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160975
SUBMITTED BY
JACK NOEHLE
02/02/2017
PG 1/6

MP

MILLENNIUM PARTNERS
735 Market Street, 3rd Floor
San Francisco, CA 94103
415.537.3890 Tel
415.537.3895 Fax
SPatterson@MillenniumPtrs.com

FACSIMILE TRANSMITTAL SHEET

DATE: July 12, 2004

TO: Jack. P. Moehle

FAX NO.: 925-949-7595/415-398-9834

FROM: Steve Patterson SP.

RE: **Contract Acceptance**

TOTAL PAGE(S) 6

☐URGENT	☐FOR YOUR INFORMATION	☐FOR REVIEW / COMMENT
☒PLEASE HANDLE	☐PER YOUR REQUEST	☐FOR YOUR FILES

NOTES/COMMENTS:

See attached.

MILLENNIUM PARTNERS
735 Market Street, 3rd Floor
San Francisco, CA 94103
415.537.3890 Tel
415.537.3895 Fax

July 12, 2004

Jack P. Moehle
Consulting Civil Engineer
3444 Echo Springs Road
Lafayette, CA 94549

RE: **301 Mission Street Project**
Structural Design Review Services

Dear Jack:

I am pleased to accept your proposal to provide Structural Design Review Services for the above mentioned project. As you are aware De-Simone Consulting Engineers are currently designing the concrete structure for the project. Please work directly with them to analyze the structural system they have proposed for this residential high rise tower and keep me informed as your review progresses.

The timing of your review is very important to our design schedule. Should you recommend changes to the structural system, we will need to know as soon as possible so that design development drawings can progress. I would particularly like to know your views on the proposed traditional shear wall core and frame system vs performance design.

Also for your information, I have Webcor Builders on board as my preconstruction contractor, currently working through estimates and constructability issues.

Please call me if you have any questions.

Sincerely,

Steve Patterson

Jack P. Moehle
Consulting Civil Engineer

3444 Echo Springs Road
Lafayette, CA 94549
Ph. (925) 937-5225
FAX (925) 949-7595

12 July 2004

Mr. Steve Patterson, Owner's Representative
Millennium Partners
735 Market Street, 3rd Floor
San Francisco, CA 94103
SPatterson@millenniumptrs.com
Office: (415) 537-3890
Mobile: (415) 902-0523
Fax: (415) 537-3895

RE: Proposed scope of structural design review services
301 Mission Street Project in San Francisco, California
DeSimone Project # 4069B

Dear Mr. Patterson:

At the request of Stephen DeSimone and Ron Polivka of DeSimone, I am pleased to submit my proposal for structural design review services for the above referenced project.

1) DESCRIPTION OF THE PROJECT

301 Mission Street Project is a proposed residential high-rise tower with basement, located at 301 Mission Street in San Francisco, California. The current design shows 60 floors, totalling approximately 600 feet above grade, with several basement levels extending below grade.

The proposed structural system uses cast-in-place reinforced concrete construction. A dual system of cast-in-place concrete shear wall core and frame with mild (nonprestressed) reinforcement resists gravity and lateral loads. Floor slabs may comprise cast-in-place mild or post-tensioned concrete floor slabs. The foundation currently is contemplated to be a concrete mat.

The proposed design is anticipated to satisfy requirements of the applicable Building Code. Special considerations include the relatively tall height in comparison with other similar projects in regions of high seismicity in the US. Some review and discussion of the applicability of Building Code provisions may be required in consideration of the building height, as outlined in the scope of services, below.

2) SCOPE OF SERVICES

a) Review analysis & design assumptions and results. Provide technical suggestions. This review may include but not necessarily be limited to

i) Design methodology and sequence;

ii) Earthquake design basis, including the applicability of design basis earthquake and/or maximum considered earthquake design levels; associated design response spectra and ground motions;

iii) Modeling and analysis methods;

iv) Building strength, stiffness and ductility; proposed R value and stiffness assumptions;

v) Concrete, rebar, and other material acceptance values (e.g., stress and strain limits);

vi) Allowable displacements/drifts and procedures for their determination;

vii) Review analysis results to check reasonableness and consistency with design assumptions and detailing provisions.

b) Review selected structural drawings, with particular attention placed to detailing practices. Provide technical comments and suggestions, including

i) Early identification of special problem areas, considering constructability and force and ductility demands;

ii) Typical reinforcement, confinement and splice details for consistency with design criteria, special details to provide increased toughness for unanticipated loadings and to ensure vertical load integrity;

iii) Quality control / Quality assurance in drawing notes and specifications. Special inspection provisions in drawing notes and specifications.

c) Participate in occasional technical discussion meetings with either members of the DeSimone staff or with the 301 Design Team.

d) Attend as-required meetings with City Officials and other Peer Review Panels.

e) Provide technical assistance in responding to comments from City and Peer Review Panels.

