984	67 48	B2-U0-G1 B0-U0-G1
			II-FR-HS	5087	97	B0-U0-G1	5491	105	B0-U0-G1	5780	110	B1-U0-G1	6069	116	B1-U0-G1		2018	49	B0-U0-G0
			III-M-HS	5059	96	B0-U0-G2	5461	104	B0-U0-G2	5748	109	B0-U0-G2	6036	115	B0-U0-G2		2007	49	B0-U0-G1
			III-W-HS IV-HS	4952 5224	94 100	B0-U0-G2 B0-U0-G2	5345 5640	102 107	B0-U0-G2 B0-U0-G2	5627 5937	107 113	B0-U0-G2 B0-U0-G2	5908 6234	113 119	B0-U0-G2 B0-U0-G2		1965 2074	48 51	B0-U0-G1 B0-U0-G1
			IV-FT-HS	4938	94	B0-U0-G2	5330	102	B0-U0-G2	5611	107	B0-U0-G2	5892	112	B0-U0-G2		1960	48	B0-U0-G1
				9720	123	B2-U0-G2	10493	133	B2-U0-G2	11046	140	B2-U0-G2	11598	147	B2-U0-G2		3143	51	B1-U0-G1
			II-FR II-ML	9785 9720	124 123	B2-U0-G1 B3-U0-G3	10564 10494	134 133	B2-U0-G1 B3-U0-G3	11120 11046	141 140	B2-U0-G1 B3-U0-G3	11676 11598	148 147	B3-U0-G1 B3-U0-G3		3164 3143	51 51	B1-U0-G1 B2-U0-G2
			III-M	9891	125	B2-U0-G2	10677	135	B2-U0-G2	11240	142	B2-U0-G2	11801	149	B2-U0-G2		3198	52	B1-U0-G1
			III-W	9183	116	B2-U0-G3	9914	125	B2-U0-G3	10436	132	B2-U0-G3	10958	139	B2-U0-G3		2969	48	B1-U0-G1
			IV-FT	9816 8942	124 113	B2-U0-G2 B2-U0-G2	10597 9653	134 122	B2-U0-G2 B2-U0-G3	11155 10161	141 129	B2-U0-G2 B2-U0-G3	11712 10669	148 135	B2-U0-G2 B2-U0-G3		3174 2892	51 47	B1-U0-G1 B1-U0-G1
48	525	79.0	VSQ-N	10260	130	B3-U0-G1	11075	140	B3-U0-G1	11659	148	B3-U0-G1	12242	155	B3-U0-G1	62.0	3317	54	B2-U0-G0
			VSQ-M VSQ-W	10060 9821	127 124	B3-U0-G2 B4-U0-G3	10861 10602	137 134	B4-U0-G2 B4-U0-G3	11432 11160	145 141	B4-U0-G2 B4-U0-G3	12004 11718	152 148	B4-U0-G2 B4-U0-G3		3253 3175	52 51	B2-U0-G1 B2-U0-G1
			II-HS	7110	90	B1-U0-G3	7675	97	B1-U0-G2	8079	102	B1-U0-G2	8483	107	B1-U0-G3		2298	37	B0-U0-G1
			II-FR-HS	7231	92	B1-U0-G1	7806	99	B1-U0-G1	8217	104	B1-U0-G1	8628	109	B1-U0-G1		2339	38	B0-U0-G0
			III-M-HS	7192 7040	91 89	B0-U0-G2 B0-U0-G2	7764 7600	98 96	B1-U0-G2 B0-U0-G2	8173 8000	103 101	B1-U0-G2 B1-U0-G2	8581 8400	109 106	B1-U0-G2 B1-U0-G2		2325 2276	38 37	B0-U0-G1 B0-U0-G1
			IV-HS	7429	94	B1-U0-G2	8020	102	B1-U0-G2	8442	107	B1-U0-G2 B1-U0-G2	8864	112	B1-00-G2 B1-U0-G2		2402	39	B0-00-G1
			IV-FT-HS	7020	89	B1-U0-G3	7579	96	B1-U0-G3	7978	101	B1-U0-G3	8377	106	B1-U0-G3		2270	37	B0-U0-G1
			II-FR	12226 12308	116 117	B2-U0-G2 B3-U0-G1	13199 13287	126 126	B2-U0-G2 B3-U0-G1	13894 13986	132 133	B2-U0-G2 B3-U0-G1	14588 14686	139 140	B3-U0-G2 B3-U0-G1				
			II-ML	12227	116	B3-U0-G1 B3-U0-G3	13200	126	B3-U0-G3	13894	132	B3-U0-G1	14589	139	B3-00-G1 B4-U0-G4				
			III-M	12440	118	B2-U0-G2	13430	128	B2-U0-G2	14137	135	B2-U0-G2	14843	141	B2-U0-G2				
			III-W IV	11550 12346	110 117	B2-U0-G3 B2-U0-G2	12468 13329	119 127	B2-U0-G3 B2-U0-G2	13125 14030	125 133	B2-U0-G3 B2-U0-G2	13781 14731	131 140	B2-U0-G3 B2-U0-G2				
			IV-FT	11247	107	B2-U0-G2 B2-U0-G3	12141	116	B2-U0-G2 B2-U0-G3	12780	122	B2-U0-G2 B2-U0-G3	13419	128	B2-U0-G2 B2-U0-G3				
48	700	105.1	VSQ-N	12904	123	B3-U0-G1	13931	133	B3-U0-G1	14663	140	B3-U0-G1	15397	146	B3-U0-G1	N/A		N/A	
			VSQ-M VSQ-W	12654 12352	120 118	B4-U0-G2 B4-U0-G3	13660 13334	130 127	B4-U0-G2 B4-U0-G3	14379 14036	137 134	B4-U0-G2 B4-U0-G3	15099 14738	144 140	B4-U0-G2 B4-U0-G3				
			II-HS	8942	85	B1-U0-G2	9653	92	B1-U0-G2	10161	97	B1-U0-G2	10669	102	B1-U0-G2				
			II-FR-HS	9095	87	B1-U0-G1	9819	93	B1-U0-G1	10336	98	B1-U0-G1	10852	103	B1-U0-G1				
			III-M-HS	9045 8854	86 84	B1-U0-G2 B1-U0-G2	9765 9558	93 91	B1-U0-G2 B1-U0-G3	10279 10062	98 96	B1-U0-G2 B1-U0-G3	10793 10565	103 101	B1-U0-G2 B1-U0-G3				
			IV-HS	9344	89	B1-U0-G2	10087	96	B1-U0-G2	10618	101	B1-U0-G2	11149	106	B1-U0-G2				
			IV-FT-HS	8831	84	B1-U0-G3	9533	91	B1-U0-G3	10035	95	B1-U0-G3	10537	100	B1-U0-G3				
			II-FR	14829 14928	113 113	B3-U0-G2 B3-U0-G2	16008 16115	121 122	B3-U0-G3 B3-U0-G2	16851 16964	128 129	B3-U0-G3 B3-U0-G2	17693 17812	134 135	B3-U0-G3 B3-U0-G2				
			II-ML	14829	113	B4-U0-G4	16009	121	B4-U0-G4	16851	128	B4-U0-G4	17694	134	B4-U0-G4				
			III-W	15088	114	B2-U0-G2	16288	124	B3-U0-G3	17145	130	B3-U0-G3	18003	137	B3-U0-G3 B3-U0-G3				
			IV IV	14009 14975	106 114	B2-U0-G3 B2-U0-G2	15123 16166	115 123	B2-U0-G3 B3-U0-G2	15919 17017	121 129	B3-U0-G3 B3-U0-G3	16715 17867	127 136	B3-U0-G3 B3-U0-G3				
			IV-FT	13641	103	B2-U0-G3	14726	112	B3-U0-G3	15501	118	B3-U0-G3	16276	123	B3-U0-G3				
48	875	131.8	VSQ-N VSQ-M	15652 15348	119 116	B3-U0-G1 B4-U0-G2	16897 16568	128 126	B4-U0-G2 B4-U0-G2	17786 17440	135 132	B4-U0-G2 B4-U0-G2	18675 18312	142 139	B4-U0-G2 B4-U0-G2	N/A		N/A	
			VSQ-W	14981	114	B4-U0-G2 B4-U0-G3	16173	123	B4-U0-G2 B4-U0-G3	17440	129	B5-U0-G3	17876	136	B5-U0-G3				
			II-HS	10845	82	B1-U0-G2	11707	89	B1-U0-G2	12324	94	B1-U0-G2	12940	98	B1-U0-G2				
			II-FR-HS III-M-HS	11032 10971	84 83	B1-U0-G1 B1-U0-G2	11909 11844	90 90	B1-U0-G2 B1-U0-G3	12536 12467	95 95	B1-U0-G2 B1-U0-G3	13162 13091	100 99	B1-U0-G2 B1-U0-G3				
			III-W-HS	10771	81	B1-00-G2 B1-U0-G3	11594	88	B1-U0-G3	12204	93	B1-U0-G3	12814	97	B1-00-G3 B1-U0-G3				
			IV-HS	11333	86	B1-U0-G2	12234	93	B1-U0-G2	12878	98	B1-U0-G3	13522	103	B1-U0-G3				
			IV-FT-HS	10711 17044	81 107	B1-U0-G3 B3-U0-G3	11562 18400	88 115	B1-U0-G3 B3-U0-G3	12171 19369	92 121	B1-U0-G3 B3-U0-G3	12779 20337	97 127	B1-U0-G3 B3-U0-G3				
			II-FR	17159	108	B3-U0-G2	18523	116	B3-U0-G2	19498	122	B3-U0-G2	20473	128	B3-U0-G2		N/A N/A		
			II-ML	17045	107	B4-U0-G4	18401	115	B4-U0-G4	19369	121	B4-U0-G4	20338	127	B4-U0-G4				
			III-M III-W	17342 16102	109 101	B3-U0-G3 B3-U0-G3	18722 17383	117	B3-U0-G3 B3-U0-G3	19707 18298	123 115	B3-U0-G3 B3-U0-G3	20692 19213	130 120	B3-U0-G3 B3-U0-G4				
			IV	17212	108	B3-U0-G3	18582	116	B3-U0-G3	19559	123	B3-U0-G3	20537	129	B3-U0-G3				
			IV-FT	15680	98	B3-U0-G3	16927	106	B3-U0-G3	17818	112	B3-U0-G3	18708	117	B3-U0-G4				
48	1050	159.6	VSQ-N VSQ-M	17990 17641	113	B4-U0-G2 B4-U0-G2	19421 19044	122 119	B4-U0-G2 B4-U0-G2	20443 20046	128 126	B4-U0-G2 B4-U0-G2	21466 21048	134 132	B4-U0-G2 B4-U0-G2	N/A		N/A	
			VSQ-W	17220	108	B5-U0-G3	18590	116	B5-U0-G3	19568	123	B5-U0-G3	20546	129	B5-U0-G3	N/A			
			II-HS	12465	78	B1-U0-G2	13457	84	B1-U0-G3	14165	89	B1-U0-G3	14873	93	B1-U0-G3				
			II-FR-HS III-M-HS	12680 12611	79 79	B1-U0-G2 B1-U0-G3	13688 13614	86 85	B1-U0-G2 B1-U0-G3	14409 14330	90 90	B1-U0-G2 B1-U0-G3	15129 15047	95 94	B1-U0-G2 B1-U0-G3				
			III-W-HS	12344	77	B1-U0-G3	13326	83	B1-U0-G3	14027	88	B1-U0-G3	14728	92	B1-U0-G4				
			IV-HS	13026	82	B1-U0-G3	14062	88	B1-U0-G3	14802	93	B1-U0-G3	15542	97	B1-U0-G3				
	L	l	IV-FT-HS	12311	77	B1-U0-G3	13290	83	B1-U0-G3	13989	88	B1-U0-G4	14689	92	B1-U0-G4				





PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZR-PLED)

									R	ZR-PLE	D								
LED	Drive	System	Dist'n	27 k	(2700k	(- 70CRI)	30K	(3000K	(- 70CRI)	40k	(4000K	- 70CRI)	50K	(5000K	- 70CRI)	System	1	TRA (590	nm)
Count	Current (mA)	Watts	Туре	LUMENS	LPW	BUG RATING	Watts	LUMENS	LPW	BUG RATING									
			II II-FR	5819 5858	136 137	B2-U0-G1 B2-U0-G1	6281 6324	147 148	B2-U0-G1 B2-U0-G1	6612 6657	155 156	B2-U0-G2 B2-U0-G1	6943 6990	163 164	B2-U0-G2 B2-U0-G1		2309 2325	70 70	B1-U0-G1 B1-U0-G0
			II-ML III-M	5819 5921	136 139	B3-U0-G3 B1-U0-G2	6282 6392	147 150	B3-U0-G3 B2-U0-G2	6612 6728	155 158	B3-U0-G3 B2-U0-G2	6943 7065	163 165	B3-U0-G3 B2-U0-G2		2309 2349	70 71	B1-U0-G1 B1-U0-G1
			III-W	5497	129	B1-U0-G2	5935	139	B1-U0-G2	6247	146	B1-U0-G2	6559	154	B1-U0-G2		2182	66	B1-U0-G1
			IV-FT	5876 5353	138 125	B1-U0-G2 B1-U0-G2	6344 5778	149 135	B2-U0-G2 B1-U0-G2	6677 6083	156 142	B2-U0-G2 B1-U0-G2	7011 6387	164 150	B2-U0-G2 B1-U0-G2		2332 2124	71 64	B1-U0-G1 B1-U0-G1
40	350	42.7	VSQ-N	6141	144	B2-U0-G1	6630	155	B2-U0-G1	6979	163	B2-U0-G1	7328	172	B2-U0-G1	33.0	2438	74	B1-U0-G0
40	330	42.7	VSQ-M VSQ-W	6023 5879	141 138	B3-U0-G1 B3-U0-G2	6502 6346	152 149	B3-U0-G1 B3-U0-G2	6844 6680	160 156	B3-U0-G1 B3-U0-G2	7186 7015	168 164	B3-U0-G1 B3-U0-G2	33.0	2390 2333	72 71	B2-U0-G1 B2-U0-G1
			II-HS	4256	100	B0-U0-G2 B0-U0-G1	4594	108	B3-00-G2 B1-U0-G1	4836	113	B3-00-G2 B1-U0-G2	5077	119	B1-U0-G2		1689	51	B0-U0-G1
			II-FR-HS	4329	101	B0-U0-G1	4673	109	B0-U0-G1	4919	115	B0-U0-G1	5165	121	B0-U0-G1		1718	52	B0-U0-G0
			III-M-HS	4305 4214	101 99	B0-U0-G2 B0-U0-G2	4647 4550	109 107	B0-U0-G2 B0-U0-G2	4892 4789	115 112	B0-U0-G2 B0-U0-G2	5137 5028	120 118	B0-U0-G2 B0-U0-G2		1708 1673	52 51	B0-U0-G1 B0-U0-G1
			IV-HS	4447	104	B0-U0-G1	4801	112	B0-U0-G2	5054	118	B0-U0-G2	5306	124	B0-U0-G2		1764	53	B0-U0-G1
			IV-FT-HS	4203 8396	98 130	B0-U0-G2 B2-U0-G2	4537 9064	106 140	B0-U0-G2 B2-U0-G2	4776 9541	112 147	B0-U0-G2 B2-U0-G2	5015 10017	117 155	B0-U0-G2 B2-U0-G2		1668 2715	51 53	B0-U0-G1 B1-U0-G1
			II-FR	8452	131	B2-U0-G1	9125	141	B2-U0-G1	9605	148	B2-U0-G1	10085	156	B2-U0-G1		2733	54	B1-U0-G1
			II-ML III-M	8396 8543	130 132	B3-U0-G3 B2-U0-G2	9064 9223	140 143	B3-U0-G3 B2-U0-G2	9541 9708	147 150	B3-U0-G3 B2-U0-G2	10018 10194	155 158	B3-U0-G3 B2-U0-G2		2715 2762	53 54	B1-U0-G1 B1-U0-G1
			III-W	7932	123	B2-U0-G2 B2-U0-G2	8563	132	B2-U0-G2 B2-U0-G2	9013	139	B2-U0-G2 B2-U0-G3	9464	146	B2-U0-G2 B2-U0-G3		2565	50	B1-00-G1
			IV	8478	131	B2-U0-G2	9152	141	B2-U0-G2	9634	149	B2-U0-G2	10116	156	B2-U0-G2		2742	54	B1-U0-G1
			IV-FT VSQ-N	7724 8861	119 137	B2-U0-G3 B3-U0-G1	8338 9566	129 148	B2-U0-G3 B3-U0-G1	8777 10070	136 156	B2-U0-G3 B3-U0-G1	9216 10574	142 163	B2-U0-G3 B3-U0-G1		2497 2866	49 56	B1-U0-G1 B1-U0-G0
40	525	64.7	VSQ-M	8690	134	B3-U0-G2	9381	145	B3-U0-G2	9875	153	B3-U0-G2	10369	160	B3-U0-G2	51.0	2809	55	B2-U0-G1
			VSQ-W II-HS	8483 6141	131 95	B4-U0-G2 B1-U0-G2	9157 6629	142 102	B4-U0-G2 B1-U0-G2	9640 6978	149 108	B4-U0-G3 B1-U0-G2	10122 7327	156 113	B4-U0-G3 B1-U0-G2		2743 1985	54 39	B2-U0-G1 B0-U0-G1
			II-FR-HS	6246	97	B1-U0-G1	6743	104	B1-U0-G1	7098	110	B1-U0-G1	7453	115	B1-U0-G1		2020	40	B0-U0-G0
			III-M-HS	6212 6081	96 94	B0-U0-G2 B0-U0-G2	6706 6564	104	B0-U0-G2 B0-U0-G2	7060 6910	109 107	B0-U0-G2 B0-U0-G2	7412 7255	115 112	B0-U0-G2 B0-U0-G2		2009 1966	39 39	B0-U0-G1 B0-U0-G1
			IV-HS	6417	99	B0-00-G2 B0-U0-G2	6927	107	B0-00-G2 B0-U0-G2	7292	113	B0-00-G2 B0-U0-G2	7656	118	B1-U0-G2		2075	41	B0-00-G1
			IV-FT-HS	6064	94	B0-U0-G2	6546	101	B0-U0-G2	6891	107	B1-U0-G2	7235	112	B1-U0-G3		1960	38	B0-U0-G1
			II-FR	10669 10740	123 124	B2-U0-G2 B2-U0-G1	11518 11594	133 134	B2-U0-G2 B3-U0-G1	12124 12205	140 141	B2-U0-G2 B3-U0-G1	12730 12815	147 148	B2-U0-G2 B3-U0-G1				
			II-ML	10669	123	B3-U0-G3	11518	133	B3-U0-G3	12124	140	B3-U0-G3	12731	147	B3-U0-G3				
			III-M III-W	10856 10079	125 116	B2-U0-G2 B2-U0-G3	11719 10880	135 125	B2-U0-G2 B2-U0-G3	12336 11453	142 132	B2-U0-G2 B2-U0-G3	12953 12026	149 139	B2-U0-G2 B2-U0-G3				
			IV	10774	124	B2-U0-G2	11630	134	B2-U0-G2	12243	141	B2-U0-G2	12855	148	B2-U0-G2				
			IV-FT VSQ-N	9814 11260	113 130	B2-U0-G3 B3-U0-G1	10595 12156	122 140	B2-U0-G3 B3-U0-G1	11153 12796	128 147	B2-U0-G3 B3-U0-G1	11710 13435	135 155	B2-U0-G3 B3-U0-G1				
40	700	86.8	VSQ-M	11042	127	B4-U0-G2	11920	137	B4-U0-G2	12548	145	B4-U0-G2	13175	152	B4-U0-G2	N/A		N/A	
			VSQ-W II-HS	10778 7803	124 90	B4-U0-G3 B1-U0-G2	11636 8423	134 97	B4-U0-G3 B1-U0-G2	12248 8866	141 102	B4-U0-G3 B1-U0-G2	12860 9310	148 107	B4-U0-G3				
			II-FR-HS	7937	91	B1-00-G2 B1-U0-G1	8568	99	B1-00-G2 B1-U0-G1	9019	104	B1-00-G2 B1-U0-G1	9470	107	B1-U0-G2 B1-U0-G1				
			III-M-HS	7893	91	B1-U0-G2	8521	98	B1-U0-G2	8970	103	B1-U0-G2	9418	109	B1-U0-G2				
			III-W-HS IV-HS	7726 8153	89 94	B0-U0-G2 B1-U0-G2	8341 8802	96 101	B1-U0-G2 B1-U0-G2	8780 9265	101 107	B1-U0-G2 B1-U0-G2	9218 9728	106 112	B1-U0-G2 B1-U0-G2				
			IV-FT-HS	7705	89	B1-U0-G3	8318	96	B1-U0-G3	8756	101	B1-U0-G3	9194	106	B1-U0-G3				
			II-FR	12366 12448	114 115	B2-U0-G2 B3-U0-G1	13349 13439	124 124	B2-U0-G2 B3-U0-G1	14052 14146	130	B2-U0-G2 B3-U0-G1	14754 14853	137 138	B3-U0-G2 B3-U0-G2				
			II-ML	12366	115	B3-U0-G3	13349	124	B3-U0-G3	14052	130	B3-U0-G3	14755	137	B4-U0-G4				
			III-W	12581 11682	116 108	B2-U0-G2 B2-U0-G3	13582 12611	126 117	B2-U0-G2 B2-U0-G3	14297 13275	132 123	B2-U0-G2 B2-U0-G3	15012 13939	139 129	B2-U0-G2 B2-U0-G3				
			IV	12487	116	B2-U0-G2	13480	125	B2-U0-G2	14189	131	B2-U0-G2	14899	138	B2-U0-G2				
			IV-FT VSQ-N	11375 13051	105 121	B2-U0-G3 B3-U0-G1	12280 14089	114 130	B2-U0-G3 B3-U0-G1	12926 14830	120 137	B2-U0-G3 B3-U0-G1	13573 15572	126 144	B2-U0-G3 B3-U0-G1				
40	875	108.0	VSQ-M	12798	118	B4-U0-G2	13816	128	B4-U0-G2	14543	135	B4-U0-G2	15270	141	B4-U0-G2	N/A		N/A	
			VSQ-W II-HS	12492 9044	116 84	B4-U0-G3	13486	125	B4-U0-G3	14196	131	B4-U0-G3	14905	138	B4-U0-G3				
			II-FR-HS	9199	85	B1-U0-G2 B1-U0-G1	9763 9930	90 92	B1-U0-G2 B1-U0-G1	10277 10453	95 97	B1-U0-G2 B1-U0-G1	10791 10976	100 102	B1-U0-G2 B1-U0-G1				
			III-M-HS	9149	85	B1-U0-G2	9876	91	B1-U0-G2	10396	96	B1-U0-G2	10916	101	B1-U0-G2				
			III-W-HS IV-HS	8955 9450	83 87	B1-U0-G2 B1-U0-G2	9667 10201	90 94	B1-U0-G3 B1-U0-G2	10176 10738	94 99	B1-U0-G3 B1-U0-G2	10685 11275	99 104	B1-U0-G3 B1-U0-G2				
			IV-FT-HS	8931	83	B1-U0-G3	9641	89	B1-U0-G3	10149	94	B1-U0-G3	10656	99	B1-U0-G3				
			II II-FR	14213 14308	111 112	B2-U0-G2 B3-U0-G1	15344 15446	120 120	B3-U0-G2 B3-U0-G2	16151 16259	126 127	B3-U0-G3 B3-U0-G2	16959 17072	132 133	B3-U0-G3 B3-U0-G2				
			II-ML	14214	111	B3-U0-G3	15344	120	B4-U0-G4	16152	126	B4-U0-G4	16959	132	B4-U0-G4				
			III-W	14461 13427	113 105	B2-U0-G2 B2-U0-G3	15612 14495	122 113	B3-U0-G2 B2-U0-G3	16433 15258	128 119	B3-U0-G3 B2-U0-G3	17255 16021	135 125	B3-U0-G3 B3-U0-G3				
			IV	14352	112	B2-U0-G2	15494	121	B3-U0-G2	16309	127	B3-U0-G3	17125	134	B3-U0-G3				
			IV-FT VSQ-N	13075 15001	102 117	B2-U0-G3 B3-U0-G1	14115	110 126	B2-U0-G3 B4-U0-G1	14858 17046	116	B3-U0-G3 B4-U0-G2	15601 17899	122 140	B3-U0-G3				
40	1050	128.2	VSQ-M	14710	117	B3-00-G1 B4-U0-G2	16194 15880	124	B4-U0-G1 B4-U0-G2	16716	133 130	B4-U0-G2 B4-U0-G2	17899	137	B4-U0-G2 B4-U0-G2	N/A		N/A	
			VSQ-W	14359	112	B4-U0-G3	15501	121	B4-U0-G3	16317	127	B4-U0-G3	17132	134	B5-U0-G3				
			II-HS II-FR-HS	10395 10573	81 82	B1-U0-G2 B1-U0-G1	11222 11414	88 89	B1-U0-G2 B1-U0-G2	11813 12015	92 94	B1-U0-G2 B1-U0-G2	12403 12616	97 98	B1-U0-G2 B1-U0-G2				
			III-M-HS	10516	82	B1-U0-G2	11352	89	B1-U0-G2	11949	93	B1-U0-G3	12547	98	B1-U0-G3				
			III-W-HS IV-HS	10293 10862	80 85	B1-U0-G3 B1-U0-G2	11112 11726	87 91	B1-U0-G3 B1-U0-G2	11696 12343	91 96	B1-U0-G3 B1-U0-G2	12281 12960	96 101	B1-U0-G3 B1-U0-G3				
			IV-FT-HS	10266	80	B1-U0-G3	11082	86	B1-U0-G3	11665	91	B1-U0-G3	12248	96	B1-U0-G3				





PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZR-PLED)

									R	ZR-PLE	D								
LED	Drive	System	Dist'n	27k	(2700k	(- 70CRI)	30K	(3000K	- 70CRI)	40k	(4000k	(- 70CRI)	50K	(5000K	- 70CRI)	System		TRA (59	0nm)
Count	Current (mA)	Watts	Туре	LUMENS	LPW	BUG RATING	Watts	LUMENS	LPW	BUG RATING									
			II II-FR	11277	132	B2-U0-G2 B3-U0-G1	12174	143 144	B2-U0-G2 B3-U0-G1	12814 12901	150	B2-U0-G2 B3-U0-G1	13455 13546	158 159	B2-U0-G2 B3-U0-G1		4475 4504	67 67	B1-U0-G1 B1-U0-G1
			II-FIX	11352 11277	133 132	B3-U0-G1 B3-U0-G3	12256 12175	144	B3-U0-G1 B3-U0-G3	12901	151 150	B3-U0-G1 B3-U0-G3	13546	159	B3-U0-G1 B3-U0-G3	-	4475	67	B1-00-G1 B2-U0-G2
			III-M	11474	134	B2-U0-G2	12387	145	B2-U0-G2	13039	153	B2-U0-G2	13691	160	B2-U0-G2	j	4553	68	B1-U0-G1
		[III-W	10654	125	B2-U0-G3	11501	135	B2-U0-G3	12106	142	B2-U0-G3	12712	149	B2-U0-G3		4228	63	B1-U0-G2
			IV-FT	11388 10374	133 121	B2-U0-G2 B2-U0-G3	12294 11199	144 131	B2-U0-G2 B2-U0-G3	12941 11788	152 138	B2-U0-G2 B2-U0-G3	13588 12377	159 145	B2-U0-G2 B2-U0-G3		4518 4117	67 61	B1-U0-G1 B1-U0-G1
80	350	85.4	VSQ-N	11902	139	B3-U0-G1	12849	150	B3-U0-G1	13525	158	B3-U0-G1	14202	166	B3-U0-G1	67.0	4723	70	B2-U0-G1
00	330	65.4	VSQ-M	11671	137	B4-U0-G2	12600	148	B4-U0-G2	13263	155	B4-U0-G2	13927	163	B4-U0-G2	07.0	4631	69	B3-U0-G1
			VSQ-W II-HS	11392 8247	133 97	B4-U0-G3 B1-U0-G2	12299 8903	144 104	B4-U0-G3 B1-U0-G2	12946 9372	152 110	B4-U0-G3 B1-U0-G2	13593 9840	159 115	B4-U0-G3 B1-U0-G2		4520 3273	67 49	B3-U0-G2 B0-U0-G1
			II-FR-HS	8389	98	B1-00-G2 B1-U0-G1	9056	104	B1-00-G2 B1-U0-G1	9533	112	B1-00-G2 B1-U0-G1	10009	117	B1-00-G2 B1-U0-G1		3329	50	B0-U0-G1
			III-M-HS	8344	98	B1-U0-G2	9007	105	B1-U0-G2	9482	111	B1-U0-G2	9956	117	B1-U0-G2		3311	49	B0-U0-G1
			III-W-HS IV-HS	8167 8618	96 101	B1-U0-G2 B1-U0-G2	8817 9304	103 109	B1-U0-G2 B1-U0-G2	9281 9793	109 115	B1-U0-G2 B1-U0-G2	9745 10283	114 120	B1-U0-G3 B1-U0-G2		3240 3420	48 51	B0-U0-G1 B0-U0-G1
			IV-FT-HS	8144	95	B1-00-G2 B1-U0-G3	8792	103	B1-00-G2 B1-U0-G3	9255	108	B1-00-G2 B1-U0-G3	9718	114	B1-00-G2 B1-U0-G3		3232	48	B0-U0-G1
			II	16239	125	B3-U0-G3	17531	135	B3-U0-G3	18454	143	B3-U0-G3	19377	150	B3-U0-G3		5251	52	B1-U0-G1
			II-FR II-ML	16348 16240	126 126	B3-U0-G2 B4-U0-G4	17648 17532	136 135	B3-U0-G2 B4-U0-G4	18577 18454	144	B3-U0-G2 B4-U0-G4	19506 19377	151 150	B3-U0-G2 B4-U0-G4		5286 5251	52 52	B1-U0-G1 B2-U0-G2
			II-IVIL	16523	128	B3-U0-G3	17837	138	B3-U0-G3	18454	143	B3-U0-G3	19377	150	B3-U0-G3	-	5343	53	B1-U0-G2
			III-W	15341	119	B2-U0-G3	16562	128	B3-U0-G3	17433	135	B3-U0-G3	18305	141	B3-U0-G3	1	4961	49	B1-U0-G2
			IV-FT	16398 14938	127	B3-U0-G3 B3-U0-G3	17703	137 125	B3-U0-G3 B3-U0-G4	18635	144	B3-U0-G3	19566 17824	151 138	B3-U0-G3		5302 4830	52 48	B1-U0-G1 B1-U0-G2
			VSQ-N	17140	115 132	B3-00-G3 B4-U0-G2	16127 18504	143	B3-00-G4 B4-U0-G2	16976 19477	151	B3-U0-G4 B4-U0-G2	20451	158	B3-U0-G4 B4-U0-G2		5542	55	B2-U0-G2
80	525	129.4	VSQ-M	16807	130	B4-U0-G2	18144	140	B4-U0-G2	19099	148	B4-U0-G2	20053	155	B4-U0-G2	101.0	5434	54	B3-U0-G1
			VSQ-W	16406	127	B4-U0-G3	17711	137	B5-U0-G3	18643	144	B5-U0-G3	19575	151	B5-U0-G3		5304	53	B3-U0-G2
			II-HS II-FR-HS	11877 12081	92 93	B1-U0-G2 B1-U0-G2	12821 13042	99 101	B1-U0-G2 B1-U0-G2	13496 13728	104 106	B1-U0-G3 B1-U0-G2	14171 14414	110 111	B1-U0-G3 B1-U0-G2	-	3841 3906	38 39	B0-U0-G1 B0-U0-G1
			III-M-HS	12016	93	B1-U0-G3	12971	100	B1-U0-G3	13654	106	B1-U0-G3	14337	111	B1-U0-G3		3885	38	B0-U0-G1
			III-W-HS	11760	91	B1-U0-G3	12696	98	B1-U0-G3	13364	103	B1-U0-G3	14032	108	B1-U0-G3		3803	38	B0-U0-G2
			IV-HS IV-FT-HS	12411 11729	96 91	B1-U0-G2 B1-U0-G3	13398 12662	104 98	B1-U0-G3 B1-U0-G3	14103 13328	109	B1-U0-G3 B1-U0-G3	14808 13995	114 108	B1-U0-G3 B1-U0-G4		4013 3792	40 38	B0-U0-G1 B0-U0-G2
				20595	119	B3-U0-G3	22232	128	B3-U0-G3	23403	135	B3-U0-G3	24573	142	B3-U0-G3		0772	00	50 00 02
		[II-FR	20732	119	B3-U0-G2	22381	129	B3-U0-G2	23559	136	B3-U0-G2	24736	142	B3-U0-G2				
			II-ML III-M	20595 20954	119 121	B4-U0-G4 B3-U0-G3	22233 22621	128 130	B4-U0-G4 B3-U0-G3	23403 23812	135 137	B4-U0-G4 B3-U0-G4	24573 25003	142 144	B4-U0-G4 B3-U0-G4				
			III-W	19456	112	B3-U0-G4	21003	121	B3-U0-G4	22109	127	B3-U0-G4	23214	134	B3-U0-G4	1			
			IV	20797	120	B3-U0-G3	22451	129	B3-U0-G3	23633	136	B3-U0-G3	24814	143	B3-U0-G4				
			IV-FT VSQ-N	18945 21737	109 125	B3-U0-G4 B4-U0-G2	20452 23466	118 135	B3-U0-G4 B4-U0-G2	21528 24701	124 142	B3-U0-G4 B4-U0-G2	22604 25936	130 149	B3-U0-G4 B4-U0-G2				
80	700	173.6	VSQ-M	21314	123	B5-U0-G3	23010	133	B5-U0-G3	24221	140	B5-U0-G3	25432	146	B5-U0-G3	N/A		N/A	
			VSQ-W	20806	120	B5-U0-G3	22461	129	B5-U0-G4	23643	136	B5-U0-G4	24825	143	B5-U0-G4]			
			II-HS II-FR-HS	15062 15321	87 88	B1-U0-G3 B1-U0-G2	16260 16539	94 95	B1-U0-G3 B1-U0-G2	17115 17410	99 100	B1-U0-G3 B1-U0-G2	17971 18280	104 105	B1-U0-G3 B1-U0-G2				
			III-M-HS	15238	88	B1-U0-G3	16450	95	B1-U0-G3	17315	100	B1-U0-G3	18181	105	B1-U0-G4				
			III-W-HS	14915	86	B1-U0-G4	16101	93	B1-U0-G4	16948	98	B1-U0-G4	17796	103	B1-U0-G4				
			IV-HS IV-FT-HS	15739 14874	91 86	B1-U0-G3 B1-U0-G4	16991 16058	98 92	B1-U0-G3 B1-U0-G4	17885 16903	103 97	B1-U0-G3 B1-U0-G4	18780 17748	108 102	B1-U0-G3 B1-U0-G4				
				23798	110	B3-U0-G3	25691	119	B3-U0-G3	27043	125	B3-U0-G4	28395	132	B3-U0-G4				
			II-FR	23957	111	B3-U0-G2	25862	120	B3-U0-G2	27223	126	B3-U0-G2	28585	132	B4-U0-G2				
			II-ML	23799 24214	110 112	B4-U0-G4 B3-U0-G4	25692 26140	119 121	B4-U0-G4 B3-U0-G4	27044 27516	125 127	B4-U0-G4 B3-U0-G4	28396 28892	132 134	B4-U0-G4 B3-U0-G4	-			
			III-W	22482	104	B3-U0-G4	24270	112	B3-U0-G4	25548	118	B3-U0-G4	26825	124	B3-U0-G4	1			
			IV FT	24032	111	B3-U0-G3	25943	120	B3-U0-G4	27309	126	B3-U0-G4	28674	133	B3-U0-G4				
	6-		IV-FT VSQ-N	21892 25118	101 116	B3-U0-G4 B4-U0-G2	23634 27116	109 126	B3-U0-G5 B5-U0-G2	24877 28543	115 132	B3-U0-G5 B5-U0-G2	26121 29970	121 139	B3-U0-G5 B5-U0-G2				
80	875	215.9	VSQ-M	24630	114	B5-U0-G3	26589	123	B5-U0-G3	27988	130	B5-U0-G3	29387	136	B5-U0-G3	N/A		N/A	
			VSQ-W II-HS	24042 17405	111 81	B5-U0-G4 B1-U0-G3	25954 18789	120 87	B5-U0-G4 B1-U0-G3	27321 19778	127 92	B5-U0-G4 B1-U0-G4	28686 20766	133 96	B5-U0-G4				
			II-FR-HS	17704	82	B1-U0-G3 B1-U0-G2	19112	89	B1-00-G3 B1-U0-G2	20118	93	B1-U0-G4 B1-U0-G2	21124	98	B2-U0-G4 B1-U0-G2	+			
			III-M-HS	17608	82	B1-U0-G4	19008	88	B1-U0-G4	20009	93	B1-U0-G4	21009	97	B1-U0-G4]			
			III-W-HS	17234	80	B1-U0-G4	18605	86	B1-U0-G4	19584	91	B1-U0-G4	20564	95	B1-U0-G4				
			IV-HS IV-FT-HS	18187 17188	84 80	B1-U0-G3 B1-U0-G4	19634 18555	91 86	B1-U0-G4 B1-U0-G4	20667 19532	96 90	B1-U0-G4 B1-U0-G4	21701 20509	101 95	B1-U0-G4 B1-U0-G4				
			II	27354	107	B3-U0-G4	29530	115	B4-U0-G4	31084	121	B4-U0-G4	32638	127	B4-U0-G4				
			II-FR II-ML	27536 27355	107 107	B3-U0-G2 B4-U0-G4	29727 29531	116 115	B4-U0-G2 B5-U0-G5	31291 31085	122 121	B4-U0-G2 B5-U0-G5	32856 32639	128 127	B4-U0-G2 B5-U0-G5				
			III-M	27832	107	B3-U0-G4	30046	117	B3-U0-G3 B3-U0-G4	31627	123	B3-00-G3 B4-U0-G4	33209	130	B3-00-G3 B4-U0-G4				
			III-W	25841	101	B3-U0-G4	27897	109	B3-U0-G4	29365	115	B3-U0-G5	30834	120	B3-U0-G5				
			IV-FT	27622	108	B3-U0-G4	29820	116	B3-U0-G4	31389	122	B4-U0-G4	32959	129	B4-U0-G4				
	1050	05/ /	VSQ-N	25163 28871	98 113	B3-U0-G5 B5-U0-G2	27165 31168	106 122	B3-U0-G5 B5-U0-G2	28595 32808	112 128	B3-U0-G5 B5-U0-G2	30024 34448	117 134	B3-U0-G5 B5-U0-G2	1G2			
80	1050	256.4	VSQ-M	28310	110	B5-U0-G3	30561	119	B5-U0-G3	32170	125	B5-U0-G4	33779	132	B5-U0-G4	N/A		N/A	
			VSQ-W II-HS	27634 20005	108 78	B5-U0-G4 B1-U0-G4	29833 21596	116 84	B5-U0-G4 B2-U0-G4	31403 22733	122	B5-U0-G5	32973	129 93	B5-U0-G5				
			II-FR-HS	20349	79	B1-U0-G4 B1-U0-G2	21968	86	B2-00-G4 B1-U0-G2	23124	89 90	B2-U0-G4 B1-U0-G2	23870 24280	95	B2-U0-G4 B1-U0-G2				
			III-M-HS	20239	79	B1-U0-G4	21848	85	B1-U0-G4	22998	90	B1-U0-G4	24148	94	B1-U0-G4				
			III-W-HS IV-HS	19809 20905	77 82	B1-U0-G4 B1-U0-G4	21385 22568	83 88	B1-U0-G4 B1-U0-G4	22511 23756	88 93	B1-U0-G4 B1-U0-G4	23636 24943	92 97	B1-U0-G5 B1-U0-G4				
			IV-HS IV-FT-HS	19756	77	B1-U0-G4 B1-U0-G4	21328	83	B1-00-G4 B1-U0-G4	23/56	88	B1-U0-G4 B1-U0-G5	23573	92	B1-00-G4 B1-U0-G5				
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PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRG-PLED)

