Campus: UCLA
Building Name: FACMGMT BLDG
CAAN ID: 4260
Auxiliary Building ID: N/A

UNIVERSITY OF CALIFORNIA

Date: 06/27/2019

FORM 1
CERTIFICATE OF SEISMIC PERFORMANCE LEVEL
☒ **UC-Designed & Constructed Facility**
☐ **Campus-Acquired or Leased Facility**

BUILDING DATA
Building Name: FACMGMT BLDG (Co-Generation Facility – Building 2 (FRS-W))
Address: 731 E Charles Yound Drive South
Site location coordinates: Latitude 34.06736 Longitudinal -118.44628

UCOP SEISMIC PERFORMANCE LEVEL (OR "RATING"): IV

ASCE 41-17 Model Building Type:

a. Longitudinal Direction: Steel concentrically braced frames
b. Transverse Direction: Steel concentrically braced frames

Gross Square Footage: 56,862
Number of stories *above* grade: 2
Number of basement stories *below* grade: 1

Year Original Building was Constructed: 1994
Original Building Design Code & Year: UBC-1988
Retrofit Building Design Code & Code (if applicable): N/A

SITE INFORMATION
Site Class: D Basis: Inferred
Geologic Hazards:
Fault Rupture: Unknown Basis: Unknown
Liquefaction: Unknown Basis: Unknown
Landslide: No Basis: Inferred

ATTACHMENT
Original Structural Drawings: Chas T Main INC, 05-26-1992, E-SG-201
Seismic Evaluation: Seismic Assessment of the UCLA Cogen Building Complex , KPFF Consulting Engineers, 12-05-2018, ASCE41-13 Tier 3
Retrofit Structural Drawings: N/A

CERTIFICATION

I, Mark Hershberg, a California-licensed structural engineer, am responsible for the completion of this certificate, and I have no ownership interest in the property identified above. My scope of review to support the completion of this certificate included both of the following:

a) the review of structural drawings indicating that they are as-built or record drawings, or that they otherwise are the basis for the construction of the building: ☑ Yes ☐ No

b) visiting the building to verify the observable existing conditions are reasonably consistent with those shown on the structural drawings: ☑ Yes ☐ No

Based on my review, I have verified that the UCOP Seismic Performance Level is presumptively permitted by the following UC Seismic Program Guidebook provision (choose one of the following):

☐ 1) Contract documents indicate that the original design and construction of the aforementioned building is in accordance with the benchmark design code year (or later) building code seismic design provisions for UBC or IBC listed in Table 1 below.

☑ 2) The existing SPL rating is based on an acceptable basis of seismic evaluation completed in 2006 or later.

☐ 3) Contract documents indicate that a comprehensive[1] building seismic retrofit design was fully-constructed with a design completed in 2000 or later, and that design was based on ground motion parameters, at a minimum, corresponding to:

☐ BSE-1E (or BSE-R) and BSE-2E (or BSE-C) as defined in ASCE 41, or the full design basis ground motion required in the 1997 UBC/1998 CBC ***or later*** for EXISTING buildings, and is presumptively assigned an SPL rating of IV.

☐ BSE-1 (or BSE-1N) and BSE-2 (or BSE-2N) as defined in ASCE 41, or the full design basis ground motion required in the 1997 UBC/1998 ***or later*** CBC for NEW buildings, and is presumptively assigned an SPL rating of III.

AFFIX SEAL HERE

Mark Hershberg	Principal
Print Name	Title
S5078	06/30/2021
CA Professional Registration No.	License Expiration Date
	06/27/2019
Signature	Date

KPFF Consulting Engineers, 213.418.0201,
700 S Flower St, Suite 2100 Los Angeles, CA 90017
Firm Name, Phone Number, and Address

[1] A comprehensive retrofit addresses the entire building structural system as indicated by the associated seismic evaluation, as opposed to addressing selective portions of the structural system.

Table 1: Benchmark Building Codes and Standards

Building Type[a,b]	Building Seismic Design Provisions	
	UBC	IBC
Wood frame, wood shear panels (Types W1 and W2)	1976	2000
Wood frame, wood shear panels (Type W1a)	1976	2000
Steel moment-resisting frame (Types S1 and S1a)	1997	2000
Steel concentrically braced frame (Types S2 and S2a)	1997	2000
Steel eccentrically braced frame (Types S2 and S2a)	1988[g]	2000
Buckling-restrained braced frame (Types S2 and S2a)	[f]	2006
Metal building frames (Type S3)	[f]	2000
Steel frame with concrete shear walls (Type S4)	1994	2000
Steel frame with URM infill (Types S5 and S5a)	[f]	2000
Steel plate shear wall (Type S6)	[f]	2006
Cold-formed steel light-frame construction—shear wall system (Type CFS1)	1997[h]	2000
Cold-formed steel light-frame construction—strap-braced wall system (Type CFS2)	[f]	2003
Reinforced concrete moment-resisting frame (Type C1)[i]	1994	2000
Reinforced concrete shear walls (Types C2 and C2a)	1994	2000
Concrete frame with URM infill (Types C3 and C3a)	[f]	[f]
Tilt-up concrete (Types PC1 and PC1a)	1997	2000
Precast concrete frame (Types PC2 and PC2a)	[f]	2000
Reinforced masonry (Type RM1)	1997	2000
Reinforced masonry (Type RM2)	1994	2000
Unreinforced masonry (Type URM)	[f]	[f]
Unreinforced masonry (Type URMa)	[f]	[f]
Seismic isolation or passive dissipation	1991	2000

Note: This table has been adapted from ASCE 41-17 Table 3-2. Benchmark Building Codes and Standards for Life Safety Structural Performed at BSE-1E.

Note: UBC = *Uniform Building Code*. IBC = *International Building Code*.

[a] Building type refers to one of the common building types defined in Table 3-1 of ASCE 41-17.

[b] Buildings on hillside sites shall not be considered Benchmark Buildings.

[c] not used

[d] not used

[e] not used

[f] No benchmark year; buildings shall be evaluated in accordance with Section III.J.

[g] Steel eccentrically braced frames with links adjacent to columns shall comply with the 1994 UBC Emergency Provisions, published September/October 1994, or subsequent requirements.

[h] Cold-formed steel shear walls with wood structural panels only.

[i] Flat slab concrete moment frames shall not be considered Benchmark Buildings.

Campus: UCLA
Building Name: FACMGMT BLDG E
CAAN ID: 4260
Auxiliary Building ID: 4260.1

UNIVERSITY OF CALIFORNIA

Date: 06/27/2019

FORM 1
CERTIFICATE OF SEISMIC PERFORMANCE LEVEL
☒ **UC-Designed & Constructed Facility**
☐ **Campus-Acquired or Leased Facility**

BUILDING DATA
Building Name: FACMGMT BLDG E (Co-Generation Facility – Building 3 (FRS-E))
Address: 731 E Charles Yound Drive South
Site location coordinates: Latitude 34.06736 Longitudinal -118.44628

UCOP SEISMIC PERFORMANCE LEVEL (OR "RATING"): III

ASCE 41-17 Model Building Type:
a. Longitudinal Direction: Steel concentrically braced frames
b. Transverse Direction: Steel concentrically braced frames
Gross Square Footage: 56,862
Number of stories *above* grade: 2
Number of basement stories *below* grade: 1

Year Original Building was Constructed: 1994
Original Building Design Code & Year: UBC-1988
Retrofit Building Design Code & Code (if applicable): N/A

SITE INFORMATION
Site Class: D Basis: Inferred
Geologic Hazards:
Fault Rupture: Unknown Basis: Unknown
Liquefaction: Unknown Basis: Unknown
Landslide: No Basis: Inferred

ATTACHMENT
Original Structural Drawings: Chas T Main INC, 05-26-1992, E-SG-201
Seismic Evaluation: Seismic Assessment of the UCLA Cogen Building Complex , KPFF Consulting Engineers, 12-05-2018, ASCE41-13 Tier 3
Retrofit Structural Drawings: N/A

CERTIFICATION

I, Mark Hershberg, a California-licensed structural engineer, am responsible for the completion of this certificate, and I have no ownership interest in the property identified above. My scope of review to support the completion of this certificate included both of the following:

a) the review of structural drawings indicating that they are as-built or record drawings, or that they otherwise are the basis for the construction of the building: ☑ Yes ☐ No
b) visiting the building to verify the observable existing conditions are reasonably consistent with those shown on the structural drawings: ☑ Yes ☐ No

Based on my review, I have verified that the UCOP Seismic Performance Level is presumptively permitted by the following UC Seismic Program Guidebook provision (choose one of the following):

☐ 1) Contract documents indicate that the original design and construction of the aforementioned building is in accordance with the benchmark design code year (or later) building code seismic design provisions for UBC or IBC listed in Table 1 below.

☑ 2) The existing SPL rating is based on an acceptable basis of seismic evaluation completed in 2006 or later.

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☐ BSE-1 (or BSE-1N) and BSE-2 (or BSE-2N) as defined in ASCE 41, or the full design basis ground motion required in the 1997 UBC/1998 ***or later*** CBC for NEW buildings, and is presumptively assigned an SPL rating of III.

AFFIX SEAL HERE

Mark Hershberg	Principal
Print Name	Title
S5078	06/30/2021
CA Professional Registration No.	License Expiration Date
Signature	06/27/2019 Date

KPFF Consulting Engineers, 213.418.0201,
700 S Flower St, Suite 2100 Los Angeles, CA 90017
Firm Name, Phone Number, and Address

[1] A comprehensive retrofit addresses the entire building structural system as indicated by the associated seismic evaluation, as opposed to addressing selective portions of the structural system.

Table 1: Benchmark Building Codes and Standards

Building Type[a,b]	Building Seismic Design Provisions	
	UBC	IBC
Wood frame, wood shear panels (Types W1 and W2)	1976	2000
Wood frame, wood shear panels (Type W1a)	1976	2000
Steel moment-resisting frame (Types S1 and S1a)	1997	2000
Steel concentrically braced frame (Types S2 and S2a)	1997	2000
Steel eccentrically braced frame (Types S2 and S2a)	1988[g]	2000
Buckling-restrained braced frame (Types S2 and S2a)	[f]	2006
Metal building frames (Type S3)	[f]	2000
Steel frame with concrete shear walls (Type S4)	1994	2000
Steel frame with URM infill (Types S5 and S5a)	[f]	2000
Steel plate shear wall (Type S6)	[f]	2006
Cold-formed steel light-frame construction—shear wall system (Type CFS1)	1997[h]	2000
Cold-formed steel light-frame construction—strap-braced wall system (Type CFS2)	[f]	2003
Reinforced concrete moment-resisting frame (Type C1)[i]	1994	2000
Reinforced concrete shear walls (Types C2 and C2a)	1994	2000
Concrete frame with URM infill (Types C3 and C3a)	[f]	[f]
Tilt-up concrete (Types PC1 and PC1a)	1997	2000
Precast concrete frame (Types PC2 and PC2a)	[f]	2000
Reinforced masonry (Type RM1)	1997	2000
Reinforced masonry (Type RM2)	1994	2000
Unreinforced masonry (Type URM)	[f]	[f]
Unreinforced masonry (Type URMa)	[f]	[f]
Seismic isolation or passive dissipation	1991	2000

Note: This table has been adapted from ASCE 41-17 Table 3-2. Benchmark Building Codes and Standards for Life Safety Structural Performed at BSE-1E.

Note: UBC = *Uniform Building Code*. IBC = *International Building Code*.

[a] Building type refers to one of the common building types defined in Table 3-1 of ASCE 41-17.

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[c] not used

[d] not used

[e] not used

[f] No benchmark year; buildings shall be evaluated in accordance with Section III.J.

[g] Steel eccentrically braced frames with links adjacent to columns shall comply with the 1994 UBC Emergency Provisions, published September/October 1994, or subsequent requirements.

[h] Cold-formed steel shear walls with wood structural panels only.

[i] Flat slab concrete moment frames shall not be considered Benchmark Buildings.

