Santiago High Architecture

Green Building Design 1A/1B

COMMERCIAL PROJECT #1 2017-18

Kids Rock Free Music School

Design a private, non-profit music school for “Kids Rock Free”. They provide free and low cost music lessons for kids 7-17. <http://fendermuseum.com/>

The building must meet LEED standards while meeting the needs of the Kids Rock Free program.

The client wants to be able to generate a modest income from features of the building to supplement student fees and fundraising. Get creative.

The Program:

You will design a 2 story facility on the designated site.

KRF will have:

30,000 square feet (+- 2000)

Spaces for:

Clerical offices

Private lessons

Vocals

Group vocals

Guitar

Drums

Keyboard

Band practice

Recording studio

Storage

“Green room”

Restrooms

Lobby

Waiting room for Family members

# The building must be a Low-Energy, Resource Efficient Building. You will be attempting to earn as many LEED points as possible while meeting the needs of the building occupants.

You will follow the California Building Code. Your building must meet building code requirements for New Construction.

You will utilize the U.S. Green Building Council’s manual “**Green Building Design and Construction 2009 Edition** to research “LEED credits” you will attempt to get. The more credits you can get, the higher your grade. Some credits will be impossible to get…..some will be hard to understand. I expect you to stretch yourself….we’re here to learn together. Remember: every credit counts!

A Site Plan will be provided and you may access Google Earth for more data.

You will need to research school spaces…. find out what they need, want, limitations, ADA requirements, etc

**ALL WORK PRESENTED ON NEATLY MOUNTED ON PRESENTATION BOARD(S)**

**I NEED 2 COPIES OF EVERYTHING!**

# Class Presentation Required

You are going to take Mr. Brown’s seat…and show my architect friends your design. Show them what you did….. and why you did it! You can use notes if you like….or wing it. The architects will be experts in LEED, Interiors, Revit, and School design. No pressure. This will be an opportunity for you to show them your skills! I would also like you to present at a Revit User Group meeting in May. I think it’s a good chance to sell your skills to possible employers.

**2017-18 Green Building Checklist Kids Rock Free**

**Cover Sheet**

**Objective: To visualize finished Building utilizing Renderings**

Building Rendering w/ site elements. Materials should be “Sustainable” and Energy Efficient. You will want to place foliage around building to warm up the scene. Title block will just have border lines

Team name with member names

Title of Project

**Cover Sheet 2**

**Objective: To visualize finished Building 3D views**

Multiple views of building. Shaded.

List of Drawings. In order by sheet number. Use class numbering system for sheets. Just Sheet Number and Sheet Name

**Site: Solar Study**

**Objective: To study solar effects on building(s).**

Solar Study (site) from SW, SE, NE, NW directions. Summer Solstice at 10am and 2pm. Winter Solstice at 10am and 2pm. Show shadow on Buildings and topography. Should be 16 views.

**Site Plan: As-Built**

**Objective: To show and study the existing site.**

Property Lines (make custom, thicker property lines), Existing topography, topo tags, adjacent streets, N arrow, Site address.

Existing Topo should be on “As-Built” phase. You may want to model site elements (like the parking lot and walkways) as floors.

Create existing buildings (shells). They should be on “As-Built” phase

No planting

Black and White. Scale: TBA

Sheet # C101

**Site Plan: Demo**

**Objective: To show what will be demolished.**

Property Lines (make custom, thicker property lines), Existing topography, adjacent streets, N arrow, Site address.

Demo topo/floors as needed

Demo existing buildings as needed

No planting

Black and White. Scale: TBA

Sheet # C102

**Site Plan: New Construction**

**Objective:** **To show the new building(s) and site elements strategically placed on the site.**

Linked Building(s)

Dimensions to locate building(s)

Dimensions for parking, walkways, site elements, etc.