									RZ	R-G-PL	ED								
LED	Drive	System	Dist'n	27	K (2700	K - 70CRI)	30K	(3000K	(- 70CRI)	40k	(4000k	(- 70CRI)	50K	(5000K	- 70CRI)	System	Т	RA (590	nm)
Count	Current (mA)	Watts	Туре	LUMENS	LPW	BUG RATING	Watts	LUMENS	LPW	BUG RATING									
			II	11409	131	B2-U0-G2	12317	142	B2-U0-G2	12965	149	B2-U0-G2	13613	156	B2-U0-G2		4528	68	B1-U0-G1
			II-FR II-ML	11485 11409	132	B3-U0-G1 B3-U0-G3	12398 12317	143 142	B3-U0-G1 B3-U0-G3	13051 12965	150 149	B3-U0-G1 B3-U0-G3	13703 13613	158	B3-U0-G1 B3-U0-G3		4558 4528	68	B1-U0-G1 B2-U0-G2
			II-IVIL	11608	133	B2-U0-G3	12517	144	B2-U0-G3 B2-U0-G2	13191	152	B2-U0-G3 B2-U0-G2	13850	156 159	B2-U0-G3 B2-U0-G2		4526	68	B1-U0-G1
			III-W	10778	124	B2-U0-G3	11635	134	B2-U0-G3	12248	141	B2-U0-G3	12860	148	B2-U0-G3		4276	64	B1-U0-G2
			IV	11520	132	B2-U0-G2	12437	143	B2-U0-G2	13091	150	B2-U0-G2	13746	158	B2-U0-G2		4572	68	B1-U0-G1
			IV-FT VSQ-N	10494 12041	121	B2-U0-G3 B3-U0-G1	11330 12999	130 149	B2-U0-G3 B3-U0-G1	11926 13683	137 157	B2-U0-G3 B3-U0-G1	12522 14367	144 165	B2-U0-G3 B3-U0-G1		4165 4779	62 71	B1-U0-G1 B2-U0-G1
80	350	87.0	VSQ-M	11808	136	B4-U0-G2	12747	147	B4-U0-G2	13418	154	B4-U0-G2	14089	162	B4-U0-G2	67.0	4686	70	B3-U0-G1
			VSQ-W	11526	132	B4-U0-G3	12443	143	B4-U0-G3	13097	151	B4-U0-G3	13752	158	B4-U0-G3		4574	68	B3-U0-G2
			II-HS II-FR-HS	8464 8609	97 99	B1-U0-G2 B1-U0-G1	9138 9294	105 107	B1-U0-G2 B1-U0-G1	9618 9783	111	B1-U0-G2 B1-U0-G1	10099 10274	116 118	B1-U0-G2 B1-U0-G1		3359 3417	50 51	B0-U0-G1 B0-U0-G1
			III-M-HS	8563	98	B1-U0-G1	9294	106	B1-U0-G1	9703	112	B1-U0-G1	10274	117	B1-U0-G1 B1-U0-G2		3398	51	B0-U0-G1
			III-W-HS	8382	96	B1-U0-G2	9048	104	B1-U0-G2	9525	109	B1-U0-G3	10001	115	B1-U0-G3		3326	50	B0-U0-G1
			IV-HS	8845	102	B1-U0-G2	9548	110	B1-U0-G2	10051	116	B1-U0-G2	10553	121	B1-U0-G2		3510	52	B0-U0-G1
			IV-FT-HS	8359 16394	96 127	B1-U0-G3 B3-U0-G3	9024 17698	104 137	B1-U0-G3 B3-U0-G3	9499 18629	109 144	B1-U0-G3 B3-U0-G3	9974 19560	115 152	B1-U0-G3 B3-U0-G3		3317 5301	50 52	B0-U0-G2 B1-U0-G1
			II-FR	16503	128	B3-U0-G2	17816	138	B3-U0-G2	18753	145	B3-U0-G2	19691	153	B3-U0-G2		5336	53	B1-U0-G1
			II-ML	16394	127	B4-U0-G4	17698	137	B4-U0-G4	18630	144	B4-U0-G4	19561	152	B4-U0-G4		5302	52	B2-U0-G2
			III-M III-W	16680 15488	129 120	B3-U0-G3 B2-U0-G3	14740	114	B2-U0-G2	18955 17600	147 136	B3-U0-G3	19902 18479	154 143	B3-U0-G3 B3-U0-G4		5343 5008	53 50	B1-U0-G2
			III-VV IV	16555	120	B3-U0-G3	16720 17871	130	B3-U0-G3 B3-U0-G3	18812	146	B3-U0-G3 B3-U0-G3	19753	153	B3-U0-G4 B3-U0-G3		5353	53	B1-U0-G2 B1-U0-G1
			IV-FT	15081	117	B3-U0-G3	16280	126	B3-U0-G3	17137	133	B3-U0-G3	17994	139	B3-U0-G3		4877	48	B1-U0-G2
80	525	129.0	VSQ-N	17303	134	B4-U0-G2	18679	145	B4-U0-G2	19663	152	B4-U0-G2	20646	160	B4-U0-G2	101.0	5595	55	B2-U0-G1
			VSQ-M VSQ-W	16967 16562	132 128	B4-U0-G2 B4-U0-G3	18317 17880	142 139	B4-U0-G2 B5-U0-G3	19281 18821	149 146	B4-U0-G2 B5-U0-G3	20245 19762	157 153	B4-U0-G2 B5-U0-G3		5486 5355	54 53	B3-U0-G1 B3-U0-G2
			II-HS	12089	94	B1-U0-G2	13052	101	B1-U0-G3	13738	106	B1-U0-G3	14425	112	B1-U0-G3		3909	39	B0-U0-G1
			II-FR-HS	12298	95	B1-U0-G2	13276	103	B1-U0-G2	13975	108	B1-U0-G2	14674	114	B1-U0-G2		3977	39	B0-U0-G1
			III-M-HS	12231	95	B1-U0-G3	13204	102	B1-U0-G3	13899	108	B1-U0-G3	14594	113	B1-U0-G3		3954	39	B0-U0-G1
			III-W-HS IV-HS	11971 12633	93 98	B1-U0-G3 B1-U0-G2	12924 13638	100 106	B1-U0-G3 B1-U0-G3	13604 14356	105 111	B1-U0-G3 B1-U0-G3	14284 15074	111	B1-U0-G3 B1-U0-G3		3871 4085	38 40	B0-U0-G2 B0-U0-G1
			IV-FT-HS	11940	93	B1-U0-G3	12889	100	B1-U0-G3	13568	105	B1-U0-G3	14246	110	B1-U0-G4		3861	38	B0-U0-G2
			II	20914	120	B3-U0-G3	22578	130	B3-U0-G3	23766	137	B3-U0-G3	24955	143	B3-U0-G3	3			
			II-FR II-ML	21054 20915	121	B3-U0-G2 B4-U0-G4	22729 22579	131 130	B3-U0-G2 B4-U0-G4	23924 23767	137 137	B3-U0-G2 B4-U0-G4	25121 24955	144 143	B3-U0-G2 B4-U0-G4				
			III-M	21280	120	B3-U0-G3	22972	132	B3-U0-G3	24182	139	B3-U0-G4	25391	145	B3-U0-G4				
			III-W	19759	114	B3-U0-G4	21330	123	B3-U0-G4	22453	129	B3-U0-G4	23575	135	B3-U0-G4				
			IV	21120	121	B3-U0-G3	22800	131	B3-U0-G3	24000	138	B3-U0-G3	25200	145	B3-U0-G4				
			IV-FT VSQ-N	19239 22074	111	B3-U0-G4 B4-U0-G2	20770 23831	119	B3-U0-G4 B4-U0-G2	21862 25084	126 144	B3-U0-G4 B4-U0-G2	22956 26339	132 151	B3-U0-G4 B4-U0-G2				
80	700	174.0	VSQ-M	21646	124	B5-U0-G3	23367	134	B5-U0-G3	24598	141	B5-U0-G3	25827	148	B5-U0-G3	N/A		N/A	
			VSQ-W	21129	121	B5-U0-G4	22810	131	B5-U0-G4	24010	138	B5-U0-G4	25212	145	B5-U0-G4				
			II-HS II-FR-HS	15363 15628	88 90	B1-U0-G3 B1-U0-G2	16586 16872	95 97	B1-U0-G3 B1-U0-G2	17458 17759	100 102	B1-U0-G3 B1-U0-G2	18332 18647	105 107	B1-U0-G3 B1-U0-G2				
			III-M-HS	15542	89	B1-U0-G2	16778	96	B1-00-G2 B1-U0-G3	17/59	102	B1-00-G2 B1-U0-G4	18545	107	B1-00-G2 B1-U0-G4				
			III-W-HS	15213	87	B1-U0-G4	16423	94	B1-U0-G4	17288	99	B1-U0-G4	18152	104	B1-U0-G4				
			IV-HS	16055	92	B1-U0-G3	17331	100	B1-U0-G3	18244	105	B1-U0-G3	19155	110	B1-U0-G3				
			IV-FT-HS	15172 25063	87 114	B1-U0-G4 B3-U0-G3	16380 27057	94 123	B1-U0-G4 B3-U0-G4	17242 28481	99	B1-U0-G4 B3-U0-G4	18104 29905	104 136	B1-U0-G4 B4-U0-G4				
			II-FR	25230	115	B3-U0-G2	27237	124	B3-U0-G2	28670	130	B4-U0-G2	30104	137	B4-U0-G2				
			II-ML	25064	114	B4-U0-G4	27057	123	B4-U0-G4	28481	130	B4-U0-G4	29906	136	B5-U0-G5				
			III-W	25501 23677	116 108	B3-U0-G4 B3-U0-G4	27529 25560	125 116	B3-U0-G4 B3-U0-G4	28978 26906	132 122	B3-U0-G4 B3-U0-G4	30427 28251	138 129	B3-U0-G4 B3-U0-G4				
			IV	25309	115	B3-U0-G4	27322	124	B3-U0-G4	28760	131	B3-U0-G4	30198	137	B3-U0-G4				
			IV-FT	23056	105	B3-U0-G4	24889	113	B3-U0-G4	26200	119	B3-U0-G4	27509	125	B3-U0-G4				
80	875	219.7	VSQ-N VSQ-M	26453 25939	120 118	B4-U0-G2 B5-U0-G3	28557 28002	130 127	B5-U0-G2 B5-U0-G3	30060	137 134	B5-U0-G2 B5-U0-G3	31563 30950	144 141	B5-U0-G2 B5-U0-G3	N/A		N/A	
			VSQ-IVI VSQ-W	25939	118	B5-U0-G3 B5-U0-G4	27335	127	B5-U0-G3 B5-U0-G4	29476 28773	134	B5-U0-G3 B5-U0-G4	30950	138	B5-U0-G3 B5-U0-G4				
			II-HS	18330	83	B1-U0-G3	19788	90	B1-U0-G4	20830	95	B2-U0-G4	21871	100	B2-U0-G4				
			II-FR-HS	18645	85	B1-U0-G2	20128	92	B1-U0-G2	21188	96	B1-U0-G2	22247	101	B1-U0-G2				
			III-M-HS	18543 18151	84	B1-U0-G4 B1-U0-G4	20018 19594	91 89	B1-U0-G4 B1-U0-G4	21072 20626	96 94	B1-U0-G4 B1-U0-G4	22125 21657	101 99	B1-U0-G4 B1-U0-G4				
			IV-HS	19154	87	B1-00-G4 B1-U0-G3	20677	94	B1-00-G4 B1-U0-G4	21766	99	B1-00-G4 B1-U0-G4	22854	104	B1-00-G4				
			IV-FT-HS	18102	82	B1-U0-G4	19541	89	B1-U0-G4	20571	94	B1-U0-G4	21599	98	B1-U0-G4				
			II ED	28808	108	B4-U0-G4	31099	117	B4-U0-G4	32736	123	B4-U0-G4	34373	129	B4-U0-G4				
			II-FR II-ML	29000 28809	109	B4-U0-G2 B5-U0-G5	31306 31100	118	B4-U0-G2 B5-U0-G5	32954 32737	124 123	B4-U0-G2 B5-U0-G5	34602 34374	130 129	B4-U0-G2 B5-U0-G5				
			III-M	29311	110	B3-U0-G4	31643	119	B4-U0-G4	33308	125	B4-U0-G4	34974	131	B4-U0-G4				
			III-W	27215	102	B3-U0-G4	29380	110	B3-U0-G5	30926	116	B3-U0-G5	32473	122	B3-U0-G5				
			IV-FT	29091 26501	109	B3-U0-G4 B3-U0-G4	31404	118	B4-U0-G4	33058 30114	124	B4-U0-G4	34710	130 119	B4-U0-G4				
00	1050	044.5	VSQ-N	30405	100	B5-U0-G2	28608 32824	123	B3-U0-G4 B5-U0-G2	34551	113	B3-U0-G5 B5-U0-G2	31620 36279	136	B5-U0-G5 B5-U0-G2	-U0-G5 -U0-G2			
80	1050	266.0	VSQ-M	29815	112	B5-U0-G3	32186	121	B5-U0-G4	33880	127	B5-U0-G4	35575	134	B5-U0-G4	N/A		N/A	
			VSQ-W	29104	109	B5-U0-G4	31419	118	B5-U0-G5	33073	124	B5-U0-G5	34726	131	B5-U0-G5				
			II-HS II-FR-HS	21069 21432	79 81	B2-U0-G4 B1-U0-G2	22745 23136	86 87	B2-U0-G4 B1-U0-G2	23942 24354	90 92	B2-U0-G4 B1-U0-G2	25139 25571	95 96	B2-U0-G4 B2-U0-G2				
			III-M-HS	21314	80	B1-00-G2 B1-U0-G4	23009	87	B1-00-G2 B1-U0-G4	24220	91	B1-00-G2 B1-U0-G4	25431	96	B1-U0-G4				
			III-W-HS	20862	78	B1-U0-G4	22521	85	B1-U0-G4	23708	89	B1-U0-G5	24893	94	B1-U0-G5				
			IV-HS	22016	83	B1-U0-G4	23766	89	B1-U0-G4	25018	94	B1-U0-G4	26268	99	B1-U0-G4				
			IV-FT-HS	20807	78	B1-U0-G4	22461	84	B1-U0-G5	23644	89	B1-U0-G5	24826	93	B1-U0-G5				





PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRG-PLED)

									RZ	R-G-PL	ED								
LED	Drive	System	Dist'n	271	K (2700)	(- 70CRI)	30K	(3000K	- 70CRI)	40K	(4000K	- 70CRI)	50K	(5000K	- 70CRI)	System		TRA (59	0nm)
Count	Current (mA)	Watts		LUMENS	LPW	BUG RATING	Watts	LUMENS	LPW	BUG RATING									
			II	16889	130	B3-U0-G3	18233	140	B3-U0-G3	19192	148	B3-U0-G3	20152	155	B3-U0-G3		6702	67	B2-U0-G2
			II-FR	17001	131	B3-U0-G2	18354	141	B3-U0-G2	19320	149	B3-U0-G2	20286	156	B3-U0-G2		6747	67	B2-U0-G1
			II-ML III-M	16890 17184	130 132	B4-U0-G4 B3-U0-G3	18233 18552	140 143	B4-U0-G4 B3-U0-G3	19193 19527	148 150	B4-U0-G4 B3-U0-G3	20152 20504	155 158	B4-U0-G4 B3-U0-G3		6703 6818	67 68	B3-U0-G3 B2-U0-G2
			III-W	15956	123	B3-U0-G3	17224	132	B3-U0-G3	18131	139	B3-U0-G3	19037	146	B3-U0-G4		6331	63	B1-U0-G2
			IV	17055	131	B3-U0-G3	18411	142	B3-U0-G3	19381	149	B3-U0-G3	20349	157	B3-U0-G3		6768	68	B2-U0-G2
			IV-FT VSQ-N	15537 17825	120 137	B3-U0-G3 B4-U0-G2	16772 19243	129 148	B3-U0-G3 B4-U0-G2	17655 20256	136 156	B3-U0-G3 B4-U0-G2	18538 21269	143 164	B3-U0-G4 B4-U0-G2		6165 7073	62 71	B1-U0-G2 B2-U0-G1
120	350	130.0	VSQ-M	17480	134	B4-U0-G2	18870	145	B4-U0-G2	19863	153	B4-U0-G2	20857	160	B4-U0-G2	100.0	6936	69	B3-U0-G1
			VSQ-W	17062	131	B5-U0-G3	18420	142	B5-U0-G3	19389	149	B5-U0-G3	20358	157	B5-U0-G3		6771	68	B3-U0-G2
			II-HS II-FR-HS	12352 12564	95 97	B1-U0-G2 B1-U0-G2	13334 13564	103 104	B1-U0-G3 B1-U0-G2	14036 14277	108	B1-U0-G3 B1-U0-G2	14738 14992	113 115	B1-U0-G3 B1-U0-G2		4901 4986	49 50	B1-U0-G2 B0-U0-G1
			III-M-HS	12496	96	B1-00-G2	13490	104	B1-00-G2	14199	109	B1-U0-G3	14910	115	B1-U0-G3		4959	50	B0-U0-G2
			III-W-HS	12231	94	B1-U0-G3	13204	102	B1-U0-G3	13899	107	B1-U0-G3	14594	112	B1-U0-G3		4853	49	B0-U0-G2
			IV-HS IV-FT-HS	12907 12198	99 94	B1-U0-G3 B1-U0-G3	13934 13168	107 101	B1-U0-G3 B1-U0-G3	14667 13862	113 107	B1-U0-G3 B1-U0-G4	15400 14555	118 112	B1-U0-G3 B1-U0-G4		5122 4840	51 48	B0-U0-G2 B0-U0-G2
			II	24123	126	B3-U0-G3	26042	136	B3-U0-G3	27413	143	B3-U0-G4	28783	150	B4-U0-G4		7800	51	B2-U0-G2
			II-FR	24284	126	B3-U0-G2	26216	137	B3-U0-G2	27596	144	B3-U0-G2	28975	151	B4-U0-G2		7853	52	B2-U0-G1
			II-ML	24124	126	B4-U0-G4	26042	136	B4-U0-G4	27414	143	B4-U0-G4	28784	150	B5-U0-G5		7800	51	B3-U0-G3
			III-W	24545 22789	128 119	B3-U0-G4 B3-U0-G4	26498 24603	138 128	B3-U0-G4 B3-U0-G4	27892 25897	145 135	B3-U0-G4 B3-U0-G4	29287 27192	153 142	B3-U0-G4 B3-U0-G4		7937 7368	52 48	B2-U0-G2 B1-U0-G2
			IV	24360	127	B3-U0-G4	26298	137	B3-U0-G4	27682	144	B3-U0-G4	29066	151	B3-U0-G4		7876	52	B2-U0-G2
			IV-FT	22191	116	B3-U0-G4	23956	125	B3-U0-G4	25217	131	B3-U0-G4	26478	138	B3-U0-G4		7176	47	B1-U0-G2
120	525	192.0	VSQ-N VSQ-M	25461 24967	133 130	B4-U0-G2 B5-U0-G3	27486 26952	143 140	B5-U0-G2 B5-U0-G3	28933 28371	151 148	B5-U0-G2 B5-U0-G3	30379 29789	158 155	B5-U0-G2 B5-U0-G3	152.0	8233 8073	54 53	B3-U0-G1 B3-U0-G2
			VSQ-W	24371	127	B5-U0-G4	26309	137	B5-U0-G4	27695	144	B5-U0-G4	29079	151	B5-U0-G4		7881	52	B3-U0-G2
			II-HS	17642	92	B1-U0-G3	19046	99	B1-U0-G3	20048	104	B1-U0-G4	21050	110	B2-U0-G4		5704	38	B1-U0-G2
			II-FR-HS III-M-HS	17946 17848	93 93	B1-U0-G2 B1-U0-G4	19373 19268	101	B1-U0-G2 B1-U0-G4	20393 20282	106 106	B1-U0-G2 B1-U0-G4	21413 21296	112	B1-U0-G2 B1-U0-G4		5803 5772	38 38	B1-U0-G1 B0-U0-G2
			III-IVI-HS	17470	91	B1-U0-G4 B1-U0-G4	18860	98	B1-00-G4 B1-U0-G4	19852	103	B1-00-G4 B1-U0-G4	20844	109	B1-U0-G4 B1-U0-G4		5649	37	B0-U0-G2 B0-U0-G2
			IV-HS	18435	96	B1-U0-G3	19902	104	B1-U0-G4	20949	109	B1-U0-G4	21997	115	B1-U0-G4	D-G4 59 D-G4 56 D-G4	5961	39	B0-U0-G2
			IV-FT-HS	17423	91	B1-U0-G4	18809	98	B1-U0-G4	19799	103	B1-U0-G4	20789	108	B1-U0-G4		5633	37	B0-U0-G2
			II-FR	30656 30860	118 119	B4-U0-G4 B4-U0-G2	33094 33315	127 128	B4-U0-G4 B4-U0-G2	34836 35068	134 135	B4-U0-G4 B4-U0-G2	36578 36822	141 142	B4-U0-G4 B4-U0-G2				
			II-ML	30657	118	B5-U0-G5	33095	127	B5-U0-G5	34837	134	B5-U0-G5	36579	141	B5-U0-G5				
			III-M	31191	120	B4-U0-G4	33673	130	B4-U0-G4	35445	136	B4-U0-G4	37217	143	B4-U0-G4				
			III-W	28960 30956	111	B3-U0-G4 B4-U0-G4	31265 33418	120 129	B3-U0-G5 B4-U0-G4	32909 35177	127 135	B3-U0-G5 B4-U0-G4	34555 36936	133 142	B3-U0-G5 B4-U0-G4				
			IV-FT	28200	108	B3-U0-G4	30444	117	B3-U0-G5	32046	123	B3-U0-G5	33648	129	B3-U0-G5				
120	700	260.0	VSQ-N	32356	124	B5-U0-G2	34929	134	B5-U0-G2	36768	141	B5-U0-G2	38606	148	B5-U0-G2	N/A		N/A	
			VSQ-W	31727 30971	122 119	B5-U0-G4 B5-U0-G4	34250 33434	132 129	B5-U0-G4 B5-U0-G5	36054 35194	139 135	B5-U0-G4 B5-U0-G5	37856 36953	146 142	B5-U0-G4 B5-U0-G5				
			II-HS	22420	86	B2-U0-G4	24203	93	B2-U0-G4	25478	98	B2-U0-G4	26751	103	B2-U0-G4				
			II-FR-HS	22806	88	B1-U0-G2	24619	95	B1-U0-G2	25916	100	B2-U0-G2	27212	105	B2-U0-G2				
			III-M-HS	22682 22201	87 85	B1-U0-G4 B1-U0-G4	24485 23967	94 92	B1-U0-G4 B1-U0-G5	25774 25228	99 97	B1-U0-G4 B1-U0-G5	27063 26489	104 102	B1-U0-G4 B1-U0-G5				
			IV-HS	23428	90	B1-00-G4 B1-U0-G4	25291	97	B1-00-G3 B1-U0-G4	26622	102	B1-00-G3	27953	102	B1-00-G3				
			IV-FT-HS	22141	85	B1-U0-G5	23902	92	B1-U0-G5	25160	97	B1-U0-G5	26418	102	B1-U0-G5				
			II II-FR	36574 36818	111	B4-U0-G4 B4-U0-G2	39483	120	B4-U0-G4 B4-U0-G2	41561 41838	126	B4-U0-G4 B4-U0-G3	43639	133	B4-U0-G5 B4-U0-G3				
			II-FIX	36575	111	B5-U0-G5	39746 39485	121 120	B5-U0-G5	41838	127 126	B5-U0-G5	43930 43640	134 133	B5-U0-G5				
			III-M	37213	113	B4-U0-G4	40174	122	B4-U0-G5	42288	129	B4-U0-G5	44402	135	B4-U0-G5				
			III-W	34552	105	B3-U0-G5	37300	113	B3-U0-G5	39263	119	B4-U0-G5	41226	125	B4-U0-G5				
			IV-FT	36932 33644	112	B4-U0-G4 B3-U0-G5	39870 36321	121 110	B4-U0-G5 B3-U0-G5	41969 38232	128 116	B4-U0-G5 B4-U0-G5	44067 40144	134	B4-U0-G5 B4-U0-G5				
120	875	329.0	VSQ-N	38602	117	B5-U0-G2	41673	127	B5-U0-G2	43866	133	B5-U0-G2	46060	140	B5-U0-G2	N/A		N/A	
120	3,3	527.0	VSQ-M	37852	115	B5-U0-G4	40863	124	B5-U0-G4	43014	131	B5-U0-G4	45165	137	B5-U0-G4	. 1/ /		N/A	
			VSQ-W II-HS	36950 26748	112 81	B5-U0-G5 B2-U0-G4	39888 28876	121 88	B5-U0-G5 B2-U0-G4	41988 30395	128 92	B5-U0-G5 B2-U0-G4	44088 31916	134 97	B5-U0-G5 B2-U0-G5				
			II-FR-HS	27209	83	B2-U0-G2	29373	89	B2-U0-G2	30919	94	B2-U0-G2	32465	99	B2-U0-G3				
			III-M-HS	27060	82	B1-U0-G4	29213	89	B1-U0-G5	30750	93	B1-U0-G5	32287	98	B1-U0-G5				
			III-W-HS IV-HS	26487 27951	81 85	B1-U0-G5 B1-U0-G4	28593 30174	87 92	B1-U0-G5 B1-U0-G4	30098 31762	91 97	B1-U0-G5 B1-U0-G5	31603 33350	96 101	B1-U0-G5 B1-U0-G5				
			IV-HS IV-FT-HS	26416	80	B1-U0-G4 B1-U0-G5	28517	87	B1-00-G4 B1-U0-G5	30018	91	B1-U0-G5 B1-U0-G5	31519	96	B1-00-G5 B2-U0-G5				
			II	42039	106	B4-U0-G5	45383	114	B4-U0-G5	47771	120	B4-U0-G5	50160	126	B5-U0-G5				
			II-FR	42319	106	B4-U0-G3	45685 45384	115 114	B4-U0-G3	48089	121	B4-U0-G3	50494	127	B4-U0-G3				
			II-ML III-M	42040 42774	106 107	B5-U0-G5 B4-U0-G5	45384 46177	114	B5-U0-G5 B4-U0-G5	47773 48606	120 122	B5-U0-G5 B4-U0-G5	50161 51037	126 128	B5-U0-G5 B4-U0-G5				
			III-W	39714	100	B4-U0-G5	42873	108	B4-U0-G5	45130	113	B4-U0-G5	47387	119	B4-U0-G5				
			IV	42451	107	B4-U0-G5	45828	115	B4-U0-G5	48240	121	B4-U0-G5	50652	127	B4-U0-G5				
			IV-FT VSQ-N	38671 44370	97 111	B4-U0-G5 B5-U0-G2	41748 47899	105 120	B4-U0-G5 B5-U0-G3	43945 50421	110 127	B4-U0-G5 B5-U0-G3	46143 52942	116 133	B4-U0-G5 B5-U0-G3	5			
120	1050	398.0	VSQ-M	43508	109	B5-00-G2 B5-U0-G4	46969	118	B5-00-G3 B5-U0-G4	49441	124	B5-00-G3 B5-U0-G4	51914	130	B5-U0-G5	N/A		N/A	
			VSQ-W	42471	107	B5-U0-G5	45849	115	B5-U0-G5	48262	121	B5-U0-G5	50676	127	B5-U0-G5				
			II-HS II-FR-HS	30745 31274	77	B2-U0-G4 B2-U0-G3	33191	83	B2-U0-G5	34938	88	B2-U0-G5	36685 37315	92	B2-U0-G5				
			II-FR-HS	31274	79 78	B2-00-G3 B1-U0-G5	33761 33578	85 84	B2-U0-G3 B1-U0-G5	35539 35345	89 89	B2-U0-G3 B2-U0-G5	37315 37112	94	B2-U0-G3 B2-U0-G5				
			III-W-HS	30444	76	B1-U0-G5	32866	83	B1-U0-G5	34596	87	B1-U0-G5	36325	91	B2-U0-G5				
			IV-HS	32127	81	B1-U0-G5	34683	87	B2-U0-G5	36508	92	B2-U0-G5	38333	96	B2-U0-G5				
			IV-FT-HS	30363	76	B1-U0-G5	32777	82	B2-U0-G5	34504	87	B2-U0-G5	36229	91	B2-U0-G5				





RAZAR WALLMOUNT-LED

F C IFICA TΙ

OPTICAL HOUSING

Heavy cast low copper aluminum (A356 alloy; <0.2% copper) assembly with integral cooling fins. The Optical Panel mounting surface is milled flat (surface variance <± .003") to facilitate thermal transfer of heat to housing and cooling fins. The Optical Housing bolts to the Electrical Housing forming a unified assembly. The minimum wall thickness is .188".

ELECTRICAL HOUSING

Heavy cast low copper aluminum (A356 alloy; <0.2% copper) assembly. Minimum wall thickness is .188". Fixture Mounting Plate affixes to mounting surface over a recessed j-box. Electrical Housing anchors on the top edge of the Mounting Plate and stainless steel recessed socket head screws tighten the Electrical Housing to the Mounting Plate from the bottom.

PLED™ OPTICAL MODULES

Emitters (LED's) are arrayed on a metal core PCB panel with each emitter located on a copper thermal transfer pad and enclosed by an LED refractor. LED optics completely seal each individual emitter to meet an IP66 rating. The asymmetric distributions, have a micro-reflector inside the refractor which re-directs the house side emitter output towards the street side and functions as a house side shielding element. Refractors are injection molded H12 acrylic. Each LED refractor is sealed to the PCB over an emitter and all refractors are retained by an aluminum frame. Any one Panel, or group of Panels in a luminaire, have the same optical pattern. LED refractors produce Type II, III, and Type IV site/area distributions as well as other specialty asymmetric distributions. Panels are field replaceable and field rotatable in 90° increments.

LED DRIVER(S)

Constant current electronic with a power factor of >.90 and a minimum operating temperature of -40°F/-40°C. Driver(s) is/are UL and cUL recognized and mounted directly against the Electrical Housing to facilitate thermal transfer, held down by universal clamps to facilitate easy removal. In-line terminal blocks facilitate wiring between the driver and optical arrays. Drivers accept an input of 120-277V, 50/60Hz or 347V-480V, 50,60Hz. (0 - 10V dimmable driver is standard. Driver has a minimum of 3KV internal surge protection. Luminaire supplied with 20KV surge protector for field accessible installation.)

LED EMITTERS

High output LED's are utilized with drive currents ranging from 350mA to 1050mA. 70CRI Minimum. LED's are available in standard Neutral White (4000K), or optional Cool White (5000K) or Warm White (3000K). Consult Factory for other LED options.

AMBER LED's

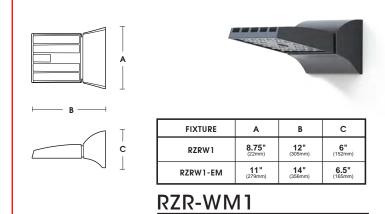
PCA (Phosphor Converted Amber) LED's utilize phosphors to create color output similar to LPS lamps and have a slight output in the blue spectral bandwidth. TRA (True Amber) LED's utilize material that emits light in the amber spectral bandwidth only without the use of phosphors.

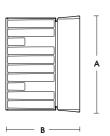
FINISH

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at 140°F. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. 400°F bake for maximum hardness and durability.

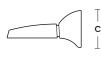
PROJECT NAME:

PROJECT TYPE:







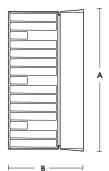


FIXTURE	Α	В	С
RZRW2	16" (406mm)	12" (305mm)	6" (152mm)
RZRW2-EM	16" (406mm)	14" (356mm)	6.5" (165mm)

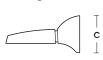
RZR-WM2

PATENT PENDING

PATENT PENDING







FIXTURE	Α	В	С
RZRW3	23" (584mm)	12" (305mm)	6" (152mm)
RZRW3-EM	23" (584mm)	14" (356mm)	6.5" (165mm)

RZR-WM3

PATENT PENDING





2019093



RAZAR WALLMOUNT SERIES-LED

EMERGENCY OPTION Emergency Back Box (EM) 3/4" Surface Conduit (SC) EMBack Box is 2' deeper than standard housing

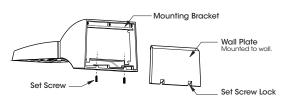
THE EMERGENCY OPTION BACK BOX EXTENDS 2" BEYOND THE STANDARD HOUSING AND CONTAINS THE EMERGENCY COMPONENTS (EC) INCLUDING BATTERIES OR CAN BE USED FOR SURFACE CONDUIT (SC) APPLICATIONS. THERE IS TO BE AN SC1, SC2, AND SC3 OPTION FORTHE DIFFERING HOUSING SIZES. SC SHIPS WITH THREADED CONDUIT PLUGS.

THE EM-LED SYSTEM PROVIDES POWERTO ALL LEDS IN THE ARRAY (20, 40, or 60) TO MEET THE FOLLOWING LIGHT LEVELS FOR A MINIMUM OF 90 MINUTES -

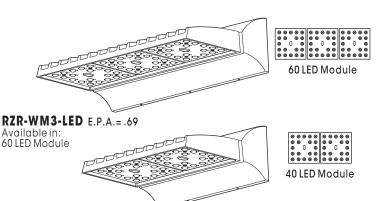
WM1 = 45% @ 350MA WM2 = 36% @ 350MA WM3 = 24% @ 350MA

*MULTIPLY THE % ABOVE BY THE LUMEN OUTPUT @ 350MA

WALL MOUNTING



PLED® MODULES



RZR-WM2-LED E.P.A.= .47
Available in:
40 LED Module

20 LED Module

RZR-WM1-LED E.P.A.=.33 Available in:

20LED Module

MAX INPUT WATTAGE

# OF		DRIVE C	URRENT	
LED's	350mA	525mA	700mA	1050mA
60	68W	99W	131W	198W
40	45W	66W	87W	134W
20	23W	33W	44W	66W

Spec/Order Example: RZR-WM2/PLED-IV/40LED-700mA/CW/277/RAL-8019-S/SF

S F	P E C / O OPTICS	R D	E R I	N G		N I VOLTAGI	= (O R M /	A T I O N options
MODEL	OPTICS		LED MO	DE	١	/OLTA	GE	FINISH	OPTIONS
	PLED® DISTRIBUTION TYPE	NO. LEDs	DRIVE CURRENT	COLOR TEMP - CCT	Γ.			STANDARD TEXTURED FINISH	☐ HIGH-LOW DIMMING FOR EXTERNAL CONTROL HLSW
☐ RZR-WM1	TYPE II PLED-II	☐ 20LED	☐ 350mA ☐ 525mA	NW (4000K)* *STANDARD		☐ 120 ☐ 208		☐ BLACK RAL-9005-T	☐ HOUSE SIDE SHIELDING
	TYPE II FRONT ROW PLED-II-FR		☐ 700mA¹ ☐ 1050mA¹	☐ CW (5000K)		☐ 240 ☐ 277		☐ WHITE RAL-9003-T	☐ SINGLE FUSE (120V & 277V) SF
☐ RZR-WM2	PLED-III	RZR-WM2	□ 1050IIIA	CONSULT FACTORY FOR OTHER LED COLORS		☐ 347 ☐ 480		GREY RAL-7004-T	☐ DOUBLE FUSE (208V & 240V) DF
	TYPE III WIDE PLED-III-W			AMBER² ☐ PHOSPHOR				☐ DARK BRONZE RAL-8019-T ☐ GREEN	BLUE-TOOTH PROGRAMMABLE PHOTO/MOTION SENSOR (FACTORY - MOTION 50/100; PHOTO 75FC)
☐ RZR-WM3	PLED-IV	RZR-WM3		CONVERTED AMBER				RAL-6005-T	☐ EMERGENCY BACKUP 1 EM1
	TYPE IV-FT PLED-IV-FT	☐ 60LED		PCA				FOR SMOOTH FINISH REPLACE SUFFIX "T" WITH SUFFIX "S"	☐ EMERGENCY BACKUP 1 (HOUSING ONLY) EMH1
	FLED-IV-FI			TRUE AMBER ³ TRA				(EXAMPLE: RAL-9005-S)	☐ EMERGENCY BACKUP 2 EM2
			NOTES:						EMERGENCY BACKUP 3EM3
			1 - 700mA and 1050mA LED'S	NOT FOR USE WITH TRA					☐ SURFACE CONDUIT 1 SC1 ☐ SURFACE CONDUIT 2 SC2
			2 - NARROW BAND AN CCT EQUIVALENT 3 - AVAILABLE IN 350r CURRENTS ONLY	MBERS HAVE NO DEFINABLE				CONSULT FACTORY FOR CUSTOM COLORS	SURFACE CONDUIT 3 SC3

LED COUNT	SOURCE TYPE	SOURCE	INITIAL LUMENS - 4000K	INITIAL LUMENS - 3000K	INITIAL LUMENS - 5000K	L70 GREATER THAN (HR)-TM21	STARTING TEMP.	SYSTEM WATTS	VOLTS	MAX INPUT AMPS
20	LED	20 PLED ° Optical Module - 350mA	2,706 - 2,993	2,571 - 2,843	2,841 - 3,143	60,000+	-20°F	22	120 277 347	0.19 0.08 0.07
20	LED	20 PLED® Optical Module - 525mA	3,897 - 4,310	3,702 - 4,095	4,092 - 4,526	60,000+	-20°F	33	120 277 347	0.28 0.12 0.10
20	LED	20 PLED ° Optical Module - 700mA	4,942 - 5,466	4,695 - 5,193	5,189 - 5,739	60,000+	-20°F	44	120 277 347	0.37 0.16 0.13
20	LED	20 PLED ° Optical Module - 1050mA	6,564 - 7,260	6,236 - 6,897	6,892 - 7,623	60,000+	-20°F	65	120 277 347	0.55 0.24 0.19
40	LED	40 PLED Optical Module - 350mA	5,585 - 6,178	5,206 - 5,869	5,864 - 6,487	60,000+	-20°F	43	120 277 347	0.36 0.16 0.13
40	LED	40 PLED° Optical Module - 525mA	8,059 - 8,914	7,656 - 8,468	8,462 - 9,360	60,000+	-20°F	65	120 277 347	0.55 0.24 0.19
40	LED	40 PLED ® Optical Module - 700mA	10,240 - 11,327	9,728 - 10,761	10,752 - 11,893	60,000+	-20°F	87	120 277 347	0.73 0.32 0.26
40	LED	40 PLED® Optical Module - 1050mA	13,642 - 15,089	12,690 - 14,335	14,324 - 15,843	60,000+	-20°F	129	120 277 347	1.08 0.47 0.38
60	LED	60 PLED® Optical Module - 350mA	8,118 - 8,979	7,712 - 8,530	8,524 - 9,428	60,000+	-20°F	65	120 277 347	0.55 0.24 0.19
60	LED	60 PLED [®] Optical Module - 525mA	11,690 - 12,930	11,106 - 12,284	12,275 - 13,577	60,000+	-20°F	98	120 277 347	0.82 0.36 0.29
60	LED	60 PLED® Optical Module - 700mA	14,825 - 16,398	14,084 - 15,578	15,566 - 17,218	60,000+	-20°F	131	120 277 347	1.09 0.47 0.38
60	LED	60 PLED® Optical Module - 1050mA	19,691 - 21,780	18,706 - 20,691	20,676 - 22,869	60,000+	-20°F	193	120 277 347	1.61 0.70 0.56

NOTES:

- 1. Max Input Amps is the highest of starting, operating, or open circuit currents
- ${\bf 2}.$ Lumen values for LED Modules vary according to the distribution type
- ${\bf 3.}$ System Watts includes the source watts and all driver components.
- 4. Fuse value should be sufficient to protect all wiring components.
- 5. L70(10K) TM-21 6x rule applied

L70(10K) - Calculated = 244,000 @ 700mA = 102,000@ 1050mA

WARNING: All fixtures must be installed in accordance with local codes or the National Electrical Code. Failure to do so may result in serious personal injury.



SNTS 4"

FEATURES

Shaft

4" square, fabricated from high grade structural steel tube. Shaft conforms to ASTM-A-501-68 specifications. Meets or exceeds minimum yield strength of 46,000 P.S.I. wall thickness 11 GA. (.120 wall) or 7 GA. (.180 wall) as specified. Reinforced hand hole is furnished with cover. Shaft is furnished with ground lug located inside pole on wall opposite hand hole.

Base Plate

Fabricated from structural quality hot rolled steel. Meets or exceeds minimum yield strength of 36,000 P.S.I. base telescopes and is circumferentially welded to pole shaft. Slotted bolt holes provide 1" flexibility on either side of bolt circle centerline.

Anchorage

(4) anchor bolts fabricated from hot rolled steel bar. Minimum yield strength of 50,000 P.S.I. bolts have "L" bend on one end and are threaded on the other. Bolts are fully galvanized and are furnished with two nuts and two washers.

Base Cover

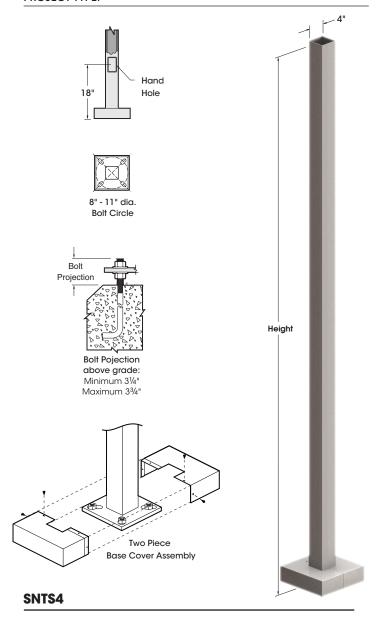
Fabricated from heavy gauge quality carbon steel. Two-piece cover conceals base.

Finish

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at 140°F. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. 400°F bake for maximum hardness and durability.