3) CLIENT RESPONSIBILITY

a) Provide all applicable drawings, specifications, and other data, including subsurface and foundation data, geotechnical engineers report & foundation design recommendations, and drawings prepared by the Engineer of Record.

b) Provide copies of all pertinent letters and memoranda pertaining to design of the various disciplines and Owner's requirements.

4) FEES

a) Basic Fee

i) The above-mentioned scope of services will be completed on a timecard basis.

ii) The hourly rate for engineering effort of Jack P. Moehle will be $190 per hour.

iii) Based on the above scope of work, it is estimated that the the effort by Jack P. Moehle can be completed within $25,000. Client will be informed of progress relative to this estimate, and total billing for services will not exceed the estimate without Client's prior approval.

iv) Fees are payable within 60 days of date of invoice.

b) Expenses

i) The following expenses are excluded from, and in addition to, the basic fee and shall be billed at cost:

(1) Travel and out-of-town living and related expenses, long distance telephone calls, fax, courier service and express mail.

5) STANDARD CONDITIONS

The Standard Terms and Conditions for work done by Jack Moehle, which are attached hereto, are made part of the Agreement.

I look forward to your response to my proposal.

Very truly yours,

Jack Moehle

Jack P. Moehle, P.E., Ph.D.

ACCEPTED AND AGREED TO:
Millennium Partners

BY: Steve Patterson

DATE: 7/12/04

TERMS AND CONDITIONS

Consultant and Client will be jointly referred to as "we," or "us."

Services: Consultant will provide the Professional Services contemplated herein in accordance with the standards of competent professionals providing similar services under similar conditions. Consultant does not warrant or guarantee the Services.

Fess for Professional Services: Unless otherwise agreed in writing, Services will be billed on a time-and-materials basis using Consultant's current schedule of fees and costs. Limitations on the amount to be billed are estimates only, and are not an agreement by Consultant that the Services will be completed for the estimated amount. All time, including travel hours, spent on the project by professional, technical, and clerical personnel will be billed.

Reimbursable Expenses: Travel expenses and accommodations necessary for execution of the project including business class air fares, rental vehicles, and highway mileage in company or personal vehicles at going rates are billed directly. Other expenses directly attributable to the project are billed at cost, including telephone and fax charges, postage and freight, printing and reproduction, and computer fees.

Payment: Client will pay Consultant's invoices no later than sixty (60) days after the invoice date. Client will also pay a late payment charge at the rate of 1.5% per month after that date. At Consultant's option, Consultant may suspend or terminate this Agreement if payments are not made when due.

Site Access: Unless the Scope of Services described in this Agreement states otherwise, Client will obtain all necessary authorizations and permits to allow Consultant to have access to the site for the purpose of providing the Services contemplated herein.

Limitation of Liability. Consultant's liability, and the liability of its employees and/or subcontractors, to Client for damages, including cost of defense, arising from Services is limited to an aggregate $25,000 or its fees received under this Agreement, whichever is less. Neither Client nor Consultant will be liable for consequential damages incurred by either party.

Mediation: Prior to any litigation, arbitration, or other proceeding, both parties will attempt to mediate any dispute between them. The American Arbitration Association will conduct the mediation, unless otherwise agreed. Consultant and Client will equally share all fees and costs of the mediation.

Termination: Either Client or Consultant may terminate this Agreement for convenience by giving fourteen (14) days written notice. Either party may terminate this Agreement for cause by giving seven (7) days written notice. If this Agreement is terminated by Client, Client shall pay Consultant, in addition to any other compensation due under this Agreement, any amount incurred by Consultant in performing Services, and in orderly terminating Services.

Full and Final Agreement: This Agreement is the full and final agreement between Client and Consultant, supersedes any prior agreements, and may not be modified except by a writing executed by both parties.