Campus: UCLA
Building Name: FACMGMT BLDG-COGEN W
CAAN ID: 4260
Auxiliary Building ID: 4260.2

UNIVERSITY OF CALIFORNIA

Date: 06/27/2019

FORM 1
CERTIFICATE OF SEISMIC PERFORMANCE LEVEL
☒ **UC-Designed & Constructed Facility**
☐ **Campus-Acquired or Leased Facility**

BUILDING DATA
Building Name: FACMGMT BLDG-COGEN W (Co-Generation Facility – Building 1 (Co-Gen W))
Address: 731 E Charles Yound Drive South
Site location coordinates: Latitude 34.06736 Longitudinal -118.44628

UCOP SEISMIC PERFORMANCE LEVEL (OR "RATING"): IV

ASCE 41-17 Model Building Type:

a. Longitudinal Direction: Steel concentrically braced frames
b. Transverse Direction: Steel concentrically braced frames

Gross Square Footage: 62,000
Number of stories *above* grade: 1
Number of basement stories *below* grade: 1

Year Original Building was Constructed: 1994
Original Building Design Code & Year: UBC-1988
Retrofit Building Design Code & Code (if applicable): N/A

SITE INFORMATION
Site Class: D Basis: Inferred
Geologic Hazards:
Fault Rupture: Unknown Basis: Unknown
Liquefaction: Unknown Basis: Unknown
Landslide: No Basis: Inferred

ATTACHMENT
Original Structural Drawings: Chas T Main INC, 05-26-1992, E-SG-201
Seismic Evaluation: Seismic Assessment of the UCLA Cogen Building Complex , KPFF Consulting Engineers, 12-05-2018, ASCE41-13 Tier 3
Retrofit Structural Drawings: N/A

CERTIFICATION

I, Mark Hershberg, a California-licensed structural engineer, am responsible for the completion of this certificate, and I have no ownership interest in the property identified above. My scope of review to support the completion of this certificate included both of the following:

a) the review of structural drawings indicating that they are as-built or record drawings, or that they otherwise are the basis for the construction of the building: ☑ Yes ☐ No
b) visiting the building to verify the observable existing conditions are reasonably consistent with those shown on the structural drawings: ☑ Yes ☐ No

Based on my review, I have verified that the UCOP Seismic Performance Level is presumptively permitted by the following UC Seismic Program Guidebook provision (choose one of the following):

☐ 1) Contract documents indicate that the original design and construction of the aforementioned building is in accordance with the benchmark design code year (or later) building code seismic design provisions for UBC or IBC listed in Table 1 below.

☑ 2) The existing SPL rating is based on an acceptable basis of seismic evaluation completed in 2006 or later.

☐ 3) Contract documents indicate that a comprehensive[1] building seismic retrofit design was fully-constructed with a design completed in 2000 or later, and that design was based on ground motion parameters, at a minimum, corresponding to:

☐ BSE-1E (or BSE-R) and BSE-2E (or BSE-C) as defined in ASCE 41, or the full design basis ground motion required in the 1997 UBC/1998 CBC ***or later*** for EXISTING buildings, and is presumptively assigned an SPL rating of IV.

☐ BSE-1 (or BSE-1N) and BSE-2 (or BSE-2N) as defined in ASCE 41, or the full design basis ground motion required in the 1997 UBC/1998 ***or later*** CBC for NEW buildings, and is presumptively assigned an SPL rating of III.

AFFIX SEAL HERE

Mark Hershberg	Principal
Print Name	Title
S5078	06/30/2021
CA Professional Registration No.	License Expiration Date
Signature	06/27/2019 Date

KPFF Consulting Engineers, 213.418.0201,
700 S Flower St, Suite 2100 Los Angeles, CA 90017
Firm Name, Phone Number, and Address

[1] A comprehensive retrofit addresses the entire building structural system as indicated by the associated seismic evaluation, as opposed to addressing selective portions of the structural system.

Table 1: Benchmark Building Codes and Standards

Building Type[a,b]	Building Seismic Design Provisions	
	UBC	IBC
Wood frame, wood shear panels (Types W1 and W2)	1976	2000
Wood frame, wood shear panels (Type W1a)	1976	2000
Steel moment-resisting frame (Types S1 and S1a)	1997	2000
Steel concentrically braced frame (Types S2 and S2a)	1997	2000
Steel eccentrically braced frame (Types S2 and S2a)	1988[g]	2000
Buckling-restrained braced frame (Types S2 and S2a)	[f]	2006
Metal building frames (Type S3)	[f]	2000
Steel frame with concrete shear walls (Type S4)	1994	2000
Steel frame with URM infill (Types S5 and S5a)	[f]	2000
Steel plate shear wall (Type S6)	[f]	2006
Cold-formed steel light-frame construction—shear wall system (Type CFS1)	1997[h]	2000
Cold-formed steel light-frame construction—strap-braced wall system (Type CFS2)	[f]	2003
Reinforced concrete moment-resisting frame (Type C1)[i]	1994	2000
Reinforced concrete shear walls (Types C2 and C2a)	1994	2000
Concrete frame with URM infill (Types C3 and C3a)	[f]	[f]
Tilt-up concrete (Types PC1 and PC1a)	1997	2000
Precast concrete frame (Types PC2 and PC2a)	[f]	2000
Reinforced masonry (Type RM1)	1997	2000
Reinforced masonry (Type RM2)	1994	2000
Unreinforced masonry (Type URM)	[f]	[f]
Unreinforced masonry (Type URMa)	[f]	[f]
Seismic isolation or passive dissipation	1991	2000

Note: This table has been adapted from ASCE 41-17 Table 3-2. Benchmark Building Codes and Standards for Life Safety Structural Performed at BSE-1E.

Note: UBC = *Uniform Building Code*. IBC = *International Building Code*.

[a] Building type refers to one of the common building types defined in Table 3-1 of ASCE 41-17.

[b] Buildings on hillside sites shall not be considered Benchmark Buildings.

[c] not used

[d] not used

[e] not used

[f] No benchmark year; buildings shall be evaluated in accordance with Section III.J.

[g] Steel eccentrically braced frames with links adjacent to columns shall comply with the 1994 UBC Emergency Provisions, published September/October 1994, or subsequent requirements.

[h] Cold-formed steel shear walls with wood structural panels only.

[i] Flat slab concrete moment frames shall not be considered Benchmark Buildings.

FORM 1
CERTIFICATE OF SEISMIC PERFORMANCE LEVEL
☒ **UC-Designed & Constructed Facility**
☐ **Campus-Acquired or Leased Facility**

BUILDING DATA
Building Name: FACMGMT BLDG-COGEN E (Co-Generation Facility – Building 5 (FRS))
Address: 731 E Charles Yound Drive South
Site location coordinates: Latitude 34.06736 Longitudinal -118.44628

UCOP SEISMIC PERFORMANCE LEVEL (OR "RATING"): III

ASCE 41-17 Model Building Type:
a. Longitudinal Direction: Steel concentrically braced frames
b. Transverse Direction: Steel concentrically braced frames

Gross Square Footage: 9,000
Number of stories *above* grade: 1
Number of basement stories *below* grade: 0

Year Original Building was Constructed: 1994
Original Building Design Code & Year: UBC-1988
Retrofit Building Design Code & Code (if applicable): N/A

SITE INFORMATION
Site Class: D Basis: Inferred
Geologic Hazards:
Fault Rupture: Unknown Basis: Unknown
Liquefaction: Unknown Basis: Unknown
Landslide: No Basis: Inferred

ATTACHMENT
Original Structural Drawings: Chas T Main INC, 05-26-1992, E-SG-201
Seismic Evaluation: Seismic Assessment of the UCLA Cogen Building Complex , KPFF Consulting Engineers, 12-05-2018, ASCE41-13 Tier 3
Retrofit Structural Drawings: N/A

CERTIFICATION

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a) the review of structural drawings indicating that they are as-built or record drawings, or that they otherwise are the basis for the construction of the building: ☑ Yes ☐ No
b) visiting the building to verify the observable existing conditions are reasonably consistent with those shown on the structural drawings: ☑ Yes ☐ No

Based on my review, I have verified that the UCOP Seismic Performance Level is presumptively permitted by the following UC Seismic Program Guidebook provision (choose one of the following):

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☐ BSE-1 (or BSE-1N) and BSE-2 (or BSE-2N) as defined in ASCE 41, or the full design basis ground motion required in the 1997 UBC/1998 ***or later*** CBC for NEW buildings, and is presumptively assigned an SPL rating of III.

AFFIX SEAL HERE

Mark Hershberg	Principal
Print Name	Title
S5078	06/30/2021
CA Professional Registration No.	License Expiration Date
Signature	06/27/2019
	Date

KPFF Consulting Engineers, 213.418.0201,
700 S Flower St, Suite 2100 Los Angeles, CA 90017
Firm Name, Phone Number, and Address

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Table 1: Benchmark Building Codes and Standards

Building Type[a,b]	Building Seismic Design Provisions	
	UBC	IBC
Wood frame, wood shear panels (Types W1 and W2)	1976	2000
Wood frame, wood shear panels (Type W1a)	1976	2000
Steel moment-resisting frame (Types S1 and S1a)	1997	2000
Steel concentrically braced frame (Types S2 and S2a)	1997	2000
Steel eccentrically braced frame (Types S2 and S2a)	1988[g]	2000
Buckling-restrained braced frame (Types S2 and S2a)	[f]	2006
Metal building frames (Type S3)	[f]	2000
Steel frame with concrete shear walls (Type S4)	1994	2000
Steel frame with URM infill (Types S5 and S5a)	[f]	2000
Steel plate shear wall (Type S6)	[f]	2006
Cold-formed steel light-frame construction—shear wall system (Type CFS1)	1997[h]	2000
Cold-formed steel light-frame construction—strap-braced wall system (Type CFS2)	[f]	2003
Reinforced concrete moment-resisting frame (Type C1)[i]	1994	2000
Reinforced concrete shear walls (Types C2 and C2a)	1994	2000
Concrete frame with URM infill (Types C3 and C3a)	[f]	[f]
Tilt-up concrete (Types PC1 and PC1a)	1997	2000
Precast concrete frame (Types PC2 and PC2a)	[f]	2000
Reinforced masonry (Type RM1)	1997	2000
Reinforced masonry (Type RM2)	1994	2000
Unreinforced masonry (Type URM)	[f]	[f]
Unreinforced masonry (Type URMa)	[f]	[f]
Seismic isolation or passive dissipation	1991	2000

Note: This table has been adapted from ASCE 41-17 Table 3-2. Benchmark Building Codes and Standards for Life Safety Structural Performed at BSE-1E.

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[i] Flat slab concrete moment frames shall not be considered Benchmark Buildings.

Campus: UCLA
Building Name: FACMGMT BLDG-ESB
CAAN ID: 4260
Auxiliary Building ID: 4260.4

UNIVERSITY OF CALIFORNIA

Date: 06/27/2019

FORM 1
CERTIFICATE OF SEISMIC PERFORMANCE LEVEL
☒ **UC-Designed & Constructed Facility**
☐ **Campus-Acquired or Leased Facility**

BUILDING DATA
Building Name: FACMGMT BLDG-ESB (Co-Generation Facility – Building 4 (ESB))
Address: 731 E Charles Yound Drive South
Site location coordinates: Latitude 34.06736 Longitudinal -118.44628

UCOP SEISMIC PERFORMANCE LEVEL (OR "RATING"): III

ASCE 41-17 Model Building Type:
a. Longitudinal Direction: Steel concentrically braced frames
b. Transverse Direction: Steel concentrically braced frames

Gross Square Footage: 7,500
Number of stories *above* grade: 1
Number of basement stories *below* grade: 0

Year Original Building was Constructed: 1994
Original Building Design Code & Year: UBC-1988
Retrofit Building Design Code & Code (if applicable): N/A

SITE INFORMATION
Site Class: D Basis: Inferred
Geologic Hazards:
Fault Rupture: Unknown Basis: Unknown
Liquefaction: Unknown Basis: Unknown
Landslide: No Basis: Inferred

ATTACHMENT
Original Structural Drawings: Chas T Main INC, 05-26-1992, E-SG-201
Seismic Evaluation: Seismic Assessment of the UCLA Cogen Building Complex , KPFF Consulting Engineers, 12-05-2018, ASCE41-13 Tier 3
Retrofit Structural Drawings: N/A

CERTIFICATION

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AFFIX SEAL HERE

Mark Hershberg	Principal
Print Name	Title
S5078	06/30/2021
CA Professional Registration No.	License Expiration Date
Signature	06/27/2019
	Date

KPFF Consulting Engineers, 213.418.0201,
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Firm Name, Phone Number, and Address

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Building Type[a,b]	Building Seismic Design Provisions	
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Steel concentrically braced frame (Types S2 and S2a)	1997	2000
Steel eccentrically braced frame (Types S2 and S2a)	1988[g]	2000
Buckling-restrained braced frame (Types S2 and S2a)	[f]	2006
Metal building frames (Type S3)	[f]	2000
Steel frame with concrete shear walls (Type S4)	1994	2000
Steel frame with URM infill (Types S5 and S5a)	[f]	2000
Steel plate shear wall (Type S6)	[f]	2006
Cold-formed steel light-frame construction—shear wall system (Type CFS1)	1997[h]	2000
Cold-formed steel light-frame construction—strap-braced wall system (Type CFS2)	[f]	2003
Reinforced concrete moment-resisting frame (Type C1)[i]	1994	2000
Reinforced concrete shear walls (Types C2 and C2a)	1994	2000
Concrete frame with URM infill (Types C3 and C3a)	[f]	[f]
Tilt-up concrete (Types PC1 and PC1a)	1997	2000
Precast concrete frame (Types PC2 and PC2a)	[f]	2000
Reinforced masonry (Type RM1)	1997	2000
Reinforced masonry (Type RM2)	1994	2000
Unreinforced masonry (Type URM)	[f]	[f]
Unreinforced masonry (Type URMa)	[f]	[f]
Seismic isolation or passive dissipation	1991	2000

Note: This table has been adapted from ASCE 41-17 Table 3-2. Benchmark Building Codes and Standards for Life Safety Structural Performed at BSE-1E.