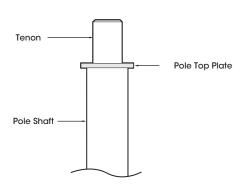
PROJECT NAME:

PROJECT TYPE:



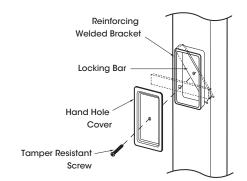
Pole Top Mount

PT23 - 23/8"X4" Tenon PT27 - 27/8"X4" Tenon



Hand Hole Cover

Reinforced hand hole w/tamper resistant bolt assembly



2020265





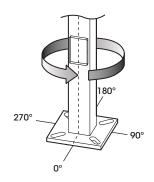
SPECIFICATIONS

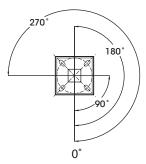
Engineering Data Maximum EPA - Square Feet

Model Number	Max. Fixture Weight	100 MPH	90 MPH	80 MPH	70 MPH
SNTS 104 - 11	400	16.7	20.5	26.1	33.4
SNTS 124 - 11	400	12.2	16.1	20.4	25.8
SNTS 144 - 11	400	9.9	12.8	16.1	20.2
SNTS 154 - 11	400	8.9	11.4	14.4	17.9
SNTS 164 - 11	400	7.9	10.1	12.8	15.9
SNTS 184 - 11	400	6.2	8.2	10.1	13.8
SNTS 204 - 11	400	4.8	6.2	7.9	11.6
SNTS 204 - 7	450	8.8	11.3	14.0	17.4
SNTS 254 - 11	350	1.6	3.2	5.5	8.8
SNTS 254 - 7	450	4.3	6.1	9.1	11.2

All above design calculations are based on sustained wind forces plus additional 1.3 wind gust (Example: Pole rated at 80 MPH withstands 104 MPH gusts)

Drilled Side MountSpecify drilling location using codes below.



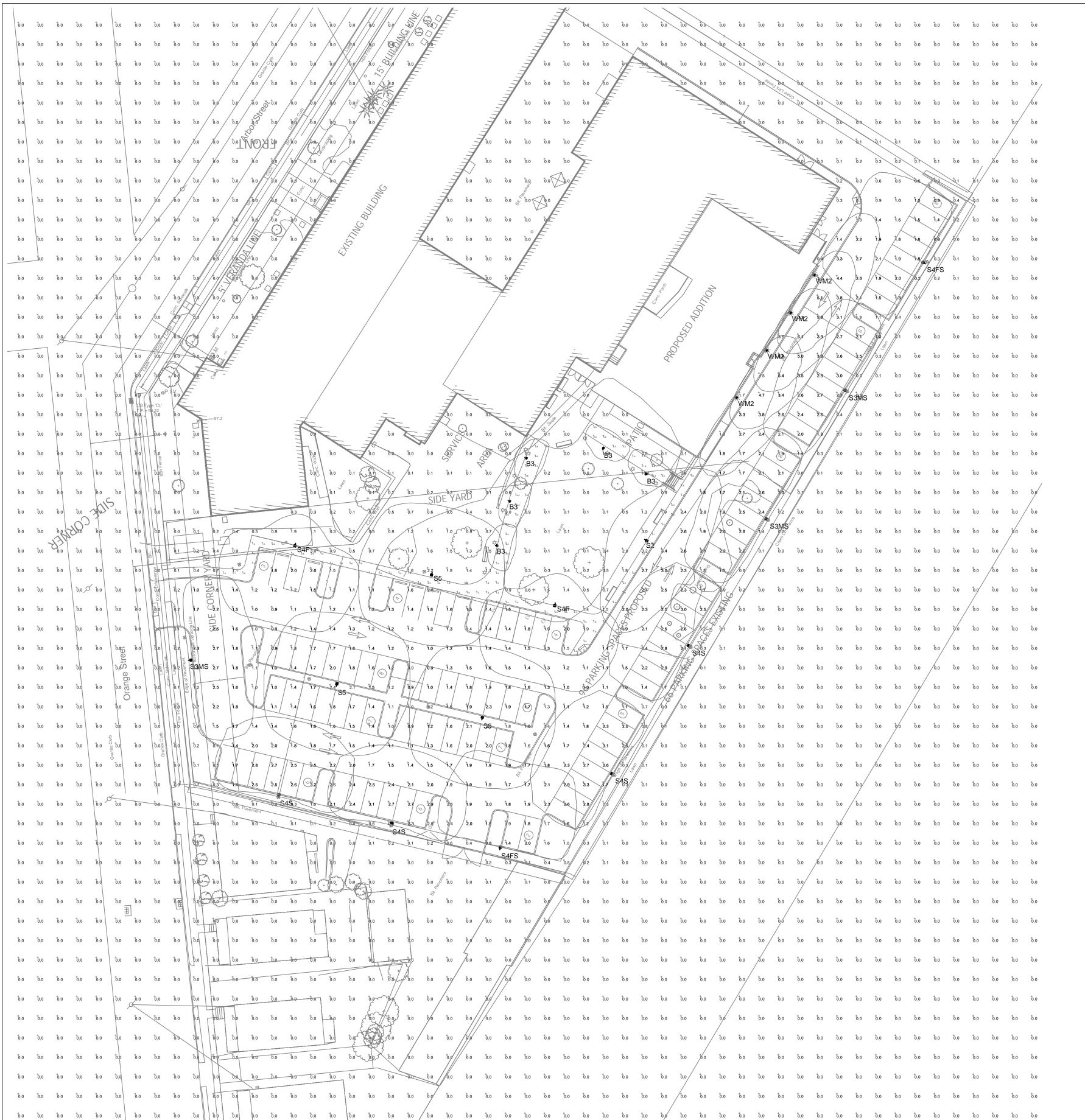


ORDERING INFORMATION

Spec/Order Example: SNTS204-7/2-180/RAL-6005-S

	Pole Mod	el Number - S	NTS 4"		Mounting	Finish	Options		
Ро	le Model	Number	- SNTS	4"	Mounting	Options	Options		
	Pole Height	Wall Thickness	Bolt Circle	Anchorage	Arm Mount	Standard Smooth Finish	Receptacle		
☐ SNTS 104 - 11	10'	11	9"	3/4"X18"X3"	☐ PT23 2³/8" X 4" Tenon	☐ Black RAL-9005-S	Duplex Receptacle		
☐ SNTS 124 - 11	12'	11	9"	3/4"X18"X3"	□ PT27 2 ⁷ /8" X 4" Tenon	☐ White RAL-9003-S	GFI Receptacle GFI		
☐ SNTS 144 - 11	14'	11	9"	3/4"X18"X3"	Other Tenon Mt	☐ Grey RAL-7004-S	3 Way Adapter		
☐ SNTS 154 - 11	15'	11	9"	3/4"X18"X3"	Drill Mount	☐ Dark Bronze	Quantilla a		
☐ SNTS 164 - 11	16'	11	9"	3/4"X18"X3"	□1	RAL-8019-S	Coupling		
☐ SNTS 184 - 11	18'	11	9"	³¼"X18"X3"	□ 2-180	Green RAL-6005-S	☐ ½" Coupling CPLN1/2		
☐ SNTS 204 - 11	20'	11	10"	3/4"X24"X3"	□ 2-90 🜪		☐ ¾" Coupling CPLN3/4		
☐ SNTS 204 - 7	20'	7	11"	3/4"X30"X3"	□ 3-90		2" Coupling CPLN2		
☐ SNTS 254 - 11	25'	11	11"	³/4"X24"X3"	□ 4-90		Specify Coupling location		
☐ SNTS 254 - 7	25'	7	11"	³ / ₄ "X30"X3"	□ 3-120	All Steel Poles supplied with Smooth Finish			
					3-120 requires PT27 and T3120 Adapter	See USALTG.COM for additional colors	Refer to the Accessories Section for other options		
☐ Specify other heigh	ts								





JOB NAME: REAL ART WAYS - HARTFORD, CT APEX LIGHTING SOLUTIONS WORKPLANE/CALC PLANE: AT FINISH GRADE MOUNTING HEIGHT: SEE LUMINAIRE SCHEDULE APPS: LED SALES: SP SPECIFIER: FREEMAN COMPANIES

Lumina	aire Schedule	e					
Qty	Label	Arrangement	Lumens	Input Watts	LLF	BUG Rating	Description
5	В3	Single	1734	11	0.900	B1-U0-G1	USAL RZRB1-PLED-III-M-20LED-175mA-WW-VOLT-FINISH
1	S2	Single	6774	55.9	0.900	B2-U0-G2	USAL RZRM-PLED-II-24LED-700mA-30K-VOLT-1-FINISH / MOUNTED TO SNTS 164-11-1-FINISH
3	S3MS	Single	5012	55.9	0.900	B0-U0-G2	USAL RZRM-PLED-III-M-24LED-700mA-30K-VOLT-1-FINISH-HS-PLED / MOUNTED TO SNTS 164-11-1-FINISH
2	S4F	Single	6231	55.9	0.900	B1-U0-G2	USAL RZRM-PLED-IV-FT-24LED-700mA-30K-VOLT-1-FINISH / MOUNTED TO SNTS 164-11-1-FINISH
2	S4FS	Single	4893	55.9	0.900	B0-U0-G2	USAL RZRM-PLED-IV-FT-24LED-700mA-30K-VOLT-1-FINISH-HS-PLED / MOUNTED TO SNTS 164-11-1-FINISH
4	S4S	Single	5177	55.9	0.900	B0-U0-G2	USAL RZRM-PLED-IV-24LED-700mA-30K-VOLT-1-FINISH-HS-PLED / MOUNTED TO SNTS 164-11-1-FINISH
3	S5	Single	7011	55.9	0.900	B3-U0-G1	USAL RZRM-PLED-VSQ-M-24LED-700mA-30K-VOLT-1-FINISH / MOUNTED TO SNTS 164-11-1-FINISH
4	WM2	Single	3206	32.4	0.900	B0-U0-G1	USAL RZR-WM1-PLED-II-20LED-525mA-WW-VOLT-FINISH-HS-PLED / WALL MOUNTED @ 14.5FT AFG TO BOF

Calculation Summary											
Label	Grid Height	Avg	Max	Min	Avg/Min	Max/Min					
PARKING & DRIVE LANES	0	1.94	6.1	0.3	6.47	20.33					
SIDEWALK	0	3.13	15.4	0.9	3.48	17.11					
SITE	0	0.16	16.2	0.0	N.A.	N.A.					

GENERAL DISCLAIMER:

Calculations have been performed according to IES standards and good practice Some differences between measured values and calculated results may occur due to tolerances in calculation methods, testing procedures, component performance, measurement techniques and field conditions such as voltage and temperature variations. Input data used to generate the attached calculations such as room dimensions, reflectances, furniture and architectural elements significantly affect the lighting calculations. If the real environment conditions do not match the input data, differences will occur between measured values and calculated values.

* LLF Determined Using Current Published Lamp Data

NOTE TO REVIEWER:

Total Light Loss Factor (LLF) applied at time of design is determined by applying the Lamp Lumen Depreciation (LLD) from current lamp manufacturer's catalog, a Luminaire Dirt Depreciation Factor (LDD) based on IES recommended values and a Ballast Factor (BF) from current ballast specification sheets. Application of an incorrect Light Loss Factor (LLF) will result in forecasts of performance that will not accurately depict actual results.

For proper comparison of photometric layouts, it is essential that you insist all designers use correct Light Loss Factors.



20-30 BEAVER ROAD, WETHERSFIELD, CT 06109 TELEPHONE 860.632.8766 / WWW.APEXLTG.COM PHOTOMETRIC CALCULATION

PROJECT TITLE:

DRAWING TITLE: INTERIOR LIGHTING SCALE: 1"=30'-0" DATE: 7/28/23

DRAWN BY: LED

SHEET:

FILE NAME: 2023-07-28 SL-1 REAL ART WAYS - HARTFORD, CT-LED.dwg

REAL ART WAYS

HARTFORD, CT

SOLID STATE LIGHTING

FIXTURE TYPE:

RAZAR BOLLARD-LED

SPECIFICATIONS

OPTICAL HOUSING

Heavy cast low copper aluminum (A356 alloy; <0.2% copper) assembly with integral cooling fins. The Optical Panel mounting surface is milled flat (surface variance <± .003") to facilitate thermal transfer of heat to housing and cooling fins. Minimum wall thickness is .188".

SHAFT & BASE

Extruded aluminum (6061-T6 alloy) riser welded to heavy cast aluminum (A356 alloy; <0.2% copper) base. Riser has minimum wall thickness of .188". Electrical assembly including LED mains driver, LED Emergency driver (optional LED-EM) with batteries, and quick connectors suspended inside riser. Concealed bolts attach the Optical Housing bolts to Riser.

ANCHOR BOLTS

Four 3/8" x 10" x 2" galvanized anchor bolts with couplings, leveling nuts, washers, template, and stainless bolts.

PLED™ OPTICAL MODULES

Emitters (LED's) are arrayed on a metal core PCB panel with each emitter located on a copper thermal transfer pad and enclosed by an LED refractor. The asymmetric distributions have a micro-reflector inside the refractor that re-directs the house side emitter output towards the street side and functions as a house side shielding element. Refractors are injection molded H12 acrylic. Each LED refractor is sealed to the PCB over an emitter and all refractors are retained by an aluminum frame. All refractors in a Panel have the same optical pattern. LED refractors produce standard site/area distributions – Type II, and Type IV. Panels are field replaceable and field rotatable in 90° increments.

LED DRIVER(S)

Constant current electronic with a power factor of >.90 and a minimum operating temperature of -40°F/-40°C. Driver(s) is/are UL and cUL recognized and mounted directly against the Electrical Housing to facilitate thermal transfer, held down by universal clamps to facilitate easy removal. In-line terminal blocks facilitate wiring between the driver and optical arrays. Drivers accept an input of 120-277V, 50/60Hz or 347V-480V, 50,60Hz. (0 - 10V dimmable driver is standard. Driver has a minimum of 3KV internal surge protection. Luminaire supplied with 20KV surge protector for field accessible installation.)

LED EMITTERS

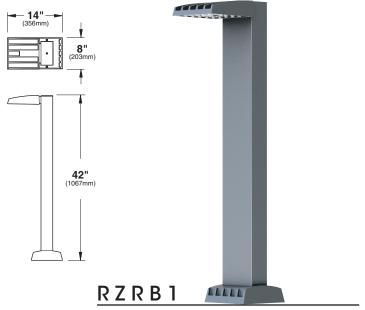
High output LED's are utilized with drive currents ranging from 175mA to 350mA. 70CRI Minimum. LED's are available in standard Neutral White (4000K), or optional Cool White (5000K) or Warm White (3000K). Consult Factory for other LED options.

AMBER LED's

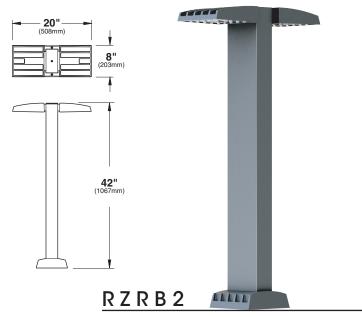
PCA (Phosphor Converted Amber) LED's utilize phosphors to create color output similar to LPS lamps and have a slight output in the blue spectral bandwidth. **TRA** (True Amber) LED's utilize material that emits light in the amber spectral bandwidth only without the use of phosphors.

FINISH

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at 140°F. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. 400°F bake for maximum hardness and durability.



PATENT PENDING



PATENT PENDING

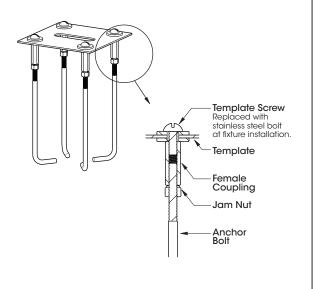




2023080

RAZAR BOLLARD SERIES - LED

ANCHOR BOLT ASSEMBLY



OVERVIEW

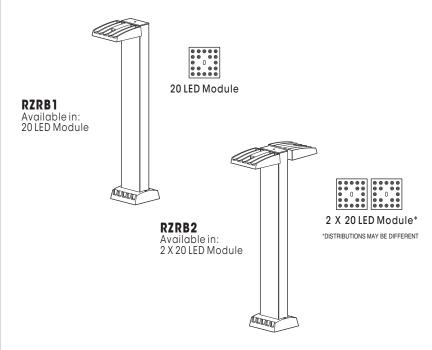
PRECISE CAST ALUMINUM LED MODULE. HOUSING IS VENTED TO PROVIDE AIR FLOW FOR THERMAL MANAGEMENT.

LED DRIVER ACCEPTS FROM 100-277 VAC INPUT VOLTAGE.

PLED® MODULES

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MAX INPUT WATTAGE

OF DRIVE CURRENT
LED's 175mA HID EQIV. 350mA HID EQIV.
40 22W 50W 44W 70W
20 12W 50W 22W 70W

Spec/Order Example: RZRB1/PLED-IV/20LED-350mA/CW/277/RAL-8019-S/DF

				Spec/Order Exa	mple: RZRB1/PLED-IV/20	DLED-350mA/CW/277/RAL-8019-S/DF
S P	EC/OF	D E	RIN	G I N	I F O R N	ATION
MODEL	OPTICS		LED MODE		FINISH	OPTIONS
MODEL	OPTICS		LED		FINISH	OPTIONS
RZRB1	PLED® DISTRIBUTION TYPE TYPE II PLED-II	No. LEDs RZRB1¹ □ 20LED RZRB2 □ 40LED	DRIVE CURRENT 175mA¹ 350mA VOLTAGE 120 208 240 277 347 480	COLOR NW (4000K)* *STANDARD CW (5000K) WW (3000K) OTHER LED COLORS AVAILABLE CONSULT FACTORY AMBER ² PHOSPHOR CONVERTED AMBER PCA TRUE AMBER TRA	STANDARD TEXTURED FINISH BLACK RAL-9005-T WHITE RAL-9003-T GREY RAL-7004-T DARK BRONZE RAL-8019-T GREEN RAL-6005-T FOR SMOOTH FINISH REPLACE SUFFIX "T" WITH SUFFIX "S" (EXAMPLE: RAL-9500-S)	HOUSE SIDE SHIELDING
			OT AVAILABLE IN RZRB1 AT 1 AND AMBERS HAVE NO DEFII			☐ 30" ☐ 36"





LED COUNT	SOURCE TYPE	SOURCE	INITIAL LUMENS - 4000K	INITIAL LUMENS - 3000K	INITIAL LUMENS - 5000K	L70 GREATER THAN (HR)	STARTING TEMP.	SYSTEM WATTS	VOLTS	MAX INPUT AMPS
20	LED	20 PLED ° Optical Module - 175mA	1,401 - 1,404	1,226 - 1,229	1,434 - 1,438	60,000+	-20°F	12	120 277	0.24 0.10
20	LED	20 PLED [®] Optical Module - 350mA	2,501 - 2,508	2,190 - 2,196	2,561 - 2,568	60,000+	-20°F	22	120 277	0.34 0.15
40	LED	40 PLED Optical Module - 175mA	2,801 - 2,808	2,452 - 2,459	2,561 - 2,568	60,000+	-20°F	22	120 277	0.38 0.17
40	LED	40 PLED [®] Optical Module - 350mA	5,002 - 5,015	4,379 - 4,391	5,122 - 5,136	60,000+	-20°F	44	120 277	0.38 0.17

NOTES:

- 1. Max Input Amps is the highest of starting, operating, or open circuit currents
- 2. Lumen values for LED Modules vary according to the distribution type
- System Watts includes the source watts and all driver components.
- Fuse value should be sufficient to protect all wiring components. For electronic driver and LED component protection, use 10KV – 20KV surge suppressors.
- 5. L70(10K) TM-21 6x rule applied

WARNING: All fixtures must be installed in accordance with local codes or the National Electrical Code. Failure to do so may result in serious personal injury.





RAZAR SERIES - LED LOW PROFILE AREA LUMINAIRE

Optical Housing

Heavy cast, low copper aluminum assembly (A356 alloy, <.2% copper) minimum wall thickness .188". LED Module mounting area is machined to within a 0.002" surface flatness variance for maximum surface contact and thermal conductivity from the LED modules to the radiating fins. Passive radiating fins above the LED Optics provide superior thermal management and long LED life. The optical and electrical compartments are integrated with the support arm to create one assembly. Cast and hinged driver compartment cover allows access to the drivers and wiring.

Electrical Housing w/ Integrated Arm

Heavy cast low copper aluminum (A356 alloy; <0.2% copper) assembly with integral cooling ribs surrounding the electrical compartment and a flat surface on the top of the arm to accommodate a photocell receptacle. Solid barrier wall separates optical and electrical compartments. The optical compartment and electrical compartment with the integrated support arm combine to create one assembly. Minimum wall thickness is .188". Cast and hinged driver assembly cover is integrated with wiring compartment cover.

PLED™ Optics

Emitters (LED's) are arrayed on a metal core PCB panel with each emitter located on a copper thermal transfer pad and enclosed by an LED refractor. LED optics completely seal each individual emitter to meet an IP66 rating. In asymmetric distributions, a micro-reflector inside the refractor re-directs the house side emitter output towards the street side and functions as a house side shielding element. Refractors are injection molded H12 acrylic. Each LED refractor is sealed to the PCB over an emitter and all refractors are retained by an aluminum frame. Any one Panel, or group of Panels in a luminaire, have the same optical pattern. LED refractors produce standard site/area distributions. Panels are field replaceable and field rotatable in 90° increments.

LED Driver(s)

Constant current electronic with a power factor of >.90 and a minimum operating temperature of -40°F/-40°C. Driver(s) is/are UL and cUL recognized and mounted directly against the Electrical Housing to facilitate thermal transfer, held down by universal clamps to facilitate easy removal. In-line terminal blocks facilitate wiring between the driver and optical arrays. Drivers accept an input of 120-277V, 50/60Hz or 347V-480V, 50,60Hz, (0 - 10V dimmable driver is standard. Driver has a minimum of 3KV internal surge protection. Luminaire supplied with 20KV surge protector for field accessible installation.)

LED Emitters

High output LED's are utilized with drive currents ranging from 350mA to 1050mA. 70CRI Minimum. LED's are available in standard Neutral White (4000K), or optional Cool White (5000K) or Warm White (3000K). Consult Factory for other LED options.

TRA (True Amber) LED's utilize material that emits light in the amber spectral bandwidth only without the use of phosphors.

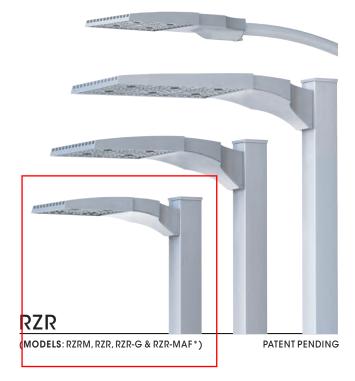
Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at 140°F. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. 400°F bake for maximum hardness and durability.

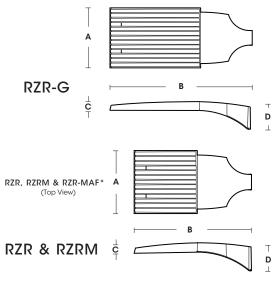
Mast Arm Fitter/Electrical Housing

Replaces standard Electrical Housing. Fits standard 2 3/8" O.D. horizontal tenon. Two (2) straps with two (2) bolts each encircle the lower half of the tenon. Upper half of the tenon rests on self-centering steps that position the angle of the luminaire at 0° , +1.5°, +1.5 or +3° up from the horizontal. All hardware is stainless steel.

PROJECT NAME:

PROJECT TYPE:





FIXTURE	Α	В	С	D
RZR-G	15"	36.5"	3"	7"
	381mm	927mm	76mm	187mm
RZR	14.75"	28.25"	2.75 "	6.5 "
	375mm	718mm	70mm	165mm
RZRM	11.5"	22"	2.5"	5.25"
	292mm	559mm	64mm	133mm
RZR-MAF	15"	28.25"	2.5"	4"
	381mm	724mm	64mm	102mm



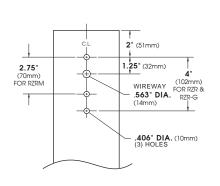
2022158

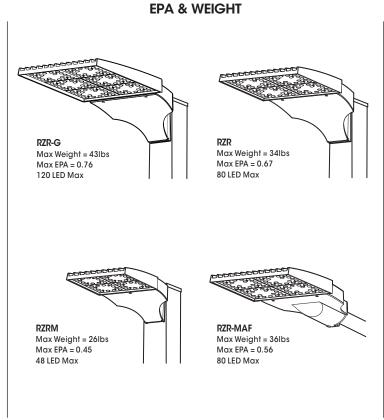


RZR-MAF*

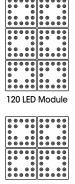
SPECIFICATIONS

POLE DRILLING TEMPLATE





PLED™ MODULES



80 LED Module



48 LED Module



8 0 8 0 0 0 8 8 0 0

24 LED Module

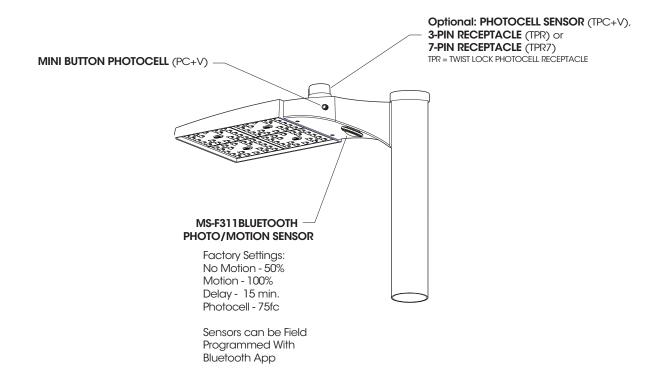
ORDERING INFORMATION

Spec/Order Example: RZR/PLED-IV/80LED-700mA/CW/277/RAL-8019-S

Luminaire	Optics		LED Mode		Voltage	Mounting	Finish	Options	
						,			
Luminaire	Optics		LED		Voltage	Mounting	Finish	Options	
	PLED™ Distribution Type	# of LEDs RZR-G	Drive Current	Color Temp - CCT		Arm Mount	Standard Textured Finish	☐ Internal House Side S	
☐ RZR-G	Type II PLED-II	☐ 120LED	☐ 1050mA¹ ☐ 875mA¹	☐ 27K (2700K)	☐ 120 ☐ 208	□ 1 = -	□ Black RAL-9005-T	(Example: HS-PLED/48) External Glare Shield 4 Sided	HS-PLED EGS4
	Type II Front Row PLED-II-FR	_	☐ 700 mA¹	☐ 40K (4000K)	□ 240	□ 2-180	☐ White RAL-9003-T	External Glare Shield3 Sided Rear Wedge	
	Type III Median		☐ 525mA	□ 50K (5000K)	□ 277	☐ 2-90 —	☐ Grey RAL-7004-T	Round Pole Adapter	
□ RZR	PLED-II-MIL	RZR/RZR-MA		☐ TRA True Amber²	□ 347 □ 480		☐ Dark Bronze RAL-8019-T	Twist Lock Receptable Only	le TPR
☐ RZR-MAF	Type III Med. PLED-III	☐ 80LED ☐ 40LED		Consult Factory		□ 3-90	☐ Green	7-Pin Twist Lock Receptable Only	TPR7
	Type III Wide	40LED		for Other LED Color, CCT, & CRI Options		□ 3-120	RAL-6005-T	High-Low Dimming for Switch by Others/Selec Levels 50/100 or 25/10	et
	Type IV PLED-IV					□ 4-90	Premium Finishes	(Example: HLSW/25) Twist Lock Photocell	HLSW
☐ RZRM	☐ Type IV	RZRM	NOTES:	1050mA not for use		•	☐ Rust	(Example: TPC347V)	TPC+V
	PLED-IV-FT	☐ 48LED	with TRA LE			Wall Mount	☐ Patina Copper	Photo Cell + Voltage (Example: PC120V)	PC+V
	Type V Narrow PLED-VSQ-N	☐ 24LED	drive curre			 □ wm ■	PC	Single Fuse (120V, 277V)	SF
	Type V Med.			t Factory for			For smooth finish replace suffix "T"	Double Fuse (208V, 240V)	DF
	Type V Wide PLED-V-SQ-W		Other Dr	rive Currents		WM - Wall Mount provided with mounting bracket and cover.	with suffix "S" (Example: RAL-9500-S) Consult factor for	Blue-Tooth Programn Photo/Motion Senso (Factory - Motion 50/100	r);
	. LLD V OQ IV						custom colors	Photo 75fc)	MS-F311



OPTIONS



High Low Dimming For Switches (HLSW)

The HLSW is a Small Electronic Switch which Provides High Low Dimming Control Through the LED Driver's 0-10V Control. Switching is Done by Adding a Seconday AC Switched Hot Trigger Line to the HLSW in Addition to the Normal AC Power Line. When the Secondary Trigger Line is Powered, the Fixture will go to 100% Dimming. With no Power to the Trigger, the Fixture will operate at 50% or 25% Dimming. Switches for the Trigger Line can be a Normal AC Switch/Breaker or Timed Switch/Breaker.

Wireless and Other Fixture Controls

Contact Factory for Wireless and Other Fixture Controls and Recomendations. Most Controls Can be Integrated and Factory Installed.

EXTERNAL GLARE SHIELDS



EGS4 - 4 Sided Shield

Minimum Cutoff = 12° Average Cutoff = 23°



EGS3W - 3 Sided Shield

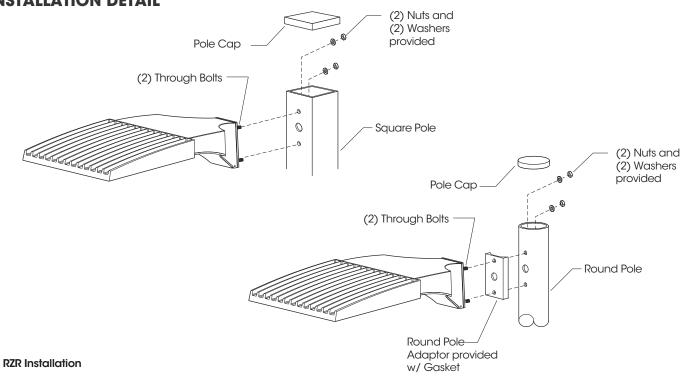
Minimum Rear Cutoff = 12° Average Rear Cutoff = 23° Minimum Side Cutoff = 4° Average Side Cutoff = 16°

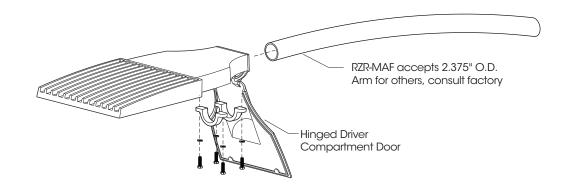
Glare Shields are rotatable on RZR and RZRM. Consult factory for custom applications.

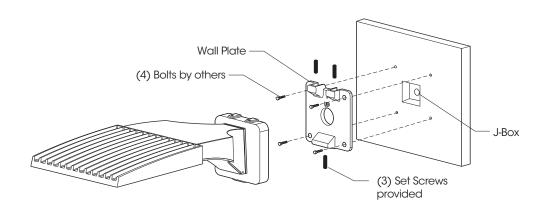




INSTALLATION DETAIL







RZR-WM Installation

RZR-MAF Installation





PHOTOMETRIC DATA GUIDE - LM-80 LUMEN MAINTENANCE

LED Life / Operating Hours	Lumen Depreciation	Lumen Depreciation Scale Factor
60,000 (10x Test Time Calculated)	L94	0.94x
100,000 (Theoretical Calculated)	L92	0.92x
150,000 (Theoretical Calcualted)	L89	0.89x

Lumen Depreciation Calculations Done in Accordance With IESNA TM-21 & LM-80 (25°C Ambient) TM-21 6x Test Time Dicatates that L94 > 60,000 Hours.

ELECTRICAL DATA GUIDE - AMPERAGE CHARTS

# of LEDs	mA	System Watts	120V	208V	277V	347V	480V
24	350	28	0.24	0.14	0.10	0.08	0.06
24	525	42	0.35	0.20	0.15	0.12	0.09
24	700	56	0.47	0.27	0.20	0.16	0.12
24	875	68	0.57	0.33	0.24	0.20	0.14
24	1050	82	0.68	0.39	0.30	0.24	0.17
48	350	53	0.44	0.25	0.19	0.15	0.11
48	525	79	0.66	0.38	0.29	0.23	0.16
48	700	105	0.88	0.51	0.38	0.30	0.22
48	875	132	1.10	0.63	0.48	0.38	0.27
48	1050	160	1.33	0.77	0.58	0.46	0.33
40	350	43	0.36	0.21	0.15	0.12	0.09
40	525	65	0.54	0.31	0.23	0.19	0.13
40	700	87	0.72	0.42	0.31	0.25	0.18
40	875	108	0.90	0.52	0.39	0.31	0.23
40	1050	128	1.07	0.62	0.46	0.37	0.27
80	350	85	0.71	0.41	0.31	0.25	0.18
80	525	129	1.08	0.62	0.47	0.37	0.27
80	700	174	1.45	0.83	0.63	0.50	0.36
80	875	216	1.80	1.04	0.78	0.62	0.45
80	1050	256	2.14	1.23	0.93	0.74	0.53
120	350	130	1.08	0.63	0.47	0.37	0.27
120	525	192	1.60	0.92	0.69	0.55	0.40
120	120 700		2.17	1.25	0.94	0.75	0.54
120	875	329	2.74	1.58	1.19	0.95	0.69
120	1050	398	3.32	1.91	1.44	1.15	0.83



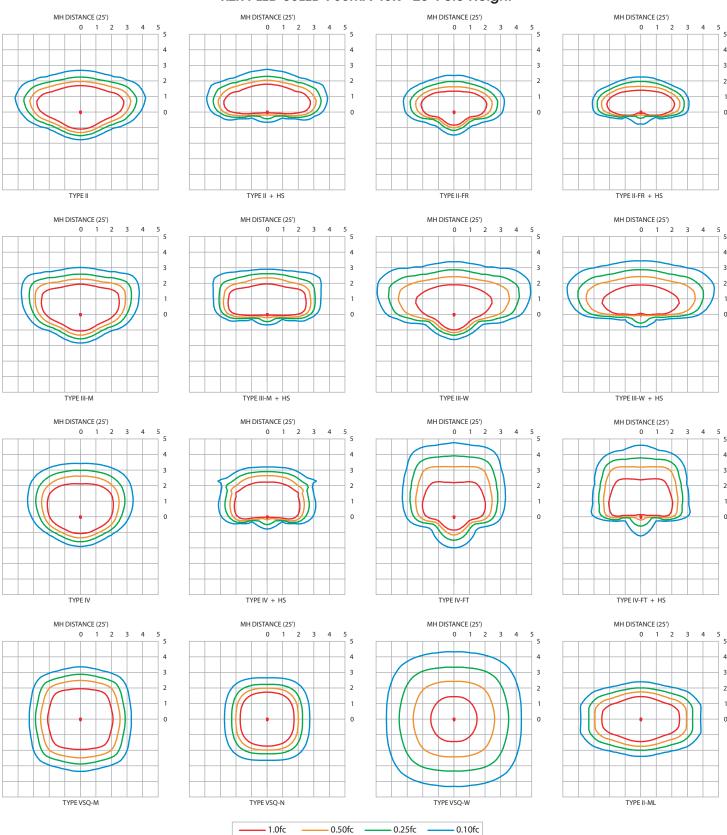


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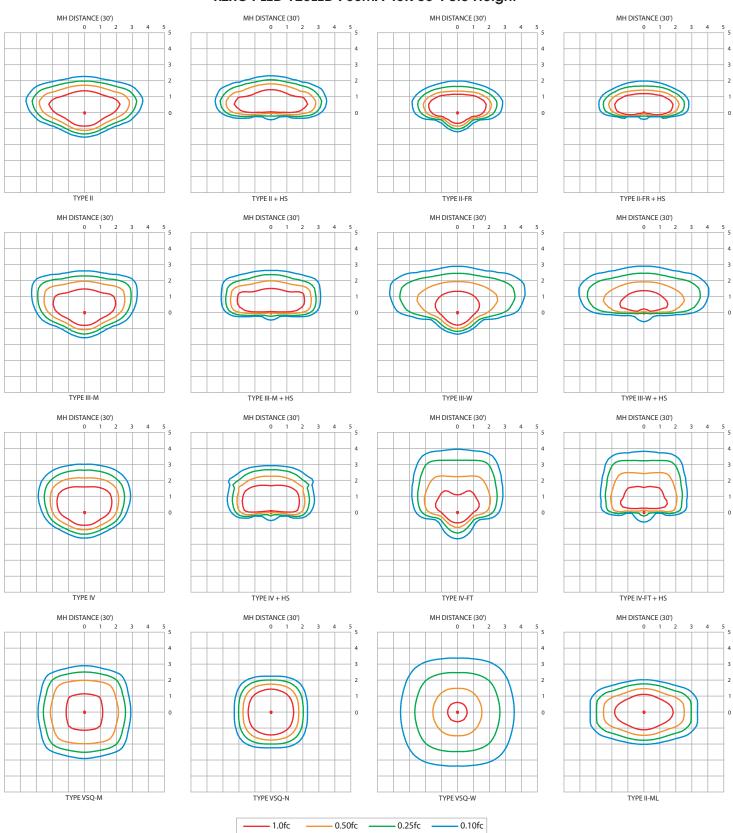
RZR-PLED-80LED-700mA-40K - 25' Pole Height







RZRG-PLED-120LED-700mA-40K 30' Pole Height







PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRM-PLED)