Jack P. Moehle

160975
SUBMITTED BY JACK MOEHLE
08/03/2017
PG 1/14

DESIMONE

Design Criteria, Analysis Methodology, and Peer Review Process

301 Mission Street
San Francisco, CA

Prepared for:
San Francisco Department of Building Inspection
1660 Mission Street 2nd Floor
San Francisco, CA 94103

Prepared by:
DeSimone Consulting Engineers, PLLC
10 United Nations Plaza, Suite 410
San Francisco, CA 94102

DeSimone Project #4069
March 22, 2005

Table of Contents

Project Summary

The 301 Mission Street project consists of two separate structures located on the same site. The western structure (tower) is a 58-story, 605-foot tall building over a single subgrade level. The eastern structure (mid-rise) is a 12-story, 128-foot tall building over five subgrade levels. The two structures are connected at the B1, Ground, 2nd, and 3rd Floors. All portions of the project are being designed in conformance with the 2001 San Francisco Building Code.

Gravity Systems

Both structures are to be of cast-in-place concrete construction. The upper floor levels of both structures will utilize post-tensioning for the floor slabs.

Lateral System - Tower

The tower structure relies on a dual lateral system comprised of concrete shear walls with outriggers, and concrete special moment-resisting frames. This system is "regular" as defined by UBC 1629.5.2. For this reason the forces calculated by UBC 1630.2 have been reduced by 80% as allowed by 1631.5.4.2.

Two drift checks have been performed for the tower:

1. Per UBC. Forces scaled to base shear neglecting both equations (30-6) and (30-7), and including 5% accidental mass eccentricity.

2. Per 2003 NEHRP. Forces scaled to base shear including equation (30-6), but neglecting torsional effects. (Drifts are taken at center of mass). This second approach is widely held as the appropriate check for tall buildings with long periods, and was recommended for use on this project by Professor Jack Moehle of U.C. Berkeley.

Lateral forces in the tower are to be transmitted by the core walls and the columns all the way to the pile cap at B1. The ground floor slab is not required to transfer forces to the perimeter basement walls. This will allow the ground floor slab to be provided with numerous steps, depressions, and openings that are typically needed to accommodate architectural requirements.

Lateral System - Mid-Rise

The mid-rise building relies solely on a concrete shear wall system. Due to the eccentricity of the shear walls relative to the center of mass of the building, the mid-rise building exhibits a slight torsional irregularity. For this reason the base shear cannot be reduced by 80% in accordance with 1631.5.4.2.

The core walls of the mid-rise building, unlike those of the tower, will have the shear shifted to the perimeter basement walls through the ground floor diaphragm.

Materials

Concrete strengths in the tower walls and frames will vary between 7 and 10 ksi. Strengths in the mid-rise walls will be 7 to 8 ksi. All floor slabs will be 5 ksi.

The shear walls in both buildings, as well as the moment frames in the tower, will use Grade 75 reinforcing for bars larger than #8's. All shear wall confinement steel will also be Grade 75 for areas where the concrete strength is 8 ksi and higher.

Foundations

The tower foundation will consists of a 10-foot thick pile cap supported by approximately 950 14-inch square, pre-cast concrete piles. The bottom of the pile cap will be approximately 25' below the existing grade. The initial vertical pile displacement due to slippage required to fully engage the pile is expected to be approximately 1" by the time of project construction completion. Additional long-term pile settlement due to compression of the underlying clay layers is expected to be as much as 5". As the piles are only located directly below the tower footprint, this settlement is expected to occur uniformly over the tower foundation area.

The mid-rise structure will rest on a mat foundation that varies between 6 feet and 8 feet in thickness. The bottom of this excavation will be approximately 63 feet below the existing grade. Tie-downs are required to resist hydrostatic uplift pressures under the portion of the deep excavation that is not directly below the mid-rise building, i.e., the area between the mid-rise and the tower.

Building Separation

As the foundations and lateral systems of the two buildings are completely separate, a joint will be placed between them at the B1, Ground, 2nd, and 3rd Floors. "Hinge slabs" will be detailed to accommodate differential settlement, as well as expected seismic displacements, between the two structures.