Note: UBC = *Uniform Building Code*. IBC = *International Building Code*.

[a] Building type refers to one of the common building types defined in Table 3-1 of ASCE 41-17.

[b] Buildings on hillside sites shall not be considered Benchmark Buildings.

[c] not used

[d] not used

[e] not used

[f] No benchmark year; buildings shall be evaluated in accordance with Section III.J.

[g] Steel eccentrically braced frames with links adjacent to columns shall comply with the 1994 UBC Emergency Provisions, published September/October 1994, or subsequent requirements.

[h] Cold-formed steel shear walls with wood structural panels only.

[i] Flat slab concrete moment frames shall not be considered Benchmark Buildings.

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Seismic Assessment of the UCLA Cogen Building Complex

KPFF JOB # 1800484

December 5, 2018

Table of Contents

1. OVERVIEW

Introduction

The Cogen building complex was constructed in the early 1990s and functions as a Central Unit Plan (CUP) and power generation plant for much of the UCLA campus. The original construction included an Emergency Services Building (ESB), which was permitted and constructed under OSHPD jurisdiction and which provided services to existing OSHPD facilities in service at that time. Both the Cogen and ESB buildings were constructed under the supervision of an OSHPD Inspector of Record (IOR).

The existing Cogen building complex is approximately 78,000 GSF and the existing ESB is approximately 7,000 GSF. All buildings consist of steel framing with double-angle braced frames providing seismic resistance. All buildings are supported on pile foundations. The design was performed under the requirements of the 1989 California Building Code. Although the ESB was permitted under OSHPD, it is not clear from record drawings whether the original Cogen was also designed as an "essential facility" under that code.

The prior seismic evaluation study conducted by KPFF in 2017 ("OSHPD Study") was intended to assess the feasibility of changing the Cogen Building from UC to OSHPD jurisdiction, thus enabling it to provide services to the RRUMC Hospital. The OSHPD Study included a structural analysis that determined a performance rating using the OSHPD SPC performance scale, per Chapter 6 of the California Administrative Code. The OSHPD Study was performed under KPFF Project #10011700063.

We understand that UCLA requires a formal seismic evaluation report for the Cogen Building to meet the evaluation requirements of the UC Seismic Safety Policy (UCSSP), as revised on May 19, 2017.

Objectives of the Study

- Our scope of work will consist of reinterpreting the seismic analysis performed for the OSHPD Study to determine the Expected Seismic Performance Level per the UCSSP. Our deliverable for this scope of work will consist of a report documenting the methodology and conclusions of the study.

- No additional structural analysis will be performed beyond that which is noted above.

2. SEISMIC EVALUATION METHODOLOGY

Regulatory Framework

This seismic evaluation will be conducted in accordance with the requirements of the current University of California Seismic Safety Policy, which uses the seismic provisions of the 2013 California Building Code (CBC). Chapter 34 of the CBC is the section addressing alterations and repairs in existing buildings; and it references the American Society of Civil Engineers Standard Seismic Rehabilitation of Existing Buildings, ASCE41-06. This Project will use ASCE41-13 which is the most current version of this standard.

Appendix A on the UC Seismic Safety Policy defines the Earthquake Performance Levels for each Rating Level as shown on Table 1.

Definitions based upon California Building Code (CBC) requirements for seismic evaluation of buildings using Occupancy Categories of CBC Table 1604A.5, depending on which applies, and performance criteria in CBC Table 3417.5	**Rating Level**	
	No Peer Review	**Peer Review**
A building evaluated as meeting or exceeding the requirements of CBC Chapter 34 for Occupancy Category I-III performance criteria with BSE- 1 and BSE-2 hazard levels replacing BSE-R and BSE-C respectively as given in Chapter 34; alternatively, a building meeting CBC requirements for a new building.	III	II
A building evaluated as meeting or exceeding the requirements of CBC Chapter 34 for Occupancy Category I-III performance criteria.	IV	III
A building evaluated as meeting or exceeding the requirements of CBC Chapter 34 for Occupancy Category I-III performance criteria only if the BSE-R and BSE-C values are reduced to 2/3 of those specified for the site.	V	IV

Table 1: From Appendix A (UC Seismic Safety Policy), Earthquake Performance Levels for Existing Buildings. Only rating levels III and IV are shown.

Table 3417.5 on the CBC 2013, defines the building seismic performance requirements by building regulatory authority and risk category. For the Cogen Building the performance criteria for Level 1 and 2 are shown on Table 2. The seismic hazard levels shown in brackets correspond to the ASCE41-13 naming convention. The hazard levels with no brackets are as defined in ASCE41-06.

Rating Level	**Level 1 (Life Safety)**	**Level 2 (Collapse Prevention)**
III	BSE-1 **(BSE-1N)**	BSE-2 **(BSE-2N)**
IV	BSE-R **(BSE-1E)**	BSE-C **(BSE-2E)**
V	2/3 of BSE-R **(BSE-1E)**	2/3 of BSE-C **(BSE-2E)**

Table 2: Seismic Hazard levels used for evaluation (Level 1 and 2) for South and North Wing structures

Analysis Method and Performance Objectives

This evaluation will be consistent with Section 7.4.2 of ASCE41-13 (Linear Dynamic Procedure) and will seek a dual rehabilitation objective consistent with the Earthquake Performance Levels for each Rating Level as shown in Table 1.

The BSE-1E and BSE-2E performance levels correspond to earthquake hazard levels with a 20% probability of exceedance in 50 years and a 5% probability of exceedance in 50 years, or those with mean return periods of 225 years and 975 years, respectively.

The BSE-1N and BSE-2N performance levels correspond to earthquake hazard levels with a 10% probability of exceedance in 50 years and a 2% probability of exceedance in 50 years, or those with mean return periods of 475 years and 2475 years, respectively.

Seismicity

Seismic spectral accelerations used in this evaluation were obtained from the U.S.G.S. Seismic Design Maps using the ASCE 41 2013 and with an assumed site class D "stiff soil", based on drawings for the adjacent Ronald Reagan University Medical Center, circa 2000. Uniform Hazard Spectra (UHS) for earthquake hazard levels BSE-1E, BSE-2E, BSE-1N, and BSE-2N are provided below. A site-specific soils report is recommended for any future comprehensive evaluations, however the assumed information is appropriate for the level of detail used for this study.

Spectrum Level	BSE-1E	BSE-2E	BSE-1N	BSE-2N
Sxs(g)	0.931	1.623	1.501	2.246
Sx1(g)	0.518	0.861	0.823	1.235

Table 3: Response spectrum accelerations (BSE-1E and BSE-2E) for Cogen Buildings

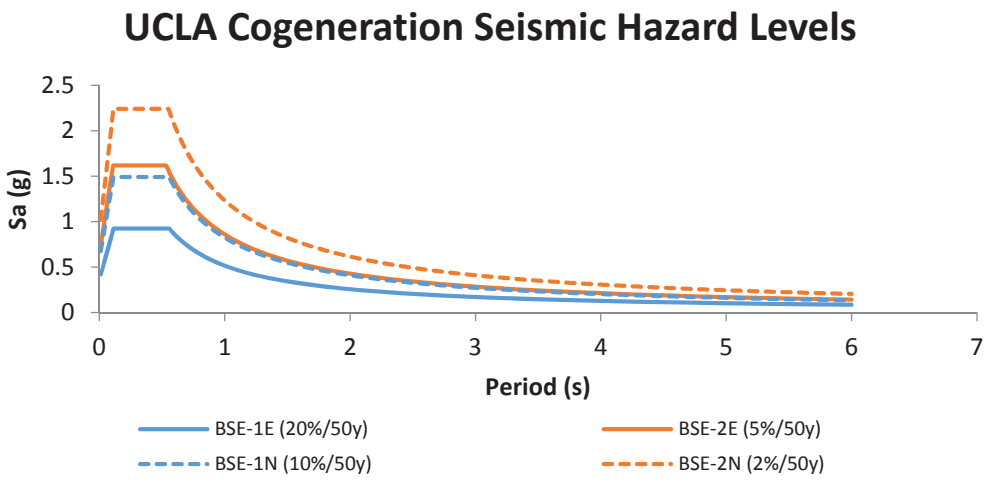


Figure 1: Seismic Hazard Levels for Cogen Buildings from USGS Website

As-built verification

The original structural scope is per as-built drawings by Chas T. Main, INC, dated 1992.

The structural systems of the Cogen and ESB buildings were visually verified on a site visit on August 30th, 2017. After the site verification the structural models were completed. The site visit confirmed the seismic separation between the different buildings and the loading criteria used for analysis.

