SALT LAKE COUNTY PARKS AND RECREATION

# SUGARHOUSE PARK PAVILION STUDY

05/16/2016


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# INDEX

# PROJECT SCOPE

The Purpose of this study is to assess the condition of the seven existing Sugarhouse Park pavilions, analyze needed repairs, and provide a cost estimate for repairs, as well as contrasting estimates for pavilion replacement. All of the existing pavilions require repairs. This study analyzes the benefits and costs of two scenarios - the repair and modifications of the pavilions as well as the complete replacement of the pavilions. Architectural Nexus combined with a team of EELD (electrical) and Dunn Associates (structural) has evaluated the cost and design implications of upgrading versus building new.

The existing pavilions have stood for over 50 years and are in considerable need of improvements. Each pavilion requires a varying amount of upgrades, including electrical lighting and panel replacement upgrades, concrete pad, roofing and a range of structural remediation. The stone walls at each pavilion have numerous stones falling out of them and these stones are then thrown into the creek. The existing fireplaces within the stone walls have significant rust and are scarcely utilized at all. The skylights in the existing roofs are leaking at multiple locations.

The structural damage to the existing pavilions is extensive with multiple structural members deteriorating. These members need to be replaced or repaired in order to prevent structural failure and further damage.

Costs for needed repairs will be contrasted with complete pavilion replacement.

A new pre-manufactured pavilion design has been studied that would better accommodate the needs of the park. The proposed pre-manufactured pavilion has been customized in order to meet the design and practical requirements.

It was determined that there are 3 sizes of pavilions for the new design. The Big Field Pavilion is to be the largest with a possible option for a design upgrade in the roof shape. Fabian Lake will be a medium sized pavilion, also with possible upgrades to the roof shape and columns. The other medium sized pavilions will include Parley's Creek, Hidden Grove and Sugar Beet. The small pavilions will be Mt. Olympus and Sego Lily. The design approach for the medium and small pavilions will be similar, however costs will be different due to the size variation.

The team was asked to study the pavilions for two scenarios for upgrading or replacing the existing pavilions as well as provide an additional scope for the amphitheater remediation.

# PROJECT INVESTIGATION

An initial site visit of the park was conducted on Thursday, October 1st 2015 which included Andrea Sorensen, SLCo Parks and Recreation, Tait Ketcham with Dunn Associates, Mansour Aghdasi with EELD, Holli Adams, Rosemary Stum, and Craig Houston with Architectural Nexus. This tour of the park pavilions provided insight to the scope of work required for the pavilion study. A kick-off meeting was held at the County Building on December 8th 2015 which included Salt Lake County Parks and Recreation and members of the Sugarhouse Park Authority with Holli Adams and Rosemary Stum in attendance as well. This meeting allowed for discussion of design

considerations and electrical and site decisions to be made. The elements of the existing pavilions were discussed in regards to vandalism, bird perching, “hiding” places, and general misuse of associated concrete grilles.

Architectural Nexus compiled multiple options into a design and cost presentation for the Sugarhouse Park Board on February 11th where one design option was selected to move forward with.

The design options reviewed at this meeting are as follows:

**Option 1**

- Standing seam metal roof
- Metal columns and beams
- Tongue and groove roof deck
- Gable or hip roof

Pricing as follows:

| DESCRIPTION | DEMO EXISTING | NEW SLAB | NEW FOOTINGS | LANDSCAPE/ IRRIGATION ALLOWANCE | ELECTRICAL | NEW SHELTER | TOTAL COST ESTIMATE |
|---|---|---|---|---|---|---|---|
| 30X50 Gable Roof | $17,000 | $14,000 | $6,000 | $1000 | $18,000 | $71,128 | $127,128 |
| 40x44 Gable Roof | $17,000 | $16,000 | $7,200 | $1000 | $18,000 | $80,061 | $139,261 |
| 40x64 Gable Roof | $19,000 | $21,000 | $8,400 | $1000 | $20,000 | $103,061 | $172,461 |
| 30x50 Hip Roof | $17,000 | $14,000 | $6,000 | $1000 | $18,000 | $71,445 | $127,445 |
| 40x44 Hip Roof | $17,000 | $16,000 | $7,200 | $1000 | $18,000 | $83,522 | $142,722 |
| 40x64 Hip Roof | $19,000 | $21,000 | $8,400 | $1000 | $20,000 | $108,622 | $178,022 |

**Option 2**

- Standing seam metal roof
- Off-set Roof
- 12” steel columns
- Steel beams
- Tongue and groove roof deck
- Gable-end ornamentation

Pricing as follows:

| DESCRIPTION | DEMO EXISTING | NEW SLAB | NEW FOOTINGS | LANDSCAPE/ IRRIGATION ALLOWANCE | ELECTRICAL | NEW SHELTER | TOTAL COST ESTIMATE |
|---|---|---|---|---|---|---|---|
| 30X44 Dual Roof Chelsea | $17,000 | $14,000 | $6,000 | $1000 | $18,000 | $85,975 | $141,975 |
| 30x50 Dual Roof Chelsea | $17,000 | $16,000 | $7,200 | $1000 | $18,000 | $91,905 | $151,105 |
| 40x64 Dual Roof Chelsea | $19,000 | $21,000 | $8,400 | $1000 | $20,000 | $130,265 | $199,665 |

**Option 3.1**

- Standing seam metal roof
- Wood columns and beams
- Tongue and groove roof deck
- Beam and column metal end caps
- Fan shaped
- Monoslope

Pricing as follows:

| DESCRIPTION | DEMO EXISTING | NEW SLAB | NEW FOOTINGS | LANDSCAPE/ IRRIGATION ALLOWANCE | ELECTRICAL | NEW SHELTER | TOTAL COST ESTIMATE |
|---|---|---|---|---|---|---|---|
| 30X50 Single Pitch Fan Shaped Wood | $17,000 | $14,000 | $6,000 | $1000 | $18,000 | $86,227 | $142,227 |
| 40x50 Single Pitch Fan Shaped Wood | $17,000 | $16,000 | $7,200 | $1000 | $18,000 | $98,260 | $157,460 |
| 50x50 Single Pitch Fan Shaped Wood | $19,000 | $21,000 | $8,400 | $1000 | $20,000 | $116,261 | $185,661 |

**Option 3.2**

- Mega-rib metal roof
- Metal columns and wood beams
- Tongue and groove roof deck
- Monoslope


Pricing as follows:

| DESCRIPTION | DEMO EXISTING | NEW SLAB | NEW FOOTINGS | LANDSCAPE/ IRRIGATION ALLOWANCE | ELECTRICAL | NEW SHELTER | TOTAL COST ESTIMATE |
|---|---|---|---|---|---|---|---|
| 34X44 Steel and Wood | $17,000 | $14,000 | $6,000 | $1000 | $18,000 | $89,246 | $145,246 |
| 40X50 Steel and Wood | $17,000 | $16,000 | $7,200 | $1000 | $18,000 | $112,872 | $172,072 |
| 44X58 Steel and Wood | $17,000 | $21,000 | $8,400 | $1000 | $20,000 | $129,704 | $199,104 |

**Option 3.3**

- Mega-rib metal roof
- Tubular steel frame
- Tongue and groove roof deck
- Monoslope

Pricing as follows:

| DESCRIPTION | DEMO EXISTING | NEW SLAB | NEW FOOTINGS | LANDSCAPE/ IRRIGATION ALLOWANCE | ELECTRICAL | NEW SHELTER | TOTAL COST ESTIMATE |
|---|---|---|---|---|---|---|---|
| 34X44 Steel and Wood | $17,000 | $14,000 | $6,000 | $1000 | $18,000 | $107,988 | $163,988 |
| 40X50 Steel and Wood | $17,000 | $16,000 | $7,200 | $1000 | $18,000 | $89,594 | $148,794 |
| 44X58 Steel and Wood | $19,000 | $21,000 | $8,400 | $1000 | $20,000 | $129,471 | $199,321 |

**Option 3.4**

- Mega-rib metal roof
- Tubular steel frame
- Tongue and groove roof deck
- Monoslope

Pricing as follows:

| DESCRIPTION | DEMO EXISTING | NEW SLAB | NEW FOOTINGS | LANDSCAPE/ IRRIGATION ALLOWANCE | ELECTRICAL | NEW SHELTER | TOTAL COST ESTIMATE |
|---|---|---|---|---|---|---|---|
| 34x44 Single Pitch Steel | $17,000 | $14,000 | $6,000 | $1000 | $18,000 | $87,302 | $143,302 |
| 40x50 Single Pitch Steel | $17,000 | $16,000 | $7,200 | $1000 | $18,000 | $121,662 | $180,862 |
| 44x58 Single Pitch Steel | $19,000 | $21,000 | $8,400 | $1000 | $20,000 | $136,865 | $206,265 |

# RENOVATE EXISTING PAVILIONS

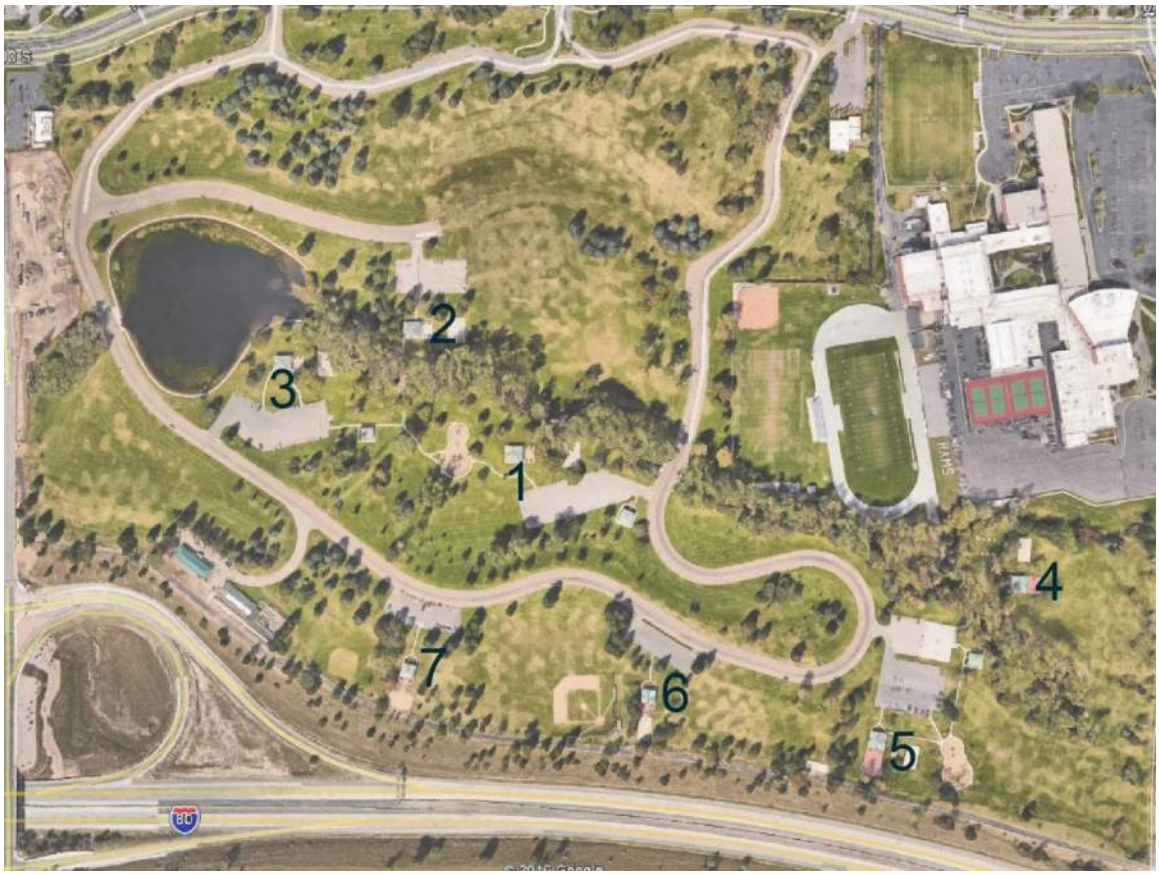
Renovating the existing pavilions at Sugarhouse Park allows for a less invasive upgrade of the pavilions. Renovation would require selective demolition, removal and replacement of concrete pads, removal of the concrete charcoal grills, replacement of selected structural members, new roofing infill at the skylights, stone wall remediation, new electrical panels and lighting, along with finish upgrades. The existing pavilions have the disadvantage of minor lack of ADA compliance, issues regarding access and picnic table accessibility. The deteriorating condition of the structures and obscured views into the pavilions are primary concerns. These concerns will be minimized in upgrading selective structural members and removing the stone walls.

## ARCHITECTURAL ANALYSIS

Currently there are two sizes of pavilions. Mt. Olympus and Sego Lily pavilions are approximately 1500 SF. The other five pavilions are larger with a square footage of about 2000 SF. Each pavilion has a large stone wall and fireplace integrated within the wall. Each pavilion also has a varying number of steel and concrete charcoal grills associated with them. The condition of each pavilion varies. The following list of the pavilions is prioritized from best to worst condition:

**Condition of Pavilions – Ranked Best to Worst:**

1. Parley's Creek
2. Big Field
3. Fabian Lakeside
4. Hidden Grove
5. Sugar Beet
6. Mt. Olympus
7. Sego Lily




In order to create better visibility within the pavilions, as well as address current wall deterioration, the rock wall along with the fireplace will be removed.

Beyond the removal of the rock wall, and replacement of structural members (see structural analysis) all the finishes on the pavilions need to be refreshed. All structural members including concrete columns and wood beams need to be repainted. Most ceiling panels are in adequate condition but also need a new coat of paint.

Other architectural upgrades include new roofing over where the existing skylights will be removed. The existing metal roofing is in acceptable condition and does not need to be completely replaced. The main roofing concern is roof leakage at the skylights, which will be resolved when the skylights are infilled.

**Existing Pavilion**

## Estimated Architectural Cost Per Pavilion:

| | DEMO OF STONE WALL | REMOVAL OF CHARCOAL GRILLS | PAINT FOR STRUCTURE AND CEILING | NEW METAL ROOFING AT SKYLIGHTS | **TOTAL** |
|---|---|---|---|---|---|
| EXISTING PAVILION | $7,400 | $800 | $2,500 | $3,000 | **$13,700** |

All cost estimates include labor and materials

## Description:

This site analysis is limited to the concrete and landscape features associated with each pavilion.

## General Conditions Summary:

The edges of the pavilion concrete pads generally coincide with the eaves of the pavilions, providing for perimeter circulation around the picnic tables, although this circulation path is narrow. At some pavilions, the concrete pad extends beyond the pavilion to accommodate BBQ grills and other activities. Some of the concrete pads have some level of integral or surface-applied coloring. Each pavilion is connected to parking and other park destinations via one or more concrete walkways.

The concrete pads vary in structural and visual quality. All have significant cracking, spalling and chipping, and some differential settlement. Some of these conditions present potential hazards to pavilion users, while others are currently cosmetic.

**Figure: Representative Cracking Examples**

## Specific Conditions Observed:

Specific conditions observed at each pavilion are listed below. General refurbishment recommendations are made in the following section. Recommendations specific to the conditions at a given pavilion are provided under the heading for that pavilion:

Parley's Creek
The concrete pad for this pavilion extends to the east accommodating four BBQ grills and a drinking fountain. The concrete of the pad has a very light tint. A utility box of some sort is located adjacent to the concrete pad on the west. A single walkway connects the pavilion to the parking lot and to a nearby playground. There is a concrete volleyball pad near the pavilion.

The walkway leading to the pavilion is generally in good condition, with a couple of cracked panels and some minor differential settlement. The pavilion pad has significant cracking and some differential settlement, both of which present some potentially hazardous conditions. The drinking fountain pad is new and in good condition. The volleyball court also has significant cracking presenting potential tripping hazards.

*Specific recommendations:* In addition to pavilion pad replacement, consider removing and replacing the volleyball court concrete pad. Repaint the standard posts. Remove and replace cracked sections of the walkway.

Big Field
The concrete pad for this pavilion extends to the east accommodating four BBQ grills. A single walkway connects the pavilion to the parking lot, with another walkway connecting to a bridge over the creek. There is a concrete pad near the pavilion for volleyball.

The walkway leading to the pavilion is in good condition overall, with a few cracked panels. The pavilion pad has extensive cracking around the perimeter, although the majority is currently cosmetic and the center of the pad has no observable cracking. There are two observed locations where settlement has created potential tripping hazards. The drinking fountain pad is newer and in good condition. The volleyball court has significant cracking, although again most of it is currently cosmetic.

*Specific recommendations:* In addition to pavilion pad replacement, consider removing and replacing the volleyball court concrete pad. Repaint the standard posts. Remove and replace cracked sections of the walkway.

Fabian Lakeside
The concrete pad for this pavilion extends to the east accommodating four BBQ grills. The concrete has a very light color tint to it. An irrigation controller and utility box of some sort are located adjacent to the concrete pad on the west. Two walkways connect the pavilion to the parking lot. There is a concrete pad near the pavilion for volleyball.

The walkways leading to the pavilion are generally in good condition, but each has some cracked panels. The perimeter of the pavilion pad has extensive cracking and chipping, with some large structural cracks that could present hazards to users. The center of the pad beneath the pavilion is in very good condition with only a single observed hairline crack. The volleyball court has extensive cracking but no differential settlement. The pad itself has a lot of slope with water ponding in the SE corner when it rains.

*Specific recommendations:* In addition to pavilion pad replacement, consider removing and replacing the volleyball court concrete pad. Repaint the standard posts. Remove and replace cracked sections of the walkway.

Hidden Grove
The concrete pad for this pavilion extends to the east accommodating two BBQ grills. This concrete is integrally colored red. A single walkway connects the pavilion to the parking lot via a bridge over the creek. There is a concrete pad north of the pavilion for volley ball, as well as horseshoe pits to the northwest.