									RZ	R-M-PL	.ED								
LED	Drive	System	Dist'n	27	K (2700I	(- 70CRI)	30K	(3000K	- 70CRI)	40k	(4000K	- 70CRI)	50K	(5000K -	- 70CRI)	System	Т	RA (590	nm)
Count	Current (mA)	Watts	Туре	LUMENS	LPW	BUG RATING	LUMENS	LPW	BUG RATING	LUMENS	LPW	BUG RATING	LUMENS	LPW	BUG RATING	Watts	LUMENS	LPW	BUG RATING
			II	3436	122	B1-U0-G1	3709	132	B1-U0-G1	3904	138	B1-U0-G1	4100	145	B1-U0-G1		1363	68	B1-U0-G1
			II-FR II-ML	3459	123	B1-U0-G1	3734 3709	132	B1-U0-G1	3930 3905	139	B1-U0-G1	4127 4100	146 145	B1-U0-G1	ļ	1372	69 68	B1-U0-G0
			II-IVIL	3436 3496	122 124	B2-U0-G2 B1-U0-G1	3709	132 134	B2-U0-G2 B1-U0-G1	3905	138 141	B2-U0-G2 B1-U0-G1	4100	145	B2-U0-G2 B1-U0-G1	-	1363 1387	69	B1-U0-G1 B1-U0-G0
			III-W	3246	115	B1-U0-G1	3505	124	B1-U0-G1	3689	131	B1-U0-G1	3873	137	B1-U0-G1	1	1289	64	B0-U0-G1
			IV	3469	123	B1-U0-G1	3746	133	B1-U0-G1	3943	140	B1-U0-G1	4140	147	B1-U0-G1]	1377	69	B1-U0-G1
			IV-FT	3161	112	B1-U0-G1	3412	121	B1-U0-G1	3592	127	B1-U0-G1	3771	134	B1-U0-G1		1254	63	B0-U0-G1
24	350	28.2	VSQ-N VSQ-M	3627 3556	129 126	B2-U0-G0 B2-U0-G1	3915 3838	139 136	B2-U0-G0 B2-U0-G1	4121 4041	146 143	B2-U0-G0 B2-U0-G1	4327 4242	153 150	B2-U0-G1 B3-U0-G1	20.0	1439 1410	72 71	B1-U0-G0 B1-U0-G0
			VSQ-W	3471	123	B3-U0-G1	3748	133	B3-U0-G1	3945	140	B3-U0-G1	4142	147	B3-U0-G1	ĺ	1377	69	B1-U0-G1
			II-HS	2513	89	B0-U0-G1	2713	96	B0-U0-G1	2856	101	B0-U0-G1	2998	106	B0-U0-G1]	997	50	B0-U0-G0
			II-FR-HS	2556 2543	91 90	B0-U0-G0 B0-U0-G1	2759 2745	98 97	B0-U0-G0 B0-U0-G1	2905 2889	103 102	B0-U0-G0 B0-U0-G1	3050 3034	108 108	B0-U0-G0 B0-U0-G1		1014 1008	51 50	B0-U0-G0 B0-U0-G0
			III-W-HS	2488	88	B0-00-G1	2686	95	B0-00-G1	2827	100	B0-00-G1	2969	105	B0-U0-G1	1	987	49	B0-00-G0 B0-U0-G1
			IV-HS	2626	93	B0-U0-G1	2835	101	B0-U0-G1	2984	106	B0-U0-G1	3133	111	B0-U0-G1	İ	1042	52	B0-U0-G0
			IV-FT-HS	2481	88	B0-U0-G1	2679	95	B0-U0-G1	2820	100	B0-U0-G1	2961	105	B0-U0-G1		985	49	B0-U0-G1
			II-FR	4908 4941	118 119	B1-U0-G1 B1-U0-G1	5298 5334	128 129	B1-U0-G1	5577 5614	134 135	B1-U0-G1	5856 5895	141	B2-U0-G1		1586 1598	51 52	B1-U0-G1
			II-FIX	4941	118	B1-00-G1 B2-U0-G2	5299	129	B1-U0-G1 B2-U0-G2	5578	135	B2-U0-G1 B2-U0-G2	5856	142	B2-U0-G1 B3-U0-G3	-	1598	51	B1-U0-G0 B1-U0-G1
			III-M	4994	120	B1-U0-G1	5392	130	B1-U0-G1	5675	137	B1-U0-G1	5959	144	B1-U0-G2	1	1615	52	B1-U0-G0
			III-W	4637	112	B1-U0-G2	5005	121	B1-U0-G2	5269	127	B1-U0-G2	5533	133	B1-U0-G2		1500	48	B0-U0-G1
			IV-FT	4956 4515	119 109	B1-U0-G1 B1-U0-G2	5350 4875	129 117	B1-U0-G1 B1-U0-G2	5632 5131	136 124	B1-U0-G1 B1-U0-G2	5913 5388	142 130	B1-U0-G2 B1-U0-G2		1602 1460	52 47	B1-U0-G1 B0-U0-G1
			VSQ-N	5180	125	B1-00-G2 B2-U0-G1	5592	135	B1-00-G2 B2-U0-G1	5886	142	B1-00-G2 B2-U0-G1	6181	149	B2-U0-G1		1676	54	B1-U0-G0
24	525	41.5	VSQ-M	5080	122	B3-U0-G1	5484	132	B3-U0-G1	5772	139	B3-U0-G1	6061	146	B3-U0-G1	31.0	1643	53	B1-U0-G0
			VSQ-W	4959	119	B3-U0-G2	5353	129	B3-U0-G2	5635	136	B3-U0-G2	5917	143	B3-U0-G2		1603	52	B1-U0-G1
			II-HS II-FR-HS	3589 3652	86 88	B0-U0-G1 B0-U0-G1	3875 3942	93 95	B0-U0-G1 B0-U0-G1	4079 4150	98 100	B0-U0-G1 B0-U0-G1	4282 4357	103 105	B0-U0-G1 B0-U0-G1	-	1161 37 1181 38		B0-U0-G0 B0-U0-G0
			III-M-HS	3631	88	B0-00-G1	3920	94	B0-00-G1	4127	99	B0-00-G1	4333	103	B0-U0-G1	1	1174	38	B0-U0-G0
			III-W-HS	3555	86	B0-U0-G2	3838	92	B0-U0-G2	4040	97	B0-U0-G2	4242	102	B0-U0-G2	1	1150	37	B0-U0-G1
			IV-HS	3751	90	B0-U0-G1	4050	98	B0-U0-G1	4263	103	B0-U0-G1	4476	108	B0-U0-G1		1213	39	B0-U0-G0
			IV-FT-HS	3545 6275	85 112	B0-U0-G2 B2-U0-G1	3827 6774	92 121	B0-U0-G2 B2-U0-G2	4029 7130	97 128	B0-U0-G2 B2-U0-G2	4230 7487	102 134	B0-U0-G2 B2-U0-G2		1146	37	B0-U0-G1
			II-FR	6317	113	B2-U0-G1	6819	122	B2-U0-G1	7178	128	B2-U0-G1	7537	135	B2-U0-G1	1			
			II-ML	6275	112	B3-U0-G3	6774	121	B3-U0-G3	7130	128	B3-U0-G3	7487	134	B3-U0-G3]			
			III-W	6385 5928	114 106	B2-U0-G2 B1-U0-G2	6893	123 114	B2-U0-G2	7256	130	B2-U0-G2	7618	136	B2-U0-G2				
			IV	6337	113	B1-U0-G2 B2-U0-G2	6399 6841	122	B1-U0-G2 B2-U0-G2	6736 7201	121 129	B1-U0-G2 B2-U0-G2	7073 7561	127 135	B1-U0-G2 B2-U0-G2	-			
			IV-FT	5772	103	B1-U0-G2	6231	111	B1-U0-G2	6559	117	B1-U0-G2	6887	123	B1-U0-G2	1			
24	700	55.9	VSQ-N	6624	118	B2-U0-G1	7151	128	B2-U0-G1	7527	135	B2-U0-G1	7903	141	B3-U0-G1	N/A		N/A	
		55.9	VSQ-M VSQ-W	6494 6340	116 113	B3-U0-G1 B3-U0-G2	7011	125 122	B3-U0-G1 B3-U0-G2	7380 7204	132 129	B3-U0-G1 B3-U0-G2	7749	139 135	B3-U0-G2	,		,	
			II-HS	4589	82	B3-00-G2 B1-U0-G1	6844 4954	89	B3-U0-G2 B1-U0-G2	5215	93	B3-U0-G2 B1-U0-G2	7565 5475	98	B3-U0-G2 B1-U0-G2	-			
			II-FR-HS	4668	84	B0-U0-G1	5040	90	B0-U0-G1	5305	95	B0-U0-G1	5570	100	B0-U0-G1	İ			
			III-M-HS	4643	83	B0-U0-G2	5012	90	B0-U0-G2	5276	94	B0-U0-G2	5539	99	B0-U0-G2				
			III-W-HS	4544 4796	81 86	B0-U0-G2 B0-U0-G2	4906 5177	88 93	B0-U0-G2 B0-U0-G2	5164 5450	92 97	B0-U0-G2 B0-U0-G2	5422 5722	97 102	B0-U0-G2 B0-U0-G2	-			
			IV-FT-HS	4532	81	B0-U0-G2	4893	88	B0-U0-G2	5150	92	B0-00-G2	5408	97	B0-U0-G2	1			
			II	7406	109	B2-U0-G2	7995	118	B2-U0-G2	8416	124	B2-U0-G2	8837	130	B2-U0-G2				
			II-FR II-ML	7456	110 109	B2-U0-G1	8049	119	B2-U0-G1	8473	125	B2-U0-G1	8896	131	B2-U0-G1				
			II-IVIL	7406 7536	111	B3-U0-G3 B2-U0-G2	7995 8135	118 120	B3-U0-G3 B2-U0-G2	8416 8563	124 126	B3-U0-G3 B2-U0-G2	8837 8992	130 133	B3-U0-G3 B2-U0-G2				
			III-W	6997	103	B1-U0-G2	7553	111	B1-U0-G2	7951	117	B2-U0-G2	8348	123	B2-U0-G2	İ			
			IV	7479	110	B2-U0-G2	8073	119	B2-U0-G2	8498	125	B2-U0-G2	8923	132	B2-U0-G2				
			IV-FT VSQ-N	6813 7817	100 115	B1-U0-G2 B2-U0-G1	7355 8439	108 124	B2-U0-G2 B3-U0-G1	7742 8883	114 131	B2-U0-G2 B3-U0-G1	8129 9327	120 138	B2-U0-G2 B3-U0-G1				
24	875	67.8	VSQ-M	7665	113	B3-U0-G1	8275	122	B3-U0-G1	8711	128	B3-U0-G1 B3-U0-G2	9146	135	B3-U0-G1	N/A		N/A	
			VSQ-W	7482	110	B3-U0-G2	8078	119	B3-U0-G2	8503	125	B4-U0-G2	8928	132	B4-U0-G2				
			II-HS	5417	80	B1-U0-G2	5847	86	B1-U0-G2	6155	91	B1-U0-G2	6463	95	B1-U0-G2				
			II-FR-HS III-M-HS	5510 5480	81 81	B0-U0-G1 B0-U0-G2	5948 5916	88 87	B1-U0-G1 B0-U0-G2	6261 6227	92 92	B1-U0-G1 B0-U0-G2	6574 6538	97 96	B1-U0-G1 B0-U0-G2				
			III-W-HS	5363	79	B0-00-G2 B0-U0-G2	5790	85	B0-00-G2 B0-U0-G2	6095	90	B0-00-G2 B0-U0-G2	6399	94	B0-U0-G2	1			
			IV-HS	5660	83	B0-U0-G2	6110	90	B0-U0-G2	6432	95	B0-U0-G2	6753	100	B0-U0-G2				
			IV-FT-HS	5349	79	B0-U0-G2	5775	85	B0-U0-G2	6078	90	B0-U0-G2	6382	94	B0-U0-G2				
			II-FR	8513 8570	104 105	B2-U0-G2 B2-U0-G1	9190 9252	112	B2-U0-G2 B2-U0-G1	9674 9739	118 119	B2-U0-G2 B2-U0-G1	10157 10225	124 125	B2-U0-G2 B2-U0-G1				
			II-ML	8513	103	B3-U0-G3	9190	112	B3-U0-G3	9674	118	B3-U0-G3	10157	124	B3-U0-G3				
			III-M	8662	106	B2-U0-G2	9351	114	B2-U0-G2	9843	120	B2-U0-G2	10335	126	B2-U0-G2				
			III-W	8042 8596	98 105	B2-U0-G2 B2-U0-G2	8682 9280	106 113	B2-U0-G2 B2-U0-G2	9139 9768	111	B2-U0-G3 B2-U0-G2	9595 10256	117 125	B2-U0-G3				
			IV-FT	7831	95	B2-U0-G2 B2-U0-G2	9280 8454	103	B2-U0-G2 B2-U0-G2	8899	109	B2-U0-G2 B2-U0-G3	9344	114	B2-U0-G2 B2-U0-G3				
24	1050	82.0	VSQ-N	8985	110	B3-U0-G1	9700	118	B3-U0-G1	10210	125	B3-U0-G1	10721	131	B3-U0-G1	N/A		N/A	
24	1000	02.0	VSQ-M	8811	107	B3-U0-G2	9512	116	B3-U0-G2	10012	122	B3-U0-G2	10513	128	B3-U0-G2	IN/A		IN/A	
			VSQ-W II-HS	8601 6226	105 76	B4-U0-G2 B1-U0-G2	9285 6721	113 82	B4-U0-G2 B1-U0-G2	9773 7075	119	B4-U0-G3 B1-U0-G2	10262	125 91	B4-U0-G3				
			II-HS II-FR-HS	6333	77	B1-U0-G2 B1-U0-G1	6837	83	B1-U0-G2 B1-U0-G1	7075	86 88	B1-U0-G2 B1-U0-G1	7429 7557	91	B1-U0-G2 B1-U0-G1				
			III-M-HS	6299	77	B0-U0-G2	6799	83	B0-U0-G2	7158	87	B0-U0-G2	7515	92	B1-U0-G2				
			III-W-HS	6165	75	B0-U0-G2	6655	81	B0-U0-G2	7005	85	B0-U0-G2	7356	90	B0-U0-G2				
			IV-HS IV-FT-HS	6506 6148	79 75	B0-U0-G2 B0-U0-G2	7023 6637	86 81	B0-U0-G2 B0-U0-G2	7393 6986	90 85	B1-U0-G2 B1-U0-G3	7762 7336	95 89	B1-U0-G2 B1-U0-G3				
			1 V 1 1-113	0140		50-00-02	5057	υı	1 20-00-02	J700	00	D1-00-G3	/ 550	07	D1-00-G0				

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PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRM-PLED)

	RZR-M-PLED																		
LED	Drive	System	Dist'n	271	K (2700I	K - 70CRI)	301	(3000	K - 70CRI)	401	(4000l	(- 70CRI)	50k	(5000)	(- 70CRI)	System	1	TRA (590	Onm)
Count	Current (mA)	Watts	Туре	LUMENS	LPW	BUG RATING	Watts	LUMENS	LPW	BUG RATING									
			II	6836	130	B2-U0-G2	7380	141	B2-U0-G2	7769	148	B2-U0-G2	8157	155	B2-U0-G2		2713	66	B1-U0-G1
			II-FR	6882 6837	131 130	B2-U0-G1	7430 7380	142 141	B2-U0-G1 B3-U0-G3	7821	149 148	B2-U0-G1	8212 8157	156	B2-U0-G1		2731	67	B1-U0-G1 B1-U0-G1
			II-ML III-M	6956	130	B3-U0-G3 B2-U0-G2	7509	141	B3-U0-G3 B2-U0-G2	7769 7905	151	B3-U0-G3 B2-U0-G2	8300	155 158	B3-U0-G3 B2-U0-G2		2713 2760	66 67	B1-U0-G1
			III-W	6459	123	B1-U0-G2	6972	133	B1-U0-G2	7339	140	B1-U0-G2	7706	147	B1-U0-G2		2563	63	B1-U0-G1
			IV-FT	6903 6289	131 120	B2-U0-G2 B1-U0-G2	7453 6789	142 129	B2-U0-G2 B1-U0-G2	7845 7146	149 136	B2-U0-G2 B1-U0-G2	8237 7503	157 143	B2-U0-G2 B2-U0-G2		2740 2496	67 61	B1-U0-G1 B1-U0-G1
48	350	52.5	VSQ-N	7216	137	B1-00-G2 B2-U0-G1	7790	148	B2-U0-G1	8200	156	B3-U0-G1	8610	164	B3-U0-G1	41.0	2864	70	B1-00-G1
40	330	32.3	VSQ-M	7076	135	B3-U0-G1	7639	146	B3-U0-G2	8041	153	B3-U0-G2	8443	161	B3-U0-G2	41.0	2808	68	B2-U0-G1
			VSQ-W II-HS	6907 5000	132 95	B3-U0-G2 B1-U0-G2	7456 5398	142	B3-U0-G2 B1-U0-G2	7849 5682	150 108	B3-U0-G2 B1-U0-G2	8242 5966	157 114	B3-U0-G2 B1-U0-G2		2741 1984	67 48	B2-U0-G1 B0-U0-G1
			II-FR-HS	5087	97	B0-U0-G1	5491	105	B0-U0-G1	5780	110	B1-U0-G1	6069	116	B1-U0-G1		2018	49	B0-U0-G0
			III-M-HS	5059	96	B0-U0-G2	5461	104	B0-U0-G2	5748	109	B0-U0-G2	6036	115	B0-U0-G2		2007	49	B0-U0-G1
			III-W-HS IV-HS	4952 5224	94 100	B0-U0-G2 B0-U0-G2	5345 5640	102 107	B0-U0-G2 B0-U0-G2	5627 5937	107 113	B0-U0-G2 B0-U0-G2	5908 6234	113 119	B0-U0-G2 B0-U0-G2		1965 2074	48 51	B0-U0-G1 B0-U0-G1
			IV-FT-HS	4938	94	B0-U0-G2	5330	102	B0-U0-G2	5611	107	B0-U0-G2	5892	112	B0-U0-G2		1960	48	B0-U0-G1
				9720	123	B2-U0-G2	10493	133	B2-U0-G2	11046	140	B2-U0-G2	11598	147	B2-U0-G2		3143	51	B1-U0-G1
			II-FR II-ML	9785 9720	124 123	B2-U0-G1 B3-U0-G3	10564 10494	134 133	B2-U0-G1 B3-U0-G3	11120 11046	141 140	B2-U0-G1 B3-U0-G3	11676 11598	148 147	B3-U0-G1 B3-U0-G3		3164 3143	51 51	B1-U0-G1 B2-U0-G2
			III-M	9891	125	B2-U0-G2	10677	135	B2-U0-G2	11240	142	B2-U0-G2	11801	149	B2-U0-G2		3198	52	B1-U0-G1
			III-W	9183	116	B2-U0-G3	9914	125	B2-U0-G3	10436	132	B2-U0-G3	10958	139	B2-U0-G3		2969	48	B1-U0-G1
			IV-FT	9816 8942	124 113	B2-U0-G2 B2-U0-G2	10597 9653	134 122	B2-U0-G2 B2-U0-G3	11155 10161	141 129	B2-U0-G2 B2-U0-G3	11712 10669	148 135	B2-U0-G2 B2-U0-G3		3174 2892	51 47	B1-U0-G1 B1-U0-G1
48	525	79.0	VSQ-N	10260	130	B3-U0-G1	11075	140	B3-U0-G1	11659	148	B3-U0-G1	12242	155	B3-U0-G1	62.0	3317	54	B2-U0-G0
			VSQ-M VSQ-W	10060 9821	127 124	B3-U0-G2 B4-U0-G3	10861 10602	137 134	B4-U0-G2 B4-U0-G3	11432 11160	145 141	B4-U0-G2 B4-U0-G3	12004 11718	152 148	B4-U0-G2 B4-U0-G3		3253 3175	52 51	B2-U0-G1 B2-U0-G1
			II-HS	7110	90	B1-U0-G2	7675	97	B1-U0-G2	8079	102	B1-U0-G2	8483	107	B1-U0-G3		2298	37	B0-U0-G1
			II-FR-HS	7231	92	B1-U0-G1	7806	99	B1-U0-G1	8217	104	B1-U0-G1	8628	109	B1-U0-G1		2339	38	B0-U0-G0
			III-M-HS	7192 7040	91 89	B0-U0-G2 B0-U0-G2	7764 7600	98 96	B1-U0-G2 B0-U0-G2	8173 8000	103 101	B1-U0-G2 B1-U0-G2	8581 8400	109 106	B1-U0-G2 B1-U0-G2		2325 2276	38 37	B0-U0-G1 B0-U0-G1
			IV-HS	7429	94	B1-U0-G2	8020	102	B1-U0-G2	8442	107	B1-00-G2 B1-U0-G2	8864	112	B1-00-G2 B1-U0-G2		2402	39	B0-00-G1
			IV-FT-HS	7020	89	B1-U0-G3	7579	96	B1-U0-G3	7978	101	B1-U0-G3	8377	106	B1-U0-G3		2270	37	B0-U0-G1
			II-FR	12226 12308	116 117	B2-U0-G2 B3-U0-G1	13199 13287	126 126	B2-U0-G2 B3-U0-G1	13894 13986	132 133	B2-U0-G2 B3-U0-G1	14588 14686	139 140	B3-U0-G2 B3-U0-G1				
			II-ML	12227	116	B3-U0-G3	13200	126	B3-U0-G3	13894	132	B3-U0-G3	14589	139	B4-U0-G4				
			III-M	12440	118	B2-U0-G2	13430	128	B2-U0-G2	14137	135	B2-U0-G2	14843	141	B2-U0-G2				
	700		III-W IV	11550 12346	110 117	B2-U0-G3 B2-U0-G2	12468 13329	119 127	B2-U0-G3 B2-U0-G2	13125 14030	125 133	B2-U0-G3 B2-U0-G2	13781 14731	131 140	B2-U0-G3 B2-U0-G2				
			IV-FT	11247	107	B2-U0-G3	12141	116	B2-U0-G3	12780	122	B2-U0-G3	13419	128	B2-U0-G3				
48		105.1	VSQ-N	12904	123	B3-U0-G1	13931	133	B3-U0-G1	14663	140	B3-U0-G1	15397	146	B3-U0-G1	N/A		N/A	
			VSQ-M VSQ-W	12654 12352	120 118	B4-U0-G2 B4-U0-G3	13660 13334	130 127	B4-U0-G2 B4-U0-G3	14379 14036	137 134	B4-U0-G2 B4-U0-G3	15099 14738	144 140	B4-U0-G2 B4-U0-G3				
			II-HS	8942	85	B1-U0-G2	9653	92	B1-U0-G2	10161	97	B1-U0-G2	10669	102	B1-U0-G2				
			II-FR-HS	9095	87	B1-U0-G1	9819	93	B1-U0-G1	10336	98	B1-U0-G1	10852	103	B1-U0-G1				
			III-M-HS	9045 8854	86 84	B1-U0-G2 B1-U0-G2	9765 9558	93 91	B1-U0-G2 B1-U0-G3	10279 10062	98 96	B1-U0-G2 B1-U0-G3	10793 10565	103 101	B1-U0-G2 B1-U0-G3				
			IV-HS	9344	89	B1-U0-G2	10087	96	B1-U0-G2	10618	101	B1-U0-G2	11149	106	B1-U0-G2				
			IV-FT-HS	8831 14829	84 113	B1-U0-G3 B3-U0-G2	9533 16008	91 121	B1-U0-G3 B3-U0-G3	10035 16851	95 128	B1-U0-G3 B3-U0-G3	10537 17693	100 134	B1-U0-G3 B3-U0-G3				
			II-FR	14928	113	B3-U0-G2 B3-U0-G2	16115	122	B3-U0-G3 B3-U0-G2	16964	120	B3-U0-G3 B3-U0-G2	17812	135	B3-U0-G3 B3-U0-G2				
			II-ML	14829	113	B4-U0-G4	16009	121	B4-U0-G4	16851	128	B4-U0-G4	17694	134	B4-U0-G4				
			III-W	15088 14009	114 106	B2-U0-G2 B2-U0-G3	16288 15123	124 115	B3-U0-G3 B2-U0-G3	17145 15919	130 121	B3-U0-G3 B3-U0-G3	18003 16715	137 127	B3-U0-G3 B3-U0-G3				
			IV	14975	114	B2-U0-G3 B2-U0-G2	16166	123	B3-U0-G2	17017	129	B3-U0-G3	17867	136	B3-00-G3 B3-U0-G3				
			IV-FT	13641	103	B2-U0-G3	14726	112	B3-U0-G3	15501	118	B3-U0-G3	16276	123	B3-U0-G3				
48	875	131.8	VSQ-N VSQ-M	15652 15348	119 116	B3-U0-G1 B4-U0-G2	16897 16568	128 126	B4-U0-G2 B4-U0-G2	17786 17440	135 132	B4-U0-G2 B4-U0-G2	18675 18312	142 139	B4-U0-G2 B4-U0-G2	N/A		N/A	
			VSQ-W	14981	114	B4-00-G2 B4-U0-G3	16173	123	B4-U0-G3	17024	129	B5-U0-G3	17876	136	B5-U0-G3				
			II-HS	10845	82	B1-U0-G2	11707	89	B1-U0-G2	12324	94	B1-U0-G2	12940	98	B1-U0-G2				
			II-FR-HS III-M-HS	11032 10971	84 83	B1-U0-G1 B1-U0-G2	11909 11844	90 90	B1-U0-G2 B1-U0-G3	12536 12467	95 95	B1-U0-G2 B1-U0-G3	13162 13091	100 99	B1-U0-G2 B1-U0-G3				
			III-W-HS	10739	81	B1-U0-G3	11594	88	B1-00-G3	12204	93	B1-U0-G3	12814	97	B1-U0-G3				
			IV-HS	11333	86	B1-U0-G2	12234	93	B1-U0-G2	12878	98	B1-U0-G3	13522	103	B1-U0-G3				
			IV-FT-HS	10711 17044	81 107	B1-U0-G3 B3-U0-G3	11562 18400	88 115	B1-U0-G3 B3-U0-G3	12171 19369	92 121	B1-U0-G3 B3-U0-G3	12779 20337	97 127	B1-U0-G3 B3-U0-G3				
			II-FR	17159	108	B3-U0-G2	18523	116	B3-U0-G2	19498	122	B3-U0-G2	20473	128	B3-U0-G2				
			II-ML III-M	17045	107	B4-U0-G4	18401	115	B4-U0-G4	19369	121	B4-U0-G4	20338	127	B4-U0-G4 B3-U0-G3				
			III-IVI III-W	17342 16102	109 101	B3-U0-G3 B3-U0-G3	18722 17383	117	B3-U0-G3 B3-U0-G3	19707 18298	123 115	B3-U0-G3 B3-U0-G3	20692 19213	130 120	B3-U0-G3 B3-U0-G4				
			IV	17212	108	B3-U0-G3	18582	116	B3-U0-G3	19559	123	B3-U0-G3	20537	129	B3-U0-G3				
			IV-FT VSQ-N	15680	98	B3-U0-G3	16927	106	B3-U0-G3	17818	112	B3-U0-G3	18708	117	B3-U0-G4				
48	1050	159.6	VSQ-M	17990 17641	113	B4-U0-G2 B4-U0-G2	19421 19044	122 119	B4-U0-G2 B4-U0-G2	20443 20046	128 126	B4-U0-G2 B4-U0-G2	21466 21048	134 132	B4-U0-G2 B4-U0-G2	N/A		N/A	
			VSQ-W	17220	108	B5-U0-G3	18590	116	B5-U0-G3	19568	123	B5-U0-G3	20546	129	B5-U0-G3				
			II-HS II-FR-HS	12465 12680	78 79	B1-U0-G2	13457	84 86	B1-U0-G3	14165	89	B1-U0-G3	14873	93	B1-U0-G3				
			III-HR-HS	12680	79	B1-U0-G2 B1-U0-G3	13688 13614	85	B1-U0-G2 B1-U0-G3	14409 14330	90 90	B1-U0-G2 B1-U0-G3	15129 15047	95 94	B1-U0-G2 B1-U0-G3				
			III-W-HS	12344	77	B1-U0-G3	13326	83	B1-U0-G3	14027	88	B1-U0-G3	14728	92	B1-U0-G4				
			IV-HS IV-FT-HS	13026	82 77	B1-U0-G3	14062	88	B1-U0-G3	14802	93 88	B1-U0-G3	15542	97	B1-U0-G3 B1-U0-G4				
	Ь	<u> </u>	IV-FI-MS	12311	77	B1-U0-G3	13290	83	B1-U0-G3	13989	68	B1-U0-G4	14689	92	D1-UU-G4				





PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZR-PLED)

	RZR-PLED																		
LED	Drive	System	Dist'n	27 k	(2700k	(- 70CRI)	30K (3000K - 70CRI) 40K (4000K - 70CRI)					50K	(5000K	- 70CRI)	System	TRA (590nm)			
Count	Current (mA)	Watts	Туре	LUMENS	LPW	BUG RATING		LPW	BUG RATING		LPW	BUG RATING		LPW	BUG RATING	Watts	LUMENS	LPW	BUG RATING
			II-FR	5819 5858	136 137	B2-U0-G1 B2-U0-G1	6281 6324	147 148	B2-U0-G1 B2-U0-G1	6612 6657	155 156	B2-U0-G2 B2-U0-G1	6943 6990	163 164	B2-U0-G2 B2-U0-G1		2309 2325	70 70	B1-U0-G1 B1-U0-G0
			II-ML III-M	5819 5921	136 139	B3-U0-G3 B1-U0-G2	6282 6392	147 150	B3-U0-G3 B2-U0-G2	6612 6728	155 158	B3-U0-G3 B2-U0-G2	6943 7065	163 165	B3-U0-G3 B2-U0-G2		2309 2349	70 71	B1-U0-G1 B1-U0-G1
			III-W	5497	129	B1-U0-G2	5935	139	B1-U0-G2	6247	146	B1-U0-G2	6559	154	B1-U0-G2		2182	66	B1-U0-G1
			IV-FT	5876 5353	138 125	B1-U0-G2 B1-U0-G2	6344 5778	149 135	B2-U0-G2 B1-U0-G2	6677 6083	156 142	B2-U0-G2 B1-U0-G2	7011 6387	164 150	B2-U0-G2 B1-U0-G2		2332 2124	71 64	B1-U0-G1 B1-U0-G1
40	350	42.7	VSQ-N	6141	144	B2-U0-G1	6630	155	B2-U0-G1	6979	163	B2-U0-G1	7328	172	B2-U0-G1	33.0	2438	74	B1-U0-G0
40	330	42.7	VSQ-M VSQ-W	6023 5879	141 138	B3-U0-G1 B3-U0-G2	6502 6346	152 149	B3-U0-G1 B3-U0-G2	6844 6680	160 156	B3-U0-G1 B3-U0-G2	7186 7015	168 164	B3-U0-G1 B3-U0-G2	33.0	2390 2333	72 71	B2-U0-G1 B2-U0-G1
			II-HS	4256	100	B0-U0-G2 B0-U0-G1	4594	108	B3-00-G2 B1-U0-G1	4836	113	B3-U0-G2 B1-U0-G2	5077	119	B1-U0-G2		1689	51	B0-U0-G1
			II-FR-HS	4329	101	B0-U0-G1	4673	109	B0-U0-G1	4919	115	B0-U0-G1	5165	121	B0-U0-G1		1718	52	B0-U0-G0
			III-M-HS	4305 4214	101 99	B0-U0-G2 B0-U0-G2	4647 4550	109 107	B0-U0-G2 B0-U0-G2	4892 4789	115 112	B0-U0-G2 B0-U0-G2	5137 5028	120 118	B0-U0-G2 B0-U0-G2		1708 1673	52 51	B0-U0-G1 B0-U0-G1
			IV-HS	4447	104	B0-U0-G1	4801	112	B0-U0-G2	5054	118	B0-U0-G2	5306	124	B0-U0-G2		1764	53	B0-U0-G1
			IV-FT-HS	4203 8396	98 130	B0-U0-G2 B2-U0-G2	4537 9064	106 140	B0-U0-G2 B2-U0-G2	4776 9541	112 147	B0-U0-G2 B2-U0-G2	5015 10017	117 155	B0-U0-G2 B2-U0-G2		1668 2715	51 53	B0-U0-G1 B1-U0-G1
			II-FR	8452	131	B2-U0-G1	9125	141	B2-U0-G1	9605	148	B2-U0-G1	10085	156	B2-U0-G1		2733	54	B1-U0-G1
			II-ML III-M	8396 8543	130 132	B3-U0-G3 B2-U0-G2	9064 9223	140 143	B3-U0-G3 B2-U0-G2	9541 9708	147 150	B3-U0-G3 B2-U0-G2	10018 10194	155 158	B3-U0-G3 B2-U0-G2		2715 2762	53 54	B1-U0-G1 B1-U0-G1
			III-W	7932	123	B2-U0-G2 B2-U0-G2	8563	132	B2-U0-G2 B2-U0-G2	9013	139	B2-U0-G2 B2-U0-G3	9464	146	B2-U0-G2 B2-U0-G3		2565	50	B1-00-G1
			IV	8478	131	B2-U0-G2	9152	141	B2-U0-G2	9634	149	B2-U0-G2	10116	156	B2-U0-G2		2742	54	B1-U0-G1
			IV-FT VSQ-N	7724 8861	119 137	B2-U0-G3 B3-U0-G1	8338 9566	129 148	B2-U0-G3 B3-U0-G1	8777 10070	136 156	B2-U0-G3 B3-U0-G1	9216 10574	142 163	B2-U0-G3 B3-U0-G1		2497 2866	49 56	B1-U0-G1 B1-U0-G0
40	525	64.7	VSQ-M	8690	134	B3-U0-G2	9381	145	B3-U0-G2	9875	153	B3-U0-G2	10369	160	B3-U0-G2	51.0	2809	55	B2-U0-G1
			VSQ-W II-HS	8483 6141	131 95	B4-U0-G2 B1-U0-G2	9157 6629	142 102	B4-U0-G2 B1-U0-G2	9640 6978	149 108	B4-U0-G3 B1-U0-G2	10122 7327	156 113	B4-U0-G3 B1-U0-G2		2743 1985	54 39	B2-U0-G1 B0-U0-G1
			II-FR-HS	6246	97	B1-U0-G1	6743	104	B1-U0-G1	7098	110	B1-U0-G1	7453	115	B1-U0-G1		2020	40	B0-U0-G0
			III-M-HS	6212 6081	96 94	B0-U0-G2 B0-U0-G2	6706 6564	104	B0-U0-G2 B0-U0-G2	7060 6910	109 107	B0-U0-G2 B0-U0-G2	7412 7255	115 112	B0-U0-G2 B0-U0-G2		2009 1966	39 39	B0-U0-G1 B0-U0-G1
			IV-HS	6417	99	B0-00-G2 B0-U0-G2	6927	107	B0-00-G2 B0-U0-G2	7292	113	B0-00-G2 B0-U0-G2	7656	118	B1-U0-G2		2075	41	B0-00-G1
			IV-FT-HS	6064	94	B0-U0-G2	6546	101	B0-U0-G2	6891	107	B1-U0-G2	7235	112	B1-U0-G3		1960	38	B0-U0-G1
			II-FR	10669 10740	123 124	B2-U0-G2 B2-U0-G1	11518 11594	133 134	B2-U0-G2 B3-U0-G1	12124 12205	140 141	B2-U0-G2 B3-U0-G1	12730 12815	147 148	B2-U0-G2 B3-U0-G1				
			II-ML	10669	123	B3-U0-G3	11518	133	B3-U0-G3	12124	140	B3-U0-G3	12731	147	B3-U0-G3				
			III-W	10856 10079	125 116	B2-U0-G2 B2-U0-G3	11719 10880	135 125	B2-U0-G2 B2-U0-G3	12336 11453	142 132	B2-U0-G2 B2-U0-G3	12953 12026	149 139	B2-U0-G2 B2-U0-G3				
			IV	10774	124	B2-U0-G2	11630	134	B2-U0-G2	12243	141	B2-U0-G2	12855	148	B2-U0-G2				
	700		IV-FT VSQ-N	9814 11260	113 130	B2-U0-G3 B3-U0-G1	10595 12156	122 140	B2-U0-G3 B3-U0-G1	11153 12796	128 147	B2-U0-G3 B3-U0-G1	11710 13435	135 155	B2-U0-G3 B3-U0-G1				
40		86.8	VSQ-M	11042	127	B4-U0-G2	11920	137	B4-U0-G2	12548	145	B4-U0-G2	13175	152	B4-U0-G2	N/A		N/A	
			VSQ-W II-HS	10778 7803	124 90	B4-U0-G3 B1-U0-G2	11636 8423	134 97	B4-U0-G3 B1-U0-G2	12248 8866	141 102	B4-U0-G3 B1-U0-G2	12860 9310	148 107	B4-U0-G3				
			II-FR-HS	7937	91	B1-00-G2 B1-U0-G1	8568	99	B1-00-G2 B1-U0-G1	9019	102	B1-00-G2 B1-U0-G1	9470	107	B1-U0-G2 B1-U0-G1				
			III-M-HS	7893	91	B1-U0-G2	8521	98	B1-U0-G2	8970	103	B1-U0-G2	9418	109	B1-U0-G2				
			III-W-HS IV-HS	7726 8153	89 94	B0-U0-G2 B1-U0-G2	8341 8802	96 101	B1-U0-G2 B1-U0-G2	8780 9265	101 107	B1-U0-G2 B1-U0-G2	9218 9728	106 112	B1-U0-G2 B1-U0-G2				
			IV-FT-HS	7705	89	B1-U0-G3	8318	96	B1-U0-G3	8756	101	B1-U0-G3	9194	106	B1-U0-G3				
			II-FR	12366 12448	114 115	B2-U0-G2 B3-U0-G1	13349 13439	124 124	B2-U0-G2 B3-U0-G1	14052 14146	130 131	B2-U0-G2 B3-U0-G1	14754 14853	137 138	B3-U0-G2 B3-U0-G2				
			II-ML	12366	115	B3-U0-G3	13349	124	B3-U0-G3	14052	130	B3-U0-G3	14755	137	B4-U0-G4				
			III-W	12581 11682	116 108	B2-U0-G2 B2-U0-G3	13582 12611	126 117	B2-U0-G2 B2-U0-G3	14297 13275	132 123	B2-U0-G2 B2-U0-G3	15012 13939	139 129	B2-U0-G2 B2-U0-G3				
			IV	12487	116	B2-U0-G2	13480	125	B2-U0-G2	14189	131	B2-U0-G2	14899	138	B2-U0-G2				
			IV-FT VSQ-N	11375 13051	105 121	B2-U0-G3 B3-U0-G1	12280 14089	114 130	B2-U0-G3 B3-U0-G1	12926 14830	120 137	B2-U0-G3 B3-U0-G1	13573 15572	126 144	B2-U0-G3 B3-U0-G1				
40	875	108.0	VSQ-M	12798	118	B4-U0-G2	13816	128	B4-U0-G2	14543	135	B4-U0-G2	15270	141	B4-U0-G2	N/A		N/A	
			VSQ-W II-HS	12492 9044	116 84	B4-U0-G3	13486	125	B4-U0-G3	14196	131	B4-U0-G3	14905	138	B4-U0-G3				
			II-FR-HS	9199	85	B1-U0-G2 B1-U0-G1	9763 9930	90 92	B1-U0-G2 B1-U0-G1	10277 10453	95 97	B1-U0-G2 B1-U0-G1	10791 10976	100 102	B1-U0-G2 B1-U0-G1				
			III-M-HS	9149	85	B1-U0-G2	9876	91	B1-U0-G2	10396	96	B1-U0-G2	10916	101	B1-U0-G2				
			III-W-HS	8955 9450	83 87	B1-U0-G2 B1-U0-G2	9667 10201	90 94	B1-U0-G3 B1-U0-G2	10176 10738	94 99	B1-U0-G3 B1-U0-G2	10685 11275	99 104	B1-U0-G3 B1-U0-G2				
			IV-FT-HS	8931	83	B1-U0-G3	9641	89	B1-U0-G3	10149	94	B1-U0-G3	10656	99	B1-U0-G3				
			II-FR	14213 14308	111 112	B2-U0-G2 B3-U0-G1	15344 15446	120 120	B3-U0-G2 B3-U0-G2	16151 16259	126 127	B3-U0-G3 B3-U0-G2	16959 17072	132 133	B3-U0-G3 B3-U0-G2				
			II-ML	14214	111	B3-U0-G3	15344	120	B4-U0-G4	16152	126	B4-U0-G4	16959	132	B4-U0-G4				
			III-W	14461 13427	113 105	B2-U0-G2 B2-U0-G3	15612 14495	122 113	B3-U0-G2 B2-U0-G3	16433 15258	128 119	B3-U0-G3 B2-U0-G3	17255 16021	135 125	B3-U0-G3 B3-U0-G3				
			IV	14352	112	B2-U0-G2	15494	121	B3-U0-G2	16309	127	B3-U0-G3	17125	134	B3-U0-G3				
			IV-FT VSQ-N	13075 15001	102 117	B2-U0-G3 B3-U0-G1	14115	110 126	B2-U0-G3 B4-U0-G1	14858 17046	116	B3-U0-G3 B4-U0-G2	15601 17899	122 140	B3-U0-G3				
40	1050	128.2	VSQ-M	14710	117	B3-00-G1 B4-U0-G2	16194 15880	124	B4-U0-G1 B4-U0-G2	16716	133 130	B4-U0-G2 B4-U0-G2	17899	137	B4-U0-G2 B4-U0-G2	N/A		N/A	
			VSQ-W	14359	112	B4-U0-G3	15501	121	B4-U0-G3	16317	127	B4-U0-G3	17132	134	B5-U0-G3				
			II-HS II-FR-HS	10395 10573	81 82	B1-U0-G2 B1-U0-G1	11222 11414	88 89	B1-U0-G2 B1-U0-G2	11813 12015	92 94	B1-U0-G2 B1-U0-G2	12403 12616	97 98	B1-U0-G2 B1-U0-G2				
			III-M-HS	10516	82	B1-U0-G2	11352	89	B1-U0-G2	11949	93	B1-U0-G3	12547	98	B1-U0-G3				
			III-W-HS IV-HS	10293 10862	80 85	B1-U0-G3 B1-U0-G2	11112 11726	87 91	B1-U0-G3 B1-U0-G2	11696 12343	91 96	B1-U0-G3 B1-U0-G2	12281 12960	96 101	B1-U0-G3 B1-U0-G3				
			IV-HS IV-FT-HS	10266	80	B1-U0-G3	11082	86	B1-U0-G3	11665	91	B1-U0-G3	12248	96	B1-U0-G3				





PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZR-PLED)