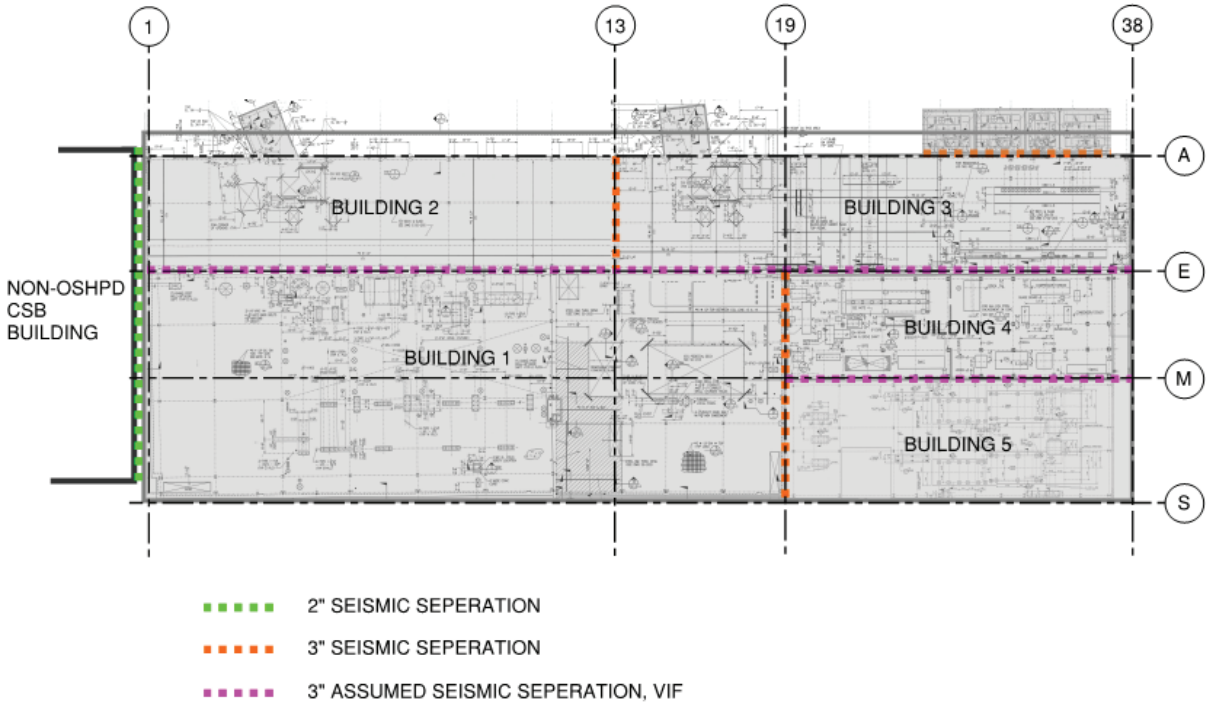


Figure 2: Seismic separation between Cogen Buildings

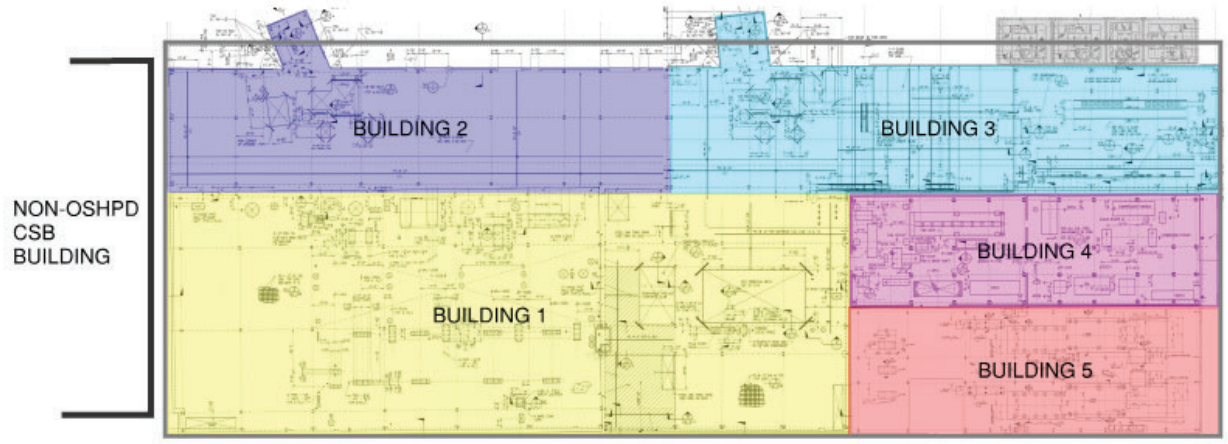


Figure 3: Building nomenclature for the purpose of this study

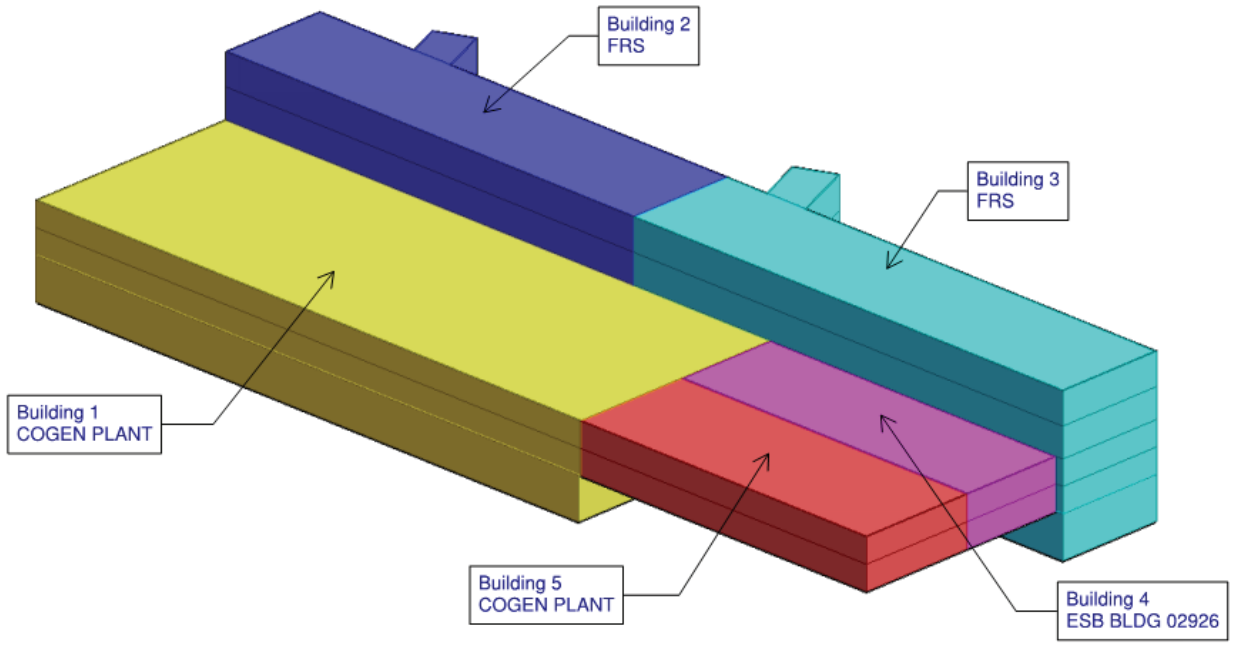


Figure 4: Building mass diagram of Cogen Buildings

3. STRUCTURAL MODEL SUMMARY

Structural Model

A three dimensional finite element model was developed in ETABS 2016 for this evaluation. The Cogen Buildings share the same foundation and podium level; hence the Cogen buildings are modeled in a single model as shown below. The ESB building was also modeled to better understand the seismic separation adequacy with the adjacent Cogen Buildings.

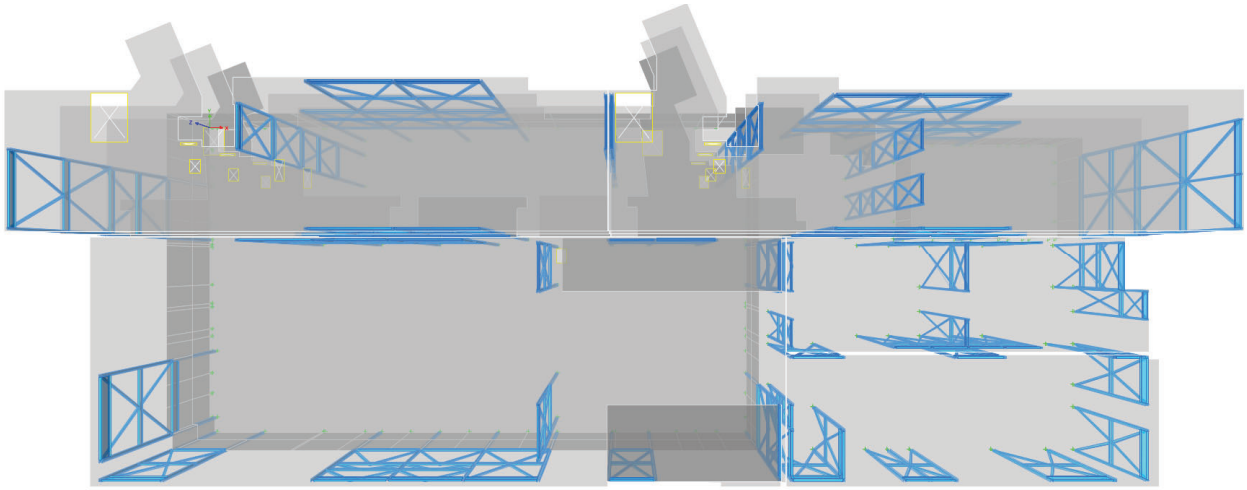


Figure 5: Plan View of ETABS 2016 Model

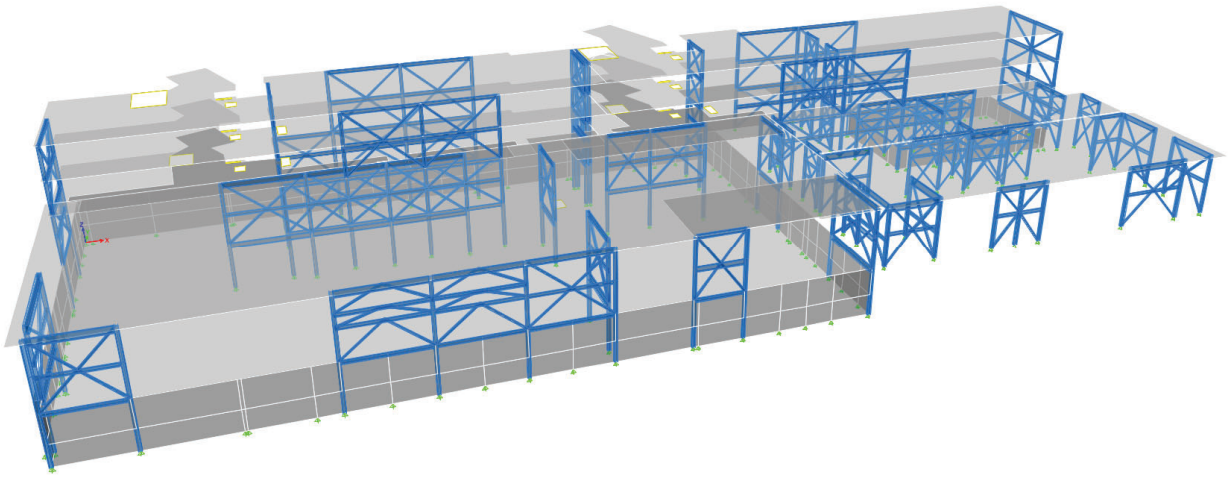


Figure 6: South West View – ETABS 2016 Model

Model and Analysis Assumptions

1. All Cogen and ESB Buildings were modeled in a single structural model.
2. Effective stiffness properties of existing lateral resisting components were considered per ASCE41-13 requirements.
3. A rigid diaphragm was assumed for all levels and the mass of each story was lumped at the calculated center of mass locations. The penthouses and mezzanine masses were lumped at the story/roof levels.
4. Sufficient modal analysis modes were included to capture at least 90% of the participation mass of the Cogen Buildings.
5. The mass of the equipment and some non-structural components were conservatively estimated based on information from the MEP Consultant.

4. RESULTS FROM SEISMIC EVALUATION

- Seismic separation

ASCE41-13 Section 7.2.13.1 provides criteria for minimum Building seismic separation from adjacent structures. The maximum combined displacement was compared to the existing seismic separation per Figure 2 on this Report. Table 4 and Figure 7 summarized the maximum combined displacement between the Cogen Buildings at BSE-1E Level. The seismic separation in the E-W direction was found to be adequate for all buildings. The calculated required seismic separation between Buildings 1 and 2, Buildings 1 and 3, and Buildings 3 and 4 have been found to exceed the existing the 3-inch seismic separation in the N-S direction. Although the provided separation does not allow for the adjacent buildings to move freely without pounding, review of the drawings did not reveal any potential mechanisms that could lead to collapse due to pounding. Therefore, we do not consider this deficiency to affect the overall seismic performance rating of the building(s).

	Maximum combined displacement (BSE-1E) at seismic separation (in)	
	E-W Direction	N-S Direction
Building 1 & Building 2	-	**5.1**
Building 1 & Building 3	-	**4.4**
Building 1 & Building 4	1.3	-
Building 1 & Building 5	1.2	-
Building 2 & Building 3	1.9	-
Building 3 & Building 4	-	**3.1**
Building 4 & Building 5	-	1.3

Table 4: Maximum seismic combined displacement between Cogen Buildings at BSE-1E

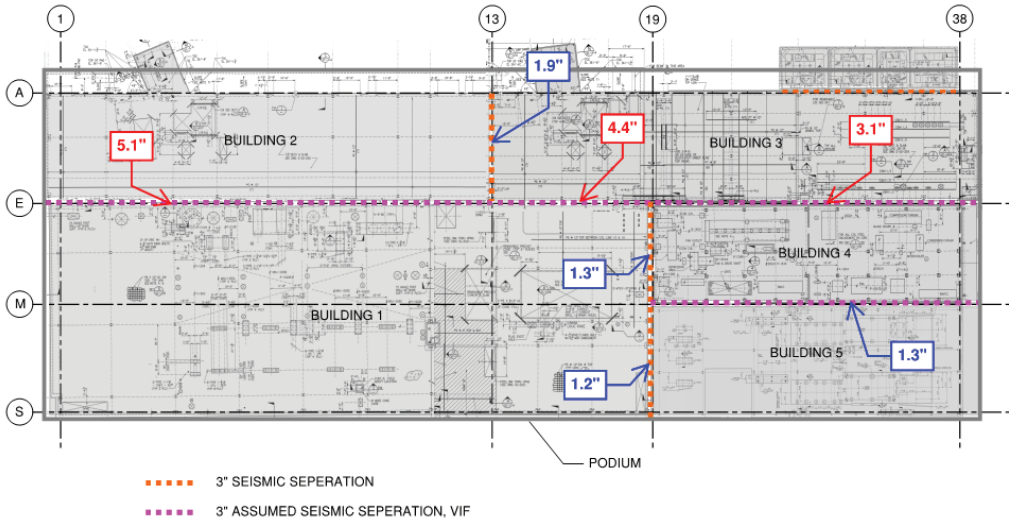


Figure 7: Maximum combined displacement at BSE-1E

- Lateral System evaluation (SCBF)

Demand over capacity ratios (DCR) for the concentric brace frames were calculated for different earthquake hazard levels corresponding to UCSSP Rating Levels III, IV and V. Acceptance criteria for linear procedures as established in Table 9-4 of ASCE41-13 were used to quantify the demands on the braces using the capacity modification factor (m-factor) to account for expected ductility of the braces as indicated in Section 7.5.2.2 of ASCE41-13. The braces m-factor corresponding to Life Safety varies between 4 and 5 and for Collapse Prevention between 6 and 7 depending on the braces slenderness ratio as shown in Figure 8.