The walkway leading to the pavilion is generally in good condition with some cracked panels and settling as well as a spot that ponds water near the bridge. The pavilion pad has significant cracking with a few large chips and some differential settling, which may present a hazard for users. The volleyball court also has significant cracking, including some that may present a tripping hazard. The horseshoe pits require maintenance. Their concrete borders are spalling and cracked through in some locations, but are serviceable. They contain no sand and are overgrown with weeds.

*Specific recommendations:* In addition to pavilion pad replacement, consider removing and replacing the volleyball court concrete pad. Repaint the standard posts. Remove and replace cracked and settling sections of the walkway. Weed the horseshoe pits and add sand to them.

Sugar Beet
The concrete pad for this pavilion extends to the south accommodating two BBQ grills and encompassing a concrete amphitheater with a fire pit. The concrete is integrally colored red. Walkways connect the pavilion to the parking lot and to a nearby playground. There is a large concrete pad near the pavilion for volley ball.

The walkway leading to the pavilion is in very good condition with no observed cracks or settling issues. The pavilion pad has significant cracking throughout, although most of it is currently cosmetic. There is more significant chipping and spalling at columns and other structural interfaces. Some differential settlement was observed. The drinking fountain pad to the east is relatively new and in very good condition. The amphitheater is in poor condition, with large cracks in horizontal and vertical surfaces, along with some differential settling in the slabs and seating blocks. There is significant ponding at the center area.

*Specific recommendations:* At the owner's request, remove the concrete amphitheater and all associated elements. Backfill the hole from the amphitheater to restore the hillside, sod with lawn, and expand irrigation system. In addition to pavilion pad replacement, consider removing and replacing the volleyball court concrete pad. Paint the standard posts.

Mt. Olympus
The concrete pad for this pavilion extends to the south accommodating two BBQ grills. The concrete is integrally colored red. An irrigation controller is located adjacent to the concrete pad on the west. A drinking fountain is set in a new concrete pad between the pavilion and the volley ball court. A rounded walkway with an annuals bed in its center connects to a single walkway leading to the parking lot. A concrete volley ball court is connected to the drinking fountain pad.

The walkway leading to the pavilion has some cracked panels and some differential settlement. The pavilion pad has significant cracking, some of it structural, along with some potentially hazardous differential settlement. The volleyball court has significant cracking, some it also structural, as well as flat spots that pond.

*Specific recommendations*: Remove and replace cracked and settling walkway panels. In addition to pavilion pad replacement, consider removing and replacing the volley ball court concrete pad. Paint the standard posts.

Sego Lily
The concrete pad for this pavilion extends to the south accommodating a single remaining BBQ

grill and a drinking fountain. The pad is integrally colored red. A portion of the pad was replaced somewhat recently with a natural gray concrete. A drinking fountain is set in a concrete pad that projects south off the main pad. The drinking fountain pad has been patched with gray concrete for the drinking fountain installation. A rounded walkway with an annuals bed in its center connects to a single walkway leading to the parking lot. A sand volleyball pit is set just south of this pavilion.

The walkway leading to the pavilions is in great condition with no observed cracking. The original red portion of the pavilion pad has significant cracking and chipping, along with some differential settlement. The concrete pad for the drinking fountain has major structural cracking aligned with the cuts and patching for the new drinking fountain. The sand volley ball pit appears to be well maintained, and the standard poles are in good condition.

*Specific recommendations:* Remove and replace the drinking fountain pad and re-set the drinking fountain.

## General Recommendations:

1. While portions of the pavilion pads may still be serviceable, the architect recommends replacing all pavilion pads in their entirety in the pavilion refurbishment scenario, for the following reasons:
    a. To ensure the concrete quality and finish matches the renewed condition of the pavilions.
    b. To prevent further deterioration of the concrete through water infiltration and freeze/thaw cycles.
    c. To prevent further differential settlement and eliminate existing and future hazards.
    d. To create a single, cohesive pad beneath the pavilions and eliminate the patching that has occurred over the years, as well as the patching that would otherwise be required to fill the holes left by the removal of the stone wall and fireplace, and the removal of the BBQ grills. As part of this replacement process, it is recommended that drinking fountain pads cast into the rectangle of the overall pavilion pad be removed and replaced, even though they are relatively new, again to eliminate a concrete patchwork.
    e. To eliminate additional patching that might be required due to structural investigations of pavilion columns.
2. At the owner's request, the architect recommends removing all BBQ grills structures.
3. Repair / replace / add turf and irrigation around new pavilion pads as needed.
4. The recommended option is to remove and replace all existing walkways and reinstalling a 6" thick slab to accommodate light vehicle use for maintenance, etc.

Additional maintenance recommendations specific to each pavilion are listed above under that pavilion's heading.

## Estimated Site Cost Per Pavilion:

| | SLAB DEMOLITION | AMPHITHEATER DEMO | VOLLEY BALL DEMO | PATCH SIDEWALKS | BACKFILL AMPHITHEATER | NEW VOLLEY BALL | NEW SLAB | LANSCAPE/ IRRIGATION ALLOWANCE | **TOTAL** |
|---|---|---|---|---|---|---|---|---|---|
| EXISTING PAVILION | $7,000 | $14,500 | $6,600 | $1,000 | $5,000 | $21,000 | $17,500 | $3,000 | **$75,600** |

OPTION: BUILD NEW RETAINING WALL IN PLACE OF AMPHITHEATER. ADD $20,300 FOR CAST IN PLACE CONCRETE WALL. ADD $5,100 FOR CONCRETE BLOCK RETAINING WALL

OPTION: REBUILD ALL NEW 6" DEEP CONCRETE SIDEWALKS. ADD $14,000 FOR DEMOLITION AT ALL PAVILIONS. ADD $45,000 TO REBUILD FOR ALL PAVILIONS

All cost estimates include labor and materials

## Description:

All of the pavilions have hip framed roofs with standing seam metal roof decks and four skinny skylights that run down the full length of the slope in the center of each hipped area. There is a masonry wall with a fireplace in it sandwiched between two concrete columns at each pavilion. The masonry wall has stone veneer on each face of the wall. There is a concrete slab around each of the pavilions that extends to just about the edge of the roof.

The framing consists of four curved glu-lam beams at each corner, two straight glu-lam beams at each side of each of the four skylights, and a glu-lam fascia member.

Although the center connection of the four corner beams could not be seen, it is assumed that one set of two opposing corner beams are continuous. The joists were also not visible but are assumed to be 2x material at possibly 24" O.C.

The four corner glu-lams bear on four 12" x 12" concrete columns that are several feet inboard of the corners. The eight straight beams bear on eight steel tubular (probably TS4x3) columns that are near the edge of the roof.

Portions of some of the glu-lam to glu-lam connections were visible. They consist of bent angles or plates, and several steel bolts.

Five of the seven pavilions appear to be the same size, but the other two, Sego Lilly and Mt. Olympus are slightly smaller than the five.

## Conditions Observed:

Most if not all:

- The original wood members are painted.
- The ceilings are all sheathed and most in fairly good shape.
- There are no gutters and the roofs just shed water from the edge of the eave.
- The skylight panels are leaking and damaging the adjacent roof members.
- The concrete columns are painted and appear to be in good condition.
- The steel members are painted. They are not protected from weather and water at the base has corroded many
- The slabs on grade has some significant cracking and movement.
- Ponding of water can and is ponding at many of the steel column locations.
- Three cracked steel columns were reported in the architectural report.

<u>Parley's Creek</u>

- The skylights appear to have been infilled with sheet metal.
- Four steel columns bear on a base plate slightly above the slab on grade. This may have been done as a repair to keep the water away. .

<u>Big Field</u>

- Some deterioration of the wood members at the skylight to fascia connections has occurred at the south and west sides of the pavilion.

<u>Fabian Lakeside</u>

- Significant deterioration of the wood members around the perimeter of the roof has occurred.

- Four steel columns bear on a base plate slightly above the slab on grade. This may have been done as a repair to keep the water away.
- Several rocks in the veneer are missing.

Hidden Grove
- There is a reveal near the top of the concrete columns.
- The skylights appear to have been infilled with sheet metal.

Sugar Beet
- There is a reveal near the top of the concrete columns.
- The north steel column on the east side has split and is bulging.
- The skylights appear to have been infilled with sheet metal.

Mt. Olympus
- This pavilion is slightly smaller than the others.
- There is a reveal near the top of the concrete columns.
- The skylights appear to have been infilled with wood framing.
- All the straight glu-lam beams adjacent to the skylights have been repaired by scabbing on a new glu-lam member alongside the existing one.
- The fascia member has been repaired by installing a steel plate across the skylight to fascia connection area and bolting to the beams.
- The two steel columns on the north are embedded in a concrete bench.

Sego Lily
- This pavilion is slightly smaller than the others.
- All the straight glu-lam beams adjacent to the skylights have been repaired by scabbing on a new glu-lam member alongside the existing one.
- The fascia members are all damaged at the skylights, but have not been repaired.
- The two steel columns on the north are embedded in a concrete bench.

## Recommendations:

1. Repaint all wood, concrete, and steel components.
2. Replace all fascia members that have been significantly damaged.
3. Replace all skylights with wood framing.
4. Replace any roofing material that is weathered, worn, or leaking.
5. Provide drainage so that water does not pond on the slab on grade.
6. Further investigate the base of the steel columns that have splitting to determine the extent of the water damage below grade.
7. If the damage to the steel columns below grade is extensive, investigate the remaining columns as well.
8. Repair and/or replace any damaged steel columns.
9. Caulk around the base of each steel and concrete column.

## Other Issues:

The pavilions were built approximately 50 years ago. It is highly probable that the columns are not reinforced with the hoop ties and spacing currently required by code for seismic resistance. There are three options to consider.

1. Provide a band or donut of properly reinforced concrete all around the existing columns. This would require a 20" square column instead of 12" square ones.
2. Wrap the existing concrete columns with carbon fiber reinforced polymer (FRP). This would provide the required containment that proper hoop ties would have provided.
3. Choose to not do anything to improve the existing columns. This option is not recommended structurally, but may be cost driven.

## Estimated Structural Cost Per Pavilion:

| | REMOVE FASCIA BOARDS | REMOVAL OF SKYLIGHTS | REPLACE GLULAM FASCIA BOARDS | REPAIR STEEL COLUMNS | FRAME IN SKYLIGHTS | **TOTAL** |
|---|---|---|---|---|---|---|
| EXISTING PAVILION | $1,000 | $2,000 | $5,000 | $2,000 | $4,000 | **$14,000** |

OPTION: WRAP EXISTING CONCRETE COLUMNS WITH CARBON FIBER REINFORCED POLYMER. ADD $3000 PER COLUMN

All cost estimates include labor and materials

## Description:

The design is intended to provide one electrical panel, 6 GFI outlets, and new interior lighting for each pavilion. The option to have exterior lighting has been provided. The lighting will be designed to have warm color/low light level that is appropriate for park. Lighting will be designed to meet the dark sky requirements.

## Recommendations:

1. Existing electrical devices such as light fixtures, outlets, panels, etc. shall be removed.

2. Remove all existing surface mounted conduit, J-boxes, etc.

3. A new twelve circuit, 100 amp single phase panel shall be provided for each pavilion. These panels shall have a heavy duty lockable enclosures (Specified by the architect). The existing feeder conduit and conductors should be replaced.

4. New GFI outlets shall be provided (minimum of four)

5. Provide new high abuse LED light fixtures in the pavilion. Light fixtures shall have 2700K color temperature (Warm color). Here is an example of the light fixture type: http://www.kenall.com/Kenall-Files/Product-Files/specificationsheets/MLHA12S.pdf

6. Provide wall mounted LED light fixtures with built in occupancy sensor/Photo cell on all sides of pavilions. Light fixtures shall have 2700K color temperature. Here is an example of the light fixture type: http://www.acuitybrands.com/products/detail/215946/lithonia-lighting/d-series-wall-size-1/size-1

7. Provide occupancy sensors/photocell to control the light fixtures. The light level shall drop to 50% after 30 minutes of motion.

### Estimated Electrical Cost Per Pavilion:

| | ELEC. DEMO | NEW PANEL/FEEDER | NEW GFI OUTLETS | INTERIOR LIGHTING | EXTERIOR LIGHTING | LIGHTING CONTROL | **TOTAL** |
|---|---|---|---|---|---|---|---|
| EXISTING PAVILION | $1,000 | $8,000 | $2,000 | $3,500 | $5,000 | $1,000 | **$20,500** |

All cost estimates include labor and materials

### Codes and Regulations:

The electrical design and installation shall meet all the local code requirements including:

a. NEC 2014
b. IBC
c. IECC
d. ANSI
e. NFPA

## SUMMARY COST ESTIMATE – EXISTING PAVILIONS

The total cost estimate to update each of the existing pavilions is as follows. These prices shown are per pavilion costs. The estimate includes architectural, structural, electrical, and site improvements including the Sugar Beet amphitheater demolition and the removal and replacement of the volleyball courts per site analysis suggestions. The estimate also includes labor, materials and a 15% contingency and 5% escalation for 2017.

| | SELECTIVE DEMOLITION | SITE IMPROVEMENTS | ARCHITECTURAL UPGRADES | ELECTRICAL | STRUCTURAL UPGRADES | CONTIGENCY 15% | 5% ESCALATION FOR 2017 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|
| EXISTING | $40,300 | $47,500 | $5,500 | $19,500 | $11,000 | $18,570 | $7,119 | **$149,489** |

OPTION: BUILD NEW RETAINING WALL IN PLACE OF AMPHITHEATER. ADD $20,300 FOR CAST IN PLACE CONCRETE WALL. ADD $5,100 FOR CONCRETE BLOCK RETAINING WALL

OPTION: REBUILD ALL NEW 6" DEEP CONCRETE SIDEWALKS. ADD $14,000 FOR DEMOLITION AT ALL PAVILIONS. ADD $45,000 TO REBUILD FOR ALL PAVILIONS

Representation of the existing pavilions with new upgrades.

# NEW PAVILIONS

Building new pavilions provides the opportunity for the park to have more functional, easily maintained shelters that create a new identity for the park. These new pavilions would give the park a much needed upgrade to meet growing demands. Building new pavilions permits ADA and code compliance. The following analysis describes the architectural, site and electrical elements that would be included in the building of new pavilions.

## ARCHITECTURAL ANALYSIS

The replacement of the existing pavilions will require total demolition of the existing pavilions, charcoal grills, and concrete pads. The priority of replacement is determined on the condition of the existing pavilions. Salt Lake County is to decide which is to be replaced first. As previously indicated the following list specifies pavilion condition from best to worst to assist with replacement prioritization.

**Condition of Pavilions – Ranked Best to Worst:**

1. Parley's Creek
2. Big Field
3. Fabian Lakeside
4. Hidden Grove
5. Sugar Beet
6. Mt. Olympus
7. Sego Lily

The size of the new pavilions will be as follows:

Big Field will be the largest at 44' x 58'. This pavilion is heavily used and in a prominent location

Fabian Lake, Parley's Creek, Hidden Grove and Sugar Beet are to be medium sized pavilions at a size of 40' x 50'.

Sego Lily and Mt. Olympus are to be the small pavilions at 34' x 44'.

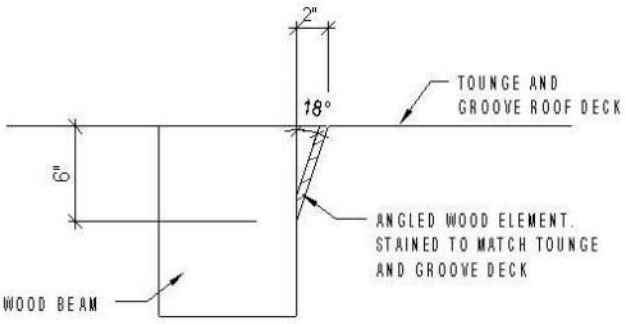
The new pavilions will include a mega-rib metal roof. The underside of the roof is a tongue and groove wooden deck. The roof structure is composed of engineered wood beams held up by double steel columns.

A new concrete slab will be poured for each new pavilion. See the site analysis for more information and layouts.

The new pavilions will have a mono-slop roof similar to the roof on the new restrooms. The lowest end will start at 10' above concrete, raising to a height of about 14' to the north.

The Fabian Lakeside and Big Field Pavilions will be unique pavilions, incorporating a fan shape to the roof (see site plans in following section). Additionally the Fabian Lakeside pavilion will have an option to have stone column wraps around each column.

In order to prevent bird nesting on the underside beams of the pavilions, a proposed solution of a trim piece should be tested via mock-up. The trim includes a piece of angled wood that will be placed between the ceiling and the beam of the new pavilions. This will create a non-90-degree angled surface that will deter nest building by swallows. See drawing below.