	RZR-PLED																		
LED	Drive	System	Dist'n	27k	(2700k	(- 70CRI)	30K	(3000K	- 70CRI)	40k	(4000k	(- 70CRI)	50K	(5000K	- 70CRI)	System		TRA (59	Onm)
Count	Current (mA)	Watts	Туре	LUMENS	LPW	BUG RATING	Watts	LUMENS	LPW	BUG RATING									
			II II-FR	11277	132	B2-U0-G2 B3-U0-G1	12174	143 144	B2-U0-G2 B3-U0-G1	12814 12901	150	B2-U0-G2 B3-U0-G1	13455 13546	158 159	B2-U0-G2 B3-U0-G1		4475 4504	67 67	B1-U0-G1 B1-U0-G1
			II-FIX	11352 11277	133 132	B3-U0-G1 B3-U0-G3	12256 12175	144	B3-U0-G1 B3-U0-G3	12901	151 150	B3-U0-G1 B3-U0-G3	13546	159	B3-U0-G1 B3-U0-G3	-	4475	67	B2-U0-G1
			III-M	11474	134	B2-U0-G2	12387	145	B2-U0-G2	13039	153	B2-U0-G2	13691	160	B2-U0-G2	j	4553	68	B1-U0-G1
		[III-W	10654	125	B2-U0-G3	11501	135	B2-U0-G3	12106	142	B2-U0-G3	12712	149	B2-U0-G3		4228	63	B1-U0-G2
			IV-FT	11388 10374	133 121	B2-U0-G2 B2-U0-G3	12294 11199	144	B2-U0-G2 B2-U0-G3	12941 11788	152 138	B2-U0-G2 B2-U0-G3	13588 12377	159 145	B2-U0-G2 B2-U0-G3		4518 4117	67 61	B1-U0-G1 B1-U0-G1
80	350	85.4	VSQ-N	11902	139	B3-U0-G1	12849	150	B3-U0-G1	13525	158	B3-U0-G1	14202	166	B3-U0-G1	67.0	4723	70	B2-U0-G1
00	330	65.4	VSQ-M	11671	137	B4-U0-G2	12600	148	B4-U0-G2	13263	155	B4-U0-G2	13927	163	B4-U0-G2	07.0	4631	69	B3-U0-G1
			VSQ-W II-HS	11392 8247	133 97	B4-U0-G3 B1-U0-G2	12299 8903	144 104	B4-U0-G3 B1-U0-G2	12946 9372	152 110	B4-U0-G3 B1-U0-G2	13593 9840	159 115	B4-U0-G3 B1-U0-G2		4520 3273	67 49	B3-U0-G2 B0-U0-G1
			II-FR-HS	8389	98	B1-00-G2 B1-U0-G1	9056	104	B1-00-G2 B1-U0-G1	9533	112	B1-00-G2 B1-U0-G1	10009	117	B1-00-G2 B1-U0-G1		3329	50	B0-U0-G1
			III-M-HS	8344	98	B1-U0-G2	9007	105	B1-U0-G2	9482	111	B1-U0-G2	9956	117	B1-U0-G2		3311	49	B0-U0-G1
			III-W-HS IV-HS	8167 8618	96 101	B1-U0-G2 B1-U0-G2	8817 9304	103 109	B1-U0-G2 B1-U0-G2	9281 9793	109 115	B1-U0-G2 B1-U0-G2	9745 10283	114 120	B1-U0-G3 B1-U0-G2		3240 3420	48 51	B0-U0-G1 B0-U0-G1
			IV-FT-HS	8144	95	B1-00-G2 B1-U0-G3	8792	103	B1-00-G2 B1-U0-G3	9255	108	B1-00-G2 B1-U0-G3	9718	114	B1-00-G2 B1-U0-G3		3232	48	B0-U0-G1
			II	16239	125	B3-U0-G3	17531	135	B3-U0-G3	18454	143	B3-U0-G3	19377	150	B3-U0-G3		5251	52	B1-U0-G1
			II-FR II-ML	16348 16240	126 126	B3-U0-G2 B4-U0-G4	17648 17532	136 135	B3-U0-G2 B4-U0-G4	18577 18454	144	B3-U0-G2 B4-U0-G4	19506 19377	151 150	B3-U0-G2 B4-U0-G4		5286 5251	52 52	B1-U0-G1 B2-U0-G2
			II-IVIL	16523	128	B3-U0-G3	17837	138	B3-U0-G3	18454	143	B3-U0-G3	19377	150	B3-U0-G3		5343	53	B1-U0-G2
			III-W	15341	119	B2-U0-G3	16562	128	B3-U0-G3	17433	135	B3-U0-G3	18305	141	B3-U0-G3	1	4961	49	B1-U0-G2
			IV-FT	16398 14938	127	B3-U0-G3 B3-U0-G3	17703	137 125	B3-U0-G3 B3-U0-G4	18635	144	B3-U0-G3	19566 17824	151 138	B3-U0-G3		5302 4830	52 48	B1-U0-G1 B1-U0-G2
			VSQ-N	17140	115 132	B3-00-G3 B4-U0-G2	16127 18504	143	B3-00-G4 B4-U0-G2	16976 19477	151	B3-U0-G4 B4-U0-G2	20451	158	B3-U0-G4 B4-U0-G2		5542	55	B2-U0-G2
80	525	129.4	VSQ-M	16807	130	B4-U0-G2	18144	140	B4-U0-G2	19099	148	B4-U0-G2	20053	155	B4-U0-G2	101.0	5434	54	B3-U0-G1
			VSQ-W	16406	127	B4-U0-G3	17711	137	B5-U0-G3	18643	144	B5-U0-G3	19575	151	B5-U0-G3		5304	53	B3-U0-G2
			II-HS II-FR-HS	11877 12081	92 93	B1-U0-G2 B1-U0-G2	12821 13042	99 101	B1-U0-G2 B1-U0-G2	13496 13728	104 106	B1-U0-G3 B1-U0-G2	14171 14414	110 111	B1-U0-G3 B1-U0-G2	-	3841 3906	38 39	B0-U0-G1 B0-U0-G1
			III-M-HS	12016	93	B1-U0-G3	12971	100	B1-U0-G3	13654	106	B1-U0-G3	14337	111	B1-U0-G3		3885	38	B0-U0-G1
			III-W-HS	11760	91	B1-U0-G3	12696	98	B1-U0-G3	13364	103	B1-U0-G3	14032	108	B1-U0-G3		3803	38	B0-U0-G2
			IV-HS IV-FT-HS	12411 11729	96 91	B1-U0-G2 B1-U0-G3	13398 12662	104 98	B1-U0-G3 B1-U0-G3	14103 13328	109	B1-U0-G3 B1-U0-G3	14808 13995	114 108	B1-U0-G3 B1-U0-G4		4013 3792	40 38	B0-U0-G1 B0-U0-G2
				20595	119	B3-U0-G3	22232	128	B3-U0-G3	23403	135	B3-U0-G3	24573	142	B3-U0-G3		0772	00	50 00 02
		[II-FR	20732	119	B3-U0-G2	22381	129	B3-U0-G2	23559	136	B3-U0-G2	24736	142	B3-U0-G2				
			II-ML III-M	20595 20954	119 121	B4-U0-G4 B3-U0-G3	22233 22621	128 130	B4-U0-G4 B3-U0-G3	23403 23812	135 137	B4-U0-G4 B3-U0-G4	24573 25003	142 144	B4-U0-G4 B3-U0-G4				
			III-W	19456	112	B3-U0-G4	21003	121	B3-U0-G4	22109	127	B3-U0-G4	23214	134	B3-U0-G4	1			
			IV	20797	120	B3-U0-G3	22451	129	B3-U0-G3	23633	136	B3-U0-G3	24814	143	B3-U0-G4				
	700		IV-FT VSQ-N	18945 21737	109 125	B3-U0-G4 B4-U0-G2	20452 23466	118 135	B3-U0-G4 B4-U0-G2	21528 24701	124 142	B3-U0-G4 B4-U0-G2	22604 25936	130 149	B3-U0-G4 B4-U0-G2				
80		173.6	VSQ-M	21314	123	B5-U0-G3	23010	133	B5-U0-G3	24221	140	B5-U0-G3	25432	146	B5-U0-G3	N/A		N/A	
			VSQ-W	20806	120	B5-U0-G3	22461	129	B5-U0-G4	23643	136	B5-U0-G4	24825	143	B5-U0-G4]			
			II-HS II-FR-HS	15062 15321	87 88	B1-U0-G3 B1-U0-G2	16260 16539	94 95	B1-U0-G3 B1-U0-G2	17115 17410	99 100	B1-U0-G3 B1-U0-G2	17971 18280	104 105	B1-U0-G3 B1-U0-G2				
			III-M-HS	15238	88	B1-U0-G3	16450	95	B1-U0-G3	17315	100	B1-U0-G3	18181	105	B1-U0-G4				
			III-W-HS	14915	86	B1-U0-G4	16101	93	B1-U0-G4	16948	98	B1-U0-G4	17796	103	B1-U0-G4				
			IV-HS IV-FT-HS	15739 14874	91 86	B1-U0-G3 B1-U0-G4	16991 16058	98 92	B1-U0-G3 B1-U0-G4	17885 16903	103 97	B1-U0-G3 B1-U0-G4	18780 17748	108 102	B1-U0-G3 B1-U0-G4				
				23798	110	B3-U0-G3	25691	119	B3-U0-G3	27043	125	B3-U0-G4	28395	132	B3-U0-G4				
			II-FR	23957	111	B3-U0-G2	25862	120	B3-U0-G2	27223	126	B3-U0-G2	28585	132	B4-U0-G2				
			II-ML	23799 24214	110 112	B4-U0-G4 B3-U0-G4	25692 26140	119 121	B4-U0-G4 B3-U0-G4	27044 27516	125 127	B4-U0-G4 B3-U0-G4	28396 28892	132 134	B4-U0-G4 B3-U0-G4	-			
			III-W	22482	104	B3-U0-G4	24270	112	B3-U0-G4	25548	118	B3-U0-G4	26825	124	B3-U0-G4	1			
			IV FT	24032	111	B3-U0-G3	25943	120	B3-U0-G4	27309	126	B3-U0-G4	28674	133	B3-U0-G4				
	6-		IV-FT VSQ-N	21892 25118	101 116	B3-U0-G4 B4-U0-G2	23634 27116	109 126	B3-U0-G5 B5-U0-G2	24877 28543	115 132	B3-U0-G5 B5-U0-G2	26121 29970	121 139	B3-U0-G5 B5-U0-G2				
80	875	215.9	VSQ-M	24630	114	B5-U0-G3	26589	123	B5-U0-G3	27988	130	B5-U0-G3	29387	136	B5-U0-G3	N/A		N/A	
			VSQ-W II-HS	24042 17405	111 81	B5-U0-G4 B1-U0-G3	25954 18789	120 87	B5-U0-G4 B1-U0-G3	27321 19778	127 92	B5-U0-G4 B1-U0-G4	28686 20766	133 96	B5-U0-G4				
			II-FR-HS	17704	82	B1-U0-G3 B1-U0-G2	19112	89	B1-00-G3 B1-U0-G2	20118	93	B1-U0-G4 B1-U0-G2	21124	98	B2-U0-G4 B1-U0-G2	+			
			III-M-HS	17608	82	B1-U0-G4	19008	88	B1-U0-G4	20009	93	B1-U0-G4	21009	97	B1-U0-G4]			
			III-W-HS	17234	80	B1-U0-G4	18605	86	B1-U0-G4	19584	91	B1-U0-G4	20564	95	B1-U0-G4				
			IV-HS IV-FT-HS	18187 17188	84 80	B1-U0-G3 B1-U0-G4	19634 18555	91 86	B1-U0-G4 B1-U0-G4	20667 19532	96 90	B1-U0-G4 B1-U0-G4	21701 20509	101 95	B1-U0-G4 B1-U0-G4				
			II	27354	107	B3-U0-G4	29530	115	B4-U0-G4	31084	121	B4-U0-G4	32638	127	B4-U0-G4				
			II-FR II-ML	27536 27355	107 107	B3-U0-G2 B4-U0-G4	29727 29531	116 115	B4-U0-G2 B5-U0-G5	31291 31085	122 121	B4-U0-G2 B5-U0-G5	32856 32639	128 127	B4-U0-G2 B5-U0-G5				
			III-M	27832	107	B3-U0-G4	30046	117	B3-U0-G3 B3-U0-G4	31627	123	B3-00-G3 B4-U0-G4	33209	130	B3-00-G3 B4-U0-G4				
			III-W	25841	101	B3-U0-G4	27897	109	B3-U0-G4	29365	115	B3-U0-G5	30834	120	B3-U0-G5				
			IV-FT	27622	108	B3-U0-G4	29820	116	B3-U0-G4	31389	122	B4-U0-G4	32959	129	B4-U0-G4				
	1050	05/ /	VSQ-N	25163 28871	98 113	B3-U0-G5 B5-U0-G2	27165 31168	106 122	B3-U0-G5 B5-U0-G2	28595 32808	112 128	B3-U0-G5 B5-U0-G2	30024 34448	117 134	B3-U0-G5 B5-U0-G2	,,,,			
80	1050	256.4	VSQ-M	28310	110	B5-U0-G3	30561	119	B5-U0-G3	32170	125	B5-U0-G4	33779	132	B5-U0-G4	N/A		N/A	
			VSQ-W II-HS	27634 20005	108 78	B5-U0-G4 B1-U0-G4	29833 21596	116 84	B5-U0-G4 B2-U0-G4	31403 22733	122	B5-U0-G5	32973	129 93	B5-U0-G5				
			II-FR-HS	20349	79	B1-U0-G4 B1-U0-G2	21968	86	B2-00-G4 B1-U0-G2	23124	89 90	B2-U0-G4 B1-U0-G2	23870 24280	95	B2-U0-G4 B1-U0-G2				
			III-M-HS	20239	79	B1-U0-G4	21848	85	B1-U0-G4	22998	90	B1-U0-G4	24148	94	B1-U0-G4				
			III-W-HS IV-HS	19809 20905	77 82	B1-U0-G4 B1-U0-G4	21385 22568	83 88	B1-U0-G4 B1-U0-G4	22511 23756	88 93	B1-U0-G4 B1-U0-G4	23636 24943	92 97	B1-U0-G5 B1-U0-G4				
			IV-HS IV-FT-HS	19756	77	B1-U0-G4 B1-U0-G4	21328	83	B1-00-G4 B1-U0-G4	23/56	88	B1-U0-G4 B1-U0-G5	23573	92	B1-00-G4 B1-U0-G5				
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PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRG-PLED)

	RZR-G-PLED																		
LED	Drive	System	Dist'n	27	K (2700	K - 70CRI)	30K	(3000K	(- 70CRI)	40k	(4000k	(- 70CRI)	50K	(5000K	- 70CRI)	System	Т	RA (590	nm)
Count	Current (mA)	Watts	Type	LUMENS	LPW	BUG RATING	Watts	LUMENS	LPW	BUG RATING									
			II	11409	131	B2-U0-G2	12317	142	B2-U0-G2	12965	149	B2-U0-G2	13613	156	B2-U0-G2		4528	68	B1-U0-G1
			II-FR II-ML	11485 11409	132	B3-U0-G1 B3-U0-G3	12398 12317	143 142	B3-U0-G1 B3-U0-G3	13051 12965	150 149	B3-U0-G1 B3-U0-G3	13703 13613	158	B3-U0-G1 B3-U0-G3		4558 4528	68	B1-U0-G1 B2-U0-G2
			III-M	11608	133	B2-U0-G3	12517	144	B2-U0-G3 B2-U0-G2	13191	152	B2-U0-G3 B2-U0-G2	13850	156 159	B2-U0-G3 B2-U0-G2		4526	68	B1-U0-G1
			III-W	10778	124	B2-U0-G3	11635	134	B2-U0-G3	12248	141	B2-U0-G3	12860	148	B2-U0-G3		4276	64	B1-U0-G2
			IV	11520	132	B2-U0-G2	12437	143	B2-U0-G2	13091	150	B2-U0-G2	13746	158	B2-U0-G2		4572	68	B1-U0-G1
			IV-FT VSQ-N	10494 12041	121	B2-U0-G3 B3-U0-G1	11330 12999	130 149	B2-U0-G3 B3-U0-G1	11926 13683	137 157	B2-U0-G3 B3-U0-G1	12522 14367	144 165	B2-U0-G3 B3-U0-G1		4165 4779	62 71	B1-U0-G1 B2-U0-G1
80	350	87.0	VSQ-M	11808	136	B4-U0-G2	12747	147	B4-U0-G2	13418	154	B4-U0-G2	14089	162	B4-U0-G2	67.0	4686	70	B3-U0-G1
			VSQ-W	11526	132	B4-U0-G3	12443	143	B4-U0-G3	13097	151	B4-U0-G3	13752	158	B4-U0-G3		4574	68	B3-U0-G2
			II-HS II-FR-HS	8464 8609	97 99	B1-U0-G2 B1-U0-G1	9138 9294	105 107	B1-U0-G2 B1-U0-G1	9618 9783	111	B1-U0-G2 B1-U0-G1	10099 10274	116 118	B1-U0-G2 B1-U0-G1		3359 3417	50 51	B0-U0-G1 B0-U0-G1
			III-M-HS	8563	98	B1-U0-G1	9294	106	B1-U0-G1	9703	112	B1-U0-G1	10274	117	B1-U0-G1 B1-U0-G2		3398	51	B0-U0-G1
			III-W-HS	8382	96	B1-U0-G2	9048	104	B1-U0-G2	9525	109	B1-U0-G3	10001	115	B1-U0-G3		3326	50	B0-U0-G1
			IV-HS	8845	102	B1-U0-G2	9548	110	B1-U0-G2	10051	116	B1-U0-G2	10553	121	B1-U0-G2		3510	52	B0-U0-G1
			IV-FT-HS	8359 16394	96 127	B1-U0-G3 B3-U0-G3	9024 17698	104 137	B1-U0-G3 B3-U0-G3	9499 18629	109 144	B1-U0-G3 B3-U0-G3	9974 19560	115 152	B1-U0-G3 B3-U0-G3		3317 5301	50 52	B0-U0-G2 B1-U0-G1
			II-FR	16503	128	B3-U0-G2	17816	138	B3-U0-G2	18753	145	B3-U0-G2	19691	153	B3-U0-G2		5336	53	B1-U0-G1
			II-ML	16394	127	B4-U0-G4	17698	137	B4-U0-G4	18630	144	B4-U0-G4	19561	152	B4-U0-G4		5302	52	B2-U0-G2
			III-W	16680 15488	129 120	B3-U0-G3 B2-U0-G3	14740 16720	114	B2-U0-G2 B3-U0-G3	18955 17600	147 136	B3-U0-G3 B3-U0-G3	19902 18479	154 143	B3-U0-G3 B3-U0-G4		5343 5008	53 50	B1-U0-G2 B1-U0-G2
			IV	16555	128	B3-U0-G3	17871	139	B3-U0-G3	18812	146	B3-U0-G3 B3-U0-G3	19753	153	B3-U0-G4 B3-U0-G3		5353	53	B1-00-G2 B1-U0-G1
		129.0	IV-FT	15081	117	B3-U0-G3	16280	126	B3-U0-G3	17137	133	B3-U0-G3	17994	139	B3-U0-G3		4877	48	B1-U0-G2
80	525		VSQ-N	17303	134	B4-U0-G2	18679	145	B4-U0-G2	19663	152	B4-U0-G2	20646	160	B4-U0-G2	101.0	5595	55	B2-U0-G1
			VSQ-M VSQ-W	16967 16562	132 128	B4-U0-G2 B4-U0-G3	18317 17880	142 139	B4-U0-G2 B5-U0-G3	19281 18821	149 146	B4-U0-G2 B5-U0-G3	20245 19762	157 153	B4-U0-G2 B5-U0-G3		5486 5355	54 53	B3-U0-G1 B3-U0-G2
			II-HS	12089	94	B1-U0-G2	13052	101	B1-U0-G3	13738	106	B1-U0-G3	14425	112	B1-U0-G3		3909	39	B0-U0-G1
			II-FR-HS	12298	95	B1-U0-G2	13276	103	B1-U0-G2	13975	108	B1-U0-G2	14674	114	B1-U0-G2		3977	39	B0-U0-G1
			III-M-HS	12231	95	B1-U0-G3	13204	102	B1-U0-G3	13899	108	B1-U0-G3	14594	113	B1-U0-G3		3954	39	B0-U0-G1
			III-W-HS IV-HS	11971 12633	93 98	B1-U0-G3 B1-U0-G2	12924 13638	100 106	B1-U0-G3 B1-U0-G3	13604 14356	105 111	B1-U0-G3 B1-U0-G3	14284 15074	111	B1-U0-G3 B1-U0-G3		3871 4085	38 40	B0-U0-G2 B0-U0-G1
			IV-FT-HS	11940	93	B1-U0-G3	12889	100	B1-U0-G3	13568	105	B1-U0-G3	14246	110	B1-U0-G4		3861	38	B0-U0-G2
			II	20914	120	B3-U0-G3	22578	130	B3-U0-G3	23766	137	B3-U0-G3	24955	143	B3-U0-G3				
			II-FR II-ML	21054 20915	121	B3-U0-G2 B4-U0-G4	22729 22579	131 130	B3-U0-G2 B4-U0-G4	23924 23767	137 137	B3-U0-G2 B4-U0-G4	25121 24955	144 143	B3-U0-G2 B4-U0-G4				
	700		III-M	21280	120	B3-U0-G3	22972	132	B3-U0-G3	24182	139	B3-U0-G4	25391	145	B3-U0-G4				
			III-W	19759	114	B3-U0-G4	21330	123	B3-U0-G4	22453	129	B3-U0-G4	23575	135	B3-U0-G4				
			IV	21120	121	B3-U0-G3	22800	131	B3-U0-G3	24000	138	B3-U0-G3	25200	145	B3-U0-G4				
			IV-FT VSQ-N	19239 22074	111	B3-U0-G4 B4-U0-G2	20770 23831	119	B3-U0-G4 B4-U0-G2	21862 25084	126 144	B3-U0-G4 B4-U0-G2	22956 26339	132 151	B3-U0-G4 B4-U0-G2			NI/A	
80		174.0	VSQ-M	21646	124	B5-U0-G3	23367	134	B5-U0-G3	24598	141	B5-U0-G3	25827	148	B5-U0-G3	N/A		N/A	
			VSQ-W	21129	121	B5-U0-G4	22810	131	B5-U0-G4	24010	138	B5-U0-G4	25212	145	B5-U0-G4				
			II-HS II-FR-HS	15363 15628	88 90	B1-U0-G3 B1-U0-G2	16586 16872	95 97	B1-U0-G3 B1-U0-G2	17458 17759	100 102	B1-U0-G3 B1-U0-G2	18332 18647	105 107	B1-U0-G3 B1-U0-G2				
			III-M-HS	15542	89	B1-00-G2 B1-U0-G3	16778	96	B1-00-G2 B1-U0-G3	17/59	102	B1-00-G2 B1-U0-G4	18545	107	B1-00-G2 B1-U0-G4				
			III-W-HS	15213	87	B1-U0-G4	16423	94	B1-U0-G4	17288	99	B1-U0-G4	18152	104	B1-U0-G4				
			IV-HS	16055	92	B1-U0-G3	17331	100	B1-U0-G3	18244	105	B1-U0-G3	19155	110	B1-U0-G3				
			IV-FT-HS	15172 25063	87 114	B1-U0-G4 B3-U0-G3	16380 27057	94 123	B1-U0-G4 B3-U0-G4	17242 28481	99	B1-U0-G4 B3-U0-G4	18104 29905	104 136	B1-U0-G4 B4-U0-G4				
			II-FR	25230	115	B3-U0-G2	27237	124	B3-U0-G2	28670	130	B4-U0-G2	30104	137	B4-U0-G2				
			II-ML	25064	114	B4-U0-G4	27057	123	B4-U0-G4	28481	130	B4-U0-G4	29906	136	B5-U0-G5				
			III-W	25501 23677	116 108	B3-U0-G4 B3-U0-G4	27529 25560	125 116	B3-U0-G4 B3-U0-G4	28978 26906	132 122	B3-U0-G4 B3-U0-G4	30427 28251	138 129	B3-U0-G4 B3-U0-G4				
			IV	25309	115	B3-U0-G4 B3-U0-G4	27322	124	B3-U0-G4 B3-U0-G4	28760	131	B3-U0-G4 B3-U0-G4	30198	137	B3-U0-G4 B3-U0-G4				
			IV-FT	23056	105	B3-U0-G4	24889	113	B3-U0-G4	26200	119	B3-U0-G4	27509	125	B3-U0-G4				
80	875	219.7	VSQ-N	26453	120	B4-U0-G2	28557	130	B5-U0-G2	30060	137	B5-U0-G2	31563	144	B5-U0-G2	N/A		N/A	
			VSQ-W	25939 25320	118	B5-U0-G3 B5-U0-G4	28002 27335	127 124	B5-U0-G3 B5-U0-G4	29476 28773	134 131	B5-U0-G3 B5-U0-G4	30950 30212	141 138	B5-U0-G3 B5-U0-G4				
			II-HS	18330	83	B1-U0-G3	19788	90	B1-U0-G4	20830	95	B2-U0-G4	21871	100	B2-U0-G4				
			II-FR-HS	18645	85	B1-U0-G2	20128	92	B1-U0-G2	21188	96	B1-U0-G2	22247	101	B1-U0-G2				
			III-M-HS	18543 18151	84	B1-U0-G4 B1-U0-G4	20018 19594	91 89	B1-U0-G4 B1-U0-G4	21072 20626	96 94	B1-U0-G4 B1-U0-G4	22125 21657	101 99	B1-U0-G4 B1-U0-G4				
			IV-HS	19154	87	B1-00-G4 B1-U0-G3	20677	94	B1-00-G4 B1-U0-G4	21766	99	B1-00-G4 B1-U0-G4	22854	104	B1-00-G4				
			IV-FT-HS	18102	82	B1-U0-G4	19541	89	B1-U0-G4	20571	94	B1-U0-G4	21599	98	B1-U0-G4				
			II ED	28808	108	B4-U0-G4	31099	117	B4-U0-G4	32736	123	B4-U0-G4	34373	129	B4-U0-G4				
			II-FR II-ML	29000 28809	109	B4-U0-G2 B5-U0-G5	31306 31100	118	B4-U0-G2 B5-U0-G5	32954 32737	124 123	B4-U0-G2 B5-U0-G5	34602 34374	130 129	B4-U0-G2 B5-U0-G5				
			III-M	29311	110	B3-U0-G4	31643	119	B4-U0-G4	33308	125	B4-U0-G4	34974	131	B4-U0-G4				
			III-W	27215	102	B3-U0-G4	29380	110	B3-U0-G5	30926	116	B3-U0-G5	32473	122	B3-U0-G5				
			IV-FT	29091 26501	109	B3-U0-G4 B3-U0-G4	31404	118	B4-U0-G4	33058 30114	124	B4-U0-G4	34710	130 119	B4-U0-G4				
00	1055	044.5	VSQ-N	30405	100	B5-U0-G2	28608 32824	123	B3-U0-G4 B5-U0-G2	34551	113	B3-U0-G5 B5-U0-G2	31620 36279	136	B3-U0-G5 B5-U0-G2				
80	1050	266.0	VSQ-M	29815	112	B5-U0-G3	32186	121	B5-U0-G4	33880	127	B5-U0-G4	35575	134	B5-U0-G4	N/A		N/A	
			VSQ-W	29104	109	B5-U0-G4	31419	118	B5-U0-G5	33073	124	B5-U0-G5	34726	131	B5-U0-G5				
			II-HS II-FR-HS	21069 21432	79 81	B2-U0-G4 B1-U0-G2	22745 23136	86 87	B2-U0-G4 B1-U0-G2	23942 24354	90 92	B2-U0-G4 B1-U0-G2	25139 25571	95 96	B2-U0-G4 B2-U0-G2				
			III-M-HS	21314	80	B1-00-G2 B1-U0-G4	23009	87	B1-00-G2 B1-U0-G4	24334	91	B1-00-G2 B1-U0-G4	25431	96	B1-U0-G2				
			III-W-HS	20862	78	B1-U0-G4	22521	85	B1-U0-G4	23708	89	B1-U0-G5	24893	94	B1-U0-G5				
			IV-HS	22016	83	B1-U0-G4	23766	89	B1-U0-G4	25018	94	B1-U0-G4	26268	99	B1-U0-G4				
	<u> </u>		IV-FT-HS	20807	78	B1-U0-G4	22461	84	B1-U0-G5	23644	89	B1-U0-G5	24826	93	B1-U0-G5				





PHOTOMETRIC DATA GUIDE - LUMEN TABLES (RZRG-PLED)

	RZR-G-PLED																		
LED	Drive	System	Dist'n	271	K (2700)	(- 70CRI)	30K	(3000K	- 70CRI)	40K	(4000K	- 70CRI)	50K	(5000K	- 70CRI)	System		TRA (59	0nm)
Count	Current (mA)	Watts		LUMENS	LPW	BUG RATING	Watts	LUMENS	LPW	BUG RATING									
			II	16889	130	B3-U0-G3	18233	140	B3-U0-G3	19192	148	B3-U0-G3	20152	155	B3-U0-G3		6702	67	B2-U0-G2
			II-FR	17001	131	B3-U0-G2	18354	141	B3-U0-G2	19320	149	B3-U0-G2	20286	156	B3-U0-G2		6747	67	B2-U0-G1
			II-ML III-M	16890 17184	130 132	B4-U0-G4 B3-U0-G3	18233 18552	140 143	B4-U0-G4 B3-U0-G3	19193 19527	148 150	B4-U0-G4 B3-U0-G3	20152 20504	155 158	B4-U0-G4 B3-U0-G3		6703 6818	67 68	B3-U0-G3 B2-U0-G2
			III-W	15956	123	B3-U0-G3	17224	132	B3-U0-G3	18131	139	B3-U0-G3	19037	146	B3-U0-G4		6331	63	B1-U0-G2
			IV	17055	131	B3-U0-G3	18411	142	B3-U0-G3	19381	149	B3-U0-G3	20349	157	B3-U0-G3		6768	68	B2-U0-G2
			IV-FT VSQ-N	15537 17825	120 137	B3-U0-G3 B4-U0-G2	16772 19243	129 148	B3-U0-G3 B4-U0-G2	17655 20256	136 156	B3-U0-G3 B4-U0-G2	18538 21269	143 164	B3-U0-G4 B4-U0-G2		6165 7073	62 71	B1-U0-G2 B2-U0-G1
120	350	130.0	VSQ-M	17480	134	B4-U0-G2	18870	145	B4-U0-G2	19863	153	B4-U0-G2	20857	160	B4-U0-G2	100.0	6936	69	B3-U0-G1
			VSQ-W	17062	131	B5-U0-G3	18420	142	B5-U0-G3	19389	149	B5-U0-G3	20358	157	B5-U0-G3		6771	68	B3-U0-G2
			II-HS II-FR-HS	12352 12564	95 97	B1-U0-G2 B1-U0-G2	13334 13564	103 104	B1-U0-G3 B1-U0-G2	14036 14277	108 110	B1-U0-G3 B1-U0-G2	14738 14992	113 115	B1-U0-G3 B1-U0-G2		4901 4986	49 50	B1-U0-G2 B0-U0-G1
			III-M-HS	12496	96	B1-00-G2 B1-U0-G3	13490	104	B1-00-G2 B1-U0-G3	14199	109	B1-00-G2 B1-U0-G3	14992	115	B1-00-G2 B1-U0-G3		4959	50	B0-00-G1 B0-U0-G2
			III-W-HS	12231	94	B1-U0-G3	13204	102	B1-U0-G3	13899	107	B1-U0-G3	14594	112	B1-U0-G3		4853	49	B0-U0-G2
			IV-HS IV-FT-HS	12907 12198	99 94	B1-U0-G3 B1-U0-G3	13934 13168	107 101	B1-U0-G3 B1-U0-G3	14667 13862	113 107	B1-U0-G3 B1-U0-G4	15400 14555	118 112	B1-U0-G3 B1-U0-G4		5122 4840	51 48	B0-U0-G2 B0-U0-G2
			II	24123	126	B3-U0-G3	26042	136	B3-U0-G3	27413	143	B3-U0-G4	28783	150	B4-U0-G4		7800	51	B2-U0-G2
			II-FR	24284	126	B3-U0-G2	26216	137	B3-U0-G2	27596	144	B3-U0-G2	28975	151	B4-U0-G2		7853	52	B2-U0-G1
			II-ML	24124	126	B4-U0-G4	26042	136	B4-U0-G4	27414	143	B4-U0-G4	28784	150	B5-U0-G5		7800	51	B3-U0-G3
			III-W	24545 22789	128 119	B3-U0-G4 B3-U0-G4	26498 24603	138 128	B3-U0-G4 B3-U0-G4	27892 25897	145 135	B3-U0-G4 B3-U0-G4	29287 27192	153 142	B3-U0-G4 B3-U0-G4		7937 7368	52 48	B2-U0-G2 B1-U0-G2
			IV	24360	127	B3-U0-G4	26298	137	B3-U0-G4	27682	144	B3-U0-G4	29066	151	B3-U0-G4		7876	52	B2-U0-G2
	525	192.0	IV-FT	22191	116	B3-U0-G4	23956	125	B3-U0-G4	25217	131	B3-U0-G4	26478	138	B3-U0-G4		7176	47	B1-U0-G2
120			VSQ-N VSQ-M	25461 24967	133	B4-U0-G2 B5-U0-G3	27486 26952	143 140	B5-U0-G2 B5-U0-G3	28933 28371	151 148	B5-U0-G2 B5-U0-G3	30379 29789	158 155	B5-U0-G2 B5-U0-G3	152.0	8233 8073	54 53	B3-U0-G1 B3-U0-G2
			VSQ-W	24371	127	B5-U0-G4	26309	137	B5-U0-G4	27695	144	B5-U0-G4	29079	151	B5-U0-G4		7881	52	B3-U0-G2
			II-HS	17642	92	B1-U0-G3	19046	99	B1-U0-G3	20048	104	B1-U0-G4	21050	110	B2-U0-G4		5704	38	B1-U0-G2
			II-FR-HS III-M-HS	17946 17848	93 93	B1-U0-G2 B1-U0-G4	19373 19268	101	B1-U0-G2 B1-U0-G4	20393 20282	106 106	B1-U0-G2 B1-U0-G4	21413 21296	112 111	B1-U0-G2 B1-U0-G4		5803 5772	38 38	B1-U0-G1 B0-U0-G2
			III-W-HS	17470	91	B1-U0-G4	18860	98	B1-00-G4 B1-U0-G4	19852	103	B1-00-G4 B1-U0-G4	20844	109	B1-U0-G4 B1-U0-G4		5649	37	B0-U0-G2 B0-U0-G2
			IV-HS	18435	96	B1-U0-G3	19902	104	B1-U0-G4	20949	109	B1-U0-G4	21997	115	B1-U0-G4		5961 39 BC	B0-U0-G2	
	700		IV-FT-HS	17423	91	B1-U0-G4	18809	98	B1-U0-G4	19799	103	B1-U0-G4	20789	108	B1-U0-G4		5633	37	B0-U0-G2
			II-FR	30656 30860	118 119	B4-U0-G4 B4-U0-G2	33094 33315	127 128	B4-U0-G4 B4-U0-G2	34836 35068	134 135	B4-U0-G4 B4-U0-G2	36578 36822	141	B4-U0-G4 B4-U0-G2				
			II-ML	30657	118	B5-U0-G5	33095	127	B5-U0-G5	34837	134	B5-U0-G5	36579	141	B5-U0-G5				
			III-M	31191	120	B4-U0-G4	33673	130	B4-U0-G4	35445	136	B4-U0-G4	37217	143	B4-U0-G4				
			III-W	28960 30956	111	B3-U0-G4 B4-U0-G4	31265 33418	120 129	B3-U0-G5 B4-U0-G4	32909 35177	127 135	B3-U0-G5 B4-U0-G4	34555 36936	133 142	B3-U0-G5 B4-U0-G4				
			IV-FT	28200	108	B3-U0-G4	30444	117	B3-U0-G5	32046	123	B3-U0-G5	33648	129	B3-U0-G5				
120		260.0	VSQ-N	32356	124	B5-U0-G2	34929	134	B5-U0-G2	36768	141	B5-U0-G2	38606	148	B5-U0-G2	N/A		N/A	
			VSQ-W	31727 30971	122 119	B5-U0-G4 B5-U0-G4	34250 33434	132 129	B5-U0-G4 B5-U0-G5	36054 35194	139 135	B5-U0-G4 B5-U0-G5	37856 36953	146 142	B5-U0-G4 B5-U0-G5				
			II-HS	22420	86	B2-U0-G4	24203	93	B2-U0-G4	25478	98	B2-U0-G4	26751	103	B2-U0-G4				
			II-FR-HS	22806	88	B1-U0-G2	24619	95	B1-U0-G2	25916	100	B2-U0-G2	27212	105	B2-U0-G2	İ			
			III-M-HS	22682 22201	87 85	B1-U0-G4 B1-U0-G4	24485 23967	94 92	B1-U0-G4 B1-U0-G5	25774 25228	99 97	B1-U0-G4 B1-U0-G5	27063 26489	104 102	B1-U0-G4 B1-U0-G5				
			IV-HS	23428	90	B1-00-G4	25291	97	B1-00-G3 B1-U0-G4	26622	102	B1-00-G3	27953	102	B1-00-G3				
			IV-FT-HS	22141	85	B1-U0-G5	23902	92	B1-U0-G5	25160	97	B1-U0-G5	26418	102	B1-U0-G5				
			II II-FR	36574 36818	111	B4-U0-G4 B4-U0-G2	39483	120	B4-U0-G4 B4-U0-G2	41561 41838	126	B4-U0-G4 B4-U0-G3	43639	133	B4-U0-G5 B4-U0-G3				
			II-FIX	36575	111	B5-U0-G5	39746 39485	121 120	B5-U0-G5	41838	127 126	B5-U0-G5	43930 43640	134 133	B5-U0-G5				
			III-M	37213	113	B4-U0-G4	40174	122	B4-U0-G5	42288	129	B4-U0-G5	44402	135	B4-U0-G5				
			III-W	34552	105	B3-U0-G5	37300	113	B3-U0-G5	39263	119	B4-U0-G5	41226	125	B4-U0-G5				
			IV-FT	36932 33644	112	B4-U0-G4 B3-U0-G5	39870 36321	121	B4-U0-G5 B3-U0-G5	41969 38232	128 116	B4-U0-G5 B4-U0-G5	44067 40144	134	B4-U0-G5 B4-U0-G5				
120	875	329.0	VSQ-N	38602	117	B5-U0-G2	41673	127	B5-U0-G2	43866	133	B5-U0-G2	46060	140	B5-U0-G2	N/A		N/A	
120	3,3	327.0	VSQ-M	37852	115	B5-U0-G4	40863	124	B5-U0-G4	43014	131	B5-U0-G4	45165	137	B5-U0-G4	. 1/ ^		N/A	
			VSQ-W II-HS	36950 26748	112 81	B5-U0-G5 B2-U0-G4	39888 28876	121 88	B5-U0-G5 B2-U0-G4	41988 30395	128 92	B5-U0-G5 B2-U0-G4	44088 31916	134 97	B5-U0-G5 B2-U0-G5				
			II-FR-HS	27209	83	B2-U0-G2	29373	89	B2-U0-G2	30919	94	B2-U0-G2	32465	99	B2-U0-G3				
			III-M-HS	27060	82	B1-U0-G4	29213	89	B1-U0-G5	30750	93	B1-U0-G5	32287	98	B1-U0-G5				
			III-W-HS IV-HS	26487 27951	81 85	B1-U0-G5 B1-U0-G4	28593 30174	87 92	B1-U0-G5 B1-U0-G4	30098 31762	91 97	B1-U0-G5 B1-U0-G5	31603 33350	96 101	B1-U0-G5 B1-U0-G5				
			IV-HS IV-FT-HS	26416	80	B1-U0-G4 B1-U0-G5	28517	87	B1-00-G4 B1-U0-G5	30018	91	B1-U0-G5 B1-U0-G5	31519	96	B1-00-G5 B2-U0-G5				
			II	42039	106	B4-U0-G5	45383	114	B4-U0-G5	47771	120	B4-U0-G5	50160	126	B5-U0-G5				
			II-FR II-ML	42319 42040	106 106	B4-U0-G3 B5-U0-G5	45685 45384	115 114	B4-U0-G3 B5-U0-G5	48089 47773	121 120	B4-U0-G3 B5-U0-G5	50494 50161	127 126	B4-U0-G3 B5-U0-G5				
			II-IVIL	42040	106	B5-00-G5 B4-U0-G5	46177	116	B3-00-G5 B4-U0-G5	48606	120	B5-00-G5 B4-U0-G5	51037	128	B5-00-G5 B4-U0-G5				
			III-W	39714	100	B4-U0-G5	42873	108	B4-U0-G5	45130	113	B4-U0-G5	47387	119	B4-U0-G5				
			IV	42451	107	B4-U0-G5	45828	115	B4-U0-G5	48240	121	B4-U0-G5	50652	127	B4-U0-G5				
			IV-FT VSQ-N	38671 44370	97 111	B4-U0-G5 B5-U0-G2	41748 47899	105 120	B4-U0-G5 B5-U0-G3	43945 50421	110 127	B4-U0-G5 B5-U0-G3	46143 52942	116 133	B4-U0-G5 B5-U0-G3				
120	1050	398.0	VSQ-M	43508	109	B5-U0-G4	46969	118	B5-00-G3 B5-U0-G4	49441	124	B5-00-G3 B5-U0-G4	51914	130	B5-U0-G5	N/A		N/A	
			VSQ-W	42471	107	B5-U0-G5	45849	115	B5-U0-G5	48262	121	B5-U0-G5	50676	127	B5-U0-G5				
			II-HS II-FR-HS	30745 31274	77	B2-U0-G4 B2-U0-G3	33191	83	B2-U0-G5	34938	88	B2-U0-G5	36685 37315	92	B2-U0-G5				
			II-FR-HS	31274	79 78	B2-00-G3 B1-U0-G5	33761 33578	85 84	B2-U0-G3 B1-U0-G5	35539 35345	89 89	B2-U0-G3 B2-U0-G5	37315 37112	94	B2-U0-G3 B2-U0-G5				
			III-W-HS	30444	76	B1-U0-G5	32866	83	B1-U0-G5	34596	87	B1-U0-G5	36325	91	B2-U0-G5				
			IV-HS	32127	81	B1-U0-G5	34683	87	B2-U0-G5	36508	92	B2-U0-G5	38333	96	B2-U0-G5				
			IV-FT-HS	30363	76	B1-U0-G5	32777	82	B2-U0-G5	34504	87	B2-U0-G5	36229	91	B2-U0-G5				





RAZAR WALLMOUNT-LED

F C IFICA TΙ

OPTICAL HOUSING

Heavy cast low copper aluminum (A356 alloy; <0.2% copper) assembly with integral cooling fins. The Optical Panel mounting surface is milled flat (surface variance <± .003") to facilitate thermal transfer of heat to housing and cooling fins. The Optical Housing bolts to the Electrical Housing forming a unified assembly. The minimum wall thickness is .188".