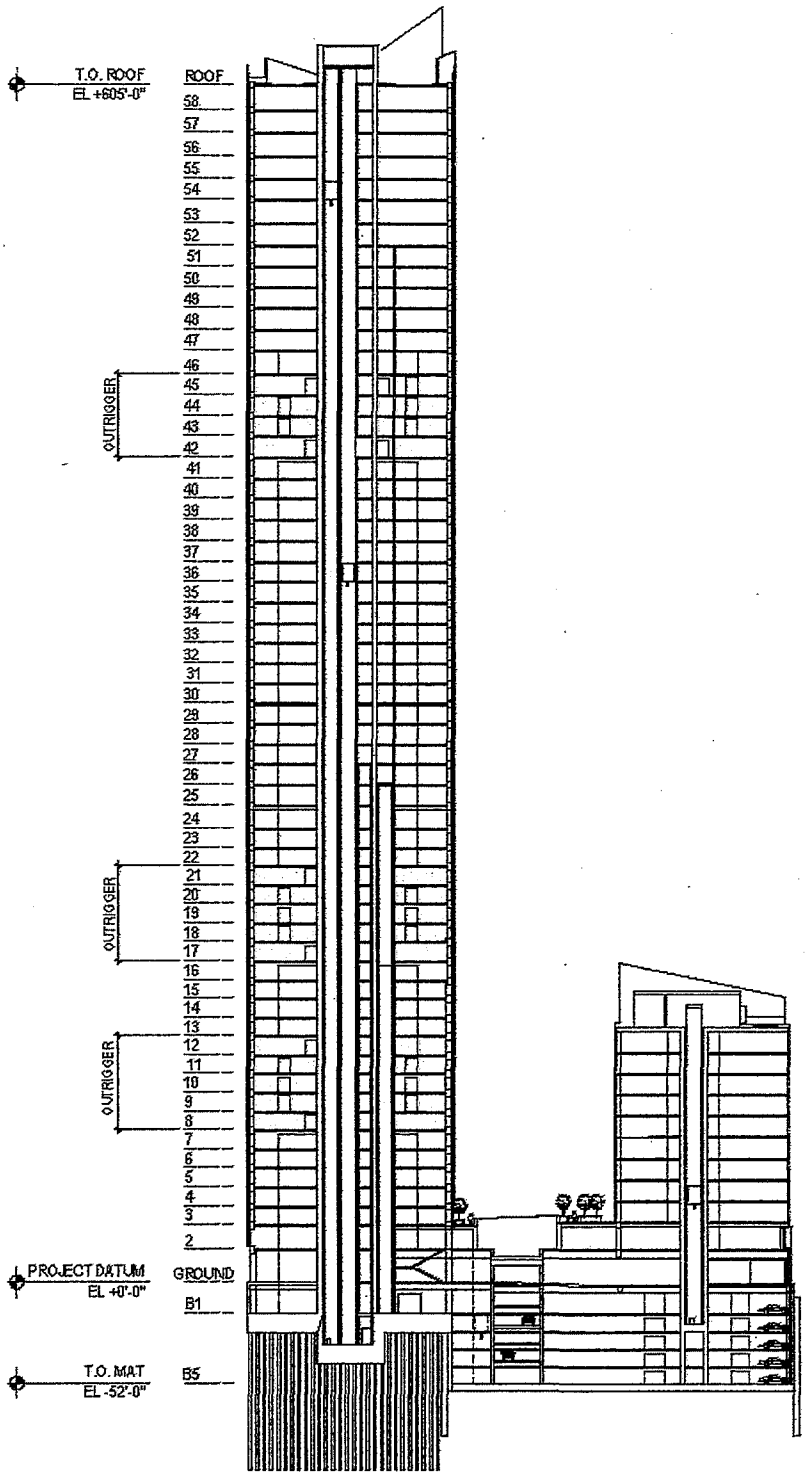


Figure 1. Building Section

Lateral Forces Summary

Tower	220,000
Mid-rise, above grade	47,341
Mid-rise, below grade	37,173

Table 1. Building Weight, kips

	Seismic Forces	Seismic Drift	Wind
Tower			
N-S	8,514	7,040	1,300
E-W			2,000
Midrise, above grade			
N-S	6,514	6,514	750
E-W	5,922	4,100	450

Table 2. Summary of Lateral Forces, kips

Table 3. Tower Base Shear

		N-S		E-W		
Basic Structural System:	R=	**8.5**		**8.5**		Table 16.N
Height of Building	h_n=	**605**	ft	**605**	ft	
Seismic Zone	z=	**0.40**		**0.40**		Table 16.I
Near-Source Factor	N_a=	**1.00**		**1.00**		Table 16-S
Near-Source Factor	N_v=	**1.064**		**1.064**		Table 16-T
Soil Profile Type		**SD**		**SD**		
Seismic Coefficients	Ca=	**0.44**	*N_a	**0.44**	*N_a	Table 16.Q
	=	**0.440**		**0.440**		
	C_v=	**0.64**	*N_v	**0.64**	*N_v	Table 16.R
	=	**0.681**		**0.681**		
	C_t=	**0.020**		**0.020**		
Importance Factor	I=	**1.00**		**1.00**		Table 16-K