Property Lines (make custom, thicker property lines), New Topography, adjacent streets, topo tags, N arrow, Site Address

Adjusted topography/floors should be on “New Construction” phase

No planting

Black and White. Scale: TBA

Sheet # C103

**Site Plan: LEED SS Credit 2**

**Objective: To prove that you have met LEED intent to channel development to urban areas with existing infrastructure, protecting greenfields and preserve habitat and natural resources**

Google Earth map of site and surrounding area (1/2 mile radius) to create “Vicinity Plan”

Mass Transit systems identified with easy to see colored detail lines and 3/32”text

Community resources identified and labeled with 3/32” text. Make a legend.

Walkways and sidewalks identified (pedestrian activity)

Color. Scale: TBA

Sheet # C104

**Site Plan: LEED SS Credit 6.1**

**Objective: To prove that you have met LEED intent of managing storm-water run-off.**

Site materials will be made as floors (so they can be counted in a schedule)

You will create a “yes/no” project parameter in floors called “Pervious” and another called “Site”. This will allow you to create a floor schedule for just the site materials. This will also allow you give the pervious area as a percentage of the total site.

Floor Schedule. Filter it so the pervious area on the site is totaled. Parameters will be: Type mark, Family, Area, Pervious, and Site. Hide “Site” in the schedule.

Show on sheet in 3/32” text: Pervious Area/Total site area=pervious %

Site plan: Show floors with surface patterns. ID floors (site elements) with floor tags. Site should be completely covered with “Site floors”.

No toposurface. No plants. No buildings.

Black and White. Scale: TBA

Sheet # C105

**Site Plan: WE Credit 1**

**Objective: To prove that you have met LEED intent to limit or eliminate the use of potable water or other natural surface or subsurface water resources available on or near the project site for landscape irrigation**

You will be utilizing “Xeriscaping” strategies to meet this goal.

Property Lines (make custom, thicker property lines), New topography, adjacent streets, N arrow, Site address.

Show plants, plant tags, ground cover.

No buildings.

Plant schedule. Family, watering requirement of plant, count, Type mark (to match plant tags)

Use of captured rainwater?

Black and White. Scale: TBA

Sheet # C106

**Site Plan: SS Credit 7.1**

**Objective: To prove that you have met the LEED Intent of to reduce “heat islands” to minimize impacts on microclimates and human and wildlife habitats.**

Create a floor schedule that shows the SRI of the hardscaping materials. Need 50% of the hardscaping to be over SRI 29. Prove it does in the schedule. Show area SRI>29 / Total hardscaping area=%

Tag site materials

Property Lines (make custom, thicker property lines), adjacent streets, N arrow, Site address.

No buildings

No plants

No topo

Graphically override SRI>29 and SRI<29 materials to clarify for LEED.

Black and White. Scale: TBA

Sheet # C107

F**loor Plans:**

Square Footage requirements met. Note: each floor does not need to be equal. Area of Level on sheet

2 floors

Bathrooms: ADA Accessible and meet the needs of the building

ADA requirements met in all rooms.

Dimensions (interior and exterior, to face of core)

SHS Custom Room tags (showing Room Name and Area)

Plumbing Fixtures COMPLETE

Casework yes

Smart Walls in course detail

Door, Window tags

Turn off slab foundation and footings

North Arrow (right direction!)

Do not shade walls

No electrical, no furniture, no floor Pattern

Callouts for “Expanded Plans”

Black and White. Scale: TBA

Sheet # A201, A202, A203 if needed

**Expanded Floor Plans:**

ADA requirements met in all rooms.

Expanded Bathroom Plans.

Expanded Guitar Room…etc

“Theme sheets” to include materials, camera views, rendering(s)

Dimensions (interior and exterior, to face of core)

SHS Custom Room tags (showing Room Name and Area)

Plumbing Fixtures COMPLETE

Casework yes

Smart Walls in medium detail

Door, Window tags

Turn off slab foundation and footings

Do not shade walls

Electrical on. Show switches, outlets, lights (as overlay), swings. Consider Copy…Paste same place from Electrical Plan

Show partial adjacent room (for reference)

½ tone Floor Pattern

½ tone furniture (to show ADA Accessibility)

Black and White. Scale: 1/4” = 1’0”

OK to put several on one sheet

Title on sheet: “Expanded Guitar Room” or “Expanded Men’s Bathroom” etc

Sheets # A200’s

**Floor Plan: Presentation**

Square Footage requirements met. Note: each floor does not need to be equal.

