



Memorandum

To: HKIT Architects **Date:** 08/09/2023

Project Name: BUSD PV Bridging Documents Thousand Oaks, District, Adult School and Transpiration Yard **Project No.:** 22023.2

From: Amruta Chanabasanavar **No. of pages:** 7

Subject: Phase 1 Evaluation

IDA has performed an analysis of the primary structural system to assess if the existing building roof structures are sufficient to support new solar panels (PV).

The following buildings were analyzed:

Berkley Adult School – 1701 San Pablo Ave, Berkley, CA 94702

1. Building A
2. Building B
3. Building C
4. Building D

Thousand Oaks Elementary School– 840 Colusa Ave, Berkley, CA 94707

1. Building A
2. Building B
3. Building C
4. Building D

Oxford Elementary School/District Office– 2020 Bonar St, Berkley, CA 94702

1. Building A
2. Building B
3. Building C
4. Building D
5. Building E
6. Building G

Transportation Bus Yard – 1325 6th St., Berkley, CA 94710

1. Building A

Record Drawings

Record drawings were available for analysis for all buildings.

Berkley Adult School:

	Record Drawings Available
Building A	February 7, 1950 Earnst J. Kump & Mark Falk Architect & Engineer
Building B	February 7, 1950 Earnst J. Kump & Mark Falk Architect & Engineer
Building C	February 7, 1950 Earnst J. Kump & Mark Falk Architect & Engineer
Building D	February 7, 1950 Earnst J. Kump & Mark Falk Architect & Engineer

Thousand Oaks Elementary School:

	Record Drawings Available
Building A	December 21, 1998 KPa Consulting Engineers, Inc.
Building B	December 21, 1998 KPa Consulting Engineers, Inc.
Building C	December 21, 1998 KPa Consulting Engineers, Inc.
Building D	December 21, 1998 KPa Consulting Engineers, Inc.

Oxford Elementary School/District Office:

	Record Drawings Available
Building A	July 1, 1964 Pregnoff & Matheu Structural Engineers
Building B	April 24, 1950 Hall & Pregnoff Structural Engineers
Building C	April 24, 1950 Hall & Pregnoff Structural Engineers
Building D	July 1, 1964 Pregnoff & Matheu Structural Engineers
Building E	July 1, 1964 Pregnoff & Matheu Structural Engineers

Building G	July 1, 1964 Pregnoff & Matheu Structural Engineers
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Transportation Bus Yard:

	Record Drawings Available
Building A	December 20, 2007 Issa Structural Engineers

Building Information

Berkley Adult School

	Building A	Building B	Building C	Building D
Total Roof Area (ft²)	14263	5808	46140	14016
Estimated Useful Roof Area for PV (ft²)	9984	4646	23863	10512
Estimated Useful Roof Area for PV (%)	70	80	52	75

Thousand Oaks Elementary School

	Building A	Building B	Building C	Building D
Total Roof Area (ft²)	12035	9487	24478	13039
Estimated Useful Roof Area for PV (ft²)	8424	7115	13463	7171
Estimated Useful Roof Area for PV (%)	70	75	55	55

Oxford Elementary School / District Office

	Building A&B	Building C	Building D	Building E	Building G
Total Roof Area (ft²)	23848	15748	6279	4907	5686
Estimated Useful Roof Area for PV (ft²)	16694	7109	3767	3925	4833
Estimated Useful Roof Area for PV (%)	70	45	60	80	85

Transportation Bus Yard

	Building A
Total Roof Area (ft²)	12465
Estimated Useful Roof Area for PV (ft²)	11218
Estimated Useful Roof Area for PV (%)	90

Building Roof description

Berkley Adult School:

1. Building A
 Existing roof consists of steel joists @ 8'-0" supported by trusses. The trusses are supported by WF columns.
2. Building B
 Existing roof consists of steel joists @ 8'-0" supported by trusses. The trusses are supported by WF columns.
3. Building C
 Existing roof consists of steel joists @ 8'-0" supported by trusses. The trusses are supported by WF columns.

4. Building D
Existing roof consists of steel joists @ 8'-0" supported by trusses. The trusses are supported by WF columns.