Calculate the period of the building using Method A:

$T_A=C_t(h_n)^{3/4}$	T_A=	**2.44**	sec	**2.44**	sec	

Building period from ETABS analysis:

	T_B=	**5.47**		**5.84**		

Maximum period for determining forces:

$T_{MAX} = 1.3 \times T_A$	T_{MAX}=	**3.17**		**3.17**		

Building period to be used for forces:

	T=	**3.17**		**3.17**		

Calculate the design base shear, V, to use for forces:

V =	$(C_v * I / (R T))$ W	=	0.0253	*W	0.0253	*W	Eqn 30-4
V <=	$(2.5\ C_a I W) / R$	=	0.1294	*W	0.1294	*W	Eqn 30-5
V >=	$0.11\ C_a I W$	=	0.0484	*W	0.0484	*W	Eqn 30-6
V >=	$((0.8\ Z\ N_v I) / R) W$	=	0.0401	*W	0.0401	*W	Eqn 30-7
	V	=	0.0484	*W	0.0484	*W	

Reduce the above by 80% since building is regular:

	V	=	**0.0387**	***W**	**0.0387**	***W**

Calculate the design base shear, V, to use for displacments:

	T_B=		**5.47**		**5.84**		
V =	$(C_v * I / (R T))$ W	=	0.0146	*W	0.0137	*W	Eqn 30-4
V <=	$(2.5\ C_a I W) / R$	=	0.1294	*W	0.1294	*W	Eqn 30-5
V >=	$0.11\ C_a I W$	=	N/A	*W	N/A	*W	Eqn 30-6
V >=	$((0.8\ Z\ N_v I) / R) W$	=	0.0401	*W	0.0401	*W	Eqn 30-7
	V	=	0.0401	*W	0.0401	*W	

Reduce the above by 80% since building is regular:

	V	=	**0.0320**	***W**	**0.0320**	***W**

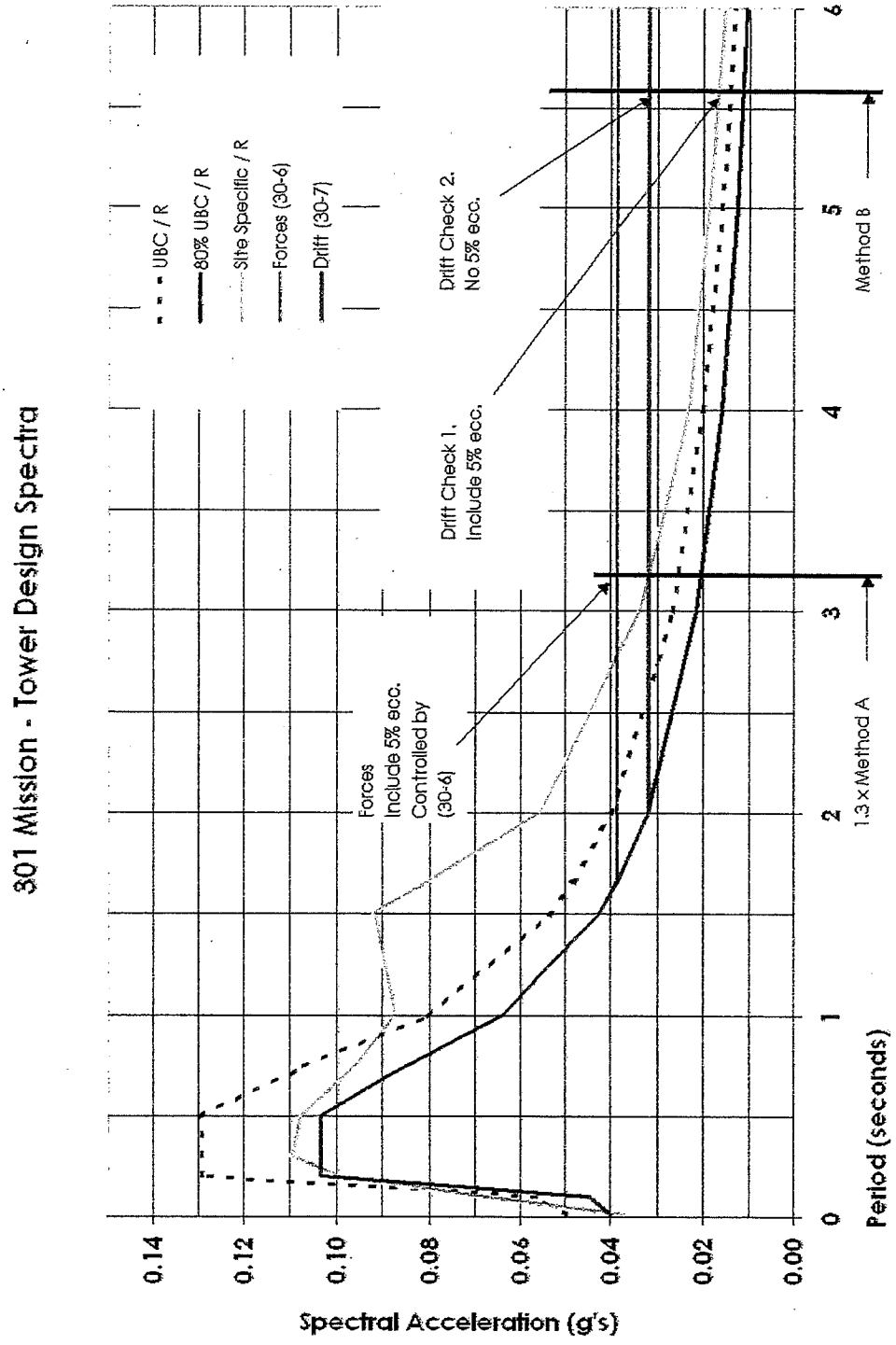


Figure 2. Tower Design Spectra

Table 4. Mid-Rise Base Shear

		N-S		E-W		
Basic Structural System:	R=	**5.5**		**5.5**		Table 16.N
Height of Building	h_n=	**128**	ft	**128**	ft	
Seismic Zone	z=	**0.40**		**0.40**		Table 16.I
Near-Source Factor	N_a=	**1.00**		**1.00**		Table 16-S
Near-Source Factor	N_v=	**1.064**		**1.064**		Table 16-T
Soil Profile Type		**SD**		**SD**		
Seismic Coefficients	Ca=	**0.44**	*N_a	**0.44**	*N_a	Table 16.Q
	=	**0.440**		**0.440**		
	C_v=	**0.64**	*N_v	**0.64**	*N_v	Table 16.R
	=	**0.681**		**0.681**		
	C_t=	**0.020**		**0.020**		
Importance Factor	I=	**1.00**		**1.00**		Table 16-K

Calculate the period of the building using Method A:

$T_A=C_t(h_n)^{3/4}$ T_A= **0.76** sec **0.76** sec

Building period from ETABS analysis:

T_B= **1.43** **0.90**

Maximum period for determining forces:

$T_{MAX} = 1.3 \times T_A$ T_{MAX}= **0.99** **0.99**

Building period to be used for forces:

T= **0.99** **0.90**

Calculate the design base shear, V, to use for forces:

V =	$(C_v * I / (R T))$ W	=	0.1251	*W	0.1376	*W	Eqn 30-4
V <=	$(2.5 C_a I W) / R$	=	0.2000	*W	0.2000	*W	Eqn 30-5
V >=	$0.11 C_a I W$	=	0.0484	*W	0.0484	*W	Eqn 30-6
V >=	$((0.8 Z N_v I) / R) W$	=	0.0619	*W	0.0619	*W	Eqn 30-7
	V	=	**0.1251**	*W	**0.1376**	*W	

Calculate the design base shear, V, to use for displacments:

T_B= **1.43** **0.90**

V =	$(C_v * I / (R T))$ W	=	0.0866	*W	0.1376	*W	Eqn 30-4
V <=	$(2.5 C_a I W) / R$	=	0.2000	*W	0.2000	*W	Eqn 30-5
V >=	$0.11 C_a I W$	=	N/A	*W	N/A	*W	Eqn 30-6
V >=	$((0.8 Z N_v I) / R) W$	=	0.0619	*W	0.0619	*W	Eqn 30-7
	V	=	**0.0866**	*W	**0.1376**	*W	