No Callouts, Electrical, Tags, Dimensions

SHS Custom Room tags (showing Room Name and Area)

Plumbing Fixtures Yes

Furniture Yes

Casework Yes

Shade walls

½ tone floor Pattern

Turn off slab foundation and footings

North Arrow (right direction!)

List Area of Level

Black and White. Scale: TBA

Sheets # A200’s

**Interior Renderings**

Use Enscape

Paint or wall covering on walls

Base molding

Ceilings

Lighting

Diffusers

Exit signs, smoke detectors, diffusers, etc

Sustainable Flooring

Furnishings

Casework

People?

Sheets # A900’s

**Mechanical Plans**

Use EnergyPro to get building load and room CFM’s.

Start with Mechanical Template….link Arch model

Assign mechanical system(s)

Assign supply, return, exhaust diffusers

Utilize ductolator and/or duct sizing software to get duct sizes

Model ductwork

Tag ducts, diffusers, mechanical equipment

SHS Custom Space/Room tags (showing just Room Name and Area)

North Arrow (right direction!)

Black and White. Scale: TBA

Mech Equipment, Diffuser, Duct Schedules

3D Views to show clash avoidance

Sheets # M200’s (this will be it’s own file…create dummy sheet in Arch model)

**Floor Plan: Furniture/Fixture**

2-3 floors

“Group” student computer stations

SHS Custom Room tags (showing Room Name and Area)

Furniture tag Type mark (letters w diamond around)

Fixture (specialty equipment) tag Type mark (numbers w circle around)

Plumbing Fixtures Yes

Casework Yes

Shade walls: No

No floor Pattern

Turn off slab foundation and footings

North Arrow (right direction!)

Furniture Schedule (Type Mark, Family, Material, Manu, Model #, Count, Low VOC req’s met (Yes/No)

Black and White. Scale: TBA

Sheets # A200’s

**Foundation Plan**

% of aggregate and/or fly ash in Concrete BASED ON RESEARCH.

Notes

Dimensions

North Arrow (right direction!)

Linework Exterior and interior footings

No concrete pattern

Black and White. Scale: TBA

3D foundation Plan Scale: TBA/3

Sheet # A101

**Electrical Plan**

Specify lights for the use of the rooms. This will take some research by your group.

Custom Tag: Watts and Type Mark

Overlay method to properly display switches, outlets, ceiling lights, and swings.

Turn off dimensions, elevations, furniture

SHS Custom Room tags (showing just Room Name)

North Arrow (right direction!)

Black and White. Scale: TBA

**Objective: To calculate total watts of lighting fixtures and prove energy efficiency of lights**

Lighting Fixture Schedule: Type mark, Family, Lumens, Watts, Count, Count\*Watts, Total Watts (create in Schedule).

Electrical Legend

Sheets # 200’s

**Roof Plan**

Solar panels w/ custom solar panel tags

Roof slope tag

Detail hidden lines for exterior walls, columns, loggias under roof

Shade Structure(s)

**Objective: To calculate total watts of Solar Panels**

Mechanical Equipment Schedule: Solar Panels

Use filter to just include Solar Panels

Need total watts of panels and parameters

Type mark, Family, Manufacturer, Model #, Max Power (need total of this), Count, Module Efficiency, Max DC Voltage, Count\*Max Power (create in schedule)

Black and White.

Sheet # A401

**Exterior Elevations**

Material (text) identifying cool roof material (ex: Eagle Cool Roof Tile Malibu 2209 Arrowhead Grey w/ SRI = 31), wall material (ex: “Merlex Navajo White Stucco over SIP”), and Windows (Pella Proline 3220 Dual pane glass w/ Low E coating).