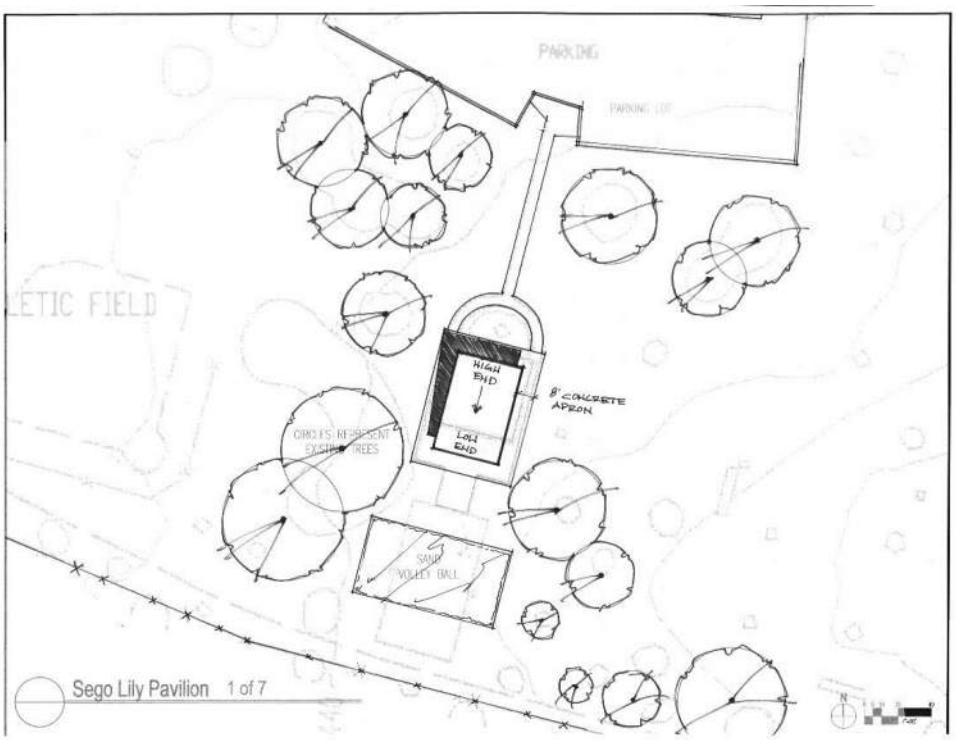

## SITE ANALYSIS

For new construction, the recommendations regarding site elements – pavilion pads, walkways, drinking fountains, sports courts – would be similar to the recommendations in the Renovate Existing section for refurbishment, with the following modifications:

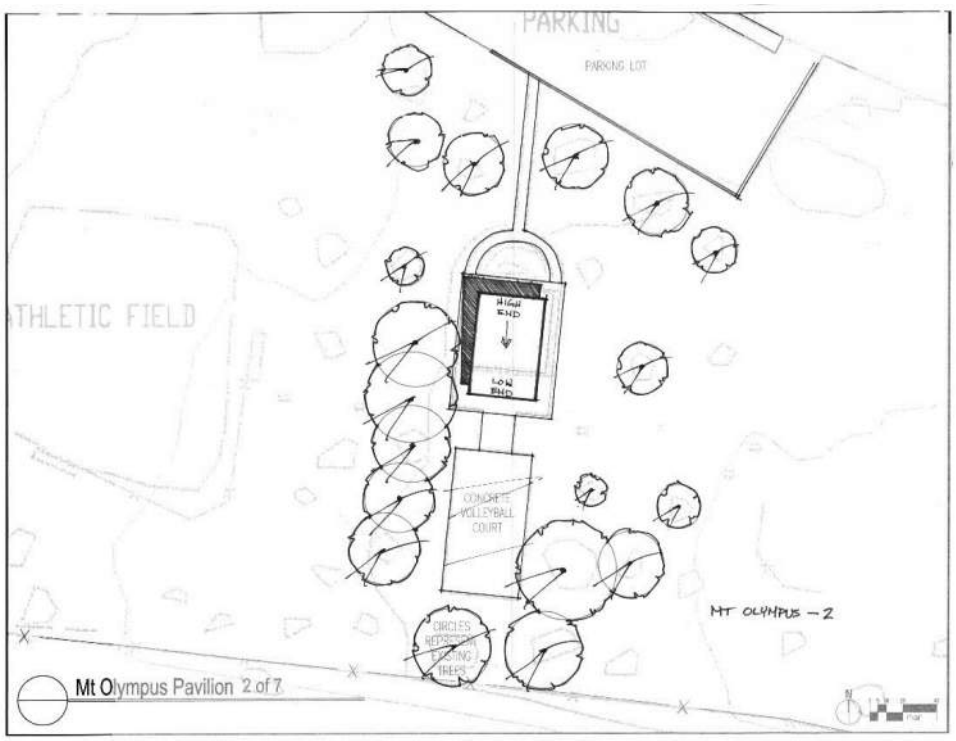
1. The configuration and sizes of the concrete pads will be adjusted to conform to the new pavilion dimensions. See included site sketches.
2. Connecting walkways may need to be added or modified to align with new pavilion layouts.
3. Landscape restoration and modification will be more significant to address the new pavilion layouts. Irrigation systems will require realignment, and potential minor redesign to ensure proper pressure and coverage. Irrigation controllers my need to be relocated.
4. At the Sugar Beet Pavilion, construct a site retaining wall in place of the amphitheater, and extend the concrete pad to the wall. This will increase the usable paved surface for larger gatherings and programs.

The following site plans represent the layout of each new pavilion. The pavilions are situated on the site with the low end at the south raising up toward the north to maximize shading.

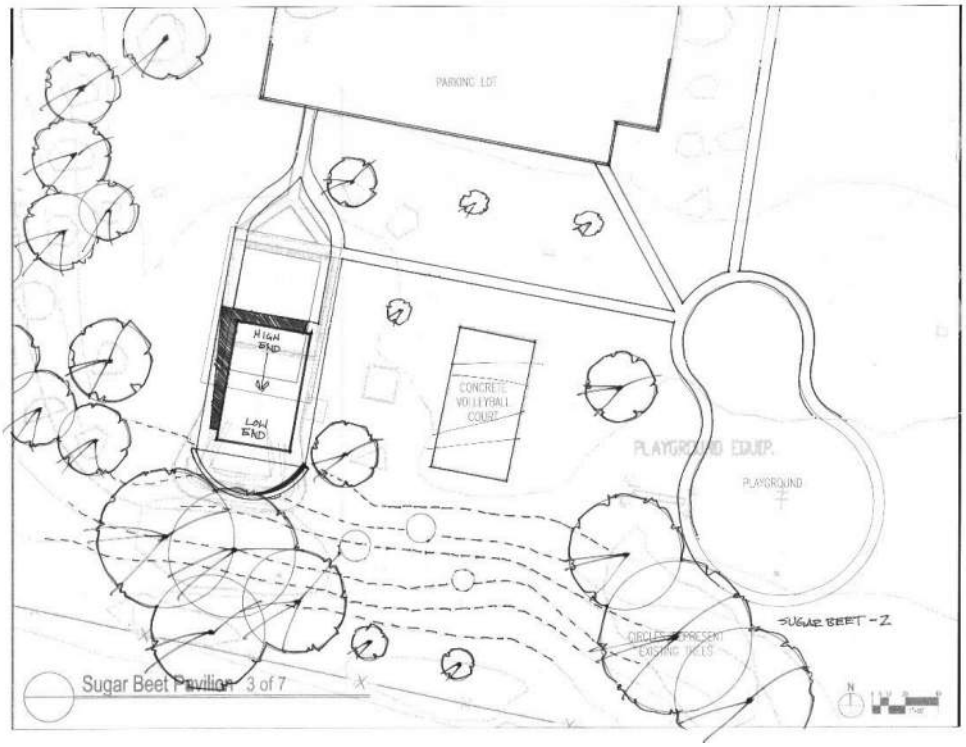
Sego Lily



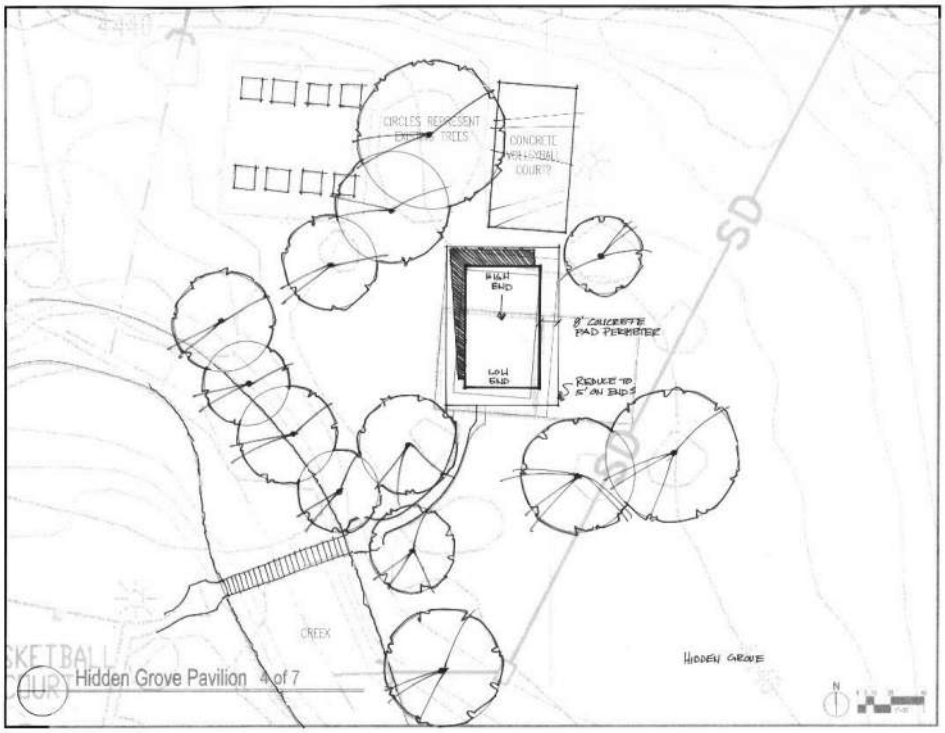

Mt. Olympus



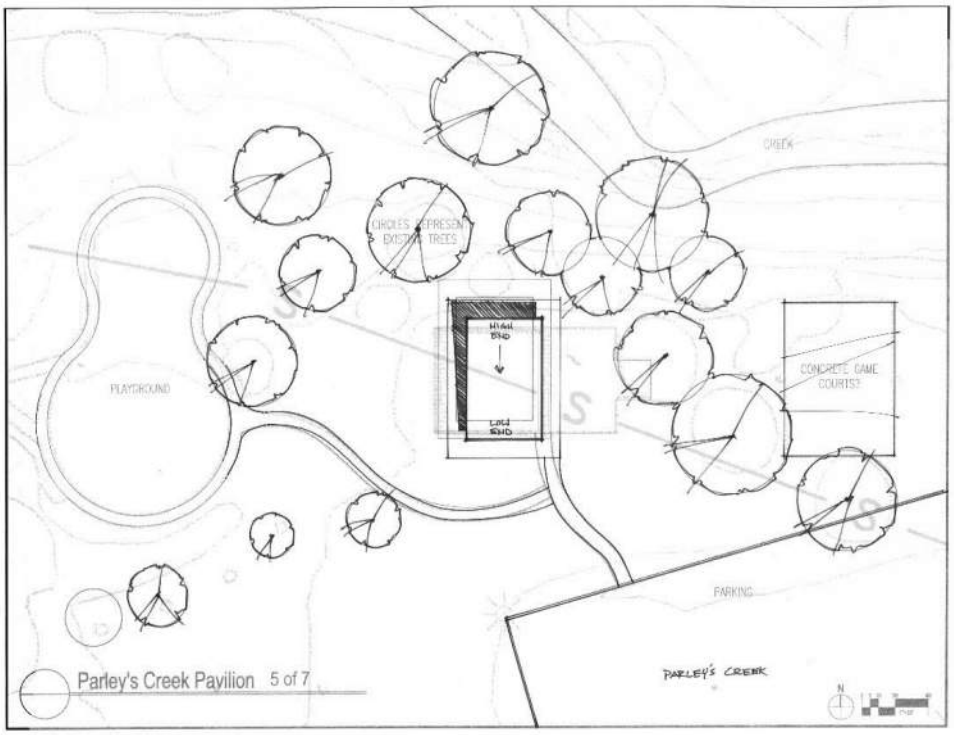
Sugar Beet



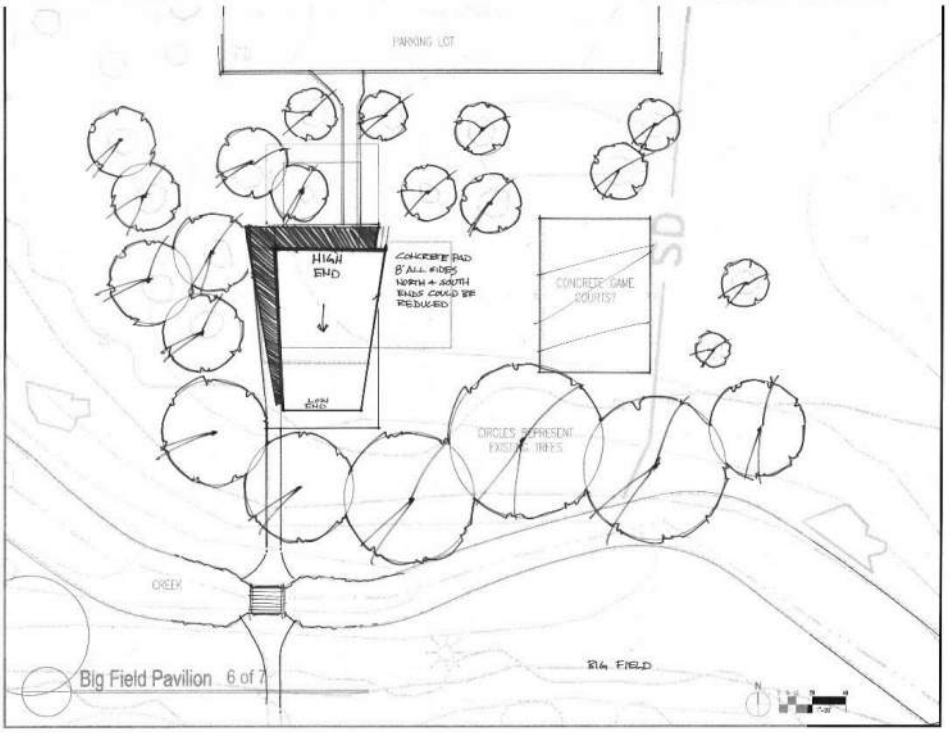

Hidden Grove



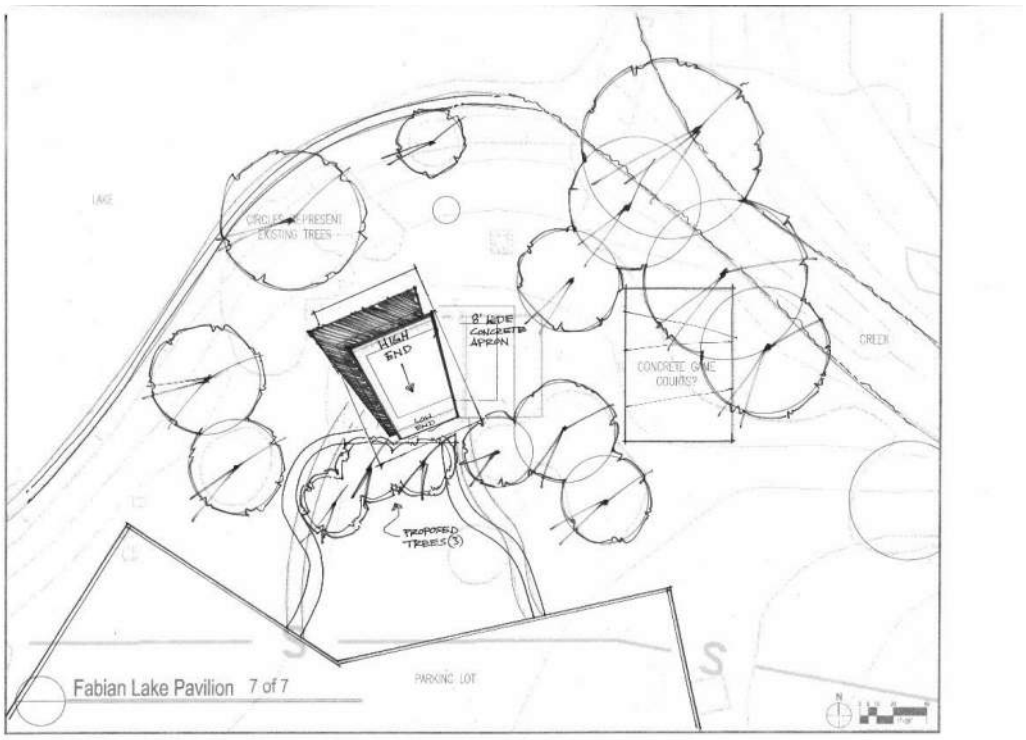
Parley's Creek




Big Field



Fabian Lakeside




**Average Estimated Site Cost Per Pavilion:**

| | SLAB DEMOLITION | AMPHITHEATER DEMO | VOLLEY BALL DEMO | PATCH SIDEWALKS | BACKFILL AMPHITHEATER | NEW VOLLEY BALL | NEW SLAB | LANSCAPE/ IRRIGATION ALLOWANCE | **TOTAL** |
|---|---|---|---|---|---|---|---|---|---|
| NEW PAVILION | $7,000 | $14,500 | $6,600 | $1,000 | $5,000 | $21,000 | $17,500 | $3,000 | **$75,600** |

OPTION: BUILD NEW RETAINING WALL IN PLACE OF AMPHITHEATER. ADD $18,300 FOR CAST IN PLACE CONCRETE WALL. ADD $3,100 FOR CONCRETE BLOCK RETAINING WALL

OPTION: REBUILD ALL NEW 6" DEEP CONCRETE SIDEWALKS. ADD $14,000 FOR DEMOLITION AT ALL PAVILIONS. ADD $45,000 TO REBUILD FOR ALL PAVILIONS

All cost estimates include labor and materials

## STRUCTURAL ANALYSIS

The pavilion shelters are pre-engineered from the manufacturer and do not require further engineering. The columns will sit on concrete footings below finish grade. More information for the new concrete slabs was provided in the site analysis section.