ELECTRICAL HOUSING

Heavy cast low copper aluminum (A356 alloy; <0.2% copper) assembly. Minimum wall thickness is .188". Fixture Mounting Plate affixes to mounting surface over a recessed j-box. Electrical Housing anchors on the top edge of the Mounting Plate and stainless steel recessed socket head screws tighten the Electrical Housing to the Mounting Plate from the bottom.

PLED™ OPTICAL MODULES

Emitters (LED's) are arrayed on a metal core PCB panel with each emitter located on a copper thermal transfer pad and enclosed by an LED refractor. LED optics completely seal each individual emitter to meet an IP66 rating. The asymmetric distributions, have a micro-reflector inside the refractor which re-directs the house side emitter output towards the street side and functions as a house side shielding element. Refractors are injection molded H12 acrylic. Each LED refractor is sealed to the PCB over an emitter and all refractors are retained by an aluminum frame. Any one Panel, or group of Panels in a luminaire, have the same optical pattern. LED refractors produce Type II, III, and Type IV site/area distributions as well as other specialty asymmetric distributions. Panels are field replaceable and field rotatable in 90° increments.

LED DRIVER(S)

Constant current electronic with a power factor of >.90 and a minimum operating temperature of -40°F/-40°C. Driver(s) is/are UL and cUL recognized and mounted directly against the Electrical Housing to facilitate thermal transfer, held down by universal clamps to facilitate easy removal. In-line terminal blocks facilitate wiring between the driver and optical arrays. Drivers accept an input of 120-277V, 50/60Hz or 347V-480V, 50,60Hz. (0 - 10V dimmable driver is standard. Driver has a minimum of 3KV internal surge protection. Luminaire supplied with 20KV surge protector for field accessible installation.)

LED EMITTERS

High output LED's are utilized with drive currents ranging from 350mA to 1050mA. 70CRI Minimum. LED's are available in standard Neutral White (4000K), or optional Cool White (5000K) or Warm White (3000K). Consult Factory for other LED options.

AMBER LED's

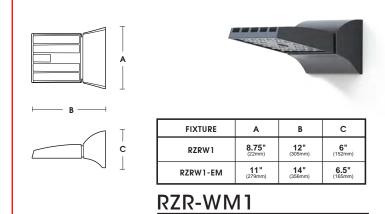
PCA (Phosphor Converted Amber) LED's utilize phosphors to create color output similar to LPS lamps and have a slight output in the blue spectral bandwidth. TRA (True Amber) LED's utilize material that emits light in the amber spectral bandwidth only without the use of phosphors.

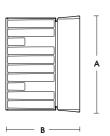
FINISH

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at 140°F. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. 400°F bake for maximum hardness and durability.

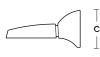
PROJECT NAME:

PROJECT TYPE:







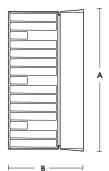


FIXTURE	Α	В	C
RZRW2	16" (406mm)	12" (305mm)	6" (152mm)
RZRW2-EM	16" (406mm)	14" (356mm)	6.5" (165mm)

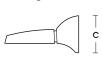
RZR-WM2

PATENT PENDING

PATENT PENDING







FIXTURE	Α	В	С
RZRW3	23" (584mm)	12" (305mm)	6" (152mm)
RZRW3-EM	23" (584mm)	14" (356mm)	6.5" (165mm)

RZR-WM3

PATENT PENDING





2019093



RAZAR WALLMOUNT SERIES-LED

EMERGENCY OPTION Emergency Back Box (EM) 3/4" Surface Conduit (SC) EMBack Box is 2" deeper than standard housing

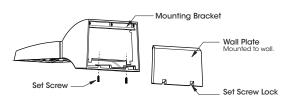
THE EMERGENCY OPTION BACK BOX EXTENDS 2" BEYOND THE STANDARD HOUSING AND CONTAINS THE EMERGENCY COMPONENTS (EC) INCLUDING BATTERIES OR CAN BE USED FOR SURFACE CONDUIT (SC) APPLICATIONS. THERE IS TO BE AN SC1, SC2, AND SC3 OPTION FOR THE DIFFERING HOUSING SIZES. SC SHIPS WITH THREADED CONDUIT PLUGS.

THE EM-LED SYSTEM PROVIDES POWER TO ALL LEDS IN THE ARRAY (20, 40, or 60) TO MEET THE FOLLOWING LIGHT LEVELS FOR A MINIMUM OF 90 MINUTES -

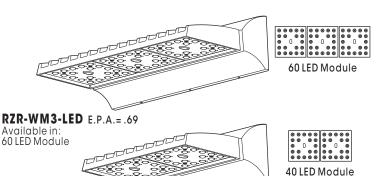
WM1 = 45% @ 350MA WM2 = 36% @ 350MA WM3 = 24% @ 350MA

*MULTIPLY THE % ABOVE BY THE LUMEN OUTPUT @ 350MA

WALL MOUNTING

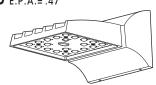


PLED® MODULES



RZR-WM2-LED E.P.A.= .47

Available in: 40 LED Module





RZR-WM1-LED E.P.A.= .33

Available in: 20LED Module

MAX INPUT WATTAGE

# OF		DRIVE C	URRENT	
LED's	350mA	525mA	700mA	1050mA
60	68W	99W	131W	198W
40	45W	66W	87W	134W
20	23W	33W	44\W	66W

Spec/Order Example: RZR-WM2/PLED-IV/40LED-700mA/CW/277/RAL-8019-S/SF

S F	P E C / O OPTICS	R D	E R I	N G		N I VOLTAGI	= (O R M /	A T I O N OPTIONS
MODEL	OPTICS		LED MO	DE	١	/OLTA	GE	FINISH	OPTIONS
	PLED® DISTRIBUTION TYPE	NO. LEDs	DRIVE CURRENT	COLOR TEMP - CCT	Γ.			STANDARD TEXTURED FINISH	☐ HIGH-LOW DIMMING FOR EXTERNAL CONTROL HLSW
☐ RZR-WM1	TYPE II PLED-II	☐ 20LED	☐ 350mA ☐ 525mA	NW (4000K)* *STANDARD		☐ 120 ☐ 208		☐ BLACK RAL-9005-T	☐ HOUSE SIDE SHIELDING
	TYPE II FRONT ROW PLED-II-FR		☐ 700mA¹ ☐ 1050mA¹	☐ CW (5000K)		☐ 240 ☐ 277		☐ WHITE RAL-9003-T	☐ SINGLE FUSE (120V & 277V) SF
☐ RZR-WM2	PLED-III	RZR-WM2	□ 1050IIIA	CONSULT FACTORY FOR OTHER LED COLORS		☐ 347 ☐ 480		GREY RAL-7004-T	☐ DOUBLE FUSE (208V & 240V) DF
	TYPE III WIDE PLED-III-W			AMBER² ☐ PHOSPHOR				☐ DARK BRONZE RAL-8019-T ☐ GREEN	BLUE-TOOTH PROGRAMMABLE PHOTO/MOTION SENSOR (FACTORY - MOTION 50/100; PHOTO 75FC)
☐ RZR-WM3	PLED-IV	RZR-WM3		CONVERTED AMBER				RAL-6005-T	☐ EMERGENCY BACKUP 1 EM1
	TYPE IV-FT PLED-IV-FT	☐ 60LED		PCA				FOR SMOOTH FINISH REPLACE SUFFIX "T" WITH SUFFIX "S"	☐ EMERGENCY BACKUP 1 (HOUSING ONLY) EMH1
	FLED-IV-FI			TRUE AMBER ³ TRA				(EXAMPLE: RAL-9005-S)	☐ EMERGENCY BACKUP 2 EM2
			NOTES:						EMERGENCY BACKUP 3EM3
			1 - 700mA and 1050mA LED'S	NOT FOR USE WITH TRA					☐ SURFACE CONDUIT 1 SC1 ☐ SURFACE CONDUIT 2 SC2
			2 - NARROW BAND AN CCT EQUIVALENT 3 - AVAILABLE IN 350r CURRENTS ONLY	MBERS HAVE NO DEFINABLE				CONSULT FACTORY FOR CUSTOM COLORS	SURFACE CONDUIT 3 SC3

LED COUNT	SOURCE TYPE	SOURCE	INITIAL LUMENS - 4000K	INITIAL LUMENS - 3000K	INITIAL LUMENS - 5000K	L70 GREATER THAN (HR)-TM21	STARTING TEMP.	SYSTEM WATTS	VOLTS	MAX INPUT AMPS
20	LED	20 PLED ° Optical Module - 350mA	2,706 - 2,993	2,571 - 2,843	2,841 - 3,143	60,000+	-20°F	22	120 277 347	0.19 0.08 0.07
20	LED	20 PLED® Optical Module - 525mA	3,897 - 4,310	3,702 - 4,095	4,092 - 4,526	60,000+	-20°F	33	120 277 347	0.28 0.12 0.10
20	LED	20 PLED ° Optical Module - 700mA	4,942 - 5,466	4,695 - 5,193	5,189 - 5,739	60,000+	-20°F	44	120 277 347	0.37 0.16 0.13
20	LED	20 PLED ° Optical Module - 1050mA	6,564 - 7,260	6,236 - 6,897	6,892 - 7,623	60,000+	-20°F	65	120 277 347	0.55 0.24 0.19
40	LED	40 PLED Optical Module - 350mA	5,585 - 6,178	5,206 - 5,869	5,864 - 6,487	60,000+	-20°F	43	120 277 347	0.36 0.16 0.13
40	LED	40 PLED° Optical Module - 525mA	8,059 - 8,914	7,656 - 8,468	8,462 - 9,360	60,000+	-20°F	65	120 277 347	0.55 0.24 0.19
40	LED	40 PLED ® Optical Module - 700mA	10,240 - 11,327	9,728 - 10,761	10,752 - 11,893	60,000+	-20°F	87	120 277 347	0.73 0.32 0.26
40	LED	40 PLED® Optical Module - 1050mA	13,642 - 15,089	12,690 - 14,335	14,324 - 15,843	60,000+	-20°F	129	120 277 347	1.08 0.47 0.38
60	LED	60 PLED® Optical Module - 350mA	8,118 - 8,979	7,712 - 8,530	8,524 - 9,428	60,000+	-20°F	65	120 277 347	0.55 0.24 0.19
60	LED	60 PLED® Optical Module - 525mA	11,690 - 12,930	11,106 - 12,284	12,275 - 13,577	60,000+	-20°F	98	120 277 347	0.82 0.36 0.29
60	LED	60 PLED® Optical Module - 700mA	14,825 - 16,398	14,084 - 15,578	15,566 - 17,218	60,000+	-20°F	131	120 277 347	1.09 0.47 0.38
60	LED	60 PLED® Optical Module - 1050mA	19,691 - 21,780	18,706 - 20,691	20,676 - 22,869	60,000+	-20°F	193	120 277 347	1.61 0.70 0.56

NOTES:

- 1. Max Input Amps is the highest of starting, operating, or open circuit currents
- ${\bf 2}.$ Lumen values for LED Modules vary according to the distribution type
- ${\bf 3.}$ System Watts includes the source watts and all driver components.
- 4. Fuse value should be sufficient to protect all wiring components.
- 5. L70(10K) TM-21 6x rule applied

L70(10K) - Calculated = 244,000 @ 700mA = 102,000@ 1050mA

WARNING: All fixtures must be installed in accordance with local codes or the National Electrical Code. Failure to do so may result in serious personal injury.



SNTS 4"

FEATURES

Shaft

4" square, fabricated from high grade structural steel tube. Shaft conforms to ASTM-A-501-68 specifications. Meets or exceeds minimum yield strength of 46,000 P.S.I. wall thickness 11 GA. (.120 wall) or 7 GA. (.180 wall) as specified. Reinforced hand hole is furnished with cover. Shaft is furnished with ground lug located inside pole on wall opposite hand hole.

Base Plate

Fabricated from structural quality hot rolled steel. Meets or exceeds minimum yield strength of 36,000 P.S.I. base telescopes and is circumferentially welded to pole shaft. Slotted bolt holes provide 1" flexibility on either side of bolt circle centerline.

Anchorage

(4) anchor bolts fabricated from hot rolled steel bar. Minimum yield strength of 50,000 P.S.I. bolts have "L" bend on one end and are threaded on the other. Bolts are fully galvanized and are furnished with two nuts and two washers.

Base Cover

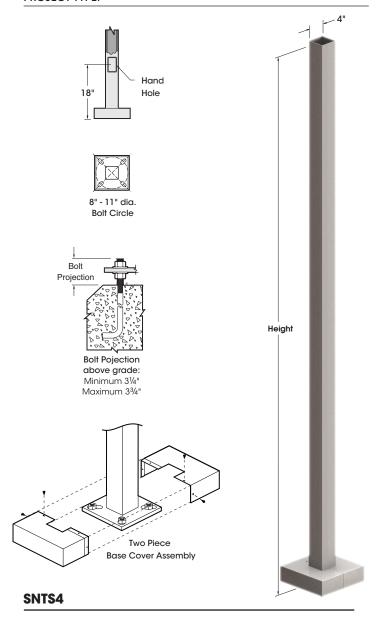
Fabricated from heavy gauge quality carbon steel. Two-piece cover conceals base.

Finish

Electrostatically applied TGIC Polyester Powder Coat on substrate prepared with 20 PSI power wash at 140°F. Four step media blast and iron phosphate pretreatment for protection and paint adhesion. 400°F bake for maximum hardness and durability.

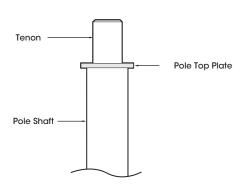
PROJECT NAME:

PROJECT TYPE:



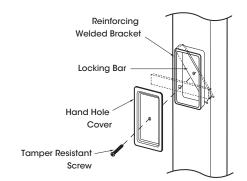
Pole Top Mount

PT23 - 23/8"X4" Tenon PT27 - 27/8"X4" Tenon



Hand Hole Cover

Reinforced hand hole w/tamper resistant bolt assembly



2020265





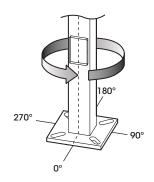
SPECIFICATIONS

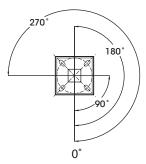
Engineering Data Maximum EPA - Square Feet

Model Number	Max. Fixture Weight	100 MPH	90 MPH	80 MPH	70 MPH
SNTS 104 - 11	400	16.7	20.5	26.1	33.4
SNTS 124 - 11	400	12.2	16.1	20.4	25.8
SNTS 144 - 11	400	9.9	12.8	16.1	20.2
SNTS 154 - 11	400	8.9	11.4	14.4	17.9
SNTS 164 - 11	400	7.9	10.1	12.8	15.9
SNTS 184 - 11	400	6.2	8.2	10.1	13.8
SNTS 204 - 11	400	4.8	6.2	7.9	11.6
SNTS 204 - 7	450	8.8	11.3	14.0	17.4
SNTS 254 - 11	350	1.6	3.2	5.5	8.8
SNTS 254 - 7	450	4.3	6.1	9.1	11.2

All above design calculations are based on sustained wind forces plus additional 1.3 wind gust (Example: Pole rated at 80 MPH withstands 104 MPH gusts)

Drilled Side MountSpecify drilling location using codes below.





ORDERING INFORMATION

Spec/Order Example: SNTS204-7/2-180/RAL-6005-S

	Pole Mod	lel Number - S	NTS 4"		Mounting	Finish	Options Options	
Ро	le Model	Number	- SNTS	4"	Mounting	Options		
	Pole Height	Wall Thickness	Bolt Circle	Anchorage	Arm Mount	Standard Smooth Finish	Receptacle	
☐ SNTS 104 - 11	10'	11	9"	3/4"X18"X3"	☐ PT23 2³/8" X 4" Tenon	☐ Black RAL-9005-S	Duplex Receptacle	
☐ SNTS 124 - 11	12'	11	9"	3/4"X18"X3"	□ PT27 2 ⁷ /ε" Χ 4" Tenon	☐ White RAL-9003-S	GFI Receptacle GFI	
☐ SNTS 144 - 11	14'	11	9"	3/4"X18"X3"	☐ Other Tenon Mt	☐ Grey RAL-7004-\$	3 Way Adapter	
☐ SNTS 154 - 11	15'	11	9"	¾"X18"X3"	Drill Mount	☐ Dark Bronze		
☐ SNTS 164 - 11	16'	11	9"	3/4"X18"X3"	□1	RAL-8019-S	Coupling	
☐ SNTS 184 - 11	18'	11	9"	3/4"X18"X3"	□ 2-180	Green RAL-6005-S	☐ ½" Coupling CPLN1/2	
☐ SNTS 204 - 11	20'	11	10"	3/4"X24"X3"	□ 2-90 🜪		34" Coupling CPLN3/4	
☐ SNTS 204 - 7	20'	7	11"	3/4"X30"X3"	□ 3-90		2" Coupling CPLN2	
☐ SNTS 254 - 11	25'	11	11"	3/4"X24"X3"	□ 4-90		Specify Coupling location	
☐ SNTS 254 - 7	25'	7	11"	³ / ₄ "X30"X3"	□ 3-120	All Steel Poles supplied with Smooth Finish		
					3-120 requires PT27 and T3120 Adapter	See USALTG.COM for additional colors	Refer to the Accessories Section for other options	
Specify other heigh	ts							



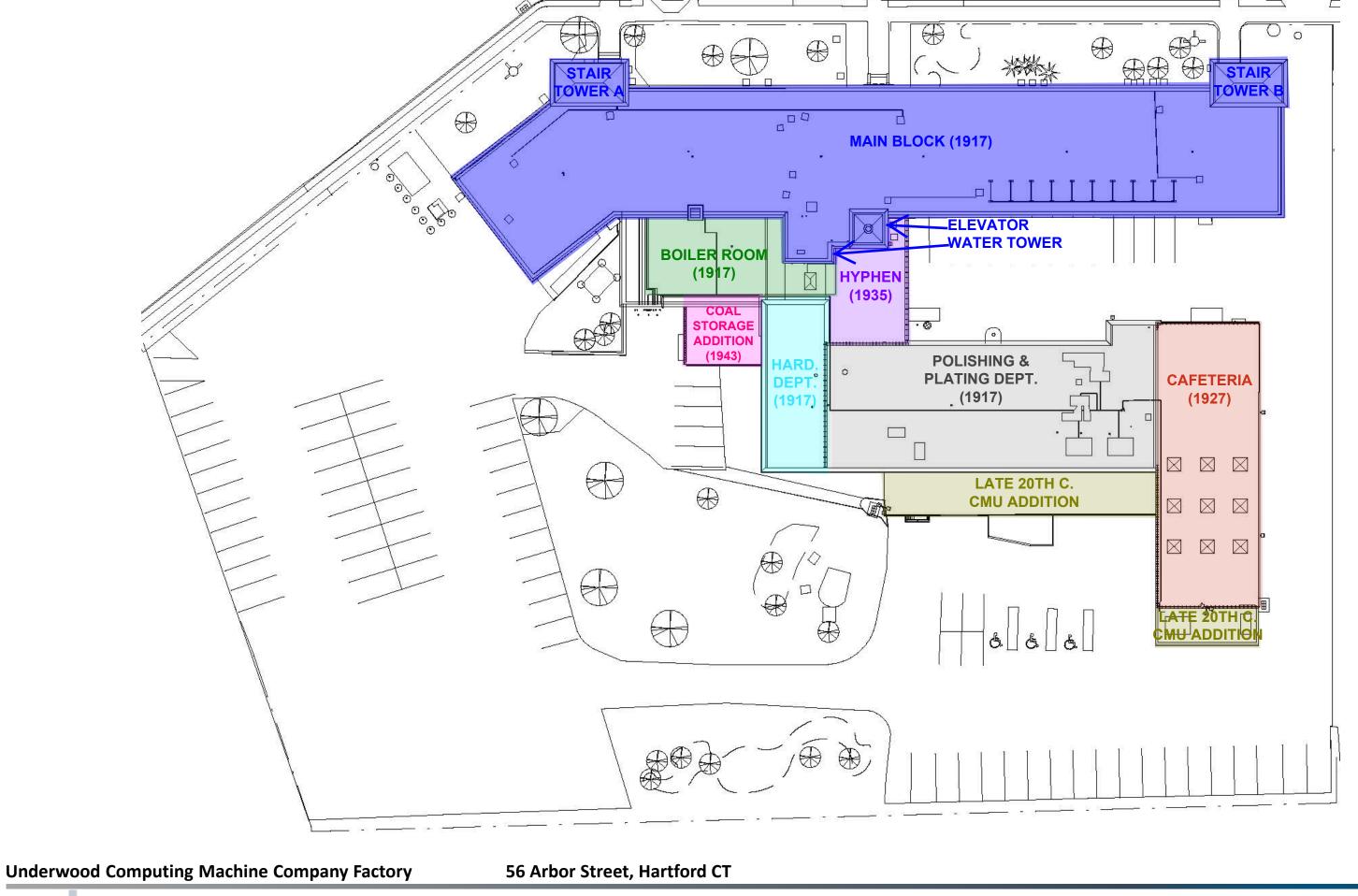
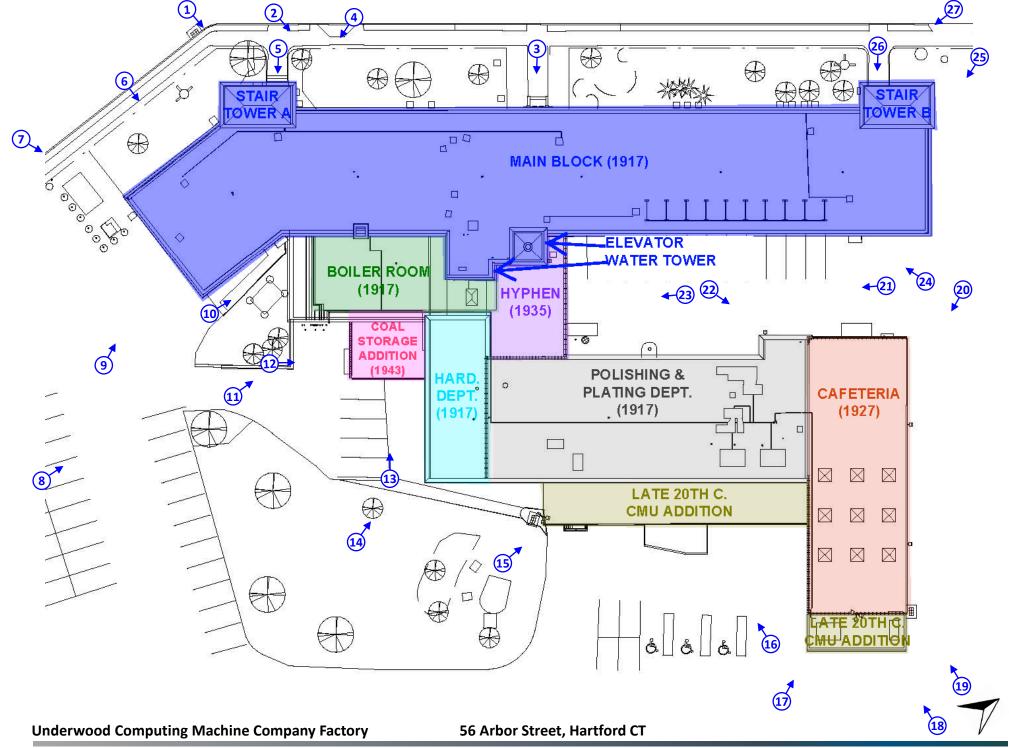




Figure 1: Annotated Site Plan







1. Main Block, west elevation



2. Main Block, west elevation



3. Main Block, primary entrance at center of façade



4. Main Block and Stair Tower A, west and north elevations



5. Main Block, Stair Tower A entrance



6. Main Block, west elevation



7. Main Block and Stair Tower A, west and south elevations



8. View northeast towards south and east complex elevations



9. Main Block, south and east elevations



11. Boiler Room and Coal Storage Addition, south and east elevations



10. Boiler Room, south elevation



12. Coal Storage Addition and Hardening Department, south elevations



13. Boiler Room and Coal Storage Addition, east and south elevations; Main Block and rear chimney visible in background



14. (L-R) Coal Storage Addition, Hardening Department, and Polishing & Plating Department, south and east elevations



15. CMU Addition at east elevation of Polishing and Plating Department



16. CMU Addition at east elevation of Polishing and Plating Department, Main Block in background

Underwood Computing Machine Company Factory



17. Cafeteria and CMU Addition, south and east elevations



19. Cafeteria and CMU Addition, east and north elevations



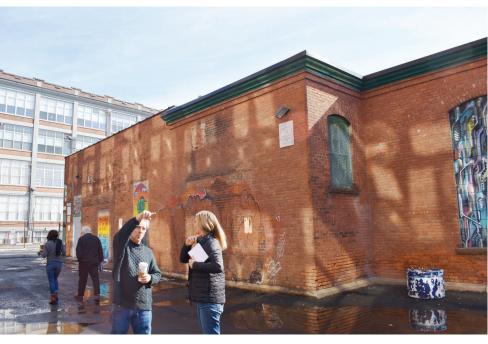
18. View southwest towards east elevations



20. Cafeteria, north and west elevations



21. (L-R) Cafeteria, Polishing & Plating Department, Hyphen and Main Block, west, north and east elevations



22. (L-R) Cafeteria and Polishing & Plating Department, west elevations



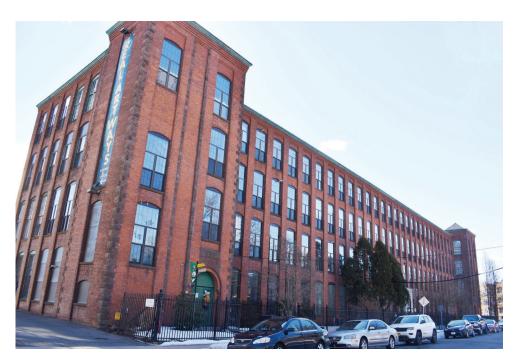
23. Hyphen, north elevation



24. Main Block, east elevation



25. Main Block and Stair Tower B, north elevations



27. Main Block, north and west elevations



26. Main Block, Stair Tower B entrance

SECTION 040120 - MAINTENANCE OF MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes maintenance, restoration, and cleaning of brick and stone masonry.
 - 1. Repairing unit masonry, including replacing units and custom masonry units.
 - 2. Re-anchoring veneers.
 - 3. Repointing joints.
 - 4. Selective replacement of trim units.
 - 5. Painting steel uncovered during the work.
 - 6. Removal of un-used anchors.
 - 7. Cleaning exposed masonry surfaces.
 - 8. Providing new openings and infilling existing openings in existing masonry.
 - 9. Heating of materials in cold weather.
 - 10. The scope of masonry work is identified on the Drawings. All the systems and processes identified in this specification section may or may not be required. The Contractor shall review the Drawings and Specification together and coordinate the scope of work required.

B. Related Requirements:

- 1. Division 01 Section "Historic Treatment Procedures".
- 2. Division 02 Section "Selective Demolition."
- 3. Division 04 Section "Unit Masonry."
- 4. Division 07 Section "Joint Sealants" for sealing joints in restored masonry.
- 5. Division 07 Section "Sheet Metal Flashing and Trim" for flashings.
- C. Products installed, but not furnished, under this Section include the following:
 - 1. Steel lintels for masonry, furnished under Division 05 Section "Metal Fabrications."

1.3 INTENT

A. Due to the various buildings and exposures over time, provide (4) separate mortar colors for mock-ups in (4) locations. Three color variations per mock-up shall be provided for SHPO approval at each location.

1.4 DEFINITIONS

- A. Very Low-Pressure Spray: Under 100 psi
- B. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.
- C. Medium-Pressure Spray: 400 to 800 psi; 4 to 6 gpm.

D. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of masonry units to freezing and thawing.

1.5 SCOPE OF WORK

A. The scope of masonry work is identified on the Drawings. All the systems and processes identified in this specification section may or may not be required. The masonry sub-contractor shall review the Drawings and specification together and coordinate the scope of work required.

1.6 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
 - 2. For cast-stone and stone trim units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: Before erecting the mock-up, of the following:
 - Each type of new exposed masonry material to be used for replacing existing materials.
 Include in each set of samples the full range of colors and textures to be expected in the completed Work. Provide straps or panels containing at least four masonry units.
 - 2. Each type and color of mortar for pointing and masonry repair in the form of sample strips, 6-inches long by 1/4-inch wide, set in aluminum or plastic channels.
 - a. Each set shall contain a close color range of at least three (3) samples of different mixes of colored sands and cements that product a mortar matching the cleaned masonry when cured and dry.
 - b. Submit with precise measurements on ingredients, proportions, gradations, and sources of colored sands from which each sample was made. Confirm availability of these ingredients.
 - 3. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of masonry representative of the range of masonry colors on the building.
 - a. Have each set contain a close color range of at least three samples of different mixes of patching compound that matches the variations in existing masonry when cured and dry.
 - 4. Each type of masonry cleaning.
 - 5. Sealant Materials: See Division 07 Section "Joint Sealants."
 - 6. Accessories: Each type of anchor, accessory, and miscellaneous support.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names, and addresses of architects and owners. Skilled and experienced masons specializing in the repair and re-pointing of existing historic masonry walls shall do all work.
- D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients. Include test reports, per ASTM C780, for mortar mixes required to comply with property specification.
- E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units,

mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

- F. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
 - 1. Cementitious materials. Include brand, type, and name of manufacturer.
 - 2. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.

1.7 INTENT

- A. Cleaning: Clean exterior masonry surfaces using the gentlest materials and techniques possible which produce an acceptable degree of cleaning. It is understood that some surfaces are not cleanable by gentle methods and, when approved by the Architect such surfaces will remain incompletely cleaned.
 - 1. Use the lowest concentration of cleaning solutions necessary to obtain acceptable clean masonry surfaces. Since the entire building is slated to be cleaned, and numerous surface contaminants are present, multiple cleaning methods and solutions will be required.
- B. Repairing Masonry and Re-Pointing: Where indicated on the Drawings, repair or replace damaged masonry and re-point mortar joints to match the color texture and tooling of acceptable original work. Re-pointing work is intended to fill holes and voids in masonry construction, to replace crumbly or deteriorated mortar with sound mortar, and to make the existing walls as weatherproof and watertight as possible.
- C. Repairing Masonry and Parging: Where indicated on the Drawings, remove loose parging and mortar back to sound mortar, repair or replace damaged masonry and re-point deep mortar joints to match the color texture and tooling of acceptable original work. Re-pointing work is intended to fill deep holes and voids in masonry construction, to replace crumbly or deteriorated mortar with sound mortar, and to make the existing walls as weatherproof and watertight as possible. Parge walls after mortar repairs are performed.
- D. Work under this section is to conform to the United States Secretary of the Interior's Standards for Rehabilitation, as administered by the National Park Service and as follows:
 - 1. The Connecticut State Historic Preservation Office (SHPO)
- E. Demolition work that impacts masonry assemblies, including but not necessarily limited to removal of metal anchorages and cutting of new masonry openings, shall be part of the scope of Work of this Section.
 - 1. Work shall be performed by the Masonry Sub-Contractor.

1.8 QUALITY ASSURANCE

- A. Qualifications: Engage an experienced mason to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance for a period of not less than ten (10) years.
 - 1. Field Supervision: Maintain experienced full-time supervisors on Project site during times that masonry restoration and cleaning work is in progress.
 - 2. Restoration Worker Qualifications: Persons who are experienced in restoration work of types they will be performing.

- B. Cleaning and Repair Appearance Standard: Cleaned and repaired surfaces are to have a uniform appearance as viewed from 10-feet away by Architect. Perform additional paint and stain removal, general cleaning, and spot repairing of small areas that are noticeably different, so that surface blends smoothly into surrounding areas.
- C. Mockups: Prepare mockup of restoration and cleaning to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.
 - 1. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48-inches in least dimension. Erect sample areas in existing walls unless otherwise indicated, to demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
 - a. Replacement: Four brick units replaced.
 - b. Patching: Three small holes at least 1-inch in diameter, for each type of masonry material indicated to be patched. Leave no evidence of repair.
 - c. Re-Anchoring Veneers: Install three masonry repair anchors in mockup wall assembly of each anchor type required.
 - 2. Re-Pointing: Prepare two separate sample areas, for each type of re-pointing required; one for demonstrating methods and quality of workmanship expected in removing mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints. Provide areas of approximately 24-inches square.
 - a. Obtain Architect's approval of mockups before starting the remainder of unit masonry restoration and cleaning.
 - b. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 3. Parging: Prepare two separate sample areas, for each type of re-pointing required; one for demonstrating methods and quality of workmanship expected in removing loose parge and mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints and parging. Provide areas of approximately 24-inches square.
 - a. Obtain Architect's approval of mockups before starting the remainder of unit masonry restoration and cleaning.
 - b. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 4. Cleaning: Prepare sample approximately 4-square feet for each type of masonry and surface condition.
 - a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not use cleaners and methods known to have a deleterious effect(s).
 - b. Allow a waiting period of not less than seven (7) calendar days after completion of sample cleaning to permit a study of sample panels for negative reactions.
 - 5. Locate mock-ups on the building where directed by the Architect. Samples should be located in inconspicuous areas.
 - 6. Notify Architect and OPM at least seven (7) calendar days in advance when mockups are ready for review.
 - 7. Approval of mockups for compliance with historical replication as detailed and indicated on the Drawings is required by the National Park Service and the State and Local Historic District Commission having jurisdiction.
 - a. Approval of mockups is also for other material and construction qualities specifically approved by the Architect,

- b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect and the State and Local Historic District Commission in writing.
- 8. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- 9. Maintain mockups during construction to serve as the standard for the Work.
- 10. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Source of Materials: Obtain materials for masonry restoration from a single source for each type of material required (brick, stone, lime, sand, etc.) to ensure a match of quality, color, pattern, and texture.
- E. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.
- F. Pre-Installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to masonry restoration, repair and cleaning including, but not limited to, the following:
 - a. Construction schedule. Verify availability of materials, Restoration Specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Materials, material application, sequencing, tolerances, and required clearances.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Store masonry units and cementitious materials on elevated platforms in a dry location. If masonry units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If masonry units or cementitious materials become wet, do not install until they are dry.
- B. Coordinate delivery of materials to avoid delaying the Work and to minimize the need for on-site storage.
- C. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
- D. Store sand where grading and other required characteristics can be maintained, and contamination avoided.
- E. Store masonry accessories to prevent corrosion and accumulation of dirt and oil.
- F. Comply with manufacturer's written instructions for minimum and maximum temperature requirements for storage.

1.10 FIELD CONDITIONS

A. Do not re-point mortar joints, excluding joints to be pointed with lime mortar, or repair masonry unless air temperature is between and 40 and 90 deg F and will remain so for at least seven (7) calendar days after completion of Work.

- 1. At no additional cost to the project, the Contractor may provide temporary heat and enclosure to perform the Work.
- B. Clean masonry surfaces only when air temperature is 40 deg F and above and will remain so for at least seven (7) calendar days after completion of cleaning.
- C. Protection of Masonry: During construction, cover projections and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
- D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil from masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.
- F. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Include heating of materials.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg Fand above and will remain so until masonry has dried, but not less than seven (7) calendar days after completing cleaning.
- G. Hot-Weather Requirements: Comply with hot-weather construction requirements in TMS 602/ACI 530.1/ASCE 6. Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

1.11 COORDINATION

A. Coordinate masonry restoration and cleaning with public circulation and egress at Project site.

1.12 SEQUENCING AND SCHEDULING

- A. Order materials as soon as possible to avoid delaying completion of the Work.
- B. Perform masonry restoration work in the following sequence:
 - 1. Remove plant growth, unused anchors, and miscellaneous items.
 - 2. Remove paint.
 - 3. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
 - 4. Perform preliminary cleaning at masonry surfaces.

- 5. Repair masonry including removal and replacement, infilling openings, removal and resetting, crack repair, and disassembly of masonry for new openings.
- 6. Rake out existing mortar and point masonry joints.
- 7. Repair existing masonry, including replacing existing unit with new.
- 8. Point existing mortar joints of masonry indicated to be restored and as otherwise noted.
- 9. Clean excess mortar from masonry surfaces.
- 10. Lightly clean all work, unless indicated on the Drawings.
- 11. After all work has been completed, complete a final rinse of masonry surfaces with low-pressure water only as the scaffold is being dismantled.
- C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units to comply with "Masonry Unit Patching" Article. Patch holes in mortar joints to comply with "Repointing Masonry" Article.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

- A. Brick: Where required, provide new face brick with the same physical properties, colors, surface texture, size, and shape to match existing brickwork.
 - 1. Provide building brick complying with ASTM C62, Grade SW where in contact with earth, Grade SW, MW, or NW for concealed backup; and of same vertical dimension as face brick, for masonry work concealed from view.
 - 2. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.
- B. Stone: Where required, provide natural building stone of variety, color, finish, size, and shape to match existing.
- C. Concrete Masonry Units: Where required, provide new units in compliance with the requirements of Division 04 Section "Unit Masonry."

2.2 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150, Type I or Type II, white or gray or both where required for color matching of exposed mortar.
 - 1. Provide cement shall not contain more than 0.60 percent total alkali when tested as per ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Mortar Sand: ASTM C144 unless otherwise indicated.
 - 1. Color: Provide natural sand necessary to produce required mortar color.
 - 2. For pointing mortar, provide sand with rounded edges.
 - 3. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary, to achieve suitable match.
- D. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.

- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. <u>Bayer Corporation, Industrial Chemicals Div.</u>; <u>Bayferrox Iron Oxide Pigments.</u>
 - b. <u>Davis Colors</u>; True Tone Mortar Colors.
 - c. Solomon Grind-Chem Services, Inc.; SGS Mortar Colors.
- E. Aggregate for Mortar: ASTM C144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 - 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 4. Colored Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- F. Aggregate for Grout: ASTM C404.
- G. Water: Potable.

2.3 CLEANING MATERIALS

- A. Water: Potable.
- B. Hot Water: Water heated to a temperature of 140 to 160 deg F.
- C. Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium polyphosphate, 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal of solution required.
- D. Mold, Mildew, and Algae Remover, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 5 quarts of 5 percent sodium hypochlorite (bleach), and 15 quarts of hot water for every 5 gal. of solution required.
- E. Non-Acidic Liquid Cleaner: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dominion Restoration Products, Inc.; Bio-Cleanse.
 - b. <u>Dumond Chemicals, Inc.; Safe n' Easy Architectural Cleaner/Restorer.</u>
 - c. <u>Price Research, Ltd.; Price Non-Acid Masonry Cleaner.</u>
 - d. PROSOCO; Enviro Klean 2010 All Surface Cleaner.
 - 2. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.
- F. Mild Acidic Cleaner: Manufacturer's standard mildly acidic cleaner containing no muriatic (hydrochloric), hydrofluoric, or sulfuric acid; or ammonium bifluoride or chlorine bleaches.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ABR Products, Inc.; X-190 Limestone & Concrete Cleaner.
 - b. <u>Diedrich Technologies Inc.; Envirorestore 100.</u>
 - c. <u>Dominion Restoration Products, Inc.; DR-60 Stone and Masonry Cleaner.</u>
 - d. PROSOCO; Enviro Klean BioWash.
 - e. <u>EaCO Chem, Inc. HD Britenol</u>

2. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.

2.4 ACCESSORY MATERIALS

- A. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ABR Products, Inc.; Rubber Mask.
 - b. <u>Price Research, Ltd.; Price Mask.</u>
 - c. PROSOCO; Sure Klean Strippable Masking.
- B. Sealant: Refer to Division 07 Section "Joint Sealants" for a sealant and backer rod.
- C. Setting Buttons and Shims: Resilient plastic buttons, non-staining to masonry, sized to suit joint thicknesses and bed depths of masonry units without intruding into required depths of pointing materials.
- D. Masonry Anchors and Pins: Fabricate from Type 304 stainless-steel rods. Provide threaded and unthreaded rods as required.
 - Masonry Repair Anchors, Expansion Type: Mechanical fasteners designed for masonry veneer stabilization consisting of 1/4-inch- diameter, Type 304 stainless-steel rod with brass expanding shells at each end and water-shedding washer in the middle. Expanding shells shall be designed to provide positive mechanical anchorage to veneer on one end and backup masonry on the other.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) BLOK-LOK Limited; Torq-Lok.
 - 2) <u>Dur-O-Wal, a Hohmann & Barnard company; Mechanical Anchor Series</u> DA5000 or DA5100.
 - 3) Hohmann & Barnard, Inc.; #521RA-B.
 - 2. Masonry Repair Anchors, Spiral Type: Driven-in, Type 304 stainless-steel spiral rods designed to be installed in drilled holes and relying on screw effect rather than adhesive to secure them to backup and veneer. Anchors are flexible in plane of veneer but rigid perpendicular to it.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) BLOK-LOK Limited; Spira-Lok.
 - 2) <u>Dur-O-Wal, a Hohmann & Barnard company; Dur-O-Flex Friction Pinning</u> Anchor DA508
 - 3) Heckmann Building Products, Inc.; #391 Remedial Wall Tie.
 - 4) Hohmann & Barnard, Inc.; Helix Spiro-Ties.
- E. Stone to Stone Adhesive: One-part cementitious stone adhesive recommended by adhesive manufacturer for type of stone repair indicated and matching stone color.
 - 1. <u>Basis of Design Product</u>: <u>Cathedral Stone Products, Inc.</u>; <u>MasonRE Adhesive</u>.
- F. Horizontal and Vertical Masonry Joint Covers: T-shaped and L-shaped soft lead flashing bed in sealant. Refer to the Drawings for locations.
 - 1. Basis of Design Product: "Type-A and Type-B "Weathercap Joint Protective System" by Weathercap, Inc. Slidell, LA.