Solar panel Tags

Door and Window tags

Slope arrows

POP

Ground Line (Wide Detail Line)

½ Tone roof and wall surface patterns

Vertical Dims: Dimension to headers and peaks of roofs. That’s it. No superfluous dimensions!

N, S, E, W Elevations

Black and White.

Improve Graphics. See Steven Shell powerpoint files

Sheet # A501, A502

**Exterior Elevations: Shadow Study**

**Objective: To see if windows are getting pounded by the sun in the summer, but allowing sun in during the winter….and to see the effect of overhangs, covered patios, etc.**

Shadow Study for each elevation

Summer Solstice 10am and 2pm

Winter Solstice 10am and 2pm

No annotation

POP

Include shade structures attached to building like trellis’ and loggias.

Ground Line (Wide Detail Line)

½ Tone roof and wall surface patterns

Black and White.

Sheets # A503 and A504. Name them “Summer Solstice Shadow Study” and “Winter Solstice Shadow Study”

**Interior Elevations**

**Objective: To show wall covering, vertical dimensions, casework materials (sustainable), interior features on walls such as whiteboards and shelving, and fixture heights.**

Create as many sheets as needed.

OK to use “TYP” to identify elevations that are repetitive. Ex: “TYP Computer Classroom Whiteboard Wall elevation”

All paints must be identified with (custom) material tags

Vertical dimensions of everything

Identify plumbing fixtures with plumbing fixture tags

Identify equipment with specialty equipment tags

All casework must be identified with both material tags and casework tags

Black and White

Scale : ¼” = 1’0”

Sheets are A700’s

**Building Sections**

2D:

Necessary Building Sections

SHS Room Tags (Just Room Names)

2D is Black and White.

No furniture.

No detail components at this level

Title on Sheet describing where section is passing. Ex: “SECTION THRU LOBBY AND TYP CLASSROOM”

Scale of 2D Sections: TBA

Callout of Exterior Wall as Wall Section

3D:

3D is Color, display Course, Furniture yes

Scale 3D sections to fit

3D of Section of each 2D Section

Sheet # A600’s

**Wall Section**

**Objective: To show the construction of your “Green” non-standard wall/roof/foundation**

Wall Sections

As many as necessary to show building construction.

Scale: TBA

Detail components appropriate to this level of detail

Text notes for materials

Title on Sheet describing where section is passing. Ex: “SECTION THRU EAST WALL @ LOBBY AND TEACHER’S OFFICE”

Color or Black and white

3D:

3D is Color, display Medium to show components in 3D (note only 3D components will be there)

Furniture no

Scale 3D sections to fit

3D of Section of each 2D Wall Section

Sheet # A600’s

**Construction Details**

**Objective: To show the construction of your “Green” non-standard wall/roof/foundation**

Foundation to wall w/ annotations

Scale: 3/4”= 1’0”

Detail components appropriate to this level of detail

Text notes for materials

Title on Sheet describing where section is passing.

Color or Black and white

Roof to wall w/ annotations

Scale: 3/4”= 1’0”

Detail components appropriate to this level of detail

Text notes for materials

Color or Black and white

Sheet # A600’s

**Plumbing Fixture Schedules**

**Objective: To show water use of plumbing fixtures and to prove water savings vs baseline. Aggregate water use must be 20% below the baseline calculated for the building.**

Flush (toilets)

Flow (faucets, showerheads).

Total Actual Water Use (You need to make the column total)

Total Water Baseline (You need to make the column total)

Total water use/baseline= %

% below baseline

Show Plumbing Fixture parameters in schedule

Itemize every instance…there are just a few.

List total flush-flow water use/baseline total water= % on sheet. Ex: 212 gal/293gal=.72 28% below baseline. Place this next to schedules, on the sheet.

Schedules are A800’s. Create as many sheets as necessary. Name the schedules by the Credit they are documenting. Ex: “WE Prerequisite 1 Water Use Reduction”

**Mechanical Equipment Schedule: On- Site Renewable Energy**

**Objective: To encourage and recognize increasing levels of on-site renewable energy self-supply to reduce environmental and economic impacts associated with fossil fuel energy use.**

Inverter parameters

Solar Panels parameters

Show total watts of system.