## Description:

The design is intended to provide one electrical panel, 6 GFI outlets, and new interior lighting for each pavilion. The option to have exterior lighting has been provided. The lighting will be designed to have warm color/low light level that is appropriate for park. Lighting will be designed to meet the dark sky requirements.

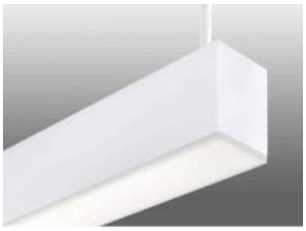
## Recommendations:

1. A new twelve circuit, 100 amp single phase narrow width panel shall be provided for each pavilion. These panels shall have a heavy duty lockable enclosures (Specified by the architect). The existing feeder conduit and conductors should be replaced. Panel to be mounted in between columns at low end of pavilion.

2. New GFI outlets shall be provided (minimum of Six, each on a dedicated circuit) imbedded inside columns.

3. Provide a 50 amp, 208 volt outlet with lockable enclosure in the Big Field pavilion to be used for different activities.

4. Option 1 Interior Lighting: linear vandal resistant 8' surface mounted fixture. Light fixtures shall have 2700K color temperature (Warm color). Owner to decide option of using an occupancy sensor/Photo cell or time clock to reduce light level to 50% after hours. Fabian Lakeside, Big Field, and Hidden Grove will have the option of brighter after hours lighting. Architect to design a wooden box enclosure to surround the fixture. This will help further secure it and help it blend into the background of the ceiling.
   http://www.pinnacle-ltg.com/files/downloads/Pinnacle%202013%20Website/Color%20Brochures/Edge_Wet_Brochure.pdf


Actual fixture would be black

5. Option 2 Interior Lighting: Provide new cylinder type, ceiling mounted LED light fixtures in the pavilion. Protective cages need to be designed around the fixtures to make them vandal resistance. Light fixtures shall have 2700K color temperature (Warm color).

6. Optional exterior wall mounted LED light fixtures with built in occupancy sensor/Photo cell on all sides of pavilions. Light fixtures shall have 2700K color temperature. Below are examples of light fixture types:
    a. http://www.ligmanlightingusa.com/led-lighting-products/product-family/tango/tango-cylindrical-and-square-wall-up-down-light-hp-led

    b. http://www.acuitybrands.com/products/detail/215946/lithonia-lighting/d-series-wall-size-1/size-1

7. Provide occupancy sensors/photocell to control the light fixtures. The light level shall drop to 50% after 30 minutes of motion.

## Average Estimated Electrical Cost Per Pavilion

| | ELEC. DEMO | NEW PANEL/FEEDER | NEW GFI OUTLETS | INTERIOR LIGHTING | EXTERIOR LIGHTING | LIGHTING CONTROL | **TOTAL** |
|---|---|---|---|---|---|---|---|
| EXISTING PAVILION | $1,000 | $8,000 | $2,000 | $14,000 | $6,000 | $1,000 | **$32,000** |

All cost estimates include labor and materials

## Codes and Regulations

The electrical design and installation shall meet all the local code requirements including:

a. NEC 2014
b. IBC
c. IECC
d. ANSI
e. NFPA

## SUMMARY COST ESTIMATE – NEW PAVILIONS

The cost for each pavilion is illustrated in the diagrams below – these costs include freight, materials, labor, and engineering from the pre-manufacturer for one pavilion. The costs also include demolition, new slab, footings, site improvements, electrical, 15% contingency and 5% escalation for 2017.

**SEGO LILY**

| SIZE | DEMO OF EXISTING PAVILION | DEMO OF SITE | NEW CONCRETE PAD | NEW FOOTINGS | LANSCAPE/ IRRIGATION ALLOWANCE | ELECTRICAL | NEW SHELTER | CONTIGENCY 15% | 5% ESCALATION FOR 2017 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|---|---|
| 34x44 | $15,000 | $13,600 | $14,000 | $15,000 | $3,000 | $29,000 | $92,482 | $25,272 | $9,688 | **$203,442** |

OPTION: REBUILD ALL NEW 6" DEEP CONCRETE SIDEWALKS. ADD $2,100 FOR DEMOLITION. ADD $7,500 TO REBUILD

**MT OLYMPUS**

| SIZE | DEMO OF EXISTING PAVILION | DEMO OF SITE | NEW CONCRETE PAD | NEW FOOTINGS | LANSCAPE/ IRRIGATION ALLOWANCE | ELECTRICAL | NEW SHELTER | CONTIGENCY 15% | 5% ESCALATION FOR 2017 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|---|---|
| 34x44 | $15,000 | $13,600 | $14,000 | $15,000 | $3,000 | $29,000 | $92,482 | $25,272 | $9,688 | **$203,442** |

OPTION: REBUILD ALL NEW 6" DEEP CONCRETE SIDEWALKS. ADD $2,100 FOR DEMOLITION. ADD $7,500 TO REBUILD

**SUGAR BEET**

| SIZE | DEMO OF EXISTING PAVILION | DEMO OF SITE | REMOVAL OF AMPHITHEATER | NEW CONCRETE PAD | NEW FOOTINGS | LANSCAPE/ IRRIGATION ALLOWANCE | ELECTRICAL | BACKFILL AMPHITHEATER | NEW SHELTER | CONTIGENCY 15% | 5% ESCALATION FOR 2017 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40x50 | $15,000 | $13,600 | $14,000 | $19,000 | $15,000 | $3,000 | $32,000 | $5,000 | $92,482 | $28,572 | $10,953 | **$211,007** |

OPTION: BUILD NEW RETAINING WALL IN PLACE OF AMPHITHEATER. ADD $18,300 FOR CAST IN PLACE CONCRETE WALL. ADD $3,100 FOR CONCRETE BLOCK RETAINING WALL

OPTION: REBUILD ALL NEW 6" DEEP CONCRETE SIDEWALKS. ADD $1,000 FOR DEMOLITION. ADD $5,700 TO REBUILD

**HIDDEN GROVE**

| SIZE | DEMO OF EXISTING PAVILION | DEMO OF SITE | NEW CONCRETE PAD | NEW FOOTINGS | LANSCAPE/ IRRIGATION ALLOWANCE | ELECTRICAL | NEW SHELTER | CONTIGENCY 15% | 5% ESCALATION FOR 2017 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|---|---|
| 40X50 | $15,000 | $13,600 | $16,500 | $15,000 | $3,000 | $32,000 | $121,493 | $30,449 | $11,672 | **$245,114** |

OPTION: REBUILD ALL NEW 6" DEEP CONCRETE SIDEWALKS. ADD $1,300 FOR DEMOLITION. ADD $4,000 TO REBUILD

**PARLEY'S CREEK**

| SIZE | DEMO OF EXISTING PAVILION | DEMO OF SITE | NEW CONCRETE PAD | NEW FOOTINGS | LANSCAPE/ IRRIGATION ALLOWANCE | ELECTRICAL | NEW SHELTER | CONTIGENCY 15% | 5% ESCALATION FOR 2017 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|---|---|
| 40X50 | $15,000 | $13,600 | $16,500 | $15,000 | $3,000 | $32,000 | $121,493 | $30,449 | $11,672 | **$245,114** |

OPTION: REBUILD ALL NEW 6" DEEP CONCRETE SIDEWALKS. ADD $1,200 FOR DEMOLITION. ADD $4,200 TO REBUILD

**BIG FIELD**

| SIZE | DEMO OF EXISTING PAVILION | DEMO OF SITE | NEW CONCRETE PAD | NEW FOOTINGS | LANSCAPE/ IRRIGATION ALLOWANCE | ELECTRICAL | NEW SHELTER | CONTIGENCY 15% | 5% ESCALATION FOR 2017 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|---|---|
| 44X58 | $15,000 | $13,600 | $21,000 | $15,000 | $3,000 | $34,000 | $147,750 | $35,363 | $13,556 | **$284,669** |

OPTION: REBUILD ALL NEW 6" DEEP CONCRETE SIDEWALKS. ADD $3,500 FOR DEMOLITION. ADD $8,000 TO REBUILD

**FABIAN LAKESIDE**

| SIZE | DEMO OF EXISTING PAVILION | DEMO OF SITE | NEW CONCRETE PAD | NEW FOOTINGS | LANSCAPE/ IRRIGATION ALLOWANCE | ELECTRICAL | STONE COLUMN SURROUNDS | NEW SHELTER | CONTIGENCY 15% | 5% ESCALATION FOR 2017 | **TOTAL** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 40X50 | $15,000 | $13,600 | $16,500 | $15,000 | $3,000 | $32,000 | $20,000 | $128,164 | $34,450 | $13,206 | **$277,319** |

OPTION: REBUILD ALL NEW 6" DEEP CONCRETE SIDEWALKS. ADD $3,200 FOR DEMOLITION. ADD $11,800 TO REBUILD

Representation of the design prototype of the new pavilions.

Representation of the Fabian Lakeside Pavilion including the option of fan shaped roof and stone column surrounds upgrades

# RECOMMENDATIONS

It is recommended that the existing pavilions at Sugarhouse Park be replaced with new custom pre-manufactured shelters that will include new concrete slabs and all new electrical. These new pavilions will replace the existing shelters and charcoal grills that will be demolished. Along with new concrete slabs, the amphitheater at Sugar Beet will be removed with the option to replace with a retaining wall.

Sugarhouse Park is used throughout the year and the upgrade to new pavilions would be highly influential on how people use the park. This is a great opportunity to take one of the most popular parks in Salt Lake City and make it more attractive and functional.

Building new pavilions will provide the park with the needed upgrades that it is seeking while creating a beautiful environment that will attract more and more visitors for years to come.

Recommended Pavilion Replacement Prototype

# APPENDIX

The appendix includes the specification sheets for the light fixtures and electrical panel.

# D-Series Size 1
## LED Wall Luminaire

Catalog Number

Notes

Type

*Hit the Tab key or mouse over the page to see all interactive elements.*

d-series

## Introduction

The D-Series Wall luminaire is a stylish, fully integrated LED solution for building-mount applications. It features a sleek, modern design and is carefully engineered to provide long-lasting, energy-efficient lighting with a variety of optical and control options for customized performance.

With an expected service life of over 20 years of nighttime use and up to 74% in energy savings over comparable 250W metal halide luminaires, the D-Series Wall is a reliable, low-maintenance lighting solution that produces sites that are exceptionally illuminated.

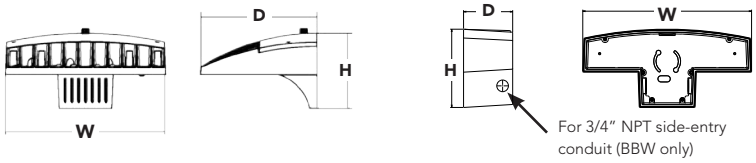
## Specifications

### Luminaire

| | | | |
|---|---|---|---|
| **Width:** | 13-3/4" (34.9 cm) | **Weight:** | 12 lbs (5.4 kg) |
| **Depth:** | 10" (25.4 cm) | | |
| **Height:** | 6-3/8" (16.2 cm) | | |

### Back Box (BBW, ELCW)

| | | | |
|---|---|---|---|
| **Width:** | 13-3/4" (34.9 cm) | **BBW Weight:** | 5 lbs (2.3 kg) |
| **Depth:** | 4" (10.2 cm) | **ELCW Weight:** | 10 lbs (4.5 kg) |
| **Height:** | 6-3/8" (16.2 cm) | | |




## Ordering Information

**EXAMPLE:** DSXW1 LED 20C 1000 40K T3M MVOLT DDBTXD

| DSXW1 LED | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Series** | **LEDs** | **Drive Current** | **Color temperature** | **Distribution** | **Voltage** | **Mounting** | **Control Options** |
| DSXW1 LED | 10C 10 LEDs (one engine)<br>20C 20 LEDs (two engines) | 350 350 mA<br>530 530 mA<br>700 700 mA<br>1000 1000 mA (1 A) | 30K 3000 K<br>40K 4000 K<br>50K 5000 K<br>AMBPC Amber phosphor converted | T2S Type II Short<br>T2M Type II Medium<br>T3S Type III Short<br>T3M Type III Medium<br>T4M Type IV Medium<br>TFTM Forward Throw Medium<br>ASYDF Asymmetric diffuse | MVOLT [1]<br>120 [1]<br>208 [1]<br>240 [1]<br>277 [1]<br>347 [2]<br>480 [2] | **Shipped included**<br>(blank) Surface mounting bracket<br>BBW Surface-mounted back box (for conduit entry) [3] | **Shipped installed**<br>PE Photoelectric cell, button type [4]<br>DMG 0-10V dimming driver (no controls)<br>PIR 180° motion/ambient light sensor, <15' mtg ht [5]<br>PIRH 180° motion/ambient light sensor, 15-30' mtg ht [5]<br>PIR1FC3V Motion/ambient sensor, 8-15' mounting height, ambient sensor enabled at 1fc [5]<br>PIRH1FC3V Motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 1fc [5]<br>ELCW Emergency battery backup (includes external component enclosure) [6] |

| Other Options | | | | Finish *(required)* | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Shipped installed** | | **Shipped separately** [8] | | DDBXD | Dark bronze | DSSXD | Sandstone | DWHGXD | Textured white |
| SF | Single fuse (120, 277 or 347V) [7] | BSW | Bird-deterrent spikes | DBLXD | Black | DDBTXD | Textured dark bronze | DSSTXD | Textured sandstone |
| DF | Double fuse (208, 240 or 480V) [7] | WG | Wire guard | DNAXD | Natural aluminum | DBLBXD | Textured black | | |
| HS | House-side shield [8] | VG | Vandal guard | DWHXD | White | DNATXD | Textured natural aluminum | | |
| SPD | Separate surge protection [9] | DDL | Diffused drop lens | | | | | | |

**NOTES**

1 MVOLT driver operates on any line voltage from 120-277V (50/60 Hz). Specify 120, 208, 240 or 277 options only when ordering with fusing (SF, DF options), or photocontrol (PE option).
2 Only available with 20C, 700mA or 1000mA. Not available with PIR or PIRH.
3 Back box ships installed on fixture. Cannot be field installed. Cannot be ordered as an accessory.
4 Photocontrol (PE) requires 120, 208, 240, 277 or 347 voltage option. Not available with motion/ambient light sensors (PIR or PIRH).
5 PIR and PIR1FC3V specifies the Sensor Switch SBGR-10-ODP control; PIRH specifies the Sensor Switch SBGR-6-ODP control; see Motion Sensor Guide for details. Includes ambient light sensor. Not available with "PE" option (button type photocell). Dimming driver standard. Not available with 20 LED/1000 mA configuration (DSXW1 LED 20C 1000).
6 Cold weather (-20C) rated. Not compatible with conduit entry applications. Not available with BBW mounting option. Not available with fusing. Not available with 347 or 480 voltage options. Emergency components located in back box housing. Emergency mode IES files located on product page at www.lithonia.com
7 Single fuse (SF) requires 120, 277 or 347 voltage option. Double fuse (DF) requires 208, 240 or 480 voltage option. Not available with ELCW.
8 Also available as a separate accessory; see Accessories information.
9 See the electrical section on page 3 for more details.

## Accessories

*Ordered and shipped separately.*

| | |
|---|---|
| DSXWHS U | House-side shield (one per light engine) |
| DSXWBSW U | Bird-deterrent spikes |
| DSXW1WG U | Wire guard accessory |
| DSXW1VG U | Vandal guard accessory |

LITHONIA LIGHTING

One Lithonia Way • Conyers, Georgia 30012 • Phone: 800.279.8041 • Fax: 770.918.1209 • www.lithonia.com