Thousand Oaks Elementary School

1. Building A
Existing roof is framed with 1 3/4" LVL @ 16" OC beams supported by 6 3/4" x 18" Glulam beams.
2. Building B
Existing roof is framed with 1 3/4" LVL @ 16" OC beams supported by WF beams.
3. Building C
Existing roof framed with 2x12 @16" OC supported by pre-fab trusses at 12'-6" OC, supported by steel columns.
4. Building D
Existing roof is framed with 1 3/4" LVL @ 16" OC beams supported by 5-1/8" x 21" Glulam beams.

Oxford Elementary School/District Office

1. Building A
Existing roof is framed with 12"x22" concrete beams supported by concrete columns.
2. Building B
Existing roof is framed with 12"x22" and 12"x18" concrete beams supported by concrete columns.
3. Building C
Existing roof consists of steel joists @ 8'-0" supported by trusses. The trusses are supported by tube steel columns.
4. Building D
Existing roof consists of 3-1/4"x13" Glulam beams @ 48" OC supported by WF beams or posts. The trusses are supported by posts.
5. Building E
Existing roof consists of 3-1/4"x14-5/8" Glulam beams @ 48" OC supported by bearing walls.

6. Building G
Existing roof is framed with precast prestress T concrete beams supported by concrete columns.

Transportation Bus Yard

1. Building A
Existing roof is framed with WF beams @ 7'-0" supported by WF beam girders and columns.

Evaluation of Gravity Loads

The PV panel weight is assumed to be a distributed load of 5 lb/ft². Since the panels will most likely be supported on a frame with a grid of stanchions, the distributed load was converted to a concentrated load of 250 pounds. This equates to a stanchion grid spacing of approximately 6 feet x 8 feet. The roof framing members were evaluated for a concentrated load of 250 pounds at various locations that would produce the highest stress. Per Code¹, strengthening of existing framing is not required if the stresses in the existing structural framing are not increased by more than 5%.

In all cases, additional stresses imposed by the proposed PV panels on the existing framing are less than a 5% increase. Therefore, the existing framing is adequate to support the anticipated loads from the PV panels provided the maximum loading of 250 pounds is not exceeded.

Existing framing is adequate to support a reroofing load of 3psf for all buildings.

Evaluation of Lateral Loads

An increase in the effective seismic weight in any story by more than 10% shall require a rehabilitation of the existing building². Effective seismic weight includes the weight of the roof (roofing, structure, ceiling, rooftop units, etc.) and weight of interior and exterior walls that are tributary to the roof (typically the weight of the wall from the roof to the story below divided by two). IDA has ignored the tributary wall weight for this preliminary phase in order to produce a conservative result. For each building, the increase in effective seismic weight is calculated for 5 psf additional load acting over the proposed area of the PV panels.

¹ 2019 California Existing Building Code, Section 503.3

² Division of the State Architect, Interpretation of Regulations IR EB-5

In all cases, the existing structures do not need to be evaluated for additional seismic loading from the new panels.

Additional wind forces on the building have not been evaluated, but are expected to be minimal. For this assumption to be accurate, the panels must be installed parallel with the roof plane, and not more than 24 inches above the roof surface. Panels on inclined frames should not be allowed without additional evaluation from the design-build team.

Panel layout spacing

The recommended panel layout spacing for the buildings are as follows:

Berkley Adult School – 1701 San Pablo Ave, Berkley, CA 94702

1. Building A – 8'x8'
2. Building B – 8'x8'
3. Building C – 8'x8'
4. Building D – 8'x8'

Thousand Oaks Elementary School– 840 Colusa Ave, Berkley, CA 94707

1. Building A - 8'x8'
2. Building B - 8'x8'
3. Building C - 8'x8'
4. Building D - 8'x11'

Oxford Elementary School/District Office– 2020 Bonar St, Berkley, CA 94702

1. Building A - 8'x8'
2. Building B – 8'x8'
3. Building C – 8'x8'
4. Building D - 8'x8'
5. Building E – 8'x8'
6. Building G - 8'x8'

Transportation Bus Yard – 1325 6th St., Berkley, CA 94710

1. Building A – 8'x7'