- G. Paint Remover: Manufacturer's standard covered or skin-forming formulation for removing paint coatings from masonry.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ABR Products, Inc.; Grip 'N Strip 800 Fast Acting.
 - b. <u>Diedrich Technologies Inc.</u>; 606 Multi-Layer Paint Remover or 606X Extra Thick Multi-Layer Paint Remover with pull-off removal system.
 - c. Dumond Chemicals, Inc.; Peel Away 1 System.
 - d. <u>PROSOCO; Enviro Klean Safety Peel 1 or Enviro Klean Safety Peel 3 with Enviro Klean Overcoat.</u>
- H. Masking Tape: Non-staining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.
- I. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to MPI #23 surface-tolerant, anticorrosive metal primer.
 - 1. Surface Preparation: Use coating requiring no better than -SP 3, "Power Tool Cleaning" surface preparation according to manufacturer's literature or certified statement.

2.5 MORTAR, PARGE, AND GROUT MIXES

- A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
 - 1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not re-temper or use partially hardened material.
- B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
 - 1. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.
- C. Do not use admixtures unless otherwise indicated.
- D. Pointing Mortar for Brick and Stone: Mix mortar materials with 1-part Portland cement, 1.25-parts lime, and 5-parts sand. Add mortar pigments to produce mortar colors required.
- E. Parge Coat: Mix mortar materials with 1-part Portland cement, ½ part lime, and 3-parts sand.
- F. Rebuilding/Setting Mortar for Brick and Stone: Mix same as pointing mortar except mortar pigments are not required.

2.6 MASONRY PATCHING COMPOUNDS

- A. Masonry Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching masonry.
 - 1. Basis of Design Products:

- a. Brick: "Jahn M110 Historic Pointing Mortar" by Cathedral Stone Products, Inc.
- b. Granite: "Jahn M160 Granite Patching Mortar." by Cathedral Stone Products, Inc.
- 2. Use formulation that is vapor and water permeable (equal to or more than the masonry unit), exhibits low shrinkage, has lower modulus of elasticity than the masonry units being repaired, and develops high bond strength to all types of masonry.
- 3. Materials must have working qualities and retardation control to permit forming and sculpturing where necessary.
- 4. Formulate patching compound used for patching masonry in colors and textures to match each masonry unit being patched. Provide not less than three colors to enable matching the color, texture, and variation of each unit.

2.7 MATERIALS FOR EPOXY CRACK INJECTION

- A. Epoxy Crack Injection Adhesive:
 - 1. Hairline cracks up to 3/16" in width: Jahn M30 Micro Injection Adhesive.
 - a. Premixed cementitious injection grout that contains no corrosive constituents. The adhesive achieves extraordinary flow capacity, high penetration, and strong adhesion. Refer to product literature and technical data for material specifications. Use formulations of product suitable for varying substrates.
 - 2. Cracks approximately 3/16" to 3/8" in width: Jahn M40 Crack and Void Injection Grout.
 - a. Premixed cementitious injection grout that does not contain any acrylic, latex, or other synthetic polymer bonding agents or additives. The grout only needs to be mixed with clean water. The grout is vapor permeable, frost and salt resistant, shrink resistant, and is physically compatible with the substrate. Refer to product literature and technical data for material specifications.

2.8 MIXING FOR EPOXY CRACK INJECTION

A. It is recommended that safety goggles, gloves, and a dust mask be worn for protection. Do not mix more material than can be used within approximately 30 minutes. Discard any mixed material that has been unused for 30 minutes or more.

B. Jahn M30:

- 1. The mixing ratio is approximately 2 to 5 parts powder to 1 part water by volume.
- 2. Mix mechanically using a high-speed drill (3,000 RPM or higher) equipped with a Jiffler type-mixing paddle. After mixing, the mortar should be poured into another clean container using a sieve. Continued agitation is necessary if the mortar is allowed to sit prior to use.

C. Jahn M40:

- 1. The mixing ratio is approximately $2 2 \frac{1}{2}$ parts powder to 1 part water by volume.
- 2. Mix manually or mechanically, using a slow speed drill (400-600 RPM) equipped with a Jiffler type-mixing paddle. The material should be mixed for a minimum of three minutes, with continued agitation should the product be allowed to sit prior to use

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.
 - 1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.
- B. Comply with chemical-cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical-cleaning solutions from contacting people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
 - 1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
 - 2. Keep wall wet below area being cleaned to prevent streaking from runoff.
 - Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
 - 4. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
 - 5. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
- C. Prevent mortar from staining face of surrounding masonry and other surfaces.
 - 1. Cover sills, ledges, and projections to protect from mortar droppings.
 - 2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
 - 3. Immediately remove mortar in contact with exposed masonry and other surfaces.
 - 4. Clean mortar splatters from scaffolding at end of each day.
- D. Remove downspouts adjacent to masonry and store in a secure area during masonry restoration and cleaning. Reinstall when masonry restoration and cleaning are complete.
 - 1. Provide temporary rain drainage during work to direct water away from building.

3.2 PLANT, MOSS, AND ALGAE REMOVAL

- A. Completely remove all plant, moss, and algae growth from masonry surfaces. Work is part of basic scope of Contract and is exclusive of cleaning Work that may be provided per Alternates.
 - 1. Cut ground-rooted creeping vegetation at grade and allow to die off before removal from masonry surfaces. Apply root-killing solution to plant roots according to manufacturer's written instructions.
 - 2. Cut masonry-rooted vegetation below foliage and allow to die off before removal.
 - 3. Completely remove all vegetative growth from masonry surfaces, being careful to remove all tendrils and suckers.
 - 4. Clean all moss and algae from masonry surfaces. Use herbicidal solution per approved cleaning products if necessary.

3.3 MISCELLANEOUS ANCHOR REMOVAL

- A. Remove all obsolete metal anchors, fasteners and brackets, wood nailers, and other extraneous items anchoring piping, conduit, downspouts, lighting, and electrical devices, etc., that are indicated for removal on the Drawings. Remove non-structural masonry-embedded metal corner guards and door frames only where indicated on the Drawings.
 - 1. All removal Work shall be performed by Masonry Contractor.
 - 2. Remove items so as to avoid spalling or cracking masonry.
 - 3. If item cannot be removed without damaging masonry, cut item flush at masonry surface and core drill surrounding masonry as close around item as practical.
 - 4. Patch holes following procedures of this Section.

3.4 MISCELLANEOUS PAINT REMOVAL

A. Paint Removal:

- 1. Remove loose and peeling paint using low-pressure spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
- 2. Apply paint remover to dry, painted masonry with trowel, spatula, or as recommended by manufacturer.
- 3. Apply cover, if required by manufacturer, per manufacturer's written instructions.
- 4. Allow paint remover to remain on surface for period recommended by manufacturer or as determined in test panels.
- 5. Scrape off paint and remover and collect for disposal.
- 6. Rinse with water applied by low-pressure spray to remove chemicals and paint residue.
- 7. Apply acidic cleaner or manufacturer's recommended after wash to masonry, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or after wash remain on surface as a neutralizing agent for period recommended by chemical-cleaner or after wash manufacturer.
- 8. Rinse with cold water applied by low-pressure spray to remove chemicals and soil.

3.5 PRELIMINARY CLEANING

- A. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, calking, asphalt, and tar.
 - 1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.
 - 2. Remove paint and caulking with paint remover.
 - a. Comply with requirements in "Paint Removal" Article.
 - b. Repeat application up to two times if needed.
 - 3. Remove asphalt and tar with solvent-type paint remover.
 - a. Comply with requirements in "Paint Removal" Article.
 - b. Apply paint remover only to asphalt and tar by brush without pre-wetting.
 - c. Allow paint remover to remain on surface for 10 to 30 minutes.
 - d. Repeat application if needed.

3.6 REPOINTING BRICK AND STONE

- A. Rake out and re-point joints to the following extent:
 - All joints in areas indicated on Drawings.

- 2. Joints where mortar is missing or where they contain holes.
- 3. Cracked joints where cracks are 1/16-inch or more in width and of any depth.
- 4. Joints where they are deteriorated to point that mortar can be easily removed by hand, without tools.
- 5. Joints where they sound hollow when tapped by metal object.
- 6. Joints where they are worn back 1/4-inch or more from surface.
- 7. Joints that have spalled.
- 8. Joints where they have been filled with substances other than mortar.
- B. Rake out joints as follows, according to procedures demonstrated in approved mockup:
 - 1. Remove mortar from joints to depth of 2 times joint width, but not less than 1/2-inch or not less than that required to expose sound, un-weathered mortar.
 - 2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
 - 3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
 - a. Use power-operated grinders, preferably pneumatic, to cut out mortar bed joints. Where power-operated grinders will not provide satisfactory results, remove mortar from top and bottom of vertical joints and other joints by hand using a chisel and resilient mallet.
- C. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.
- D. Pointing with Mortar:
 - 1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
 - 2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8-inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
 - 3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
 - 4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Finish joint by brushing with stiff brush to texture joint to match existing joint surface texture. Remove excess mortar from edge of joint by brushing.
 - 5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
 - 6. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and re-point.
- E. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

3.7 BRICK REMOVAL, REPLACEMENT, AND INFILL

- A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully remove by hand entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
- B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
- C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.
- D. Remove and salvage in an undamaged condition as many whole bricks as possible.
 - Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 - 2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
 - 3. Stack and store salvaged brick for reuse.
- E. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.
- F. Replace removed damaged brick with other removed brick in good condition where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to a usable size, without visible damage.
- G. Install new or salvaged brick to replace removed brick. Fit units into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
 - 1. Maintain joint width for replacement units to match existing joints.
 - 2. Use setting buttons or shims to set units accurately spaced with uniform joints.
 - 3. At exterior openings cut by power saws remove cut bricks and tooth-in new bricks.
 - 4. All brick faces exposed to weather must be outside faces of whole bricks.
 - 5. Cut brick faces exposed to weather are not acceptable.
- H. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding clay bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g per 30 sq. inch minimum. Use wetting methods which ensure units are nearly saturated, but surface is dry when units are laid.
 - 1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork. Finish joint by brushing with stiff brush to texture joint to match existing joint surface texture.
 - 2. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for re-pointing existing masonry, and at same time as re-pointing of surrounding area.
 - 3. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

3.8 BACKUP MASONRY REMOVAL AND REPLACEMENT

A. Where backup masonry is fractured or unstable and at locations indicated, remove mortar and masonry units that are broken or deteriorated and rebuild with whole, new brick or whole

salvaged units. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

- B. Support and protect remaining masonry that surrounds removal area.
- C. Maintain flashing, reinforcement, anchors, lintels, and adjoining construction in an undamaged condition.
- D. Notify Architect of unforeseen detrimental conditions, including voids, cracks, bulges, loose units beyond the removal area, rotted wood, rusted metal, and other deteriorated items.
- E. Remove in an undamaged condition as many whole bricks as possible.
 - 1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 - 2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
 - 3. Store brick for reuse. Store off ground, on skids, and protected from weather.
 - 4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.
- F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.
- G. Replace removed damaged brick with salvaged backup brick in good condition, where possible, or with new building brick matching existing backup brick. Do not use broken units unless they can be cut to usable size.
- H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
- I. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated, but surface is dry when laid.
- J. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
 - 1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.9 REANCHORING VENEERS

- A. Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions. Space anchors not more than 12-inches on center vertically and 8-inches on center horizontally apart unless otherwise indicated. Install at locations to avoid penetrating flashing.
- B. Recess anchors 5/8-inch or more from surface of mortar joint, and fill recess with pointing mortar.

3.10 PAINTING STEEL UNCOVERED DURING THE WORK

- A. Notify Architect if steel is exposed during masonry removal. Where Architect determines that steel is structural, or for other reasons cannot be totally removed, prepare, and paint it as follows:
 - 1. Surface Preparation: Remove paint, rust, and other contaminants according to -SP 3, "Power Tool Cleaning" as applicable to comply with paint manufacturer's recommended preparation.
 - 2. Antirust Coating: Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).
- B. If on inspection and rust removal, the thickness of a steel member is found to be reduced from rust by more than 1/16 inch notify Architect before proceeding.

3.11 MASONRY UNIT PATCHING

A. Patching Bricks:

- 1. Remove loose material from masonry surface. Carefully remove additional material so patch will not have feathered edges but will have square or slightly undercut edges on area to be patched and will be at least 1/4 inch thick, but not less than recommended by patching compound manufacturer.
- 2. Mask adjacent mortar joint or rake out for repointing if patch will extend to edge of masonry unit.
- 3. Mix patching compound in individual batches to match each unit being patched.
- 4. Rinse surface to be patched and leave damp, but without standing water.
- 5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
- 6. Place patching compound in layers as recommended by patching compound manufacturer, but not less than 1/4 inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.
- 7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the masonry unit. Shape and finish surface before or after curing, as determined by testing, to best match existing masonry unit.
- 8. Keep each layer damp for 72 hours or until patching compound has set.

3.12 MASONRY INSTALLATION, GENERAL

- A. Thickness: Build walls and other masonry construction to full thickness shown.
- B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, un-chipped edges. Allow units to dry before laying, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- D. Matching Existing Masonry: Match type, coursing, bonding, color, and texture. Verify in field, and then submit samples and constructing mock-ups for Architect's review and approval.
- E. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

- 1. For conspicuous vertical lines such as external corners, door jambs, reveals, and expansion/control joints; do not vary from plumb by more than an 1/8-inch in 10 feet and 1/4-inch in 20 feet, but no more than a 1/2-inchmaximum.
- 2. For vertical alignment of exposed head joints, do not vary from plumb by more than a 1/4-inch in 10 feet, or 1/2-inchmaximum.
- 3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than an 1/8-inch in 10 feet, 1/4-inch in 20 feet, or 1/2-inch maximum.
- 4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus an 1/8-inch, with a maximum thickness limited to 1/2-inch. Do not vary from bed-joint thickness of adjacent courses by more than an 1/8-inch.
- 5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8-inch. Do not vary from adjacent bed and head-joint thicknesses by more than 1/8-inch.
- 6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16-inch except due to warpage of masonry within specified tolerances for units.
- 7. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16-inch from one masonry unit to the next.

3.13 MORTAR BEDDING AND JOINTING

- A. Lay masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.14 PATCHING AND REPAIRING HOLES IN BRICK

A. For holes with a diameter of 2-inches or less, pack hole full depth with mortar. For holes with a diameter of larger than 2-inches, remove cut brick and replace with salvaged brick or new brick matching the existing.

3.15 DISASSEMBLY OF MASONRY

- A. Carefully remove by hand masonry indicated on drawings to be removed. Remove units from joint to joint and in a manner to permit removal without damaging surrounding brick or other materials.
- B. Support and protect construction that surrounds removal area.
- C. Salvage as many whole, undamaged brick units as possible.
- D. Remove mortar from salvaged units and store for reuse.

3.16 STONE CRACK REPAIR

- A. Design Intent. The objectives of the Work of this Article include:
 - 1. Repair of existing cracks using non-structural repairs using composite patch material.

- B. Crack repair with composite patch material.
 - 1. Cut out crack using a rotary tool for the full length and expanse of the crack. Crack shall be cut out to a depth back to sound stone not less than 1/2-inch deep.
 - 2. Install composite patch material per manufacturer's instructions in the cut-out area. Color of material shall match the host stone.
 - 3. Clean cementitious crack filler from face of stone before it sets by scrubbing with water. Tool surface of material to match the host stone.

3.17 PARGING

- A. Parge interior faces of masonry walls, where indicated, in one uniform coats to a total thickness of 1/4" inch. Dampen wall before applying first coat.
- B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8-inch per foot.
- C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.18 CLEANING MASONRY

- A. Proceed with cleaning in an orderly manner; work from bottom to top of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water will not wash over cleaned, dry surfaces.
- B. Use only those cleaning methods indicated for each masonry material and location.
- C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.
- D. It may be necessary to employ different cleaning methods and products to clean the various materials and surfaces. Begin by cleaning with water, the gentlest means available. When water washing does not achieve the desired result, proceed with more aggressive methods as listed (in increasingly aggressive methods) below:
 - 1. Method #1A Cold-Water Wash: Clean masonry with cold, low-pressure water.
 - 2. <u>Method #1B Hot Pressurized Water Wash</u>: Clean stone masonry with hot water low-pressure spray hot water, followed by brushing.
 - 3. <u>Method #2 Detergent Cleaning</u>: Clean masonry with a detergent solution applied as follows:
 - a. Wet masonry with cold water applied by low-pressure spray.
 - b. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used, and that masonry surface remains wet.
 - c. Rinse with cold water to remove detergent solution and soil.
 - d. Apply rinse by medium-pressure spray.
 - e. Repeat cleaning procedure above where required to produce the cleaning effect established by mockup.
 - 4. Method #3 Chemical Cleaning: If above options to not achieve acceptable results, as determined by the Architect, proceed with chemical cleaning of masonry surfaces. Use only the gentlest means necessary to achieve acceptable results as determined by the Architect. Clean brick masonry with nonacidic liquid cleaners applied as follows:

- a. Wet masonry with water applied by low-pressure spray.
- b. Apply cleaner to masonry in two applications by brush or low-pressure spray. Let cleaner remain on surface for period as recommended by chemical-cleaner manufacturer and as stablished by mockup.
- c. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.
- d. Rinse with water applied by low-pressure spray to remove chemicals and soil.
- e. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once.
- E. Final Cleaning: After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter, use wood scrapers, stiff-nylon or fiber brushes, and clean water, spray applied at low pressure.
 - 1. Do not use metal scrapers or brushes.
 - 2. Do not use acidic or alkaline cleaners.
 - 3. Wash adjacent woodwork and other non-masonry surfaces. Use detergent and soft brushes or cloths.
 - 4. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
 - 5. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

3.19 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste and other masonry materials, and legally dispose of off Owner's property.

END OF SECTION 040120

Site Summary

The Underwood Computing Machine Company Factory property is comprised of seven fully integrated masonry buildings constructed between 1917 and 1927 to accommodate the manufacture of early calculators and billing machines. After the stock market crash in 1929, production moved a half mile northeast to the Underwood Typewriter factory at 581 Capitol Avenue (demolished 1970), and the Machine Company property was eventually converted to a research, development, engineering, and patent facility in 1936 for Underwood-Elliot Fisher.

Located in Hartford's Parkville neighborhood, the Main Block was constructed in 1917 by architect Frank H. Oldershaw with its primary (west) elevation facing Arbor Street. The Boiler Room, Hardening Department, and Polishing & Plating Department buildings, also constructed in 1917, project from the Main Block's rear (east) elevation. The company Cafeteria, erected in 1927 by the Tidewater Building Company, extends eastward from the Polishing & Plating Department's north elevation. The Hyphen, constructed in 1935 by Lockwood Green Engineers, was designed to facilitate access between the Main Block and former Polishing and Plating building. Finally, the Coal Storage Addition was completed in 1943 by Standard Structural Steel, and the two concrete masonry unit (CMU) Additions completed during the last quarter of the 20th century.

The buildings are grouped and described below according to their dates of construction (DOC). Figure 1 provides an annotated site plan with building names and DOC, and the colored font below corresponds to the colors on the annotated plan.

Project Summary

The rehabilitation of the former Underwood Computing Machine Company Factory will be undertaken in two phases. The majority of work comprising *Phase I* will be focused on the Real Art Ways (RAW) space within the former Hardening Department, Polishing & Plating Department, Cafeteria, and CMU Additions, and will include:

- Interior rehabilitation of the existing RAW space
- New or upgraded mechanical, electrical, plumbing, and fire protection systems within the Real Art Ways space
- Construction of the proposed Addition
- New roofs throughout & restoration of the existing rooftop signage
- Elevator code upgrades
- Sitework

Phase II will focus on the exterior envelope and interior rehabilitation of the Main Block, including:

- Exterior masonry cleaning, repairs, and repointing
- Partial window replacement
- Restoration of original exterior entrances
- Modification of original stair railings to comply with the Connecticut and International Building Code Regulations
- New hardwood floor in the Main Block lobby

- New accessible lavatories on each floor of the Main Block
- New RAW office and Learning and Engagement spaces on first floor of the Main Block
- New or updated mechanical, electrical, plumbing, and fire protection systems within the Main Block

Number 1

Architectural Feature: Exterior Masonry

Approximate Date of Feature: 1917, 1927, 1935, 1943, Late 20th C.

Describe Existing Feature and its Condition:

The Main Block is a west-facing, four-story, 39-bay-by-six-bay, red brick building with Italianate influences. Its six southernmost bays cant slightly southward, creating an inverted "J" footprint that follows the curve along Arbor Street.

The building rests on a concrete foundation clad with roughly hewn brownstone. Regularly-spaced window openings feature brownstone sills and segmental arch lintels; the fourth floor windows are capped by five rows of corbelled brick. A metal cornice, painted to appear as having a patina finish, defines the roofline along each elevation. Various window openings throughout contain red brick infill. Stair towers projecting from the southwest (identified as Stair Tower A on the annotated site plan) and northwest (Stair Tower B) corners are framed by brownstone quoins, and feature two vertical rows of brownstone block extending from the foundation to the roofline. Rounded arch entryways access each tower from the façade. Above each entryway are inset beveled brownstone blocks with raised numbering identifying the date of construction, "1917".

The main entrance, centered on the façade, was likely added when the property was converted to a research and development facility in 1936. The formed concrete surround, extending from the building's foundation to the second floor windowsills, is comprised of a series of linear setbacks that create a stepped outline. Massive, modern raised lettering identifying the building's address, "56", are positioned above the transom.

The side (north and south) and rear (east) elevations are similar in configuration and detailing to the façade. An off-center water tower and elevator shaft project above the roofline, adjacent to an exterior brick chimney.

The Boiler Room is connected to the Main Block's east elevation, the Hyphen's south elevation, and the Coal Storage Addition and Hardening Department's west elevations. The single-story building has red brick walls with a corbelled brick and copper cornice similar to the Main Block. Two wide window openings with brownstone sills and segmental arch lintels pierce the south elevation, and one large entrance occupies the east elevation. Various gas meters and pipes are mounted to the exterior masonry. The Coal Storage Addition is also a single-story red brick structure. A punched garage door opening at the south elevation accesses the interior; the building contains no window openings. A parapet above the south wall is capped with terracotta coping.

The single-story Hardening Department is connected to the Boiler Room at its west elevation, to the Hyphen and Polishing & Plating Department at its north elevation, and to the Coal Storage Addition at its south elevation. The building measures eight-bays-by-three-bays with red brick walls that rest on a concrete foundation and rise to a corbelled brick and copper cornice. Segmental arched window openings have brownstone sills; various openings contain concrete infill.

The single-story Polishing & Plating Department is connected to the Hardening Department at its south elevation, to the Hyphen at its west elevation, and the Cafeteria at its north elevation. A fire

wall with terra cotta coping projects above the roofline between the Polishing and Hardening buildings. Window openings are identical to those in the Main Block and Hardening Department with segmental arches and brownstone sills. At the rear elevation, windows are infilled with painted concrete. A CMU Addition extends from the east elevation. Measuring seven-bays-by-one-bay, the structure has various square and rectangular window openings and one entrance centered on the façade (east elevation). Signage identifying the current occupant and project applicant, REAL ART WAYS, is painted across the north half of the façade.

The single-story Cafeteria connects to the Polishing & Plating Department and CMU Addition at its south elevation. The building measures seven-bays-by-three-bays with red brick walls and large, rectangular window openings containing painted infill. A brick parapet with terra cotta coping projects above the roofline along the east, west and south elevations. A single-story, one-bay-by-three-bay CMU Addition extends from the Cafeteria's east elevation.

The single-story, red brick Hyphen connects to the Main Block at its west elevation, the Boiler Room and Hardening Department at its south elevation, and the Polishing & Plating Department at its east elevation. One modern entrance and a series of square window openings are punched along the north elevation.

The exteriors remain in fair to good condition with visible soiling and staining of the brick and brownstone elements. Some efflorescence is visible at grade.

Photo No. 1–27

Drawing No. Existing Conditions: AX30, AX31, AX32, AX33

Proposed Plans: A30, A31, A32, A33

Renderings Real Art Ways Proposed Birdseye Perspective &

Real Art Ways Night Concert

Specifications Maintenance of Masonry **Figure 1** Annotated Site Plan

Describe Work and Impact on Existing Feature:

Phase I

Addition

The Polishing & Plating Department's late 20th century CMU Addition will be removed and a rectangular, single-story, lobby, café, theater, and live arts addition constructed. Exterior walls will be clad with a metal panel system and windows will be insulated aluminum sash with latticed aluminum overhangs for sun shading. The corridor proposed between the new construction and Polishing & Plating Department, highlighted in pink on Sheet A21C (Proposed First Floor Plan), will serve as a visual separation between the two buildings. Primary access to this space will be provided by two pairs of aluminum storefront systems positioned between the Addition and Polishing & Plating Department. The projecting canopy capping the entrance will include signage identifying the new "Real Art Ways" space. The roof will be flat TPO. Interior finishes are described below under Number 5: Circulation and Number 6: Interior.

Phase II

All existing brick, brownstone, and concrete will be rehabilitated in accordance with the *Secretary of the Interior's Standards for Rehabilitation and Preservation Briefs 1 and 2*. Areas of mortar deterioration will be repointed with a mortar mix consistent with the original. In limited areas where masonry is too damaged for repair or bricks are cracked or missing, new brick will be replaced inkind or repaired to match the original in size, color, and texture. Masonry cleaning will be undertaken in areas of repair and repointing; Black Beauty or any other harsh abrasive will not be used to clean the masonry. Any proposed surface cleaning shall be conducted using the gentlest means possible. Specifications for masonry cleaning, repair, and replacement are provided with this submittal.

Metal elements will be gently cleaned with a nonacidic liquid chemical cleaner and will be repainted to match the existing patina finish.

The modern raised lettering identifying the building's address, "56", above the main entrance will be removed and the stone repaired.

Number 2

Architectural Feature: Windows

Approximate Date of Feature: 1917, 1927, 1935, 1943, Late 20th C.

Description of Existing Feature and its Condition:

Most of the Main Block windows consist of aluminum replacement sash. Those along the west elevation are comprised of pairs of hung, six-over-six units positioned beneath 12-light fixed sash. The north, south, and east elevation windows are simpler, and typically feature pairs of one-over-one windows beneath a glazed transom.

A limited assortment of historic wood sash remains throughout, including eight-over-eight, 10-over-10, and 20-over-20 hung units. A pair of nine-over-nine wood windows in rectangular openings flank the main entrance at the façade/west elevation. Along the second floor of the east elevation, many units were partially replaced; the lower halves contain sliding aluminum inserts positioned beneath the original 20-light wood sash. The historic wood was covered with metal panels, likely in an attempt to reduce exposure to the elements and continued deterioration.

Various openings contain brick or plywood infill, and most of the first-floor units along the west elevation have metal security grilles riveted to the exterior masonry.

The wood windows are in fair condition and suffer from deference maintenance with flaking and peeling paint and broken panes, which has likely caused water intrusion and rot. Replacement windows are in good and operable condition.

The Boiler Room has two window openings on its south elevation that each contain three sets of sixover-six hung wood sash separated by simple flat mullions. The only window opening on the east elevation contains CMU and brick infill. There are no windows in the Coal Storage Addition.

The Hardening Department has a pair of replacement aluminum sash that match the configuration of the replacement units in the Main Block's east elevation. The remaining openings contain CMU infill.

The Polishing & Plating Department retains three historic 25-over-15 wood sash at its east elevation. The remaining window openings contain concrete and brick infill. The CMU Addition contains punched aluminum windows in various configurations.

All of the Cafeteria window openings contain concrete or brick infill. The CMU Addition contains four-light windows in the south and east elevations covered by steel security grates.

The Hyphen has six punched one-over-one aluminum windows on its north elevation.

Photo No. 1–28, 30, 33, 35, 41-43, 48-50, 52, 54, 78, 82, 84, 87-89, 96

Existing Wood Window Photographs 1-9

Drawing No. Existing Conditions: AX30, AX31, AX32, AX33, AX50

Proposed Plans: A30, A31, A32, A33, A50

DBVW Window Survey

Description of Proposed Work and Impact on Existing Feature:

Phase I

Three modern replacement windows in the <u>Hardening Department</u> will be removed and the openings infilled with CMU to accommodate the proposed theaters (see Sheet A31, Detail 3).

Phase II

Most of the Main Block aluminum replacement windows will be retained and repaired, as needed.

Masonry-infilled openings will be retained.

Security grilles will be removed and will not be replaced.

The pair of nine-over-nine wood sash flanking the main entrance will be restored.

All remaining wood sash and frames in the Main Block and Polishing & Plating Department, as well as the partially-replaced sash at the Main Block's east elevation, will be completely removed and replaced with new Low-E, double-glazed, fixed over awning aluminum windows with spacer bars, exterior applied muntins and interior screens within the existing window openings. Extant original windows will be used to replicate the size, configuration, and profiles of the original windows as closely as possible. Custom aluminum brick molds will be fabricated to closely approximate the existing. Windows and brick molds will be green to match the historic color.

The change in window operability from double-hung to awning is due to the overall size of the windows. The following summary was provided by the project's window vendor, Winnco:

"The biggest issue with either the single- or double-hung options is the overall size of the existing windows. If the windows were to be made as either a single or double hung window, they would be larger than the AAMA test size $(60" \times 99")$ and would most likely not come with a warranty. If we say in general the existing window openings are approximately $60" \times 120"$, the weight of the window sashes would be approximately 150 lbs. each. This is more than the balancers can reasonably handle. Also, the meeting rails will not meet the wind load or dead load requirements at this size. This is the main reason we opted to go with the hung replica option."

The Boiler Room windows will be fully removed and replaced with new Low-E, double-glazed, energy efficient six-over-six aluminum sash with spacer bars, exterior applied muntins and interior screens within the existing window openings. Extant original windows will be used to replicate the size, configuration, and profiles of the original windows as closely as possible. Custom aluminum brick molds will be fabricated to closely approximate the existing. Windows and brick molds will be green to match the historic color. The modern Coal Storage overhead door will be repaired and painted (see photos 11 & 12 for reference).

The Polishing & Plating Department's infilled openings will be retained. The CMU Addition windows will be removed to accommodate the proposed Addition.

Underwood Computing Machine Company Factory, 56 Arbor Street, Hartford, CT
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The Cafeteria's infilled openings will be retained. The CMU Addition windows will be retained, repaired as needed, and painted.

The punched Hyphen one-over-one aluminum sash will be retained and repaired as needed.

Number 3

Architectural Feature: Exterior Entrances

Approximate Date of Feature: 1917, 1927, 1935, 1943, Late 20th C.

Description of Existing Feature and its Condition:

The Underwood Computing Machine Company complex has a total of 15 exterior entrances; seven of these doors access the Main Block. Stair towers A and B have pairs of original, half-light, raised panel doors within round arch masonry openings. The north leaf of each pair and both transoms are covered/infilled with plywood. Access is provided by concrete walkways and brownstone or granite stairs.

At the center of the façade is the main entrance. Accessed by a concrete walkway and stair with flanking knee walls, the entrance is comprised of an aluminum storefront system with glazed a transom and sidelights.

Additional flush metal doors or aluminum storefront systems are located on the south and east elevations. Two at the east elevation are capped by canvas canopies anchored to the exterior masonry by steel rods.

A pair of paneled doors accesses the Boiler Room on its east elevation, and a modern rolling overhead garage door accesses the Coal Storage Addition on its south elevation.

The Hardening Department and Polishing & Plating Department have no exterior entrances.

The Polishing & Plating Department's CMU Addition has two entrances at its east elevation. The main entrance to the RAW space is comprised of steel doors and a glazed transom accessed by a former concrete loading dock. The entrance is capped by a standing seam shed roof supported by square metal posts. The secondary entrance at the south end of the elevation is a flush metal door and concrete stair surrounded by a modern metal enclosure.

The Cafeteria has three punched exterior entrances located at its east, north, and west elevations. All are modern flush fire rated metal doors; the pair at the east elevation has vision panels.

The Hyphen is accessed on the north elevation by an aluminum storefront system. A modern canvas canopy is fastened to the exterior masonry.

Photo No. 1-5, 11-13, 15-21, 23, 24, 26-28, 37, 46, 48, 59

Drawing No. Existing Conditions: AX30, AX31, AX32, AX33, AX52

<u>Proposed Plans</u>: A30, A31, A32, A33, A52

Product Specification Mapes Super Lumideck Flat Soffit Canopy

Description of Proposed Work and Impact on Existing Feature:

Phase I

No work is proposed in Phase I.

Underwood Computing Machine Company Factory, 56 Arbor Street, Hartford, CT
City of Hartford Historic Preservation Commission
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Phase II

Most of the existing exterior entrances will be retained and repaired as needed.

The Main Block's historic stair tower doors will be restored, per details provided on Sheets AX52 and A52. The existing plywood will be removed, and the north leaves and transoms fit with new glass. Original/deteriorated hardware will be replaced with code-compliant handles and locks.

The fabric canopies capping the secondary entrances at the Main Block and Hyphen will be replaced with new aluminum canopies that are more compatible with the industrial character of the complex. Please see the Mapes Super Lumideck Flat Soffit Canopy product specification for additional information.

As noted above, the Polishing & Plating Department's CMU Addition will be removed. The proposed **Addition** will have four fully glazed aluminum storefront systems at the east and south elevations.

Number 4

Architectural Feature: Roofs

Approximate Date of Feature: 1917, 1927, 1935, 1943, Late 20th C.

Description of Existing Feature and its Condition:

The Main Block has a tar and gravel roof pierced by various vents and mechanical equipment surrounded by a masonry parapet. The stair towers and rear water tower have hipped roofs clad in asphalt shingles. A copper vent hood caps the water tower. Signage is mounted to the roof's northeast corner.

The Boiler Room has a tar and gravel roof, and the Coal Storage Addition has a flat membrane with modern aluminum gutters and downspouts.

The Hardening Department has flat tar and gravel roof and masonry parapet.

The Polishing & Plating Department has a flat membrane roof and masonry parapet, with condensing units mounted at its north and south ends. The CMU Addition has a flat membrane roof.

The Cafeteria has a flat membrane flat pierced by nine pyramidal skylights. The Addition has a flat membrane roof with mechanical units. A metal safety guardrail is mounted to the CMU north, south, and east masonry walls around the roof.

The Hyphen has a flat membrane roof pierced by a single skylight and masonry parapet walls. The roof and skylight remain in poor condition, due to continual water incursion and ponding around the opening.

Photo No. N/A

Drawing No. Existing Conditions: AX25A, AX25B, AX25C

Proposed Plans: A25A, A25B, A25C

Description of Proposed Work and Impact on Existing Feature:

Phase I

All existing roofs will be removed. New roofs will have rigid insulation above the decking and new TPO systems installed. The stair tower asphalt shingles will be replaced with new architectural asphalt shingles. New mechanical equipment will replace the existing in most locations.

The signage mounted to the Main Block's northeast corner will be retained and restored.

An equipment screen will be integrated into the existing guardrail system on the CMU Addition.

The Hyphen skylight will be infilled to ensure the existing electrical equipment in this space remains weatherproof and intact.

New mechanical equipment is proposed on the **Addition** roof.

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City of Hartford Historic Preservation Commission
Historic Review Application

Phase II

Mechanical equipment updates/upgrades will include new units on the roof in the same locations as the existing units.

Number 5

Architectural Feature: Mechanical, Plumbing, and Electrical Systems

Approximate Date of Feature: Late 1980s-Present

Describe Existing Feature and its Condition:

The mechanical and life safety systems have been altered over the years and are outdated, including boilers, hot water heaters, the heating distribution system, and fire alarm systems.

Photo No. N/A
Drawing No. N/A

Describe Work and Impact on Existing Feature:

Phase I

New mechanical, plumbing and electrical systems will be installed in the updated RAW program space. All new systems will comply with current building code requirements and will be sized appropriately. Existing rooftop mechanicals will be replaced in-kind approximately in their existing locations.

Phase II

New or updated mechanical, plumbing, electrical and fire protection systems will be installed in the Main Block. All new or updated systems will comply with current building code requirements and will be sized appropriately. Existing rooftop mechanicals will be replaced in-kind approximately in their existing locations and new equipment added.

Number 6

Architectural Feature: Site **Approximate Date of Feature**: N/A

Description of Existing Feature and its Condition:

The building is located on a 2.93-acre lot bound by 16–30 Arbor Street on the north, Arbor and Orange streets on the west, 22 Orange Street and associated garages on the south, and the Connecticut Fastrak Busway on the east. A cast-iron picket fence follows the parcel line along Orange and Arbor streets, enclosing the site frontage along the façade/west elevation.

Paved pedestrian paths access each of the three exterior entrances on the front elevation.

A landscaped area surrounds the Boiler Room, Coal Storage, and Hardening Department at the southwest corner of the site. The remainder of the parcel consists of paved parking.

Photo No. 1, 2, 4, 6-25, 27

Drawing No. Existing Conditions: AX10

Proposed Plans: A10

Description of Proposed Work and Impact on Existing Feature:

Phase I

The existing parking will be reconfigured and zoning-required islands and landscaping provided. The vehicular lane to the east of the site will be moved further east to increase the required landscaped area. A new concrete terrace will be added to the south side of the addition outside of the proposed café.

The landscaped area at the southwest corner of the site will be cleared of overgrown brush. Paved pedestrian pathways will be installed around the proposed **Addition**, Cafeteria, Polishing and Plating, and Hardening Department buildings.

Phase II

The existing cast iron picket fence will be repaired and repainted.

SECTION 040120 - MAINTENANCE OF MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes maintenance, restoration, and cleaning of brick and stone masonry.
 - 1. Repairing unit masonry, including replacing units and custom masonry units.
 - 2. Re-anchoring veneers.
 - 3. Repointing joints.
 - 4. Selective replacement of trim units.
 - 5. Painting steel uncovered during the work.
 - 6. Removal of un-used anchors.
 - 7. Cleaning exposed masonry surfaces.
 - 8. Providing new openings and infilling existing openings in existing masonry.
 - 9. Heating of materials in cold weather.
 - 10. The scope of masonry work is identified on the Drawings. All the systems and processes identified in this specification section may or may not be required. The Contractor shall review the Drawings and Specification together and coordinate the scope of work required.

B. Related Requirements:

- 1. Division 01 Section "Historic Treatment Procedures".
- 2. Division 02 Section "Selective Demolition."
- 3. Division 04 Section "Unit Masonry."
- 4. Division 07 Section "Joint Sealants" for sealing joints in restored masonry.
- 5. Division 07 Section "Sheet Metal Flashing and Trim" for flashings.
- C. Products installed, but not furnished, under this Section include the following:
 - 1. Steel lintels for masonry, furnished under Division 05 Section "Metal Fabrications."

1.3 INTENT

A. Due to the various buildings and exposures over time, provide (4) separate mortar colors for mock-ups in (4) locations. Three color variations per mock-up shall be provided for SHPO approval at each location.

1.4 DEFINITIONS

- A. Very Low-Pressure Spray: Under 100 psi
- B. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.
- C. Medium-Pressure Spray: 400 to 800 psi; 4 to 6 gpm.

D. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of masonry units to freezing and thawing.

1.5 SCOPE OF WORK

A. The scope of masonry work is identified on the Drawings. All the systems and processes identified in this specification section may or may not be required. The masonry sub-contractor shall review the Drawings and specification together and coordinate the scope of work required.

1.6 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
 - 2. For cast-stone and stone trim units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: Before erecting the mock-up, of the following:
 - Each type of new exposed masonry material to be used for replacing existing materials.
 Include in each set of samples the full range of colors and textures to be expected in the completed Work. Provide straps or panels containing at least four masonry units.
 - 2. Each type and color of mortar for pointing and masonry repair in the form of sample strips, 6-inches long by 1/4-inch wide, set in aluminum or plastic channels.
 - a. Each set shall contain a close color range of at least three (3) samples of different mixes of colored sands and cements that product a mortar matching the cleaned masonry when cured and dry.
 - b. Submit with precise measurements on ingredients, proportions, gradations, and sources of colored sands from which each sample was made. Confirm availability of these ingredients.
 - 3. Patching Compound: Submit sets of patching compound Samples in the form of plugs (patches in drilled holes) in sample units of masonry representative of the range of masonry colors on the building.
 - a. Have each set contain a close color range of at least three samples of different mixes of patching compound that matches the variations in existing masonry when cured and dry.
 - 4. Each type of masonry cleaning.
 - 5. Sealant Materials: See Division 07 Section "Joint Sealants."
 - 6. Accessories: Each type of anchor, accessory, and miscellaneous support.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names, and addresses of architects and owners. Skilled and experienced masons specializing in the repair and re-pointing of existing historic masonry walls shall do all work.
- D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients. Include test reports, per ASTM C780, for mortar mixes required to comply with property specification.
- E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units,

mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

- F. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
 - 1. Cementitious materials. Include brand, type, and name of manufacturer.
 - 2. Pre-blended, dry mortar mixes. Include description of type and proportions of ingredients.