## Performance Data

### Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

| LEDs | Drive Current (mA) | System Watts | Dist. Type | 30K | | | | | 40K | | | | | 50K | | | | | AMBER | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lumens | B | U | G | LPW | Lumens | B | U | G | LPW | Lumens | B | U | G | LPW | Lumens | B | U | G | LPW |
| 10C (10 LEDs) | 350mA | 14W | T2S | 1,415 | 0 | 0 | 1 | 101 | 1,520 | 0 | 0 | 1 | 109 | 1,529 | 0 | 0 | 1 | 109 | 894 | 0 | 0 | 1 | 64 |
| | | | T2M | 1,349 | 0 | 0 | 1 | 96 | 1,449 | 0 | 0 | 1 | 104 | 1,458 | 0 | 0 | 1 | 104 | 852 | 0 | 0 | 1 | 61 |
| | | | T3S | 1,400 | 0 | 0 | 1 | 100 | 1,503 | 0 | 0 | 1 | 107 | 1,512 | 0 | 0 | 1 | 108 | 884 | 0 | 0 | 1 | 63 |
| | | | T3M | 1,386 | 0 | 0 | 1 | 99 | 1,488 | 0 | 0 | 1 | 106 | 1,497 | 0 | 0 | 1 | 107 | 876 | 0 | 0 | 1 | 63 |
| | | | T4M | 1,358 | 0 | 0 | 1 | 97 | 1,458 | 0 | 0 | 1 | 104 | 1,467 | 0 | 0 | 1 | 105 | 858 | 0 | 0 | 1 | 61 |
| | | | TFTM | 1,411 | 0 | 0 | 1 | 101 | 1,515 | 0 | 0 | 1 | 108 | 1,525 | 0 | 0 | 1 | 109 | 892 | 0 | 0 | 1 | 64 |
| | | | ASYDF | 1,262 | 0 | 0 | 1 | 90 | 1,355 | 1 | 0 | 1 | 97 | 1,363 | 1 | 0 | 1 | 97 | 797 | 0 | 0 | 1 | 57 |
| | 530 mA | 20W | T2S | 2,054 | 1 | 0 | 1 | 103 | 2,205 | 1 | 0 | 1 | 110 | 2,219 | 1 | 0 | 1 | 111 | 1,264 | 0 | 0 | 1 | 63 |
| | | | T2M | 1,957 | 1 | 0 | 1 | 98 | 2,102 | 1 | 0 | 1 | 105 | 2,115 | 1 | 0 | 1 | 106 | 1,205 | 0 | 0 | 1 | 60 |
| | | | T3S | 2,031 | 0 | 0 | 1 | 102 | 2,181 | 0 | 0 | 1 | 109 | 2,195 | 0 | 0 | 1 | 110 | 1,250 | 0 | 0 | 1 | 63 |
| | | | T3M | 2,010 | 1 | 0 | 1 | 101 | 2,159 | 1 | 0 | 1 | 108 | 2,172 | 1 | 0 | 1 | 109 | 1,237 | 0 | 0 | 1 | 62 |
| | | | T4M | 1,970 | 1 | 0 | 1 | 99 | 2,115 | 1 | 0 | 1 | 106 | 2,128 | 0 | 0 | 1 | 106 | 1,212 | 0 | 0 | 1 | 61 |
| | | | TFTM | 2,047 | 0 | 0 | 1 | 102 | 2,198 | 0 | 0 | 1 | 110 | 2,212 | 0 | 0 | 1 | 111 | 1,260 | 0 | 0 | 1 | 63 |
| | | | ASYDF | 1,830 | 1 | 0 | 1 | 92 | 1,966 | 1 | 0 | 1 | 98 | 1,978 | 1 | 0 | 1 | 99 | 1,127 | 0 | 0 | 1 | 56 |
| | 700 mA | 27W | T2S | 2,623 | 1 | 0 | 1 | 97 | 2,816 | 1 | 0 | 1 | 104 | 2,834 | 1 | 0 | 1 | 105 | 1,544 | 0 | 0 | 1 | 57 |
| | | | T2M | 2,499 | 1 | 0 | 1 | 93 | 2,684 | 1 | 0 | 1 | 99 | 2,701 | 1 | 0 | 1 | 100 | 1,472 | 0 | 0 | 1 | 55 |
| | | | T3S | 2,593 | 1 | 0 | 1 | 96 | 2,785 | 1 | 0 | 1 | 103 | 2,802 | 1 | 0 | 1 | 104 | 1,527 | 0 | 0 | 1 | 57 |
| | | | T3M | 2,567 | 1 | 0 | 1 | 95 | 2,757 | 1 | 0 | 1 | 102 | 2,774 | 1 | 0 | 1 | 103 | 1,512 | 0 | 0 | 1 | 56 |
| | | | T4M | 2,515 | 1 | 0 | 1 | 93 | 2,701 | 1 | 0 | 1 | 100 | 2,718 | 1 | 0 | 1 | 101 | 1,481 | 0 | 0 | 1 | 55 |
| | | | TFTM | 2,614 | 1 | 0 | 1 | 97 | 2,807 | 1 | 0 | 1 | 104 | 2,825 | 1 | 0 | 1 | 105 | 1,539 | 0 | 0 | 1 | 57 |
| | | | ASYDF | 2,337 | 1 | 0 | 1 | 87 | 2,510 | 1 | 0 | 1 | 93 | 2,526 | 1 | 0 | 1 | 94 | 1,376 | 0 | 0 | 1 | 51 |
| | 1000 mA | 40W | T2S | 3,685 | 1 | 0 | 1 | 92 | 3,957 | 1 | 0 | 1 | 99 | 3,982 | 1 | 0 | 1 | 100 | 2,235 | 1 | 0 | 1 | 58 |
| | | | T2M | 3,512 | 1 | 0 | 1 | 88 | 3,771 | 1 | 0 | 1 | 94 | 3,795 | 1 | 0 | 1 | 95 | 2,130 | 1 | 0 | 2 | 55 |
| | | | T3S | 3,644 | 1 | 0 | 1 | 91 | 3,913 | 1 | 0 | 1 | 98 | 3,938 | 1 | 0 | 1 | 98 | 2,210 | 1 | 0 | 2 | 57 |
| | | | T3M | 3,607 | 1 | 0 | 1 | 90 | 3,874 | 1 | 0 | 1 | 97 | 3,898 | 1 | 0 | 1 | 97 | 2,187 | 1 | 0 | 2 | 56 |
| | | | T4M | 3,534 | 1 | 0 | 1 | 88 | 3,795 | 1 | 0 | 1 | 95 | 3,819 | 1 | 0 | 1 | 95 | 2,143 | 1 | 0 | 2 | 55 |
| | | | TFTM | 3,674 | 1 | 0 | 1 | 92 | 3,945 | 1 | 0 | 1 | 99 | 3,969 | 1 | 0 | 1 | 99 | 2,228 | 1 | 0 | 2 | 57 |
| | | | ASYDF | 3,284 | 1 | 0 | 1 | 82 | 3,527 | 1 | 0 | 1 | 88 | 3,549 | 1 | 0 | 1 | 89 | 1,991 | 1 | 0 | 2 | 51 |
| 20C (20 LEDs) | 350mA | 24W | T2S | 2,820 | 1 | 0 | 1 | 118 | 3,028 | 1 | 0 | 1 | 126 | 3,047 | 1 | 0 | 1 | 127 | 1,777 | 1 | 0 | 1 | 74 |
| | | | T2M | 2,688 | 1 | 0 | 1 | 112 | 2,886 | 1 | 0 | 1 | 120 | 2,904 | 1 | 0 | 1 | 121 | 1,693 | 1 | 0 | 1 | 71 |
| | | | T3S | 2,789 | 1 | 0 | 1 | 116 | 2,995 | 1 | 0 | 2 | 125 | 3,013 | 1 | 0 | 2 | 126 | 1,757 | 0 | 0 | 1 | 73 |
| | | | T3M | 2,761 | 1 | 0 | 1 | 115 | 2,964 | 1 | 0 | 2 | 124 | 2,983 | 1 | 0 | 2 | 124 | 1,739 | 1 | 0 | 1 | 72 |
| | | | T4M | 2,705 | 1 | 0 | 1 | 113 | 2,904 | 1 | 0 | 2 | 121 | 2,922 | 1 | 0 | 2 | 122 | 1,704 | 1 | 0 | 1 | 71 |
| | | | TFTM | 2,811 | 1 | 0 | 1 | 117 | 3,019 | 1 | 0 | 2 | 126 | 3,038 | 1 | 0 | 2 | 127 | 1,771 | 0 | 0 | 1 | 74 |
| | | | ASYDF | 2,513 | 1 | 0 | 1 | 105 | 2,699 | 1 | 0 | 2 | 112 | 2,716 | 1 | 0 | 2 | 113 | 1,584 | 1 | 0 | 1 | 66 |
| | 530 mA | 36W | T2S | 4,079 | 1 | 0 | 1 | 113 | 4,380 | 1 | 0 | 1 | 122 | 4,408 | 1 | 0 | 1 | 122 | 2,504 | 1 | 0 | 1 | 70 |
| | | | T2M | 3,887 | 1 | 0 | 1 | 108 | 4,174 | 1 | 0 | 1 | 116 | 4,200 | 1 | 0 | 1 | 117 | 2,387 | 1 | 0 | 1 | 66 |
| | | | T3S | 4,034 | 1 | 0 | 1 | 112 | 4,332 | 1 | 0 | 1 | 120 | 4,359 | 1 | 0 | 1 | 121 | 2,477 | 1 | 0 | 1 | 69 |
| | | | T3M | 3,993 | 1 | 0 | 1 | 111 | 4,288 | 1 | 0 | 1 | 119 | 4,315 | 1 | 0 | 1 | 120 | 2,451 | 1 | 0 | 2 | 68 |
| | | | T4M | 3,912 | 1 | 0 | 2 | 109 | 4,201 | 1 | 0 | 2 | 117 | 4,227 | 1 | 0 | 1 | 117 | 2,402 | 1 | 0 | 1 | 67 |
| | | | TFTM | 4,066 | 1 | 0 | 1 | 113 | 4,367 | 1 | 0 | 1 | 121 | 4,394 | 1 | 0 | 1 | 122 | 2,496 | 1 | 0 | 1 | 69 |
| | | | ASYDF | 3,635 | 1 | 0 | 2 | 101 | 3,904 | 1 | 0 | 2 | 108 | 3,928 | 1 | 0 | 2 | 109 | 2,232 | 1 | 0 | 1 | 62 |
| | 700 mA | 47W | T2S | 5,188 | 1 | 0 | 1 | 110 | 5,571 | 1 | 0 | 1 | 119 | 5,606 | 1 | 0 | 1 | 119 | 3,065 | 1 | 0 | 1 | 65 |
| | | | T2M | 4,945 | 1 | 0 | 1 | 105 | 5,310 | 1 | 0 | 1 | 113 | 5,343 | 1 | 0 | 1 | 114 | 2,921 | 1 | 0 | 1 | 62 |
| | | | T3S | 5,131 | 1 | 0 | 1 | 109 | 5,510 | 1 | 0 | 2 | 117 | 5,544 | 1 | 0 | 2 | 118 | 3,031 | 1 | 0 | 1 | 64 |
| | | | T3M | 5,079 | 1 | 0 | 2 | 108 | 5,454 | 1 | 0 | 2 | 116 | 5,488 | 1 | 0 | 2 | 117 | 3,000 | 1 | 0 | 1 | 64 |
| | | | T4M | 4,976 | 1 | 0 | 2 | 106 | 5,343 | 1 | 0 | 2 | 114 | 5,377 | 1 | 0 | 2 | 114 | 2,939 | 1 | 0 | 1 | 63 |
| | | | TFTM | 5,172 | 1 | 0 | 2 | 110 | 5,554 | 1 | 0 | 2 | 118 | 5,589 | 1 | 0 | 2 | 119 | 3,055 | 1 | 0 | 1 | 65 |
| | | | ASYDF | 4,624 | 1 | 0 | 2 | 98 | 4,966 | 1 | 0 | 2 | 106 | 4,997 | 1 | 0 | 2 | 106 | 2,732 | 1 | 0 | 1 | 58 |
| | 1000 mA | 74W | T2S | 7,205 | 1 | 0 | 1 | 97 | 7,736 | 1 | 0 | 1 | 105 | 7,785 | 1 | 0 | 1 | 105 | 4,429 | 1 | 0 | 1 | 61 |
| | | | T2M | 6,866 | 1 | 0 | 2 | 93 | 7,373 | 1 | 0 | 2 | 100 | 7,419 | 1 | 0 | 2 | 100 | 4,221 | 1 | 0 | 2 | 58 |
| | | | T3S | 7,124 | 1 | 0 | 2 | 96 | 7,650 | 1 | 0 | 2 | 103 | 7,698 | 1 | 0 | 2 | 104 | 4,380 | 1 | 0 | 2 | 60 |
| | | | T3M | 7,052 | 1 | 0 | 2 | 95 | 7,736 | 1 | 0 | 2 | 105 | 7,620 | 1 | 0 | 2 | 103 | 4,335 | 1 | 0 | 2 | 59 |
| | | | T4M | 6,910 | 1 | 0 | 2 | 93 | 7,420 | 1 | 0 | 2 | 100 | 7,466 | 1 | 0 | 2 | 101 | 4,248 | 1 | 0 | 2 | 58 |
| | | | TFTM | 7,182 | 1 | 0 | 2 | 97 | 7,712 | 1 | 0 | 2 | 104 | 7,760 | 1 | 0 | 2 | 105 | 4,415 | 1 | 0 | 2 | 60 |
| | | | ASYDF | 6,421 | 1 | 0 | 2 | 87 | 6,895 | 2 | 0 | 2 | 93 | 6,938 | 2 | 0 | 2 | 94 | 3,947 | 1 | 0 | 2 | 54 |

# Performance Data

## Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

| Ambient | | Lumen Multiplier |
|---|---|---|
| 0°C | 32°F | 1.02 |
| 10°C | 50°F | 1.01 |
| 20°C | 68°F | 1.00 |
| **25°C** | **77°F** | **1.00** |
| 30°C | 86°F | 1.00 |
| 40°C | 104°F | 0.98 |

## Projected LED Lumen Maintenance

Data references the extrapolated performance projections for the **DSXW1 LED 20C 1000** platform in a **25°C ambient**, based on 10,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

| Operating Hours | 0 | 25,000 | 50,000 | 100,000 |
|---|---|---|---|---|
| Lumen Maintenance Factor | 1.0 | 0.95 | 0.93 | 0.88 |

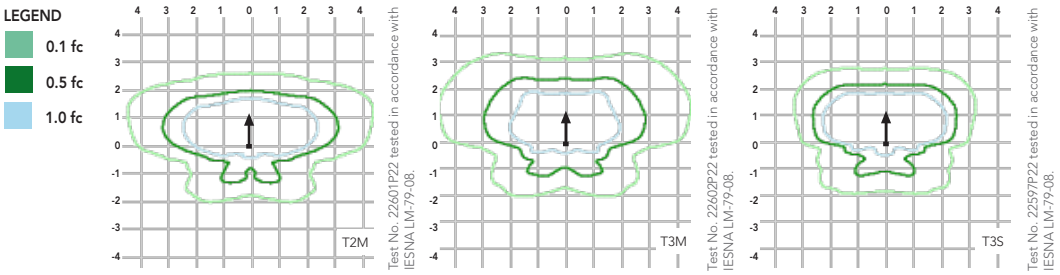
## Electrical Load

| LEDs | Drive Current (mA) | System Watts | Current (A) 120V | 208V | 240V | 277V | 347V | 480V |
|---|---|---|---|---|---|---|---|---|
| 10C | 350 | 14 W | 0.13 | 0.07 | 0.06 | 0.06 | - | - |
| | 530 | 20 W | 0.19 | 0.11 | 0.09 | 0.08 | - | - |
| | 700 | 27 W | 0.25 | 0.14 | 0.13 | 0.11 | - | - |
| | 1000 | 40 W | 0.37 | 0.21 | 0.19 | 0.16 | - | - |
| 20C | 350 | 24 W | 0.23 | 0.13 | 0.12 | 0.10 | - | - |
| | 530 | 36 W | 0.33 | 0.19 | 0.17 | 0.14 | - | - |
| | 700 | 47 W | 0.44 | 0.25 | 0.22 | 0.19 | 0.15 | 0.11 |
| | 1000 | 74 W | 0.69 | 0.40 | 0.35 | 0.30 | 0.23 | 0.17 |

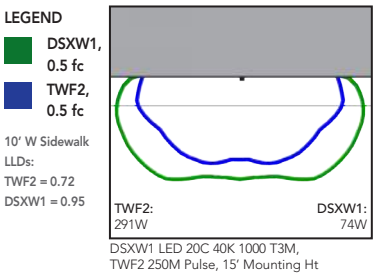
# Photometric Diagrams

To see complete photometric reports or download .ies files for this product, visit Lithonia Lighting's D-Series Wall Size 1 homepage.

Isofootcandle plots for the DSXW1 LED 20C 1000 40K. Distances are in units of mounting height (15').




Distribution overlay comparison to 250W metal halide.




DSXW1 LED 20C 40K 1000 T3M, TWF2 250M Pulse, 15' Mounting Ht

# Options and Accessories

T3M (left), ASYDF (right) lenses

HS - House-side shields

BSW - Bird-deterrent spikes

WG - Wire guard

VG - Vandal guard

DDL - Diffused drop lens

## FEATURES & SPECIFICATIONS

### INTENDED USE

The energy savings, long life and easy-to-install design of the D-Series Wall Size 1 make it the smart choice for building-mounted doorway and pathway illumination for nearly any facility.

### CONSTRUCTION

Two-piece die-cast aluminum housing has integral heat sink fins to optimize thermal management through conductive and convective cooling. Modular design allows for ease of maintenance. The LED driver is mounted to the door to thermally isolate it from the light engines for low operating temperature and long life. Housing is completely sealed against moisture and environmental contaminants (IP65).

### FINISH

Exterior parts are protected by a zinc-infused Super Durable TGIC thermoset powder coat finish that provides superior resistance to corrosion and weathering. A tightly controlled multi-stage process ensures a minimum 3 mils thickness for a finish that can withstand extreme climate changes without cracking or peeling. Available in textured and non-textured finishes.

### OPTICS

Precision-molded proprietary acrylic lenses provide multiple photometric distributions tailored specifically to building mounted applications. Light engines are available in 3000 K (80 min. CRI), 4000 K (70 min. CRI) or 5000 K (70 CRI) configurations.

### ELECTRICAL

Light engine(s) consist of 10 high-efficacy LEDs mounted to a metal-core circuit board to maximize heat dissipation and promote long life (L88/100,000 hrs at 25°C). Class 1 electronic drivers have a power factor >90%, THD <20%, and a minimum 2.5KV surge rating. When ordering the SPD option, a separate surge protection device is installed within the luminaire which meets a minimum Category C Low (per ANSI/IEEE C62.41.2).

### INSTALLATION

Included universal mounting bracket attaches securely to any 4" round or square outlet box for quick and easy installation. Luminaire has a slotted gasket wireway and attaches to the mounting bracket via corrosion-resistant screws.

### LISTINGS

CSA certified to U.S. and Canadian standards. Rated for -40°C minimum ambient.

DesignLights Consortium® (DLC) qualified product. Not all versions of this product may be DLC qualified. Please check the DLC Qualified Products List at www.designlights.org to confirm which versions are qualified.

### WARRANTY

Five-year limited warranty. Complete warranty terms located at www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx.