Figure 9 thru Figure 15 show maximum brace DCR for the maximum rating level that was satisfied for each UCLA Cogen building and Table 4 summarizes the maximum brace DCR per building. This information was used to classify the Cogen Buildings seismic performance.

- Foundation System evaluation

The foundation system of the Cogen Buildings consists of pile caps interconnected with grade beams. It was determined with a high level analysis that the foundation system is capable of accommodating the gravity and seismic reactions of the Cogen Buildings for the level of forces associated with the rating level of the superstructure.

Table 9-4. *(Continued)*

Component/Action	m-Factors for Linear Procedures[w]				
		Primary		Secondary	
	IO	LS	CP	LS	CP
Braces in Compression (except EBF braces)					
a. Slender[n] $\frac{Kl}{r} \geq 4.2\sqrt{E/F_y}$					
1. *W*, *I*, 2*L* in-plane[n], 2*C* in-plane[n]	1.25	6	8	7	9
2. 2*L* out-of-plane[n], 2*C* out-of-plane[n]	1.25	5	7	6	8
3. HSS, pipes, tubes, *L*	1.25	5	7	6	8
b. Stocky[n,o] $\frac{Kl}{r} \leq 2.1\sqrt{E/F_y}$					
1. *W*, *I*, 2*L* in-plane[n], 2*C* in-plane[n]	1.25	5	7	6	8
2. 2*L* out-of-plane[n], 2*C* out-of-plane[n]	1.25	4	6	5	7
3. HSS, pipes, tubes	1.25	4	6	5	7
c. Intermediate	Linear interpolation between the values for slender and stocky braces (after application of all applicable modifiers) shall be used.				

Figure 8: m-factors for LP (Steel Components)

	Maximum Brace forces (DCR)					
	BSE-1N (LS)	BSE-2N (CP)	BSE-1E (LS)	BSE-2E (CP)	BSE-1E*(2/3) (LS)	BSE-2E*(2/3) (CP)
Building 1	**1.4**	**1.5**	**0.8**	**0.9**	**0.6**	**0.7**
Building 2	**1.0**	**1.0**	**0.6**	**0.7**	**0.4**	**0.5**
Building 3	**0.8**	**0.8**	**0.5**	**0.6**	**0.3**	**0.4**
Building 4	**0.4**	**0.5**	**0.3**	**0.3**	**0.2**	**0.2**
Building 5	**0.4**	**0.4**	**0.2**	**0.3**	**0.2**	**0.2**

Table 5: Maximum Brace DCR (Demand over Capacity Ratios) per Building

Building 1

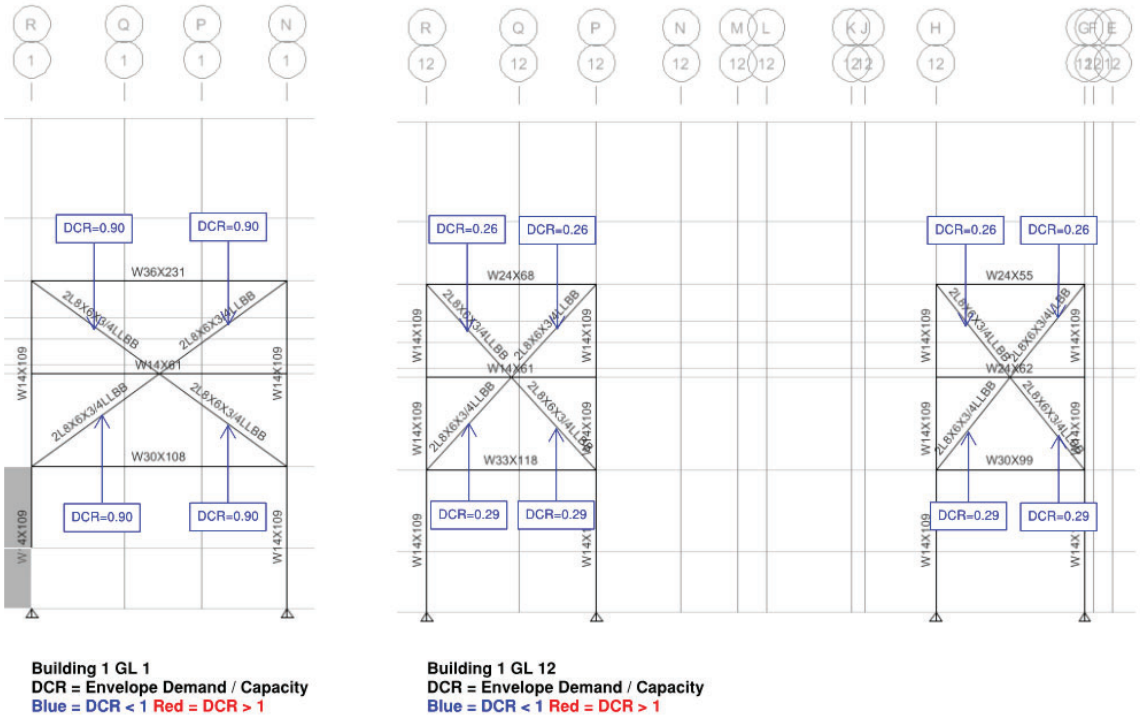


Figure 9: Brace DCR Envelopes at grid 1&12 (UCLA Seismic Rating IV – Hazard Level BSE-2E (CP))

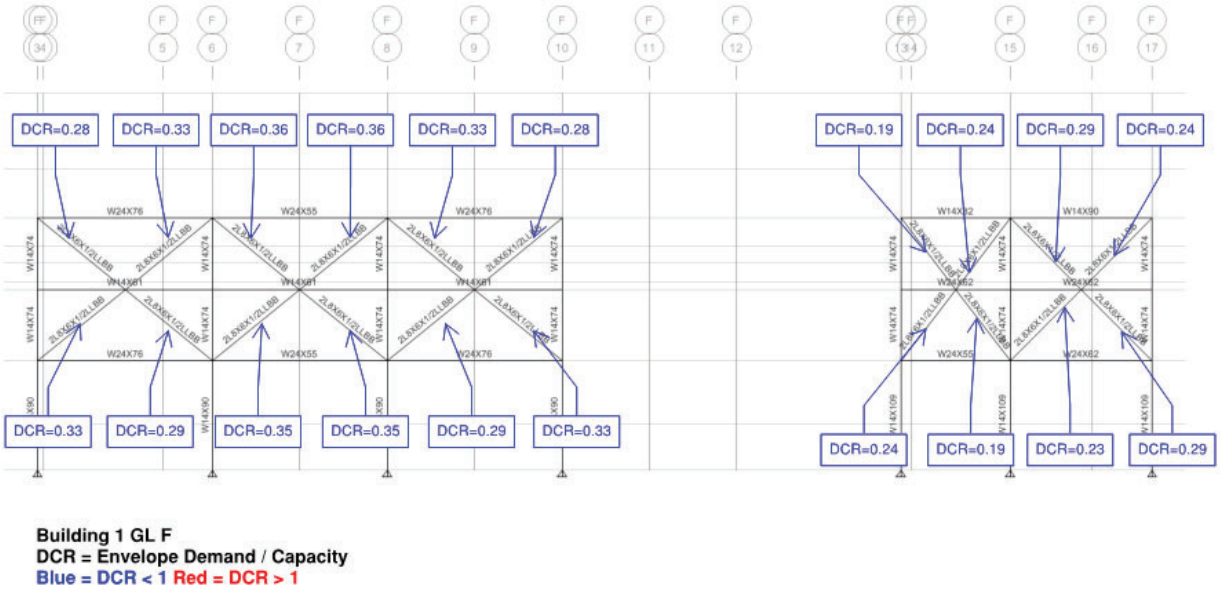


Figure 10: Brace DCR Envelopes at grid line F (UCLA Seismic Rating IV – Hazard Level BSE-2E (CP))

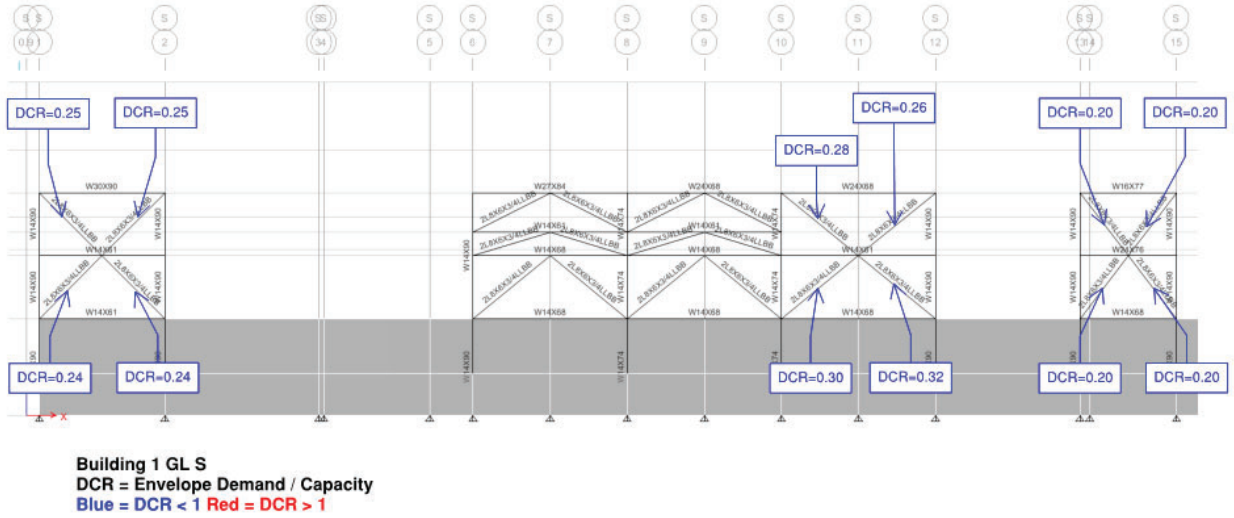


Figure 11: Brace DCR Envelopes at grid line S (UCLA Seismic Rating IV – Hazard Level BSE-2E (CP))

Building 2

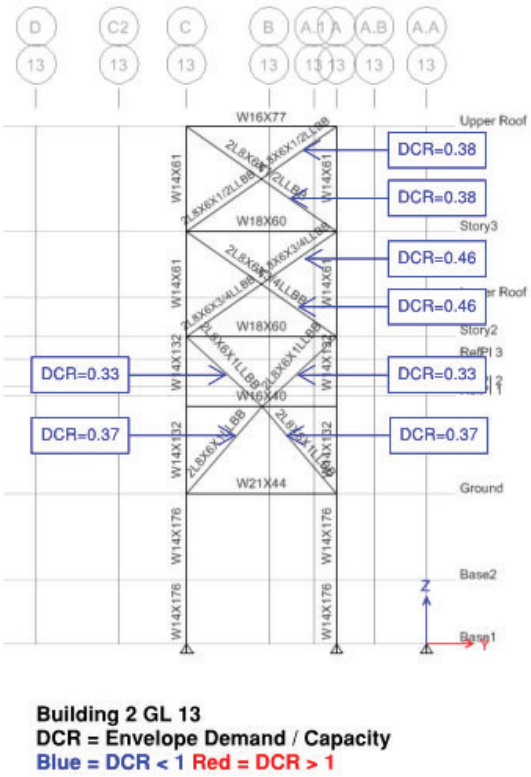


Figure 12: Brace DCR Envelopes at grid line 13 (UCLA Seismic Rating IV – Hazard Level BSE-2E (CP))