1.7 INTENT

- A. Cleaning: Clean exterior masonry surfaces using the gentlest materials and techniques possible which produce an acceptable degree of cleaning. It is understood that some surfaces are not cleanable by gentle methods and, when approved by the Architect such surfaces will remain incompletely cleaned.
 - 1. Use the lowest concentration of cleaning solutions necessary to obtain acceptable clean masonry surfaces. Since the entire building is slated to be cleaned, and numerous surface contaminants are present, multiple cleaning methods and solutions will be required.
- B. Repairing Masonry and Re-Pointing: Where indicated on the Drawings, repair or replace damaged masonry and re-point mortar joints to match the color texture and tooling of acceptable original work. Re-pointing work is intended to fill holes and voids in masonry construction, to replace crumbly or deteriorated mortar with sound mortar, and to make the existing walls as weatherproof and watertight as possible.
- C. Repairing Masonry and Parging: Where indicated on the Drawings, remove loose parging and mortar back to sound mortar, repair or replace damaged masonry and re-point deep mortar joints to match the color texture and tooling of acceptable original work. Re-pointing work is intended to fill deep holes and voids in masonry construction, to replace crumbly or deteriorated mortar with sound mortar, and to make the existing walls as weatherproof and watertight as possible. Parge walls after mortar repairs are performed.
- D. Work under this section is to conform to the United States Secretary of the Interior's Standards for Rehabilitation, as administered by the National Park Service and as follows:
 - 1. The Connecticut State Historic Preservation Office (SHPO)
- E. Demolition work that impacts masonry assemblies, including but not necessarily limited to removal of metal anchorages and cutting of new masonry openings, shall be part of the scope of Work of this Section.
 - 1. Work shall be performed by the Masonry Sub-Contractor.

1.8 QUALITY ASSURANCE

- A. Qualifications: Engage an experienced mason to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance for a period of not less than ten (10) years.
 - 1. Field Supervision: Maintain experienced full-time supervisors on Project site during times that masonry restoration and cleaning work is in progress.
 - 2. Restoration Worker Qualifications: Persons who are experienced in restoration work of types they will be performing.

- B. Cleaning and Repair Appearance Standard: Cleaned and repaired surfaces are to have a uniform appearance as viewed from 10-feet away by Architect. Perform additional paint and stain removal, general cleaning, and spot repairing of small areas that are noticeably different, so that surface blends smoothly into surrounding areas.
- C. Mockups: Prepare mockup of restoration and cleaning to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.
 - 1. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than two adjacent whole units or approximately 48-inches in least dimension. Erect sample areas in existing walls unless otherwise indicated, to demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
 - a. Replacement: Four brick units replaced.
 - b. Patching: Three small holes at least 1-inch in diameter, for each type of masonry material indicated to be patched. Leave no evidence of repair.
 - c. Re-Anchoring Veneers: Install three masonry repair anchors in mockup wall assembly of each anchor type required.
 - 2. Re-Pointing: Prepare two separate sample areas, for each type of re-pointing required; one for demonstrating methods and quality of workmanship expected in removing mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints. Provide areas of approximately 24-inches square.
 - a. Obtain Architect's approval of mockups before starting the remainder of unit masonry restoration and cleaning.
 - b. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 3. Parging: Prepare two separate sample areas, for each type of re-pointing required; one for demonstrating methods and quality of workmanship expected in removing loose parge and mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints and parging. Provide areas of approximately 24-inches square.
 - a. Obtain Architect's approval of mockups before starting the remainder of unit masonry restoration and cleaning.
 - b. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 4. Cleaning: Prepare sample approximately 4-square feet for each type of masonry and surface condition.
 - a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not use cleaners and methods known to have a deleterious effect(s).
 - b. Allow a waiting period of not less than seven (7) calendar days after completion of sample cleaning to permit a study of sample panels for negative reactions.
 - 5. Locate mock-ups on the building where directed by the Architect. Samples should be located in inconspicuous areas.
 - 6. Notify Architect and OPM at least seven (7) calendar days in advance when mockups are ready for review.
 - 7. Approval of mockups for compliance with historical replication as detailed and indicated on the Drawings is required by the National Park Service and the State and Local Historic District Commission having jurisdiction.
 - a. Approval of mockups is also for other material and construction qualities specifically approved by the Architect,

- b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect and the State and Local Historic District Commission in writing.
- 8. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- 9. Maintain mockups during construction to serve as the standard for the Work.
- 10. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Source of Materials: Obtain materials for masonry restoration from a single source for each type of material required (brick, stone, lime, sand, etc.) to ensure a match of quality, color, pattern, and texture.
- E. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.
- F. Pre-Installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to masonry restoration, repair and cleaning including, but not limited to, the following:
 - a. Construction schedule. Verify availability of materials, Restoration Specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Materials, material application, sequencing, tolerances, and required clearances.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Store masonry units and cementitious materials on elevated platforms in a dry location. If masonry units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If masonry units or cementitious materials become wet, do not install until they are dry.
- B. Coordinate delivery of materials to avoid delaying the Work and to minimize the need for on-site storage.
- C. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
- D. Store sand where grading and other required characteristics can be maintained, and contamination avoided.
- E. Store masonry accessories to prevent corrosion and accumulation of dirt and oil.
- F. Comply with manufacturer's written instructions for minimum and maximum temperature requirements for storage.

1.10 FIELD CONDITIONS

A. Do not re-point mortar joints, excluding joints to be pointed with lime mortar, or repair masonry unless air temperature is between and 40 and 90 deg F and will remain so for at least seven (7) calendar days after completion of Work.

- 1. At no additional cost to the project, the Contractor may provide temporary heat and enclosure to perform the Work.
- B. Clean masonry surfaces only when air temperature is 40 deg F and above and will remain so for at least seven (7) calendar days after completion of cleaning.
- C. Protection of Masonry: During construction, cover projections and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
- D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil from masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.
- F. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Include heating of materials.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg Fand above and will remain so until masonry has dried, but not less than seven (7) calendar days after completing cleaning.
- G. Hot-Weather Requirements: Comply with hot-weather construction requirements in TMS 602/ACI 530.1/ASCE 6. Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.

1.11 COORDINATION

A. Coordinate masonry restoration and cleaning with public circulation and egress at Project site.

1.12 SEQUENCING AND SCHEDULING

- A. Order materials as soon as possible to avoid delaying completion of the Work.
- B. Perform masonry restoration work in the following sequence:
 - 1. Remove plant growth, unused anchors, and miscellaneous items.
 - 2. Remove paint.
 - 3. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
 - 4. Perform preliminary cleaning at masonry surfaces.

- 5. Repair masonry including removal and replacement, infilling openings, removal and resetting, crack repair, and disassembly of masonry for new openings.
- 6. Rake out existing mortar and point masonry joints.
- 7. Repair existing masonry, including replacing existing unit with new.
- 8. Point existing mortar joints of masonry indicated to be restored and as otherwise noted.
- 9. Clean excess mortar from masonry surfaces.
- 10. Lightly clean all work, unless indicated on the Drawings.
- 11. After all work has been completed, complete a final rinse of masonry surfaces with low-pressure water only as the scaffold is being dismantled.
- C. As scaffolding is removed, patch anchor holes used to attach scaffolding. Patch holes in masonry units to comply with "Masonry Unit Patching" Article. Patch holes in mortar joints to comply with "Repointing Masonry" Article.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

- A. Brick: Where required, provide new face brick with the same physical properties, colors, surface texture, size, and shape to match existing brickwork.
 - 1. Provide building brick complying with ASTM C62, Grade SW where in contact with earth, Grade SW, MW, or NW for concealed backup; and of same vertical dimension as face brick, for masonry work concealed from view.
 - 2. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.
- B. Stone: Where required, provide natural building stone of variety, color, finish, size, and shape to match existing.
- C. Concrete Masonry Units: Where required, provide new units in compliance with the requirements of Division 04 Section "Unit Masonry."

2.2 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150, Type I or Type II, white or gray or both where required for color matching of exposed mortar.
 - 1. Provide cement shall not contain more than 0.60 percent total alkali when tested as per ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Mortar Sand: ASTM C144 unless otherwise indicated.
 - 1. Color: Provide natural sand necessary to produce required mortar color.
 - 2. For pointing mortar, provide sand with rounded edges.
 - 3. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary, to achieve suitable match.
- D. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.

- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bayer Corporation, Industrial Chemicals Div.; Bayferrox Iron Oxide Pigments.
 - b. <u>Davis Colors</u>; True Tone Mortar Colors.
 - c. Solomon Grind-Chem Services, Inc.; SGS Mortar Colors.
- E. Aggregate for Mortar: ASTM C144.
 - For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 - 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 4. Colored Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- F. Aggregate for Grout: ASTM C404.
- G. Water: Potable.

2.3 CLEANING MATERIALS

- A. Water: Potable.
- B. Hot Water: Water heated to a temperature of 140 to 160 deg F.
- C. Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium polyphosphate, 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal of solution required.
- D. Mold, Mildew, and Algae Remover, Job Mixed: Solution prepared by mixing 2 cups of tetrasodium pyrophosphate (TSPP), 5 quarts of 5 percent sodium hypochlorite (bleach), and 15 quarts of hot water for every 5 gal. of solution required.
- E. Non-Acidic Liquid Cleaner: Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dominion Restoration Products, Inc.; Bio-Cleanse.
 - b. <u>Dumond Chemicals, Inc.</u>; Safe n' Easy Architectural Cleaner/Restorer.
 - c. <u>Price Research, Ltd.; Price Non-Acid Masonry Cleaner.</u>
 - d. PROSOCO; Enviro Klean 2010 All Surface Cleaner.
 - 2. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.
- F. Mild Acidic Cleaner: Manufacturer's standard mildly acidic cleaner containing no muriatic (hydrochloric), hydrofluoric, or sulfuric acid; or ammonium bifluoride or chlorine bleaches.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ABR Products, Inc.; X-190 Limestone & Concrete Cleaner.
 - b. <u>Diedrich Technologies Inc.; Envirorestore 100.</u>
 - c. <u>Dominion Restoration Products, Inc.; DR-60 Stone and Masonry Cleaner.</u>
 - d. PROSOCO; Enviro Klean BioWash.
 - e. <u>EaCO Chem, Inc. HD Britenol</u>

2. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.

2.4 ACCESSORY MATERIALS

- A. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ABR Products, Inc.; Rubber Mask.
 - b. Price Research, Ltd.; Price Mask.
 - c. PROSOCO; Sure Klean Strippable Masking.
- B. Sealant: Refer to Division 07 Section "Joint Sealants" for a sealant and backer rod.
- C. Setting Buttons and Shims: Resilient plastic buttons, non-staining to masonry, sized to suit joint thicknesses and bed depths of masonry units without intruding into required depths of pointing materials.
- D. Masonry Anchors and Pins: Fabricate from Type 304 stainless-steel rods. Provide threaded and unthreaded rods as required.
 - Masonry Repair Anchors, Expansion Type: Mechanical fasteners designed for masonry veneer stabilization consisting of 1/4-inch- diameter, Type 304 stainless-steel rod with brass expanding shells at each end and water-shedding washer in the middle. Expanding shells shall be designed to provide positive mechanical anchorage to veneer on one end and backup masonry on the other.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) BLOK-LOK Limited; Torq-Lok.
 - 2) <u>Dur-O-Wal, a Hohmann & Barnard company; Mechanical Anchor Series</u> DA5000 or DA5100.
 - 3) Hohmann & Barnard, Inc.; #521RA-B.
 - 2. Masonry Repair Anchors, Spiral Type: Driven-in, Type 304 stainless-steel spiral rods designed to be installed in drilled holes and relying on screw effect rather than adhesive to secure them to backup and veneer. Anchors are flexible in plane of veneer but rigid perpendicular to it.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) BLOK-LOK Limited; Spira-Lok.
 - 2) <u>Dur-O-Wal, a Hohmann & Barnard company; Dur-O-Flex Friction Pinning</u> Anchor DA508
 - 3) Heckmann Building Products, Inc.; #391 Remedial Wall Tie.
 - 4) Hohmann & Barnard, Inc.; Helix Spiro-Ties.
- E. Stone to Stone Adhesive: One-part cementitious stone adhesive recommended by adhesive manufacturer for type of stone repair indicated and matching stone color.
 - 1. <u>Basis of Design Product</u>: <u>Cathedral Stone Products, Inc.; MasonRE Adhesive.</u>
- F. Horizontal and Vertical Masonry Joint Covers: T-shaped and L-shaped soft lead flashing bed in sealant. Refer to the Drawings for locations.
 - 1. Basis of Design Product: "Type-A and Type-B "Weathercap Joint Protective System" by Weathercap, Inc. Slidell, LA.

- G. Paint Remover: Manufacturer's standard covered or skin-forming formulation for removing paint coatings from masonry.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ABR Products, Inc.; Grip 'N Strip 800 Fast Acting.
 - b. <u>Diedrich Technologies Inc.</u>; 606 Multi-Layer Paint Remover or 606X Extra Thick Multi-Layer Paint Remover with pull-off removal system.
 - c. Dumond Chemicals, Inc.; Peel Away 1 System.
 - d. <u>PROSOCO; Enviro Klean Safety Peel 1 or Enviro Klean Safety Peel 3 with Enviro Klean Overcoat.</u>
- H. Masking Tape: Non-staining, nonabsorbent material; compatible with mortar, joint primers, sealants, and surfaces adjacent to joints; and that easily comes off entirely, including adhesive.
- I. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer according to MPI #23 surface-tolerant, anticorrosive metal primer.
 - 1. Surface Preparation: Use coating requiring no better than -SP 3, "Power Tool Cleaning" surface preparation according to manufacturer's literature or certified statement.

2.5 MORTAR, PARGE, AND GROUT MIXES

- A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
 - 1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not re-temper or use partially hardened material.
- B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
 - 1. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.
- C. Do not use admixtures unless otherwise indicated.
- D. Pointing Mortar for Brick and Stone: Mix mortar materials with 1-part Portland cement, 1.25-parts lime, and 5-parts sand. Add mortar pigments to produce mortar colors required.
- E. Parge Coat: Mix mortar materials with 1-part Portland cement, ½ part lime, and 3-parts sand.
- F. Rebuilding/Setting Mortar for Brick and Stone: Mix same as pointing mortar except mortar pigments are not required.

2.6 MASONRY PATCHING COMPOUNDS

- A. Masonry Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching masonry.
 - 1. Basis of Design Products:

- a. Brick: "Jahn M110 Historic Pointing Mortar" by Cathedral Stone Products, Inc.
- b. Granite: "Jahn M160 Granite Patching Mortar." by Cathedral Stone Products, Inc.
- 2. Use formulation that is vapor and water permeable (equal to or more than the masonry unit), exhibits low shrinkage, has lower modulus of elasticity than the masonry units being repaired, and develops high bond strength to all types of masonry.
- 3. Materials must have working qualities and retardation control to permit forming and sculpturing where necessary.
- 4. Formulate patching compound used for patching masonry in colors and textures to match each masonry unit being patched. Provide not less than three colors to enable matching the color, texture, and variation of each unit.

2.7 MATERIALS FOR EPOXY CRACK INJECTION

- A. Epoxy Crack Injection Adhesive:
 - 1. Hairline cracks up to 3/16" in width: Jahn M30 Micro Injection Adhesive.
 - a. Premixed cementitious injection grout that contains no corrosive constituents. The adhesive achieves extraordinary flow capacity, high penetration, and strong adhesion. Refer to product literature and technical data for material specifications. Use formulations of product suitable for varying substrates.
 - 2. Cracks approximately 3/16" to 3/8" in width: Jahn M40 Crack and Void Injection Grout.
 - a. Premixed cementitious injection grout that does not contain any acrylic, latex, or other synthetic polymer bonding agents or additives. The grout only needs to be mixed with clean water. The grout is vapor permeable, frost and salt resistant, shrink resistant, and is physically compatible with the substrate. Refer to product literature and technical data for material specifications.

2.8 MIXING FOR EPOXY CRACK INJECTION

A. It is recommended that safety goggles, gloves, and a dust mask be worn for protection. Do not mix more material than can be used within approximately 30 minutes. Discard any mixed material that has been unused for 30 minutes or more.

B. Jahn M30:

- 1. The mixing ratio is approximately 2 to 5 parts powder to 1 part water by volume.
- 2. Mix mechanically using a high-speed drill (3,000 RPM or higher) equipped with a Jiffler type-mixing paddle. After mixing, the mortar should be poured into another clean container using a sieve. Continued agitation is necessary if the mortar is allowed to sit prior to use.

C. Jahn M40:

- 1. The mixing ratio is approximately $2 2 \frac{1}{2}$ parts powder to 1 part water by volume.
- 2. Mix manually or mechanically, using a slow speed drill (400-600 RPM) equipped with a Jiffler type-mixing paddle. The material should be mixed for a minimum of three minutes, with continued agitation should the product be allowed to sit prior to use

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.
 - 1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.
- B. Comply with chemical-cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical-cleaning solutions from contacting people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
 - Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
 - 2. Keep wall wet below area being cleaned to prevent streaking from runoff.
 - Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
 - 4. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
 - 5. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
- C. Prevent mortar from staining face of surrounding masonry and other surfaces.
 - 1. Cover sills, ledges, and projections to protect from mortar droppings.
 - 2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
 - 3. Immediately remove mortar in contact with exposed masonry and other surfaces.
 - 4. Clean mortar splatters from scaffolding at end of each day.
- D. Remove downspouts adjacent to masonry and store in a secure area during masonry restoration and cleaning. Reinstall when masonry restoration and cleaning are complete.
 - 1. Provide temporary rain drainage during work to direct water away from building.

3.2 PLANT, MOSS, AND ALGAE REMOVAL

- A. Completely remove all plant, moss, and algae growth from masonry surfaces. Work is part of basic scope of Contract and is exclusive of cleaning Work that may be provided per Alternates.
 - 1. Cut ground-rooted creeping vegetation at grade and allow to die off before removal from masonry surfaces. Apply root-killing solution to plant roots according to manufacturer's written instructions.
 - 2. Cut masonry-rooted vegetation below foliage and allow to die off before removal.
 - 3. Completely remove all vegetative growth from masonry surfaces, being careful to remove all tendrils and suckers.
 - 4. Clean all moss and algae from masonry surfaces. Use herbicidal solution per approved cleaning products if necessary.

3.3 MISCELLANEOUS ANCHOR REMOVAL

- A. Remove all obsolete metal anchors, fasteners and brackets, wood nailers, and other extraneous items anchoring piping, conduit, downspouts, lighting, and electrical devices, etc., that are indicated for removal on the Drawings. Remove non-structural masonry-embedded metal corner guards and door frames only where indicated on the Drawings.
 - 1. All removal Work shall be performed by Masonry Contractor.
 - 2. Remove items so as to avoid spalling or cracking masonry.
 - 3. If item cannot be removed without damaging masonry, cut item flush at masonry surface and core drill surrounding masonry as close around item as practical.
 - 4. Patch holes following procedures of this Section.

3.4 MISCELLANEOUS PAINT REMOVAL

A. Paint Removal:

- 1. Remove loose and peeling paint using low-pressure spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
- 2. Apply paint remover to dry, painted masonry with trowel, spatula, or as recommended by manufacturer.
- 3. Apply cover, if required by manufacturer, per manufacturer's written instructions.
- 4. Allow paint remover to remain on surface for period recommended by manufacturer or as determined in test panels.
- 5. Scrape off paint and remover and collect for disposal.
- 6. Rinse with water applied by low-pressure spray to remove chemicals and paint residue.
- 7. Apply acidic cleaner or manufacturer's recommended after wash to masonry, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or after wash remain on surface as a neutralizing agent for period recommended by chemical-cleaner or after wash manufacturer.
- 8. Rinse with cold water applied by low-pressure spray to remove chemicals and soil.

3.5 PRELIMINARY CLEANING

- A. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, calking, asphalt, and tar.
 - 1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.
 - 2. Remove paint and caulking with paint remover.
 - a. Comply with requirements in "Paint Removal" Article.
 - b. Repeat application up to two times if needed.
 - 3. Remove asphalt and tar with solvent-type paint remover.
 - a. Comply with requirements in "Paint Removal" Article.
 - b. Apply paint remover only to asphalt and tar by brush without pre-wetting.
 - c. Allow paint remover to remain on surface for 10 to 30 minutes.
 - d. Repeat application if needed.

3.6 REPOINTING BRICK AND STONE

- A. Rake out and re-point joints to the following extent:
 - All joints in areas indicated on Drawings.

- 2. Joints where mortar is missing or where they contain holes.
- 3. Cracked joints where cracks are 1/16-inch or more in width and of any depth.
- 4. Joints where they are deteriorated to point that mortar can be easily removed by hand, without tools.
- 5. Joints where they sound hollow when tapped by metal object.
- 6. Joints where they are worn back 1/4-inch or more from surface.
- 7. Joints that have spalled.
- 8. Joints where they have been filled with substances other than mortar.
- B. Rake out joints as follows, according to procedures demonstrated in approved mockup:
 - 1. Remove mortar from joints to depth of 2 times joint width, but not less than 1/2-inch or not less than that required to expose sound, un-weathered mortar.
 - 2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
 - 3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
 - a. Use power-operated grinders, preferably pneumatic, to cut out mortar bed joints. Where power-operated grinders will not provide satisfactory results, remove mortar from top and bottom of vertical joints and other joints by hand using a chisel and resilient mallet.
- C. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.
- D. Pointing with Mortar:
 - 1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
 - 2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8-inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
 - 3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
 - 4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Finish joint by brushing with stiff brush to texture joint to match existing joint surface texture. Remove excess mortar from edge of joint by brushing.
 - 5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
 - 6. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and re-point.
- E. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

3.7 BRICK REMOVAL, REPLACEMENT, AND INFILL

- A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully remove by hand entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
- B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
- C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.
- D. Remove and salvage in an undamaged condition as many whole bricks as possible.
 - Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 - 2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
 - 3. Stack and store salvaged brick for reuse.
- E. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.
- F. Replace removed damaged brick with other removed brick in good condition where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to a usable size, without visible damage.
- G. Install new or salvaged brick to replace removed brick. Fit units into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
 - 1. Maintain joint width for replacement units to match existing joints.
 - 2. Use setting buttons or shims to set units accurately spaced with uniform joints.
 - 3. At exterior openings cut by power saws remove cut bricks and tooth-in new bricks.
 - 4. All brick faces exposed to weather must be outside faces of whole bricks.
 - 5. Cut brick faces exposed to weather are not acceptable.
- H. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding clay bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g per 30 sq. inch minimum. Use wetting methods which ensure units are nearly saturated, but surface is dry when units are laid.
 - 1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork. Finish joint by brushing with stiff brush to texture joint to match existing joint surface texture.
 - 2. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for re-pointing existing masonry, and at same time as re-pointing of surrounding area.
 - 3. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

3.8 BACKUP MASONRY REMOVAL AND REPLACEMENT

A. Where backup masonry is fractured or unstable and at locations indicated, remove mortar and masonry units that are broken or deteriorated and rebuild with whole, new brick or whole

salvaged units. Carefully remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

- B. Support and protect remaining masonry that surrounds removal area.
- C. Maintain flashing, reinforcement, anchors, lintels, and adjoining construction in an undamaged condition.
- D. Notify Architect of unforeseen detrimental conditions, including voids, cracks, bulges, loose units beyond the removal area, rotted wood, rusted metal, and other deteriorated items.
- E. Remove in an undamaged condition as many whole bricks as possible.
 - 1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 - 2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
 - 3. Store brick for reuse. Store off ground, on skids, and protected from weather.
 - 4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.
- F. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for brick replacement.
- G. Replace removed damaged brick with salvaged backup brick in good condition, where possible, or with new building brick matching existing backup brick. Do not use broken units unless they can be cut to usable size.
- H. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
- I. Lay replacement brick with rebuilding (setting) mortar and with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated, but surface is dry when laid.
- J. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours, including weekends and holidays.
 - 1. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

3.9 REANCHORING VENEERS

- A. Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions. Space anchors not more than 12-inches on center vertically and 8-inches on center horizontally apart unless otherwise indicated. Install at locations to avoid penetrating flashing.
- B. Recess anchors 5/8-inch or more from surface of mortar joint, and fill recess with pointing mortar.

3.10 PAINTING STEEL UNCOVERED DURING THE WORK

- A. Notify Architect if steel is exposed during masonry removal. Where Architect determines that steel is structural, or for other reasons cannot be totally removed, prepare, and paint it as follows:
 - 1. Surface Preparation: Remove paint, rust, and other contaminants according to -SP 3, "Power Tool Cleaning" as applicable to comply with paint manufacturer's recommended preparation.
 - 2. Antirust Coating: Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).
- B. If on inspection and rust removal, the thickness of a steel member is found to be reduced from rust by more than 1/16 inch notify Architect before proceeding.

3.11 MASONRY UNIT PATCHING

A. Patching Bricks:

- 1. Remove loose material from masonry surface. Carefully remove additional material so patch will not have feathered edges but will have square or slightly undercut edges on area to be patched and will be at least 1/4 inch thick, but not less than recommended by patching compound manufacturer.
- 2. Mask adjacent mortar joint or rake out for repointing if patch will extend to edge of masonry unit.
- 3. Mix patching compound in individual batches to match each unit being patched.
- 4. Rinse surface to be patched and leave damp, but without standing water.
- 5. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
- 6. Place patching compound in layers as recommended by patching compound manufacturer, but not less than 1/4 inch or more than 2 inches thick. Roughen surface of each layer to provide a key for next layer.
- 7. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the masonry unit. Shape and finish surface before or after curing, as determined by testing, to best match existing masonry unit.
- 8. Keep each layer damp for 72 hours or until patching compound has set.

3.12 MASONRY INSTALLATION, GENERAL

- A. Thickness: Build walls and other masonry construction to full thickness shown.
- B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, un-chipped edges. Allow units to dry before laying, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- D. Matching Existing Masonry: Match type, coursing, bonding, color, and texture. Verify in field, and then submit samples and constructing mock-ups for Architect's review and approval.
- E. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:

- 1. For conspicuous vertical lines such as external corners, door jambs, reveals, and expansion/control joints; do not vary from plumb by more than an 1/8-inch in 10 feet and 1/4-inch in 20 feet, but no more than a 1/2-inchmaximum.
- 2. For vertical alignment of exposed head joints, do not vary from plumb by more than a 1/4-inch in 10 feet, or 1/2-inchmaximum.
- 3. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than an 1/8-inch in 10 feet, 1/4-inch in 20 feet, or 1/2-inch maximum.
- 4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus an 1/8-inch, with a maximum thickness limited to 1/2-inch. Do not vary from bed-joint thickness of adjacent courses by more than an 1/8-inch.
- 5. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8-inch. Do not vary from adjacent bed and head-joint thicknesses by more than 1/8-inch.
- 6. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16-inch except due to warpage of masonry within specified tolerances for units.
- 7. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16-inch from one masonry unit to the next.

3.13 MORTAR BEDDING AND JOINTING

- A. Lay masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.14 PATCHING AND REPAIRING HOLES IN BRICK

A. For holes with a diameter of 2-inches or less, pack hole full depth with mortar. For holes with a diameter of larger than 2-inches, remove cut brick and replace with salvaged brick or new brick matching the existing.

3.15 DISASSEMBLY OF MASONRY

- A. Carefully remove by hand masonry indicated on drawings to be removed. Remove units from joint to joint and in a manner to permit removal without damaging surrounding brick or other materials.
- B. Support and protect construction that surrounds removal area.
- C. Salvage as many whole, undamaged brick units as possible.
- D. Remove mortar from salvaged units and store for reuse.

3.16 STONE CRACK REPAIR

- A. Design Intent. The objectives of the Work of this Article include:
 - 1. Repair of existing cracks using non-structural repairs using composite patch material.

- B. Crack repair with composite patch material.
 - 1. Cut out crack using a rotary tool for the full length and expanse of the crack. Crack shall be cut out to a depth back to sound stone not less than 1/2-inch deep.
 - 2. Install composite patch material per manufacturer's instructions in the cut-out area. Color of material shall match the host stone.
 - 3. Clean cementitious crack filler from face of stone before it sets by scrubbing with water. Tool surface of material to match the host stone.

3.17 PARGING

- A. Parge interior faces of masonry walls, where indicated, in one uniform coats to a total thickness of 1/4" inch. Dampen wall before applying first coat.
- B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8-inch per foot.
- C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.18 CLEANING MASONRY

- A. Proceed with cleaning in an orderly manner; work from bottom to top of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water will not wash over cleaned, dry surfaces.
- B. Use only those cleaning methods indicated for each masonry material and location.
- C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.
- D. It may be necessary to employ different cleaning methods and products to clean the various materials and surfaces. Begin by cleaning with water, the gentlest means available. When water washing does not achieve the desired result, proceed with more aggressive methods as listed (in increasingly aggressive methods) below:
 - 1. Method #1A Cold-Water Wash: Clean masonry with cold, low-pressure water.
 - 2. <u>Method #1B Hot Pressurized Water Wash</u>: Clean stone masonry with hot water low-pressure spray hot water, followed by brushing.
 - 3. <u>Method #2 Detergent Cleaning</u>: Clean masonry with a detergent solution applied as follows:
 - a. Wet masonry with cold water applied by low-pressure spray.
 - b. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used, and that masonry surface remains wet.
 - c. Rinse with cold water to remove detergent solution and soil.
 - d. Apply rinse by medium-pressure spray.
 - e. Repeat cleaning procedure above where required to produce the cleaning effect established by mockup.
 - 4. Method #3 Chemical Cleaning: If above options to not achieve acceptable results, as determined by the Architect, proceed with chemical cleaning of masonry surfaces. Use only the gentlest means necessary to achieve acceptable results as determined by the Architect. Clean brick masonry with nonacidic liquid cleaners applied as follows:

- a. Wet masonry with water applied by low-pressure spray.
- b. Apply cleaner to masonry in two applications by brush or low-pressure spray. Let cleaner remain on surface for period as recommended by chemical-cleaner manufacturer and as stablished by mockup.
- c. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.
- d. Rinse with water applied by low-pressure spray to remove chemicals and soil.
- e. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once.
- E. Final Cleaning: After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter, use wood scrapers, stiff-nylon or fiber brushes, and clean water, spray applied at low pressure.
 - 1. Do not use metal scrapers or brushes.
 - 2. Do not use acidic or alkaline cleaners.
 - 3. Wash adjacent woodwork and other non-masonry surfaces. Use detergent and soft brushes or cloths.
 - 4. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
 - 5. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

3.19 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste and other masonry materials, and legally dispose of off Owner's property.

END OF SECTION 040120

DBVW Window Survey Summary

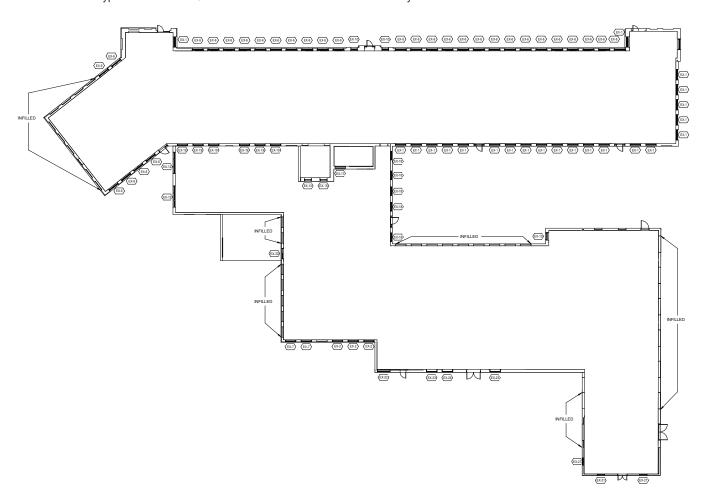
Those windows that remain in **poor condition** exhibit areas of water infiltration that has caused damage to the interior of the sash and the sills, including cracking, paint failure, and rot. Paint failure, including blistering, flaking, and peeling, is visible on most surfaces, which is indicative of water penetration and deterioration. The glazing putty is loose, cracked, and missing sections, which has allowed water to saturate the wood, especially at the joints. Operability is difficult/unfeasible due to the weight and deterioration of the units. In addition, many of the original wood windows were partially replaced, resulting in retention of the original upper halves and sliding aluminum inserts in the lower halves. Additional photos of the deteriorated wood windows are linked above.

Those windows that remain in **fair condition** are typically the replacement aluminum sash that are not historically appropriate and have been inadequately installed. Sealants are not visible and improper fasteners.

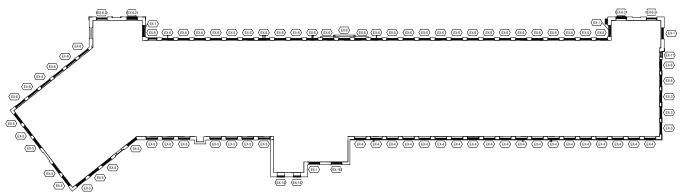
Windows that are in **good condition** have the appropriate configurations, remain operable, and were constructed & installed correctly.

First Floor Existing Window Type Keyplan

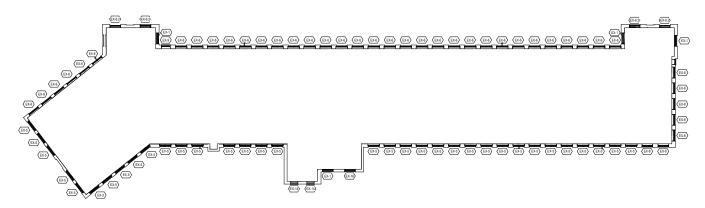
* Note: Window types EX-21 to EX-23 are not historic and omitted from this survey



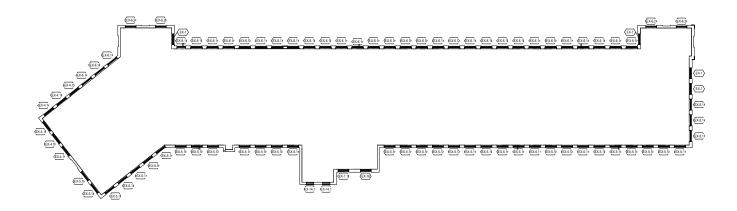
Second Floor Existing Window Type Keyplan



Third Floor Existing Window Type Keyplan



Fourth Floor Existing Window Type Keyplan



Existing Window Summary

Total Windows and In fills	Fully In filled	Original Windows	Non-Original Windows	Hybrid Original and Non- Original Windows
385	31	53	273	28
100%	8.1%	13.8%	70.9%	7.3%

Note:

These totals only reflect windows on the exterior of the building and do not include any existing in filled, or removed windows which became a part of the interior of the building during any additions. These total also do not include any windows which are a part of the CMU addition.

EX-1- Original Wood Window

Good	Fair	Poor
0	0	35
0%	0%	100%



EX-1 - Original 20/20 double hung arched wood window



EX-1- Interior



EX-1 - Exterior



EX-1- Interior

EX-2- Original Metal Window

Good	Fair	Poor
0	0	3
0%	0%	100%



EX-2 - Original 20/20 double hung arched metal window with wire glass



EX-2- Interior

EX-3- Partially Original Wood Window

Good	Fair	Poor
0	0	3
0%	0%	100%



EX-3 - Non-Original aluminum sliding window installed under original 20 pane upper sash



EX-3- Interior

EX-4- Partially Original Wood Window

Good	Fair	Poor
0	0	25
0%	0%	100%



EX-4- Non-Original aluminum sliding window installed under original 20 pane upper sash covered with plywood



EX-4- Interior



EX-4- Interior

EX-5- Non-Original Aluminum Window

Good	Fair	Poor
0	86	0
0%	100%	0%



EX-5 - Non-Original double mulled double hung aluminum window with arched transom. No exterior caulking is visible at the aluminum replacement windows



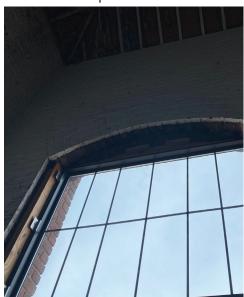
EX-5- Interior Sill

EX-6- Non-Original Aluminum Window

Good	Fair	Poor
0	156	0
0%	100%	0%



EX-6- Non-Original double mulled 6/6 double hung aluminum window with 12 pane arched transom



EX-6- Replacement windows have typically been inadequately installed. No sealant is visible and improper fasteners have been used

EX-7- Non-Original Aluminum Window

Good	Fair	Poor
0	2	0
0%	100%	0%



EX-7 - Non-Original double mulled double hung aluminum window with arched transom



EX-7- Interior

EX-8- Replacement Aluminum Double Hung Window

Double Hair	9 1111110011	
Good	Fair	Poor
0	0	7
0%	0%	100%



EX-8- Replacement aluminum double hung window with carpentry in fill above



EX-8- Interior

EX-9- Non-Original Aluminum Window

Good	Fair	Poor
0	3	0
0%	100%	0%



EX-9 - Non-Original 8/8 double hung aluminum window with 8 pane arched transom



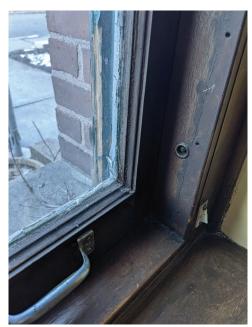
EX-9- Interior

EX-10- Original Wood Window

Good	Fair	Poor
0	2	0
0%	100%	0%



EX-10- Original 9/9 double hung wood window



EX-10- Interior

EX-11- Original Wood Window

Good	Fair	Poor
0	0	2
0%	0%	100%



EX-11 -Original 4/4 double hung arched wood window



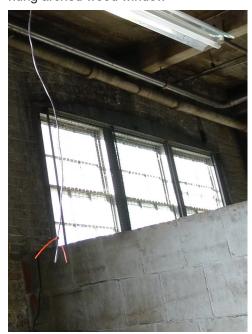
EX-11- Interior

EX-12- Original Wood Window

Good	Fair	Poor
0	0	2
0%	0%	100%



EX-12- Original triple mulled 6/6 double hung arched wood window



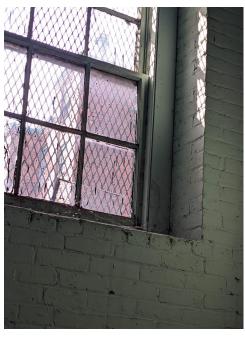
EX-12- Interior

EX-13- Original Wood Window

Good	Fair	Poor
0	0	1
0%	0%	100%



EX-13 - Original 6/6 double hung arched wood window



EX-13- Interior

EX-14- Non-Original Wood Window

Good	Fair	Poor
0	6	0
0%	100%	0%



EX-14- Non-Original double hung arched aluminum window



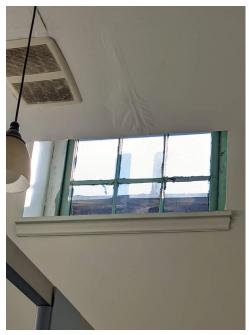
EX-14- Interior

EX-15- Original Wood Window

Good	Fair	Poor
0	0	2
0%	0%	100%



EX-15 - Original 6 pane fixed wood window



EX-15- Interior

EX-16- Original Wood Window

Good	Fair	Poor
		4
0%	0%	100%



EX-16- Original 6/6 double hung arched wood window



EX-16- Interior

EX-17- Original Wood Window

Good	Fair	Poor
0	0	2
0%	0%	100%



EX-17 - Non-Original 10 pane fixed arched aluminum window



EX-17- Interior

EX-18- Non-Original Aluminum Window

Good	Fair	Poor
0	5	0
0%	100%	0%



EX-18- Non-Original double hung aluminum window



EX-18- Interior

EX-19- Non-Original Wood Window

Good	Fair	Poor
	7	
0%	100%	0%



EX-19 - Non-Original double hung arched aluminum window



EX-19- Interior

EX-20- Replacement sliding window over masonry in fill

Good	Fair	Poor
	1	
0%	100%	0%



EX-19 - Replacement sliding window over masonry in fill



EX-19- Interior

Infilled Window Types



Window infilled with brick



Window Infilled with Block



1. Existing wood window



2. Bottom rail and sill



3. Stile and muntins



4. Brick mold



5. Existing wood window



6. Brick mold, stile, bottom rail, sill and muntin



7. Muntin detail



8. Muntins, stile and brick mold



9. Sill and bottom rail



September 7, 2023

RE:

Real Art Ways Expansion

56 Arbor Street

Hartford, Connecticut

To Whom It May Concern:

On behalf of 56 Arbor Street LLC, the owner of 56 Arbor Street, Hartford, Connecticut, I am acknowledging that I have been informed that The Public Archaeology Laboratory, Inc is in the process of submitting permitting applications to the City of Hartford for the expansion project associated with this property. 56 Arbor Street LLC consents to the submission of these applications and other applications as deemed necessary during the review process.

Sincerely,

Will K. Wilkins

Executive Director

Real Art Ways, Inc

56 Arbor Street LLC