**Note:** Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

# MILLENIUM STRETCH™

## MLHA12 SERIES – STRAIGHT CONTINUOUS RUN

**PROJECT INFORMATION**

Job Name _____

Fixture Type _____

Catalog Number _____

Approved by _____

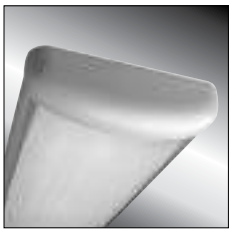
**PRODUCT FEATURES:**

» Surface mount – ceiling or wall; 12"×48"

» Continuous row mount luminaires

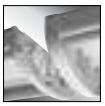
» ADA compliant

» Peace of Mind Guarantee® against breakage


Rounded End Cap


Flat End Cap


Reveal End Cap


Continuous Row Joiner Band

### SPECIFICATIONS

**HOUSING:** Marine grade aluminum. Extruded body with die-cast end caps. Housing, with end caps, post assembly TGIC polyester powder coat finished – 5-step pre-treatment. See Ordering Information for finishes. Each linear run of luminaires consists of one Beginning of Run Luminaire (B), one or multiple Middle Luminaire(s) (M), and one End of Run Luminaire (E). Specify and/or order systems per linear run (i.e. (1)B48, (5)M48, (1)E48). NOTE: Contact factory for custom lengths. See Dimensional Data for raceway. See Options for second raceway (2RW).

**LENS:** UV-stabilized, high impact extruded clear or pearlescent polycarbonate. Smooth exterior, linear prismatic interior. Nominal thickness .156". Lens securely positioned in body channels and end caps. Lens locked in place with tamper-resistant stainless steel Torx® with center pin fasteners and sealed with closed cell gaskets.

**END CAPS:** Marine grade die-cast aluminum. Three styles available: Flat, Rounded and Reveal. Conduit and "Wiremold™ ready" knockouts visible only from interior of end cap (Flat and Rounded styles only).

**REFLECTOR:** Full reflector/wire cover – 92% reflectivity.

**SOCKETS:** Shock-resistant sockets with internal locking collar to ensure positive lamp retention.

**HARDWARE:** Four stainless steel, tamper-resistant Torx® with center pin fasteners secure lens in housing body's lens channel. Electrical Quick Connector supplied (Specify Circuit Qty, see below).

**ELECTRICAL:** LED: Available 3500K, 4000K and 5000K color temperatures, 82 CRI. 120-277VAC, 50/60Hz electrical input with serviceable high power factor electronic, constant-current driver (<20% THD, >0.95 PF). Standard 0-10V dimming with 1-100% range, maximum driver source of 250 µA. LF: Class P ballasts. Fluorescent electronic 120/277/347 and dual voltage ballasts high power factor.

**INSTALLATION:** Standard six-point mounting per fixture required for Peace of Mind Guarantee®.

**PHOTOMETRICS:** Photometry tested to the IESNA LM-79-08 standard by an ILAC/ISO17025 accredited laboratory. For additional photometric data, please go to www.kenall.com.

**WARRANTY:** limited ten (10) year warranty for LED Lamps.

**LISTINGS:** UL and CUL listed for Wet Location – covered ceiling mount. IP64 rated – ceiling mount. ADA compliant. Corner, horizontal wall and pendant mount installation – damp location only. Suitable for use as a raceway. Suitable for use in continuous row.

LED | PEACE OF MIND Guarantee® | c UL us | IP64 | ADA

### ORDERING INFORMATION (Ex: MLHA12S-B48-2/M48-E48-R-MW-PP-1-45L40K-DCC-1-120-FS)

| Model | Begin. Hsg. | Mid. Hsg. | End. Hsg | End Cap | Finish | Lens | Lamp Qty | Lamp Type | Ballast/Driver | Circuit Qty | Voltage | Options |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MLHA12S** | **B48** | **/M48** | **E48** | | | | | | | | | |

**Beginning of Run Housing Style**
**B48** Nominal 48" housing

**Middle Fixture(s) Housing Style**
(replace "x" with qty)
**(x)/M48** Nominal 48" housing(s)

**Ending of Run Housing Style**
**E48** Nominal 48" housing

**End Caps**
**R** Rounded
**F** Flat
**RV** Reveal

**Finish**
**MW** Matte White
**MB** Matte Black
**LG** Light Gray
**CC** Custom Color (Consult Factory)

**Lens**
**CP**† Clear Polycarbonate
**PP** Pearlescent Polycarbonate

**Lamp Quantity (Cross Section)**
**1** One
**2** Two
**3** Three
**4** Four

**Lamp Type**
**45L35K** 45 Watt 3500K LED
**45L40K** 45 Watt 4000K LED
**45L50K** 45 Watt 5000K LED
**67L35K** 67 Watt 3500K LED
**67L40K** 67 Watt 4000K LED
**67L50K** 67 Watt 5000K LED
**90L35K** 90 Watt 3500K LED
**90L40K** 90 Watt 4000K LED
**90L50K** 90 Watt 5000K LED
**28** F28T5 (rapid start only)
**32** F32T8
**44** F48T8HO (2 lamp only)
**54** F54T5HO (rapid start only)
**54A** F54T5HO amalgam (rapid start only)

**Ballast/Driver Type**
**DCC** Dimming Constant Current (LED)
**IS** Instant Start Electronic <10% THD (T8,T8HO)
**RS** Rapid Start Electronic <10% THD (T8,T8HO,T5,T5HO)
**SB** Specified Ballast

**Circuit Quantity**
**1** One
**2**†■ Two

**Voltage**
**120** 120 Volts
**277** 277 Volts
**347** 347 Volts (Consult Factory)
**DV** 120-277 Volts

**Options**
**1RW** First Isolated Raceway
**2RW** Second Isolated Raceway (2 lamps only)
**CDF** Captive Diffuser Fasteners
**DL** Damp Location (Interior use NO gasketing)
**EL***† 500 Minimum Lumen Battery Pack – Specify Qty (90 Minutes; 32°F Starting Temperature)
**PEL***† 1100 Minimum Lumen Battery Pack – Specify Qty (90 Minutes; 32°F Starting Temperature)
**LEL** LED Emergency Battery Backup (45L max)
**FS** Single Fuse & Holder
**NAT** Natatorium Environment Option
**PH** Phillips Head Fasteners
**PM**§ Pendant Mount (stems by others; damp only)
**UC**† Uplight Component (Pendant Mount only; stems by others; damp only)
**XC** Auxiliary Circuit

**Accessories**
**CMB**§ Corner Mount Bracket (Must be ordered with DL Option)
**9500** Torx Screwdriver
**D-0552** Torx Driver Bit (Required for CMB Option)

* One lamp maximum in emergency mode
● 347V available with EL and PEL options only with two T8 lamps
† n/a with LED Lamp Options
■ n/a with T5HO if EL/PEL option ordered with PM or UC option
§ PM and CMB not available in conjunction

**www.kenall.com** **P: 800-4-Kenall** **F: 262-891-9701** **10200 55th Street Kenosha, Wisconsin 53144**

# MILLENIUM STRETCH™

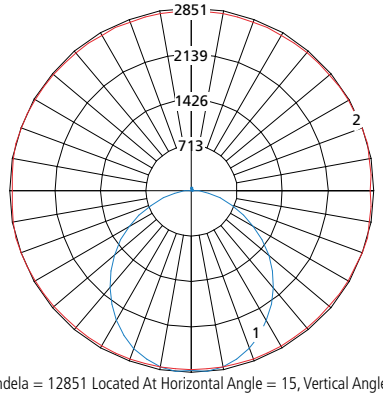
## MLHA12 SERIES – STRAIGHT CONTINUOUS RUN

### PERFORMANCE

| Lamp Type | Initial Delivered Lumens @ 25°C | Efficacy (lm/W) | Input Power (W) | Drive Current (mA) | Estd. L70 LED Life (Hrs) |
|---|---|---|---|---|---|
| 45L35K | 4666 | 93 | 50 | 94 | 80,000 |
| 45L40K | 4975 | 99 | 50 | 94 | 80,000 |
| 45L50K | 5173 | 103 | 50 | 94 | 80,000 |
| 67L35K | 6689 | 90 | 74 | 66 | 80,000 |
| 67L40K | 7131 | 96 | 74 | 66 | 80,000 |
| 67L50K | 7416 | 100 | 74 | 66 | 80,000 |
| 90L35K | 8548 | 85 | 101 | 94 | 60,000 |
| 90L40K | 9113 | 91 | 101 | 94 | 60,000 |
| 90L50K | 9477 | 94 | 101 | 94 | 60,000 |

Displayed information is for selected luminaires only. Additional wattages and color temperatures are also available.
Visit www.kenall.com for additional information.

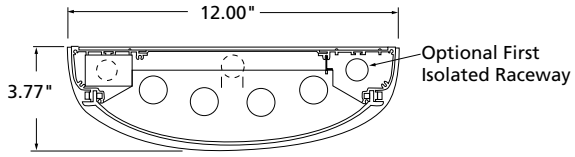
Model: MLHA12-48-F-MW-PP-1-90L40K-DCC-1-DV




Maximum Candela = 12851 Located At Horizontal Angle = 15, Vertical Angle = 5

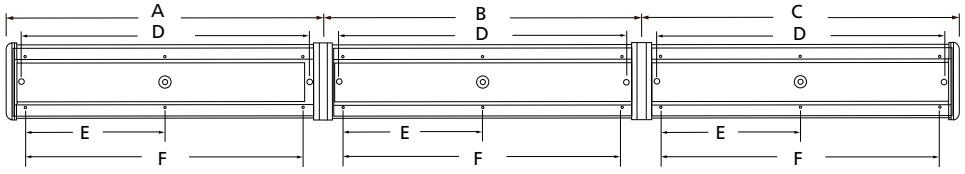
1 - Vertical Plane Through Horizontal Angles (15-195) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (5) (Through Max. Cd.)

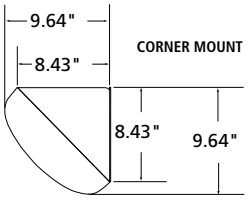
### DIMENSIONAL DATA

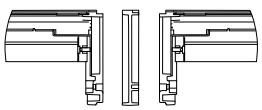



Nominal Four Foot Fixture Legend

| LMP | End Cap | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| T8/LED | R | 50.23 | 49.34 | 50.23 | 46.31 | 22.50 | 45.00 |
| T8/LED | F | 49.32 | 49.34 | 49.32 | 46.31 | 22.50 | 45.00 |
| T8/LED | RV | 51.59 | 49.34 | 51.59 | 46.31 | 22.50 | 45.00 |
| T5 | R | 48.27 | 47.37 | 48.27 | 44.35 | 22.25 | 44.50 |
| T5 | F | 47.36 | 47.37 | 47.36 | 44.35 | 22.25 | 44.50 |
| T5 | RV | 49.63 | 47.37 | 49.63 | 44.35 | 22.25 | 44.50 |



JOINER BAND – REQUIRED FOR ROW MOUNTING

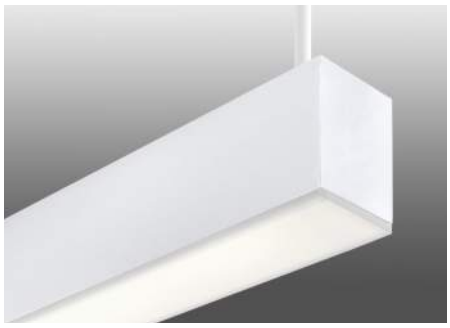
www.kenall.com P: 800-4-Kenall F: 262-891-9701 10200 55th Street Kenosha, Wisconsin 53144

# EDGE EVOLUTION EX3 WET

Project Name _____ Date _____

Catalog Number _____ Type _____

*LED Direct Linear with Satine Wet Lens*



MADE IN USA | PowerDensity | 5 YEAR WARRANTY

**CONSTRUCTION** 6063-T5 extruded aluminum housing with welded ends. Internal lens gaskets seal housing to prevent moisture and debris from entering the fixture. Pressure equalizing vent allows fixture to "breathe" preventing condensation. Fixtures can be installed individually or connected for a continuous run appearance.

**LENS** Solid acrylic diffuse snap-in lens with matte finish with an EPDM gasked for complete wet seal.

**ELECTRICAL** Electronic, 120 to 277 volt input and 36V output. 0-10 volt dimming standard. Must specify 1D in circuiting for dimming.

**LED** All luminaire configurations tested in accordance with IES LM-79. Diodes tested in accordance with IES LM-80. R9≥20, 27K is CRI≥90, 30K, 35K, and 40K is CRI≥82.

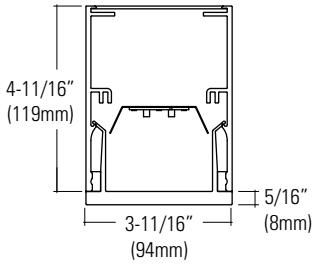
**MOUNTING** 1/2" diameter rigid stem pendant and wall and surface mount available. Refer to installation instructions for appropriate ceiling detail and rigid pendant details. Pendants and canopies are painted white unless otherwise specified.

**FINISH** Standard powder-coat textured white, metallic silver, textured black, graphite or bronze painted finish, consult factory for chip of standard paint finishes. Pendants and canopies painted white unless specified differently in the options section of the part number. Contact factory for additional custom color and finish options.

**WARRANTY** Edge LED offered with a 5-year limited warranty. Covers LED, driver and fixture.

**LABELS** UL and cUL Listed, approved for wet location unless otherwise noted. IP65 rated.

**TEMP RATING** Edge Wet is rated for temperatures from -30°C to 40°C




## LUMINAIRE SPECIFICATION

**Sample Catalog #:** EX3-WET-N-35HO-8-IND-S-120-1C-W

**EX3- WET- N- ____- _'- ___- ______- ___- __- __- ___**

### HOUSING
**EX3-** Edge EX 3

### DIRECT
**WET-** Satine Wet Lens

### INDIRECT
**N-** None, Closed

### COLOR/ LUMENS
**27K Color Temperature Lumen Options**
- **27-** 27K, 252 lumens/ft, 4.7 watts/ft
- **27HO-** 27K, 469 lumens/ft, 8.7 watts/ft

**30K Color Temperature Lumen Options**
- **30-** 30K, 319 lumens/ft, 4.7 watts/ft
- **30HO-** 30K, 593 lumens/ft, 8.7 watts/ft

**35K Color Temperature Lumen Options**
- **35-** 35K, 328 lumens/ft, 4.7 watts/ft
- **35HO-** 35K, 610 lumens/ft, 8.7 watts/ft

**40K Color Temperature Lumen Options**
- **40-** 40K, 335 lumens/ft, 4.7 watts/ft
- **40HO-** 40K, 622 lumens/ft, 8.7 watts/ft

**Custom Output**
- **CL_____-** Specify color temp. and lumens/ft. (i.e. CL35600)
- **CW____-** Specify color temp. and wattage/ft. (i.e. CW407.5) (Specify lumens/watts between standard offering listed above. Lumens are specified per color temp.)

### LENGTH
**Individual Units**
- **2-** 27-1/8" actual (689mm)
- **3-** 39" actual (991mm)
- **4-** 50-3/4" actual (1,289mm)
- **5-** 62-5/8" actual (1,591mm)
- **6-** 74-5/8" actual (1,895mm)
- **7-** 86-1/2" actual (2,197mm)
- **8-** 98-3/8" actual (2,499mm)

### POSITION
- **IND-** Individual Unit[5]
- **BOR-** Beginning of Row[1,4]
- **MOR-** Middle of Row[2,4]
- **EOR-** End of Row[3,4]

### MOUNTING
**Pendant**
- **PP__JB-** Junction Box (specify O.A.L., 12", 18" or 24")
- **PP__ST-** Structure (specify O.A.L., 12", 18" or 24")

**Wall**
- **WA-** Wall Mount

**Surface (Ceiling)**
- **S-** Surface Mount (utilize for in-wall application. Building surface waterproofing by others)

### VOLTAGE
- **120-** 120 V
- **277-** 277 V
- **347-** 347 V[9]
- **UNV-** UNV (120-277)

### CIRCUITING
- **1C-** Single Circuit
- **1B-** Single Circuit with Battery Pack[6,9]
- **1D-** Single Circuit Dimming[9]
- **1E-** Single Circuit with Emergency Circuit[9]

### FINISH
- **W-** Matte White
- **S-** Metallic Silver
- **BL-** Textured Black
- **GR-** Graphite
- **BR-** Bronze
- **CC-** Custom Color

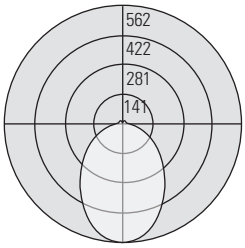
### OPTIONS
- **GLR-** Internal Fast Blow Fuse
- **AM-** Antimicrobial Paint
- **CC-C-** Custom Color Canopy[7]
- **CC-P-** Custom Color Pendant[8]
- **EPF-** End Power Feed[10]

[1]BOR fixtures are used for beginning of row and have joining holes on non-power end of fixture. [2]MOR fixtures are used for middle of row and have joining holes on both ends of fixture. [3]EOR fixtures are used for the end of a row and have joining holes on power end of fixture. [4]Factory submittal drawing approval required. [5]IND fixtures are individual fixtures and have no joining holes. IND fixtures cannot be joined. [6]Integral battery pack with integral test switch provided with 1B option. [7]If canopy is to match fixture housing, must specify with CC-C. If not specified canopy will be standard matte white. [8]If pendant is to match fixture housing, must specify with CC-P. If not specified pendant will be standard matte white. [9]Some Edge Wet configurations will not accommodate all electrical options. Consult factory. [10]EPF option not applicable for Pendant mounted fixtures.