Calculate percentage of renewable energy as 5 of buildings annual energy cost (EA Credit 2)

Schedules are A800’s. Create as many sheets as necessary.

**Mechanical Equipment Schedule:**

HVAC System (give parameters)

Tankless water Heaters (give parameters)

Schedules are A800’s. Create as many sheets as necessary.

**Window Schedule**

Parameters: Type Mark, Count, Family, Height, Width, Glass Area, VT, U-Value, SHGC, Orientation, Manufacturer, Model, LOW E Coating (Yes/No). Glass Area will be a calculated value in the Window Schedule.

**Objective: To get glass area of wall by orientation.**

Ex: How much glass area is on the south wall.

We want to know the % of glass area on each wall. List this next to schedules.

Sort by Orientation. Give orientation totals.

Schedules are A800’s. Create as many sheets as necessary.

**Presentation**

Layout all drawings on mat board

Drawings in order by sheet #

Cover sheets on top

**Spec Book**

Create “book” for spec sheets and EnergyPro report. Spec books that are just stapled will be graded down. Plan ahead! Save everything. Print spec sheets of everything as you make design decisions.

**EnergyPro**

**Objective: To use Energy modeling to analyse the performance of the building based on your design decisions.**

**You will use you energy Model to prove minimum energy performance EA Prerequisite 2**

**You will use you energy Model to prove optimized energy performance EA Credit 1**

Non-Residential Title 24 Performance (your best)

Non-Residential Title 24 LEED (your best)

Load calculations: Walls, Glass, Roof, Building Orientations (4). Compare your walls, glass, and roof vs. the “standard”. Use best orientation. Give sensible BTU comparisons. **Room load Summary**

**Analysis: How did your walls, glass, roof, building orientation, HVAC Unit effect building performance? What gave most bang for the buck? Which was least effective? Were any building performance enhancements free or close to free? I want numbers… backed by your reports. *Ex: When changing the exterior walls from R-13 to ICF’s, the load of the building went from 12,500 to 9300 sensible BTU’s. The 25.6% decrease in load was significant, making ICF’s a cost-effective design option. See Load Summary2***

**Spec Sheets**

Lighting

Toilets

Faucets

Solar panels Inverter

Cool Roof material

HVAC Unit(s)

Windows

Furniture

Casework

Equipment

Fixtures

Elevator

**LEED Report (in Book form, each team member does their share)**

Document the points you are attempting:

Credit

Points

Intent

Benefit

Implementation

Supporting Documents

Attempt to get as many LEED points as possible.

Step 1: Identify the “Low hanging fruit” Credits.

Step 2: Identify the “Not accessible” credits

Step 3: Identify the “Possible” credits

Add this list to report

**Green Building Design 2017-18**

**Site**

We need to count the pervious % of the site materials. Higher is better. We want the water hitting the ground to stay on the site….not go to the storm drains.

We need to show (by pattern) the pervious material on the site

Subregions can’t have patterns ☹ …..so we can’t use them.

“Floors” are the workaround.

They can give us: Area, Pattern

We need to distinguish floors in the building from floors on the site

Give the floor pattern and color

Project Parameters

We need some custom parameters for this project (hence the name)

We need 3:

Solar Reflective Index (SRI) number

SRI >=29 Yes/no

Pervious Yes/No

Manage

Project parameters

Add

Check Floors

Name: SRI

Type of parameter: Number

Group Under: green Building Properties

Check Instance

Ok

Add

Check Floors

Name: SRI >=29

Type of parameter: Yes/No

Group Under: green Building Properties

Check Instance

Ok

Add

Check Floors

Name: Pervious

Type of parameter: Yes/No

Group Under: green Building Properties

Check Instance

Ok

Ok

Pick the floor…..see the new parameters?

Create a new floor type for each material that will go on the surface of your site. Each type should have a different color and pattern.