Building 3

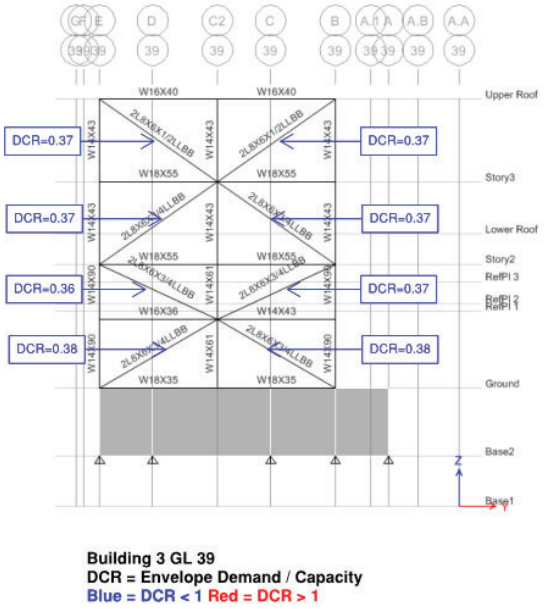


Figure 13: Brace DCR Envelopes at grid line 39 (UCLA Seismic Rating III – Hazard Level BSE-2N (CP))

Building 4

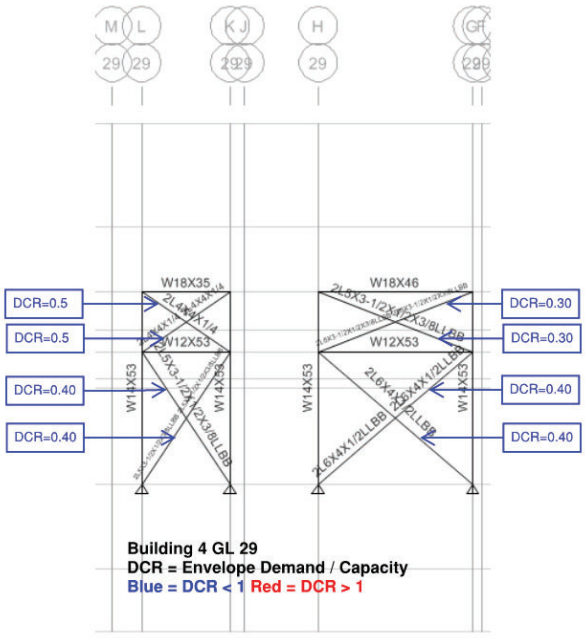


Figure 14: Brace DCR Envelopes at grid 29 (UCLA Seismic Rating III – Hazard Level BSE-2N (CP))

Building 5

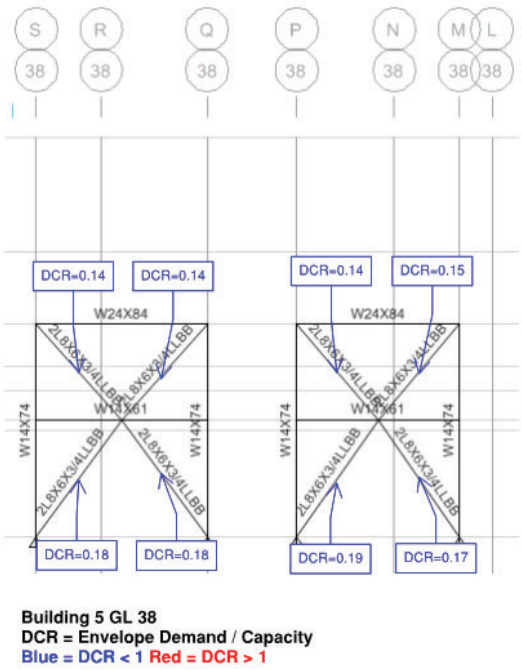


Figure 15: Brace DCR Envelopes at grid line 38 (UCLA Seismic Rating III – Hazard Level BSE-2N (CP))

5. NON-STRUCTURAL COMPONENTS AND RETAINING HAZARD EVALUATION

A high level evaluation of representative seismic bracing, equipment anchorage and survey of potential falling hazards or hazardous materials was conducted based on walk-through observations performed at site visit on August 30th, 2017.

The UCSSP requires identification of potential falling hazards that pose a significant life or safety hazard to occupants. For the purposes of seismic performance levels, "falling hazards" are defined as:

> *…interior and exterior building elements that may fall or slide during an earthquake, including parapets, ornamentation, chimneys, walls, and partitions, but excluding equipment, fixtures, ceilings, furniture, furnishings, and other contents.*

Per UCSSP, the excluded elements noted above should not be considered in the determination of the seismic performance rating, but should be considered and abated in the Program for Abatement of Seismic Hazards as set forth in UCSSP Section III.D.

Our observations of potential falling hazards concluded that heavy features, heavy stone veneers, parapets and hazardous material were properly attached to the structure and do not represent a significant life or safety hazard to occupants.

Existing equipment was observed to be positively attached to the main structure, although no documentation is available to confirm the capacities or design basis of the bracing/anchorage system.

Building utilities, including piping and conduit, do not appear to be braced to the extent required by the current building code. It is therefore likely that utilities may be damaged or ruptured in a significant seismic event without the addition of bracing meeting current code requirements.

Flex joints were observed at most, but not all, conduits, pipes, ducts or similar when crossing seismic separation between buildings. It is also unknown whether flex joints have adequate movement capability for the calculated building movements. Utilities without flex joints or with inadequate flex joint movement capability may be damaged or ruptured in a significant seismic event.

Due to the nature of the Cogen complex as a central utility plant, special consideration should be given to the abatement of utility bracing deficiencies. Damage or rupture to the Cogen utility lines is likely to result in the disruption of utilities such as steam, chilled water and power that are critical for the operation of facilities dependent on the Cogen plant. Per UCSSP, these issues should be considered in the Program for Abatement of Seismic Hazards, but they are not considered in the seismic performance rating determined in this study.

6. SEISMIC PERFORMANCE RATING OF THE COGEN BUILDINGS

Based on the study documented in this report, Buildings 3, 4 and 5 classify as seismic performance Level III and Building 1 and Building 2 as seismic performance Level IV. See Figure 17 for a summary of UCLA Cogen Buildings Rating levels by building.

As shown in Section 4 the seismic separation in the N-S direction is inadequate and pounding between buildings is very likely to occur. It is our opinion that pounding effects between the Cogen buildings are not likely to create a building collapse mechanism or any significant structural damage to the buildings. Local damage at the buildings interface is expected to occur.

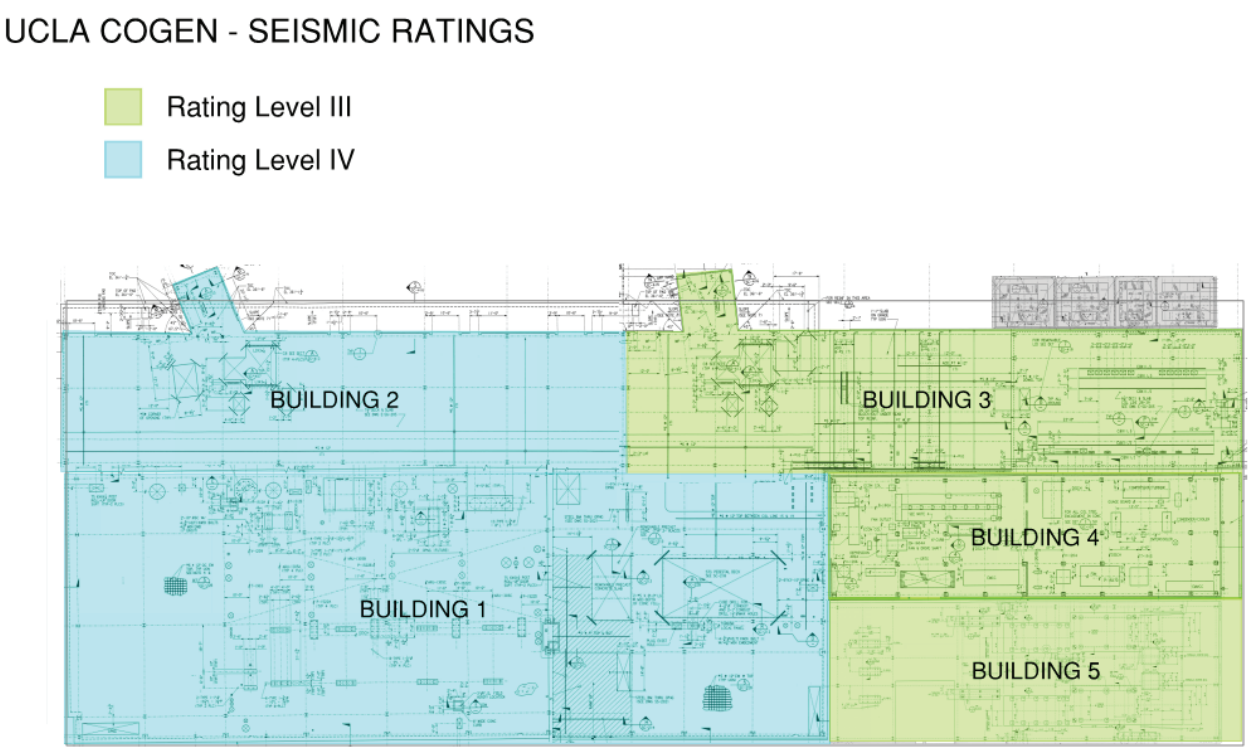


Figure 17: UCLA Cogen building rating levels

7. CONCLUSIONS

Previous results from KPFF OSHPD study in 2017 were reinterpreted in order to determine the Expected Seismic Performance Level per the UCSSP. The results were scaled linearly to the different hazard levels and acceptance criteria indicated in the UCSSP Policy. No additional structural analysis was performed

Two different rating levels per UCSSP were used to classify the Cogen Building Performance. These rating levels are summarized in Table 1 and the hazard level used for the evaluation summarized in Table 2. Buildings 1 and 2 have the lowest performance (Rating Level IV) and Buildings 3, 4 and 5 have the highest performance (Rating Level III).

As shown in Chapter 4 the seismic separation in the N-S direction is inadequate and pounding between buildings is very likely to occur. It is our structural opinion that pounding effects between the Cogen buildings are not likely to create a building collapse mechanism or any significant structural damage to the buildings. Local damage at the buildings interface is expected to occur.

Based on high level analysis of the foundation system it was determined that the foundations of the Cogen Buildings are capable of accommodating the gravity and seismic reactions of the superstructure for the level of forces associated with the rating level of the building above.

High level evaluation of representative nonstructural components of the Cogen Buildings based of walk-through observations performed at site visit on August 30th, 2017 showed the following conditions:

- Existing equipment was observed to be positively attached to the main structure, but no documentation is available about the bracing/anchorage system. Testing of anchorage will be needed to verify capacities of existing anchors.
- Existing utilities were not braced to the extent required by current codes.
- Flex joints were not observed for some conduits, pipes, ducts or similar when crossing seismic separation between buildings.

Due to the nature of the Cogen as a central utility plant, and the potential for the disruption of building utility services to the campus after a seismic event, the improvement of seismic bracing for building utilities is recommended to be considered in the Program for Abatement of Seismic Hazards.