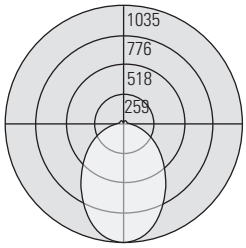
PINNACLE ARCHITECTURAL LIGHTING®

*Pinnacle Architectural Lighting 12655 East 42nd Avenue, Suite 50 Denver, CO 80239*
*Phone 303.322.5570 Fax 303.322.5568 www.pinnacle-ltg.com*

 *March 2016*

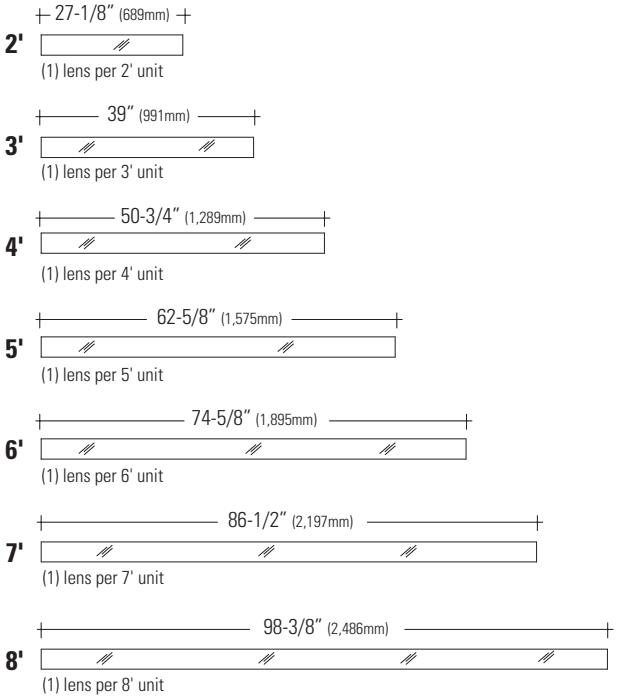



Test #: ILT86499
Part #: EX3-WET-N-40-4'
Lumens per watt: 71
Total Delivered Lumens: 1338

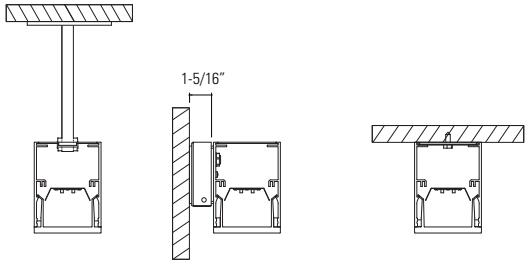



Test #: ILT86500
Part #: EV3-WET-N-40HO-4'
Lumens per watt: 72
Total Delivered Lumens: 2487

## • INDIVIDUAL MODULES




## • MOUNTING OPTIONS




PP- Pendant Pipe WA - Wall Mount S - Surface Mount

## • GET CONNECTED

When making rows with Edge Wet, the rows must be ordered as individual units with a position specified. Positions can either be "BOR" - Beginning of Row, "MOR" - Middle of Row, or "EOR" - End of Row. This will signify to the factory how to set up the fixture and where it will attach to other fixtures. The connection between fixtures is less than 1/8". For single, non-connected units, specify as "IND" for individual.

## • COMPACT COMPONENTS

All-inclusive module houses all LED system components in one compact unit. Unit easily releases from the housing for room-side maintenance.

## • WATER RESISTANT

Gore® Protective Vent allows the fixture to breathe, preventing condensation from building up inside the fixture that could cause damage to the internal components. Vent allows moisture to escape fixture without allowing moisture in.

PINNACLE ARCHITECTURAL LIGHTING®

*Pinnacle Architectural Lighting 12655 East 42nd Avenue, Suite 50 Denver, CO 80239*
*Phone 303.322.5570 Fax 303.322.5568 www.pinnacle-ltg.com*

*March 2016*

KIRLIN
*Lighting Since 1895*

| CATALOG # | | TYPE |
|---|---|---|
| JOB NAME | WATTAGE | VOLTAGE |

12" LED 1300•800 LUMEN SERIES 20•11 WATT **LSV-12287**

# Surface Vandal Downlight • LED

## Up to 90,000 Hour Life
## LM-80 Qualified • LM-79 Certified Photometry

## Specifications

**Delivered System Performance***
- Standard WFL distribution: 1269 delivered lumens / 63 LPW / 1.1 SC.
- 20 watt LED array. 3500°K standard (or see Options -27K, -30K or -41K).
- Up to 85 CRI and 90,000 hour life (L70). For 90+ CRI, see Option -HC.
- Option -43: 800 lumen / 11 watt series package instead.
- Fully sustainable: removable for servicing.

**Thermal Management System**
- All aluminum proprietary heat sink, components and housing maximize cool operation and long life while minimizing maintenance.

**LED Power Supply**
- **0-10V CCR dimming standard. (100-10%)**
- 120-277V / 50-60Hz standard. Load insensitive.
- Suitable for outdoor / indoor use: -30°C (-22°F) to 60°C (140°F).
- For Lutron HiLume dimming, see Option -29 or -39.

**Trim Assembly**
- Vandal resistant white flat seamless aluminum, one piece self-flanged trim.
- Flush center pin tamperproof hex screws and captive nutes secure trim to housing.
- High strength prismatic acrylic above 1/8" clear flat polycarbonate.
- Tamperproof tool included.

**Aluminum Housing**
- Seamless white acrylic enameled. Rustproof: Exceeds 1000 hour ASTM 5% salt spray test.
- No visible cylinder hardware.
- Cool operation: Extends life of all components.
- Fully sustainable: Entire luminaire, including LED light engine, is modular, easily visible and serviced through aperture.
- Lightweight: minimizes ceiling load.

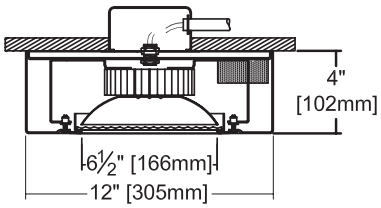
**Installation**
- Center point mounting for snug fit to ceiling. Mounting hardware furnished.
- 2" collar for surface J-box mount. (See Option -80)
- Indoor or outdoor for covered ceiling use (see Option -89).

**UL, C-UL (Canada) Listings**
- Wet, damp or dry locations, covered ceilings. (See Option -89)

**CE & FCC Compliance**
- Meets IEC/EN 60601-1-2 electromagnetic compatibility standard for medical electrical equipment.
- FCC Part 15 certified for EMI/RFI emissions.

**FIVE YEAR Limited Warranty**
- Complete standard fixture.

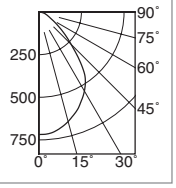
## Performance at a Glance




EEE Exceptional Energy Efficiency

**STANDARD (WFL) DISTRIBUTION**

| | |
|---|---|
| Lumens: | 1269 |
| Beam: | ~58° |
| SC: | 1.1 |
| LPW: | 63 |
| Efficiency: | 89.6% |
| ITL Test: | 80528 |





THE KIRLIN COMPANY

3401 EAST JEFFERSON AVENUE • DETROIT, MICHIGAN 48207-4232
(313) 259-6400 • Fax: (313) 259-9409 OR (313) 259-3121 • www.kirlinlighting.com


*See note next page

CATALOG NUMBER

**LATITUDES LED LIGHTING** **LSV-12287**

# LSV-12287 12" LED 1300•800 LUMEN SERIES 20•11 WATT

KIRLIN Since 1895

## Detailed Photometry - Installed Fixture

Photometric testing done in accordance with IESNA LM-79-08

Photometry from I.T.L., Boulder, CO

### STANDARD (WFL)

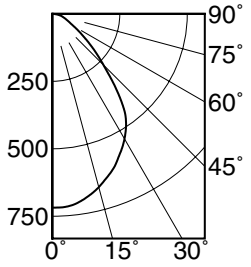
Lumens: 1269
Beam: ~58°
SC: 1.1
LPW: 63
Efficiency: 89.6%
ITL Test: 80528

EEE

Total System Watts 20.2

Cone of Light▲

| Dist. | FC | Dia. |
|---|---|---|
| 6 | 20.2 | 6.7 |
| 8 | 11.4 | 8.9 |
| 10 | 7.3 | 11.1 |
| 12 | 5.0 | 13.3 |
| 14 | 3.7 | 15.5 |
| 16 | 2.8 | 17.8 |




| CANDLEPOWER DISTRIBUTION | | | | | |
|---|---|---|---|---|---|
| | 0.0 | 22.5 | 45.0 | 67.5 | 90.0 |
| 0 | 727 | 727 | 727 | 727 | 727 |
| 5 | 757 | 757 | 758 | 738 | 417 |
| 15 | 685 | 679 | 675 | 668 | 660 |
| 25 | 579 | 591 | 588 | 585 | 597 |
| 35 | 471 | 467 | 469 | 471 | 473 |
| 45 | 245 | 253 | 271 | 253 | 246 |
| 55 | 131 | 135 | 130 | 135 | 131 |
| 65 | 64 | 71 | 70 | 72 | 64 |
| 75 | 44 | 44 | 44 | 44 | 44 |
| 85 | 10 | 10 | 10 | 10 | 10 |
| 90 | 0 | 0 | 0 | 0 | 0 |

### LM-80 Qualified • LM-79 Certified Photometry

* LED manufacturers maintain a tolerance of ±7% on flux (lumens) and power (electrical) measurements. Kirlin photometrics are actual test data from Independent Testing Laboratories (ITL) where photometry was measured from 1417 (20W) lumen light engines (within the established tolerance).

**▲Cone of Light Key**
(Dia. (in ft.) shown is where FC value is half the FC at nadir.)

**Ft.** Distance from fixture
**FC** Footcandles at nadir (0°)
**Dia.** Circle of light at 50% of FC

## Options

### LED Power Supply

-29 **Two wire** full range (100-1%) PWM dimming instead (Lutron). 120V only. Not available with Option -EI.
-39 **Three wire** full range (100-1%) PWM dimming instead (Lutron).
-43 800 lumen / 11 watt series package instead. Apply lumen factor of 60.7% to above data. Also see Options -29 and -39.
-97 Specify other voltage. Consult factory.
-EI Remote emergency inverter for 85% of rated lumens. Run time: 90+ minutes. 120 **or** 277V, 60Hz input only. Specify voltage. Not for use with Option -29.

### Color (CCT and CRI)

-27K Color temperature 2700°K instead.
-30K Color temperature 3000°K instead.
-41K Color temperature 4100°K instead.
-HC 90+ CRI instead. 2700° or 3000°K only. Reduces output by ~15%.

### Lenses and Trims

-21 White transluscent flat poly diffuser instead.
-23 Frosted microprismatic lens instead.
-46 Gasket between trim and lens.
-CF Custom color filter (Rosco). Specify.

### Luminaire (Housing) Finishes

-35 Natural aluminum acrylic enamel.
-37 Dark Bronze acrylic enamel.
-38 Black acrylic enamel.
-94 Custom color/finish. Specify. Consult factory.

### Mounting

-80 2" collar for mounting beneath surface outlet box. 1/2" T.S. KO's. Must add Option -89 for wet label listing.
-89 Sealed top WeatherCap. Must add to Option -80 for wet label listing.

### Other

-99 Special modification. Consult factory.
-FS In-line fusing.

## SUBMITTAL DATA

JOB NAME

TYPE

WATTAGE VOLTAGE

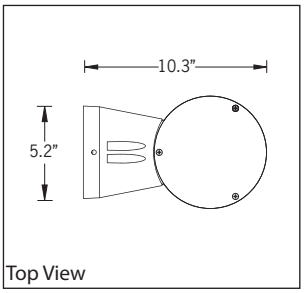
CATALOG NUMBER

## APPROVAL STAMP

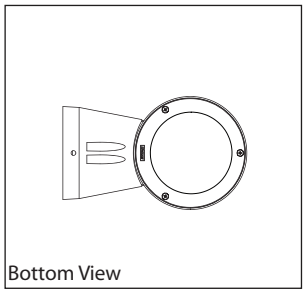
# LUMINAIRE SPECIFICATION

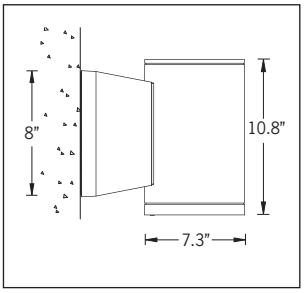
Head Office: Tel: 503-645-0500
7144 NW Progress Ct Fax: 503-645-8100
Hillsboro, Oregon 97124
www.ligmanlightingusa.com

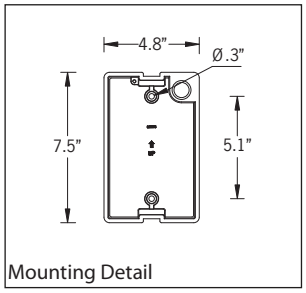
IP65 : Suitable for Wet Locations
IK08 : Impact Resistant (Vandal Resistant)



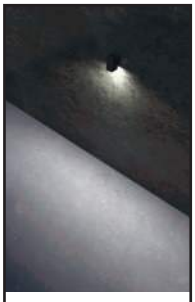
Top View

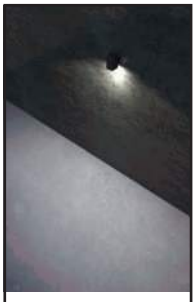

Bottom View



Mounting Detail


Type II


Type III


Type IV

For Up/Down distributions see Ligman website, or contact factory.

# UTA-31861

## Tango 29 round wall down LED Type II, III , IV

Wall luminaires with a variety of lenses and lamps with up and downward light distributions. The Tango is unique as it is available with Type II,III,IV & V light distribution options that facilitates wider spacing and even light distribution between the light fixtures. Providing higher energy saving and reduced installation costs. The up-down versions can be manufactured with different distributions. Designed to illuminate the wall surface and for light accents on vertical surfaces.
Low copper content die-cast aluminum housing and aluminum frame with integral anti-glare baffles. Stainless steel screws. Durable silicone rubber gasket and clear toughened glass. Single cable entry. Housing is treated with a nickel and chrome phosphate protection before applying a 4.7 mil powder coating, this ensures high corrosion resistance. Integral electronic control gear.
Mounting plate for 3" and 4" junction box is provided with the fixture.
Surface mount conduit boxes are available as an option.
A round pole adapter can be manufactured to suit specific pole diameters. Please contact the factory for more information.

### Physical Data

Length: 10.3"
Weight: 9.7 lbs
Height: 10.8"

### Lamp

- ☐ 38w - White - LED
- ☐ 20w - White - LED
- ☐ 28w - White - LED

### Distribution Type (Please Specify)

- ☐ T2 - Type II
- ☐ T3 - Type III
- ☐ T4 - Type IV

### LED Color (Please Specify)

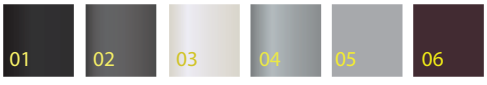
- ☐ W27 - 2700K
- ☐ W30 - 3000K
- ☐ W40 - 4000K

### Voltage (Please Specify)

- ☐ 120v/277v
- ☐ Other _____

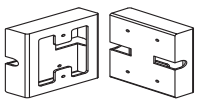
### Color (Please Specify)

- ☐ 01-Black - RAL 9011
- ☐ 03-White - RAL 9003
- ☐ 05-Matt Silver - RAL 9006
- ☐ 06-Bronze - RAL 6014
- ☐ 02- Dark Grey - RAL 7043
- ☐ 04 - Metallic Silver - RAL 9006
- ☐ 07- Custom - RAL _____




### Options (Please Specify)

- ☐ F - Frosted Lens
- ☐ C - Clear Lens



- ☐ SCE - Surface Conduit Entry Box - ☐ 1/2" Conduit ☐ 3/4" Conduit
- ☐ HGT- Specify Custom Height _____

*Ordering Example : UTA - 31861 - 38w - T2 - W30 - 120v - Options*

PROJECT: _____ DATE: _____

TYPE: _____ QUANTITY: _____ NOTE: _____

Rev: 10/15

# Pow-R-Line 1a-LX

*Pow-R-Line 1a-LX Column Type*

## General Description

### Panelboard Ratings

***Voltage***

- 240 Vac maximum

***Main Lugs***

- 100 and 225 A

***Main Breakers***

- 100 and 225 A

***Branch Breakers***

- 15–100 A (bolt-on)

***Short-Circuit Current Ratings (Symmetrical)***

- 240 Vac: 10 kA and 22 kA fully rated
- 240 Vac: 22–200 kA series rated

***Service***

- Three-phase, four-wire 208Y/120 V and 240/120 V delta
- Single-phase, three-wire 120/240 V
- Single-phase, two-wire 120 V
- Three-phase, three-wire 208 and 240 V

### Mains

For available mains, refer to **Table 22.5-1.**

Main breakers, 100 A, Types BAB and QBHW are horizontally mounted, same as branch breakers. All other main breakers are vertically mounted.

### Branch Circuits

For available branch devices, refer to **Table 22.5-2.**

### Main Lugs Only

The short-circuit rating of the MLO assembled panelboard will be fully rated based upon the lowest rated branch device or may be series rated with an approved upstream device.

Main lugs only ampere ratings: 100 and 225.

### Main Circuit Breakers

The short-circuit rating shown is that of the main breaker only. The short-circuit rating of the assembled panelboard is the rating of the lowest fully rated main or branch device or the rating of an approved series rated combination.