Add parameter info (you may need to do a little research on your material’s SRI)

The SRI of >=29 is your target for as much of your site as possible. Roof can have an SRI above 29!

I will need a drawing showing the pervious material on the site and a schedule proving the pervious %.

I will need a drawing showing the SRI >=29 surfaces as a % of the site.

I will need a drawing showing the buildings on the site with a shadow study during summer solstice. Trees, trellis’, shade structures, roof overhangs, etc need to be in.

I will need a drawing showing the buildings on the site with a shadow study during winter solstice. Trees, trellis’, shade structures, roof overhangs, etc need to be in.

You will create Floor Schedules to count the area you are targeting. Use the parameters as filters to count what you want.

Place the schedules on the corresponding Site Plans.

1. Pervious Site %

Floors with colors and patterns

Floor Schedule: Filter Pervious, total Area, Name

Floor Schedule: Total Area of Hardscaping, pervious and impervious

No not include house…this is just site materials

No plants

1. Planting

Landscape Plan.

Plants on.

Plant Schedule

Tag everything on ground with Type mark tags and material Tags

1. Heat Island

Landscape plan

Heat Island

Show shadow study during summer solstice in Corona (because we can)

SRI floor Schedule >29

Note: You must graphically show >29 SRI hardscaping material on ground. Find a way to color/pattern surfaces >29

1. Mass Transit

Mass transportation

Use Google Earth Data to document. Graphically describe elements NGBS is looking for. Test notes for items like parks and stores.

NOTHING IN 3D yet. All 4 drawings are Plan Views on C-size sheets.

**Site Location**

The site is located at about 82499 Ave 46 in Indio. It is across the street from the Date Festival-Fairgrounds. Indio gets very hot during the summer, and has wind and dust issues. Take that into consideration in your design.

**Green Building Design Report 2015-16**

Create a PowerPoint presentation, complete with Excel charts to explain your design decisions. The following are examples only…but give an idea of what type of features you should be covering.

**Key Sustainable Features**

Water Conservation: Low Flow Fixtures, Flush fixtures, rainwater cistern, xeriscaping, etc

Recycled Materials: Shade structure is made of 80% recycled lumber from a local winery

Daylighting: Light wells, atrium, clerestory windows, light tubes, skylights

Individual Controls: Thermostats in each zone, operable windows

**Building Envelope**

Roof

Type: Cold applied styrene-butadiene-styrene (SBS), modified bitumen membrane roofing over metal deck

Green Roof: Cold applied elastomeric protected membrane roofing system,

Overall R-Value: 27.5-30.3

Solar Reflectance: .71

Walls

Exterior wall insulation, sprayed in-place polyurethane foam insulation over masonry wall and semi-rigid mineral wool fiber batt insulation inside metal stud backup walls

Overall R-Value: 22-32

Glazing %: 21% overall

Foundation

20% fly ash added to concrete, exterior perimeter has R-4 rigid insulation

Windows

Fixed windows have U-Value of .32, operable windows have U-Value of .52

SHGC is .3 for fixed windows and .22 for operable

VT is .51 for all windows

**Building Orientation**

Location: Corona, CA

Ideal orientation of front door for optimal building performance: 15 degrees NE to 30 degrees NW

**Energy Efficiency**

HVAC System

HVAC system is a Packaged VAV System from York/Carrier/Trane.

50 ton unit with 12 VAV boxes with 20% and reheat.

Water heaters are Noritz NC380 (N-1321M) SERIES  
NC380 Series ASME Tankless Water Heaters

Lighting

Lithonia ES8 High Performance T-8 Lighting

.60w/sf

89 LPW

Average 52 Fc

48 Watts but has 2- 32 Watt bulbs

Dimming and occupancy sensors

Renewables

200 Sharp U-235 solar panels provide a 47 Kw system

Title 24 and LEED

Building meets California Title 24 Energy standards and actually exceeds it by 21.4%, meeting LEED EA Prerequisite 2 and Credit EA 1.