APPENDIX A: LOADING CRITERIA, MASSES AND LOAD PATTERNS

project	UCLA RR COGEN	by	JR	sheet no.
location	Los Angeles	date	9/11/2017	
client		job no.	1700063	
	Loading Criteria			

Typical Ground Floor - A

3" Metal Deck w/ 4 1/2" Conc	0.0	
Ceilings, Sprinklers, Mech. Ducts/Pipes, Misc.	5.0	
Misc	2.0	
Deck dead load	**7.0**	psf
Beams	4.5	psf
Beam dead load	**11.5**	psf
Girders	3.0	
Girder dead load	**14.5**	psf
Columns	3.0	psf
Column dead ld.	**17.5**	psf
Line Load	19.0	psf
dead load	**36.5**	psf
Additional Seismic Loads		
Partitions	10.0	
Seismic dead ld.	**46.5**	psf
Live load		
Floor Live load	**100.0**	psf

Typical Ground Floor Area - B

3" Metal Deck w/ 4 1/2" Conc	0.0	
Sprinklers, Mech. Ducts/Pipes, Misc.	10.0	
Misc	3.0	
Deck dead load	**13.0**	psf
Beams	4.5	psf
Beam dead load	**17.5**	psf
Girders	3.0	
Girder dead load	**20.5**	psf
Columns	3.0	psf
Column dead ld.	**23.5**	psf
Equipments and Pads	20.0	psf
Line Load	9.3	psf
dead load	**52.8**	psf
Additional Seismic Loads		
Partitions	0.0	
Seismic dead ld.	**52.8**	psf
Live load		
Floor Live load	**50.0**	psf

project	UCLA RR COGEN	by	JR	sheet no.
location	Los Angeles	date	9/11/2017	
client		job no.	1700063	
	Loading Criteria			

Typical Floor - C

3" Metal Deck w/ 3 1/4" Conc	59.4	
Ceilings, Sprinklers, Mech. Ducts/Pipes, Misc.	5.0	
Misc	2.0	
Deck dead load	**66.4**	psf
Beams	4.5	psf
Beam dead load	**70.9**	psf
Girders	3.0	
Girder dead load	**73.9**	psf
Columns	3.0	psf
Column dead ld.	**76.9**	psf
Conc Pad	0.0	psf
dead load	**76.9**	psf

Additional Seismic Loads

Partitions	10.0	
Seismic dead ld.	**86.9**	psf

Llve load

Floor Live load	**100.0**	psf

Typical Floor - D

3" Metal Deck w/ 3 1/4" LTWT Conc	43.6	
Ceilings, Sprinklers, Mech. Ducts/Pipes, Misc.	5.0	
Misc	2.0	
Deck dead load	**50.6**	psf
Beams	4.5	psf
Beam dead load	**55.1**	psf
Girders	3.0	
Girder dead load	**58.1**	psf
Columns	3.0	psf
Column dead ld.	**61.1**	psf
Conc Pad	0.0	psf
dead load	**61.1**	psf

Additional Seismic Loads

Partitions	10.0	
Seismic dead ld.	**71.1**	psf

Llve load

Floor Live load	**50.0**	psf

project	UCLA RR COGEN	by	JR	sheet no.
location	Los Angeles	date	9/11/2017	
client		job no.	1700063	
	Loading Criteria			

Typical Floor - E

3" Metal Deck w/ 3 1/4" Conc	0.0	
Ceilings, Sprinklers, Mech. Ducts/Pipes, Misc.	5.0	
Misc	2.0	
Deck dead load	**7.0**	psf
Beams	4.5	psf
Beam dead load	**11.5**	psf
Girders	3.0	
Girder dead load	**14.5**	psf
Columns	3.0	psf
Column dead ld.	**17.5**	psf
Line Load	31.2	psf
dead load	**48.7**	psf

Additional Seismic Loads

Partitions	10.0	
Seismic dead ld.	**58.7**	psf

Llve load

Floor Live load	**100.0**	psf

Typical Floor - F

3" Metal Deck w/ 3 1/4" Conc	0.0	
Ceilings, Sprinklers, Mech. Ducts/Pipes, Misc.	5.0	
Misc	2.0	
Deck dead load	**7.0**	psf
Beams	4.5	psf
Beam dead load	**11.5**	psf
Girders	3.0	
Girder dead load	**14.5**	psf
Columns	3.0	psf
Column dead ld.	**17.5**	psf
Line Load	21.8	psf
dead load	**39.3**	psf

Additional Seismic Loads

Partitions	10.0	
Seismic dead ld.	**49.3**	psf

Llve load

Floor Live load	**100.0**	psf

project	UCLA RR COGEN	by	JR	sheet no.
location	Los Angeles	date	9/11/2017	
client		job no.	1700063	
	Loading Criteria			

Typical Floor - G

3" Metal Deck w/ 3 1/4" Conc	0.0	
Ceilings, Sprinklers, Mech. Ducts/Pipes, Misc.	5.0	
Misc	2.0	
Deck dead load	**7.0**	psf
Beams	4.5	psf
Beam dead load	**11.5**	psf
Girders	3.0	
Girder dead load	**14.5**	psf
Columns	1.5	psf
Column dead ld.	**16.0**	psf
PH	3.9	
Line Load	12.3	psf
dead load	**32.1**	psf

Additional Seismic Loads

Partitions	5.0	
Seismic dead ld.	**37.1**	psf

LIve load

Floor Live load	**20.0**	psf

project	UCLA RR COGEN	by	JR	sheet no.
location	Los Angeles	date	9/11/2017	
client		job no.	1700063	
	Loading Criteria			

Typical Roof - H

3" Metal Deck w/ 6" LTWT Conc	0.0	
Sprinklers, Mech. Ducts/Pipes, Misc.	15.0	
Misc	3.0	
Deck dead load	**18.0**	psf
Beams	4.5	psf
Beam dead load	**22.5**	psf
Girders	3.0	
Girder dead load	**25.5**	psf
Columns	1.5	psf
Column dead load	**27.0**	psf
Equipments and Pads	35.0	psf
Line Load	38.2	psf
dead load	**100.2**	psf

Additional Seismic Loads

Partitions	0.0	
Seismic dead ld.	**100.2**	psf

Live Load

Floor Live load	**20.0**	psf

Typical Roof - I

3" Metal Deck w/ 3 1/4" LTWT Conc	0.0	
Sprinklers, Mech. Ducts/Pipes, Misc.	15.0	
Misc	3.0	
Deck dead load	**18.0**	psf
Beams	4.5	psf
Beam dead load	**22.5**	psf
Girders	3.0	
Girder dead load	**25.5**	psf
Columns	1.5	psf
Column dead load	**27.0**	psf
Equipments and Pads	50.0	psf
Line Load	48.3	psf
dead load	**125.3**	psf

Additional Seismic Loads

Partitions	0.0	
Seismic dead ld.	**125.3**	psf

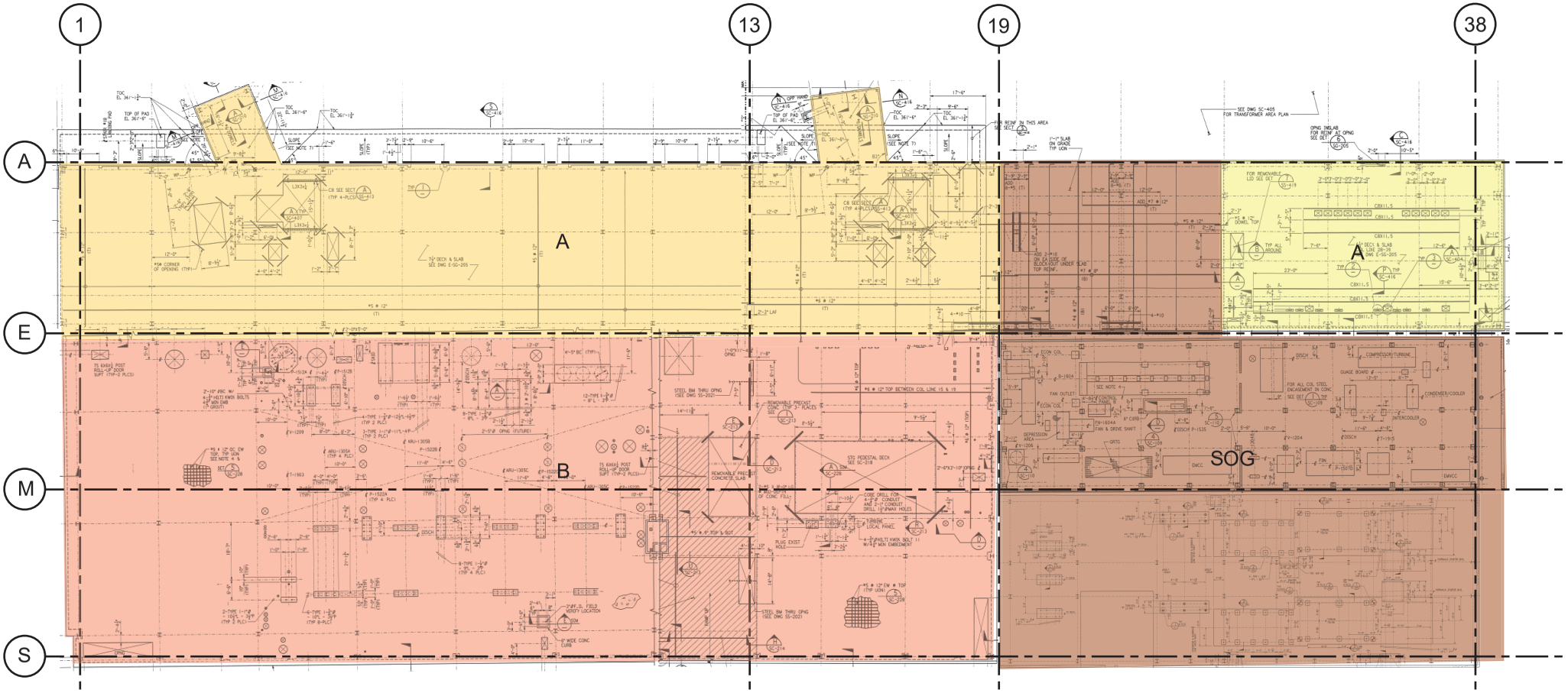
Live Load

Floor Live load	**20.0**	psf

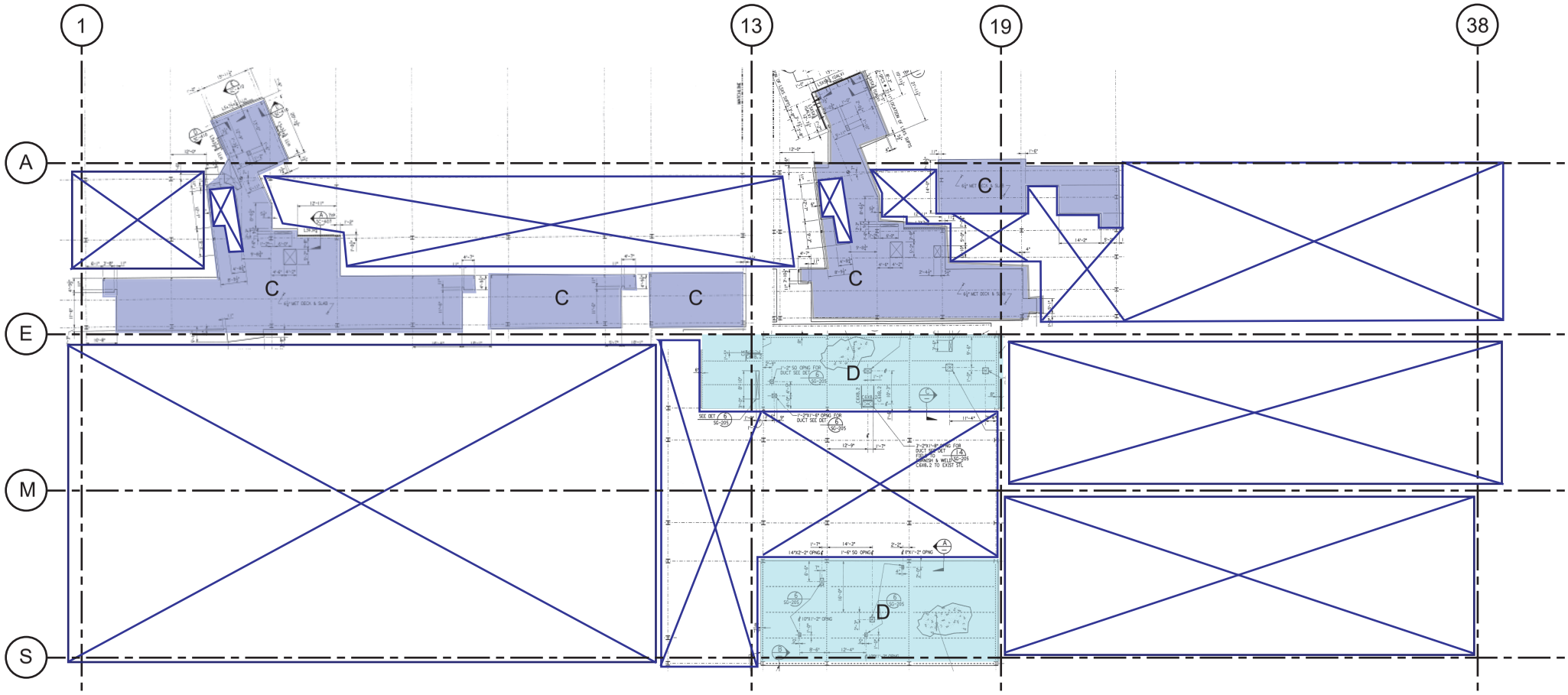
project	UCLA RR COGEN	by	JR	sheet no.
location	Los Angeles	date	9/11/2017	
client		job no.	1700063	
	Loading Criteria			