**Table 22.5-1. Main Circuit Breakers**

| Breaker Frame Amperes | Breaker Type | Interrupting Rating (kA Symmetrical) at 240 Vac |
|---|---|---|
| 100 | BAB | 10 |
| 100 | QBHW | 22 |
| 100 | EHD | 18 |
| 150 | FDB | 18 |
| 150 | FD, FDE | 65 |
| 150 | HFD, HFDE | 100 |
| 150 | FDC | 200 |
| 225 | EDB | 22 |
| 225 | EDS | 42 |
| 225 | ED, FD | 65 |
| 225 | EDH, HFD | 100 |
| 225 | EDC, FDC | 200 |

**Table 22.5-2. Branch Circuit Breakers**

| Breaker Type | Ampere Rating | Number of Poles | Interrupting Rating (kA Symmetrical) | | |
|---|---|---|---|---|---|
| | | | 120 Vac | 120/240 Vac | 240 Vac |
| BAB | 15–70 | 1 | 10 | — | — |
| BAB | 15–100 | 2 | — | 10 | — |
| BAB | 15–100 | 2, 3 | — | — | 10 |
| BAB-D ① | 15–60 | 1, 2 | 10 | 10 | — |
| BAB-C ② | 15–30 | 1, 2 | 10 | 10 | — |
| BABRP ③ | 15–30 | 1, 2 | 10 | 10 | — |
| BABRSP ③ | 15–30 | 1, 2 | 10 | 10 | — |
| QBGF | 15–50 ④ | 1, 2 | 10 | 10 | — |
| QBGFEP | 15–50 ④ | 1, 2 | 10 | 10 | — |
| QBCAF ⑤ | 15–20 | 1 | 10 | 10 | — |
| QBHW | 15–70 | 1 | 22 | — | — |
| QBHW | 15–100 | 2 | — | 22 | — |
| QBHW | 15–100 | 2, 3 | — | — | 22 |
| QBHGF | 15–30 ④ | 1, 2 | 22 | 22 | — |
| QBGFEP | 15–30 ④ | 1, 2 | 22 | 22 | — |
| QBHCAF ⑤ | 15–20 | 1 | 22 | 22 | — |

① HID (High Intensity Discharge) rated breaker.
② Switching neutral breaker. Single-pole device requires two-pole space, two-pole device requires three-pole space.
③ Solenoid operated breaker.
④ 50 A is two-pole only.
⑤ Arc fault breaker.

### Series Rated Combinations

Refer to series rating tables beginning on **Page 22.0-13** for the approved series rated combinations available for the branch circuit breakers listed in **Table 22.5-2.**

## Technical Data and Specifications

### Bussing

100–225 A: copper is standard.

### Boxes

Boxes are made from code-gauge steel.

Blank ends are supplied as standard.

### Trims

Trims are made from code-gauge steel and painted ANSI 61 gray.

Doors have three-point catch and lock.

### Neutral Bars

When column type panels are furnished with trough extensions and pull box, the neutral bar will be placed in the pull box unless otherwise specified.

When troughs and pull box are not furnished, the neutral bar will be located on the panel at the same end as the main.

### Cabinets

Boxes and trims are code-gauge steel. ANSI-61 light gray painted finish.

Boxes are furnished without knockouts.

Standard depth is 6.00 inches (152.4 mm). Standard width is 8.63 inches (219.1 mm).

### Top and Bottom Gutters

4.50 inches (114.3 mm) minimum.

### Left Side Gutter

4.50 inches (114.3 mm) minimum.

### Pull Box

Pull box is furnished without knockouts.

### Modifications

**Table 22.5-3. Sub-Feed Breakers (One Per Panel)**

| Ampere Rating Space | Breaker Type | Interrupting Rating (kA Symmetrical) at 240 V |
|---|---|---|
| 150 | FDB | 18 |
| 150 | FD, FDE | 65 |
| 150 | HFD, HFDE | 100 |
| 150 | FDC | 200 |
| 225 | EDB | 22 |
| 225 | EDS | 42 |
| 225 | ED, FD, FDE | 65 |
| 225 | EDH, HFD, HFDE | 100 |
| 225 | EDC, FDC | 200 |

### Shunt Trips

Shunt trips are available on BAB, QBHW and FDB breakers. BAB and QBHW require one additional pole space for shunt trip, i.e., single-pole is two-pole size, two-pole is three-pole size and three-pole is four-pole size.

### Ground Bar

Standard bolted in box. Aluminum is standard, copper is available as an option.

### Assembled Circuit Breaker Panelboards

Box size, box and trim catalog numbers for standard column type panelboards listed are available from **Table 22.5-4.**

### Instructions

1. Using description of the required panelboard, select the rating and type of main required.
   a. 100 A panelboards—**Table 22.5-4.**
   b. 225 A panelboards—**Table 22.5-4.**
2. Count total number of branch circuit poles, including provisions, required in the panelboard. Do not count main breaker poles. Convert two- or three-pole branch breakers to single poles, i.e., three-pole breaker, count as three poles.

   Determine sub-feed breaker or through-feed lug requirements.
3. Select the panelboard main ampere rating from **Table 22.5-4.**
4. Panelboard Type from first column, main breaker Frame and Designation, if applicable from second column, and sub-feed breaker Frame and Designation, if applicable, from the third column.
5. From Step 2, determine the number of branch circuits in Column 4.
6. Read box size numbers across columns to the right. All panels are surface mounted.

Table 22.5-4. Panelboards—Dimensions in Inches (mm)

| Panelboard Types | Main Breaker Types Mounting: (H) = Horizontal (V) = Vertical | Sub-Feed Breaker Types Vertical Mounting | Maximum Number of Branch Circuits Including Provisions | Box Dimensions ① | | |
|---|---|---|---|---|---|---|
| | | | | Height | Width | Depth |
| **100 A** | | | | | | |
| Main breaker | BAB, QBHW (H) | —<br>— | 27<br>39 | 69.00 (1752.6)<br>81.00 (2057.4) | 8.63 (219.1)<br>8.63 (219.1) | 6.00 (152.4)<br>6.00 (152.4) |
| Main lugs or main breaker | EHD, FDB, FD, FDE, HFD (V), HFDE | —<br>— | 30<br>42 | 69.00 (1752.6)<br>81.00 (2057.4) | 8.63 (219.1)<br>8.63 (219.1) | 6.00 (152.4)<br>6.00 (152.4) |
| Main lugs or main breaker with 100 A through-feed lugs or sub-feed breaker | | EDB, EDS, ED, EDH, EHD, FD, FDE, HFD, HFDE | 30<br>42 | 78.00 (1981.2)<br>90.00 (2286.0) | 8.63 (219.1)<br>8.63 (219.1) | 6.00 (152.4)<br>6.00 (152.4) |
| **225 A** | | | | | | |
| Main lugs or main breaker | EHD, FDB, FD, FDE HFD, HFDE, ED, EDH (V) | —<br>— | 30<br>42 | 69.00 (1752.6)<br>81.00 (2057.4) | 8.63 (219.1)<br>8.63 (219.1) | 6.00 (152.4)<br>6.00 (152.4) |
| Main lugs or main breaker with 225 A through-feed lugs or sub-feed breaker | | EDB, EDS, ED, EDH, EHD, FD, FDE, HFD, HFDE | 30<br>42 | 78.00 (1981.2)<br>90.00 (2286.0) | 8.63 (219.1)<br>8.63 (219.1) | 6.00 (152.4)<br>6.00 (152.4) |

① For horizontal mounted mains (BAB Type), use main lug table, include space in branch section for mains.

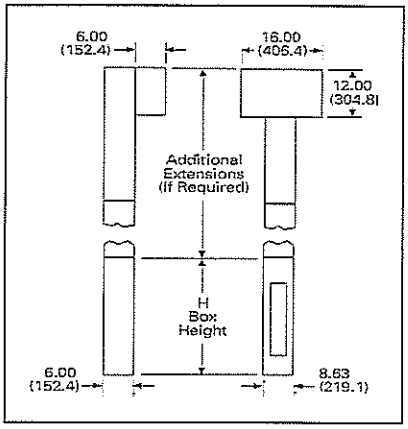



**Figure 22.5-1. Trough Extension — Dimensions in Inches (mm)**

### Trough Extension

When extension troughs are used, the NEC requires that the number of conductors in wireways shall not contain more than 30 conductors at any cross section, unless the conductors are for signal circuits or are control conductors between a motor and its starter and used only for starting duty. The sum of the cross-sectional areas of all contained conductors at any cross section of a wireway shall not exceed 20% of the interior cross-sectional area of the wireway.

The derating factors specified in the NEC shall not be applicable to the 30 current-carrying conductors at 20% fill specified above.

22

# Pow-R-Line 2a-LX

*Pow-R-Line 2a-LX Column Type*

## General Description

### Panelboard Ratings

*Voltage*

- 240 Vac
- 480Y/277 Vac maximum

  Note: PRL2a panelboards are suitable for use on three-phase, three-wire applications when derived from a three-phase, four-wire 480Y/277 Vac service where the neutral is not brought to the panelboard. For three-phase, three-wire 480 Vac delta services, use a PRL3a panelboard.
- 250 Vdc maximum

*Main Lugs*

- 100 and 225 A

*Main Breakers*

- 100 and 225 A

*Branch Breakers*

- 15–100 A

*Short-Circuit Current Ratings (Symmetrical)*

- 240 Vac: 65 kA fully rated
- 240 Vac: 100–200 kA series rated
- 480Y/277 Vac: 14 kA fully rated
- 480Y/277 Vac: 22–150 kA series rated
- 250 Vdc: 10 kA and 14 kA fully rated

Service

- Three-phase, four-wire 208Y/120 V and 240/120 V delta and 480Y/277 V
- Single-phase, three-wire 120/240 V
- Single-phase, two-wire 120 V
- Three-phase, three-wire 208 and 240 V
- Two-wire 125 Vdc
- Two-wire 250 Vdc

### Mains

For available mains, refer to **Table 22.5-5**.

Type GHB main breakers are horizontally mounted, same as branch breakers. All other main breakers are vertically mounted.

### Branch Circuits

For available branch devices, refer to **Table 22.5-6**.

### Main Lugs Only

The short-circuit rating of the MLO assembled panelboard will be fully rated based upon the lowest rated branch device or may be series rated with an approved upstream device.

Main lugs only ampere ratings: 100 and 225.

### Main Circuit Breakers

The short-circuit rating shown is that of the main breaker only. The short-circuit rating of the assembled panelboard is the rating of the lowest fully rated main or branch device or the rating of an approved series rated combination.

**Table 22.5-5. Main Circuit Breakers**

| Breaker Frame Amperes | Breaker Type | Interrupting Rating (kA Symmetrical) | | |
|---|---|---|---|---|
| | | 240 Vac | 480Y/277 Vac | 125/250 Vdc |
| 100 | GHB | 65 | 14 | 14 |
| 100 | EHD | 18 | 14 | 10 |
| 150 | FDB | 18 | 14 | 10 |
| 150 | FD, FDE | 65 | 35 | 10 |
| 150 | HFD, HFDE | 100 | 65 | 22 |
| 150 | FDC, FDCE | 200 | 100 | 22 |
| 225 | ED | 65 | — | — |
| 225 | FD, FDE | 65 | 35 | 10 |
| 225 | EDH | 100 | — | — |
| 225 | HFD, HFDE | 100 | 65 | 10 |
| 225 | EDC | 200 | — | — |
| 225 | FDC | 200 | 100 | 10 |

**Table 22.5-6. Branch Circuit Breakers**

| Breaker Type | Ampere Rating | Number of Poles | Interrupting Rating (kA Symmetrical) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 120 Vac | 240 Vac | 277 Vac | 480Y/277 Vac | 125/250 Vdc |
| GHB | 15–100 | 1 | 65 | — | 14 | — | 14 |
| GHB | 15–100 | 2, 3 | — | 65 | — | 14 | 14 |
| GHQ | 15–20 | 1 | 65 | — | 14 | — | — |
| HGHB | 15–30 | 1 | 65 | — | 25 | — | — |
| GHQRSP ① | 15–20 | 1, 2 | 65 | 65 | 14 | 14 | — |
| GHBS ① | 15–30 | 1, 2 | 65 | 65 | 14 | 14 | — |

① Solenoid operated breaker.

### Series Rated Combinations

Refer to series rating tables beginning on **Page 22.0-13** for the approved series rated combinations available for the branch circuit breakers listed in **Table 22.5-6**.

## Technical Data and Specifications

### Bussing

100–225 A: copper is standard.

### Boxes

Boxes are made from code-gauge steel.

Blank ends are supplied as standard.

### Trims

Trims are made from code-gauge steel and painted ANSI 61 gray.

Doors have three-point catch and lock.

### Neutral Bars

When column type panels are furnished with trough extensions and pull box, the neutral bar will be placed in the pull box unless otherwise specified.

When troughs and pull box are not furnished, the neutral bar will be located on the panel at the same end as the main.

### Cabinets

Boxes and trims are code-gauge steel. ANSI-61 light gray painted finish.

Boxes are furnished without knockouts.

Standard depth is 6.00 inches (152.4 mm). Standard width is 8.63 inches (219.1 mm).

### Top and Bottom Gutters

4.50 inches (114.3 mm) minimum.

### Left Side Gutter

3.31 inches (84.2 mm) minimum.

### Pull Box

Pull box is furnished without knockouts.

### Modifications

**Table 22.5-7. Sub-Feed Breakers (One Per Panel)**

| Ampere Rating Space | Breaker Type | Interrupting Rating (kA Symmetrical) | |
|---|---|---|---|
| | | 240 V | 480 V |
| 150 | FDB | 18 | 14 |
| 150 | FD, FDE | 65 | 35 |
| 150 | HFD, HFDE | 100 | 65 |
| 150 | FDC | 200 | 100 |
| 225 | ED | 65 | — |
| 225 | FD, FDE | 65 | 35 |
| 225 | EDH | 100 | — |
| 225 | HFD, HFDE | 100 | 65 |
| 225 | EDC | 200 | — |
| 225 | FDC | 200 | 100 |

### Shunt Trips

Shunt trips are available on GHB, FDB and FD breakers. GHB breakers with shunt trips require three-pole frame.

### Ground Bar

Standard bolted in box. Aluminum is standard, copper is available as an option.

### Assembled Circuit Breaker Panelboards

Box size, box and trim catalog numbers for standard column type panelboards listed are available from **Table 22.5-8.**

### Instructions

1. Using description of the required panelboard, select the rating and type of main required.
   a. 100 A panelboards—Table **22.5-8.**
   b. 225 A panelboards—Table **22.5-8.**
2. Count total number of branch circuit poles, including provisions, required in the panelboard. Do not count main breaker poles. Convert two- or three-pole branch breakers to single poles, i.e., three-pole breaker, count as three poles. Determine sub-feed breaker or through-feed lug requirements.
3. Select the panelboard main ampere rating from **Table 22.5-8.**
4. Panelboard type from first column, main breaker frame and designation, if applicable from second column, and sub-feed breaker frame and designation, if applicable, from the third column.
5. From Step 2, determine the number of branch circuits in Column 4.
6. Read box size numbers across columns to the right. All panels are surface mounted.

Table 22.5-8. Panelboards—Dimensions in Inches (mm)

| Panelboard Types | Main Breaker Types Mounting: (H) = Horizontal (V) = Vertical | Sub-Feed Breaker Types Vertical Mounting | Maximum Number of Branch Circuits Including Provisions | Box Dimensions ① Height | Width | Depth |
|---|---|---|---|---|---|---|
| **100 A** | | | | | | |
| Main breaker | GHB<br>(H) | —<br>— | 27<br>39 | 69.00 (1752.6)<br>81.00 (2057.4) | 8.63 (219.1)<br>8.63 (219.1) | 6.00 (152.4)<br>6.00 (152.4) |
| Main lugs or main breaker | EHD, FDB, FD, FDE<br>HFD, HFDE, FDCE<br>(V) | —<br>— | 30<br>42 | 69.00 (1752.6)<br>81.00 (2057.4) | 8.63 (219.1)<br>8.63 (219.1) | 6.00 (152.4)<br>6.00 (152.4) |
| Main lugs or main breaker with 100 A through-feed lugs or sub-feed breaker | | FD, FDE, HFD, HFDE, FDC, FDCE | 30<br>42 | 78.00 (1981.2)<br>90.00 (2286.0) | 8.63 (219.1)<br>8.63 (219.1) | 6.00 (152.4)<br>6.00 (152.4) |
| **225 A** | | | | | | |
| Main lugs or main breaker | EHD, FDB, FD, FDE,<br>HFD, HFDE<br>(V) | —<br>— | 30<br>42 | 69.00 (1752.6)<br>81.00 (2057.4) | 8.63 (219.1)<br>8.63 (219.1) | 6.00 (152.4)<br>6.00 (152.4) |
| Main lugs or main breaker with 225 A through-feed lugs or sub-feed breaker | | FD, FDE<br>FDE, HFD, HFDE, FDC | 30<br>42 | 78.00 (1981.2)<br>90.00 (2286.0) | 8.63 (219.1)<br>8.63 (219.1) | 6.00 (152.4)<br>6.00 (152.4) |

① For horizontal mounted mains (BAB Type), use main lug table, include space in branch section for mains.

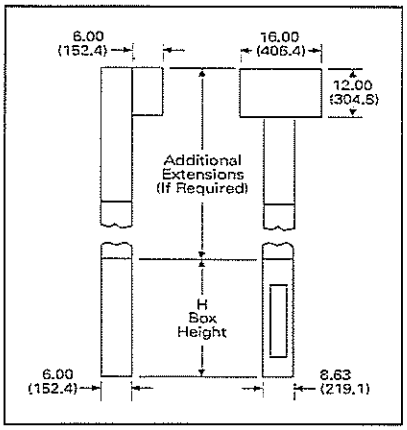



Figure 22.5-2. Trough Extension—Dimensions in Inches (mm)

### Trough Extension

When extension troughs are used, the NEC requires that the number of conductors in wireways shall not contain more than 30 conductors at any cross section, unless the conductors are for signal circuits or are control conductors between a motor and its starter and used only for starting duty. The sum of the cross-sectional areas of all contained conductors at any cross section of a wireway shall not exceed 20% of the interior cross-sectional area of the wireway.

The derating factors specified in the NEC shall not be applicable to the 30 current-carrying conductors at 20% fill specified above.