Typical Roof - J

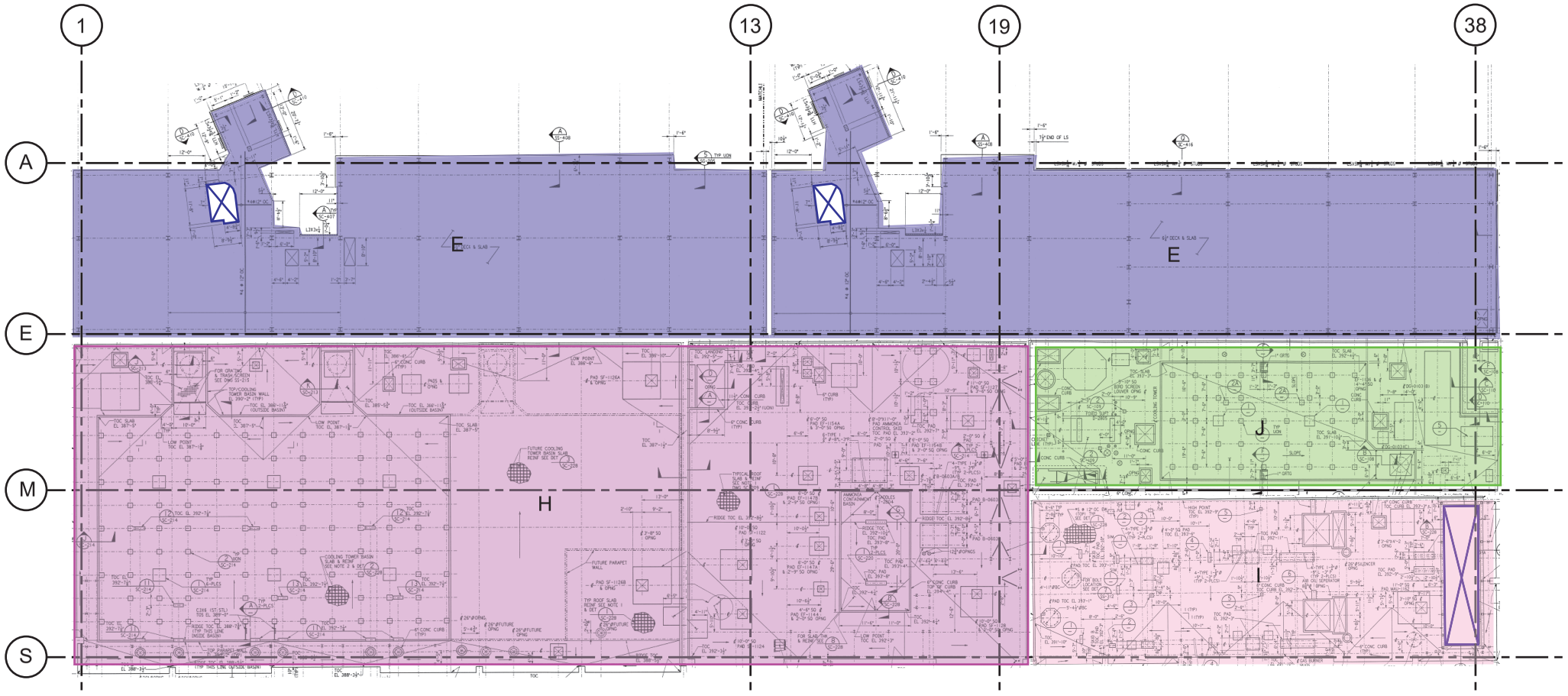
3" Metal Deck w/ 8" LTWT Conc		0.0	
Sprinklers, Mech. Ducts/Pipes, Misc.		15.0	
Misc		3.0	
	Deck dead load	**18.0**	psf
Beams		4.5	psf
	Beam dead load	**22.5**	psf
Girders		3.0	
	Girder dead load	**25.5**	psf
Columns		1.5	psf
	Column dead load	**27.0**	psf
PH		0.9	
Equipments and Pads		50.0	psf
Line Load		13.9	psf
	dead load	**91.8**	psf
Additional Seismic Loads			
Partitions		0.0	
	Seismic dead ld.	**91.8**	psf
Live Load			
Floor Live load		**20.0**	psf



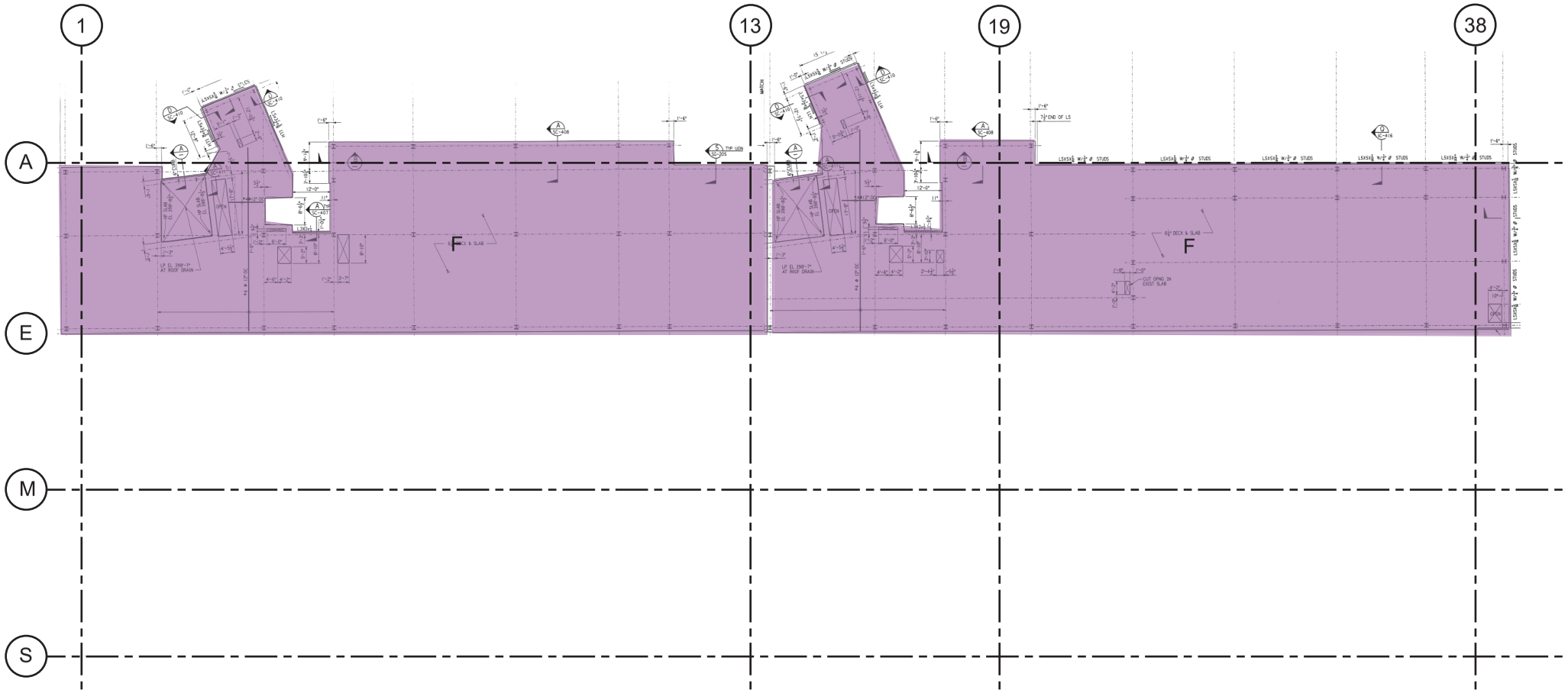
GROUND LEVEL ELEVATION 361'-6"



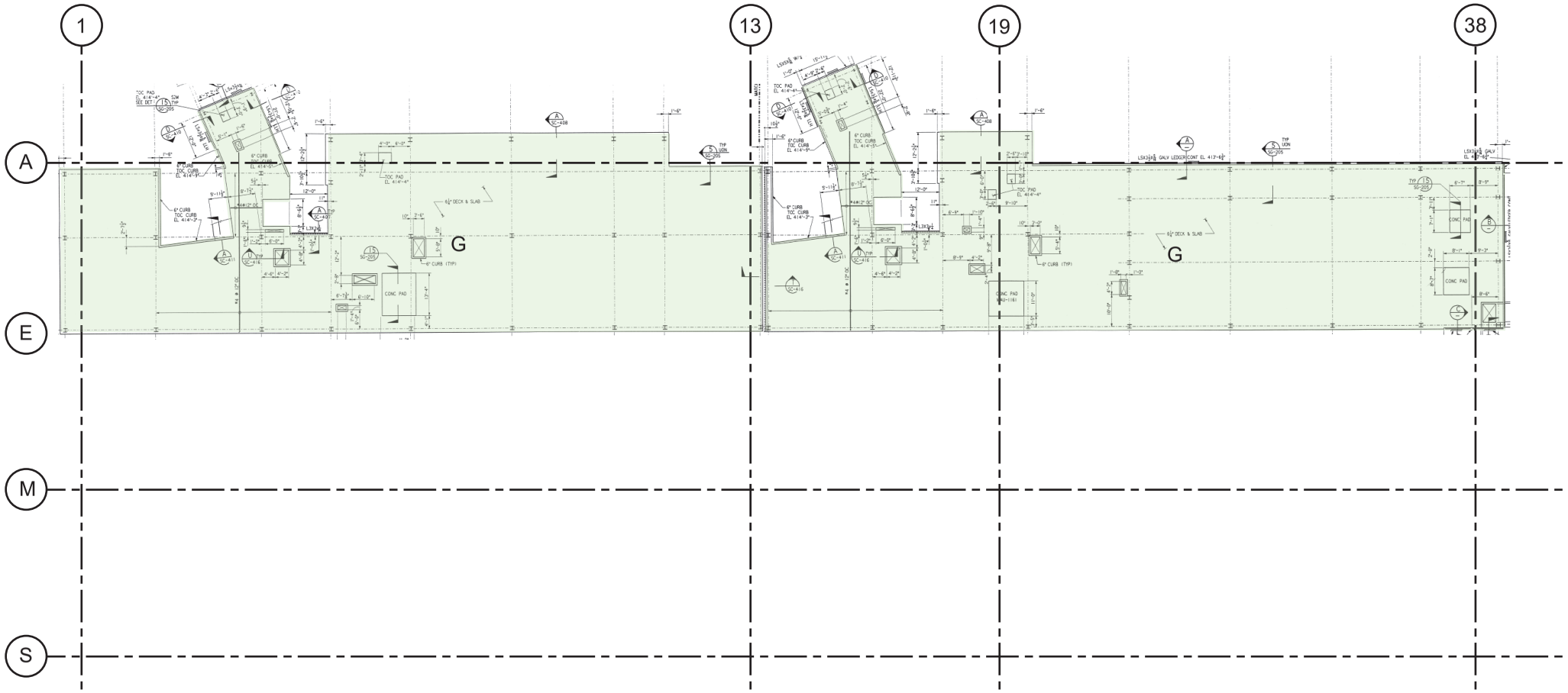
MEZZANINE LEVEL (BUILDING 3 AND 4) ELEVATION 373'-2"
STORAGE LEVEL (BUILDING 2) ELEVATION 375'-6"
PLATFORM & PIPE SUPPORT (BUILDING 5) ELEV 375'-6"



LOWER ROOF LEVEL (BUILDING 2,5, AND 6) ELEVATION 391'-6" LOW POINT
LOWER ROOF LEVEL (BUILDING 1) ELEVATION 386'-6" LOW POINT
SECOND LEVEL (BUILDING 3 AND 4) ELEVATION 384'-10"



THIRD LEVEL ELEVATION 398'-10"



UPPER ROOF LEVEL ELEVATION 412'-10"