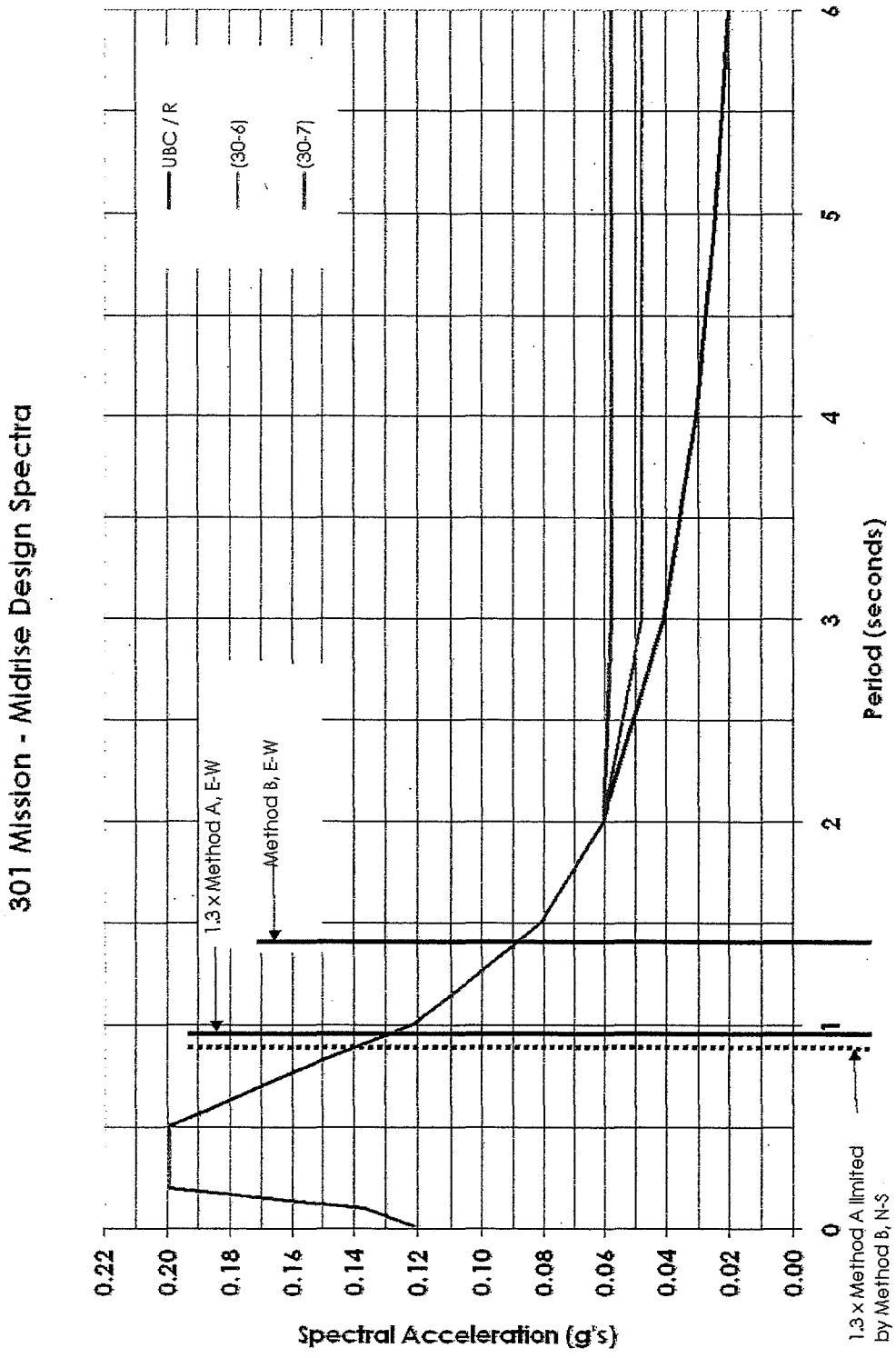


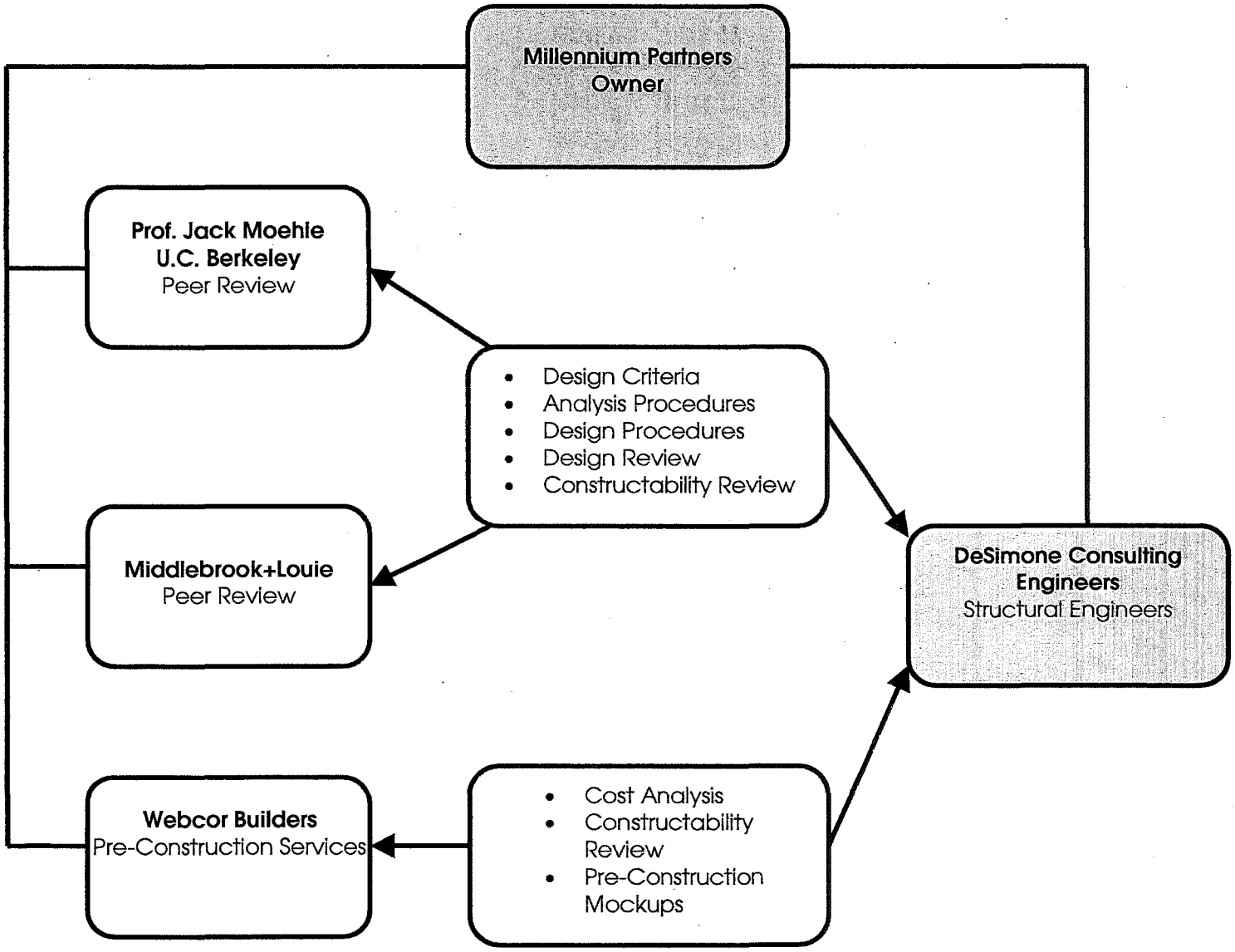
Figure 3. Mid-Rise Design Spectra

Structural Engineering and Peer Review Team

Webcor Builders have been involved in the design process since early in 2004 in order to provide cost estimating and constructability feedback and assistance to the project design team.

Additional technical expertise has been brought to the team by Professor Jack Moehle of U.C. Berkeley, who has been advising on the project since July of 2004.

Middlebrook + Louie of San Francisco are also performing an independent peer review of the entire project design.



Peer Review by
Professor Jack Moehle, U.C. Berkeley

Professor Moehle has consulted with DeSimone on the design of the tower portion of the project since July 2004. His contribution to the design, especially in the area of appropriate analysis assumptions, has been significant. The following summarizes the significant key points of our numerous discussions and meetings:

Regular vs. Irregular

The tower lateral system configuration, which incorporates the combination of concrete outrigger walls and columns acting together with the central core walls, represents a "regular" structure as defined by UBC 1629.5.2.

Force Level

So long as the structure can be classified as "regular", and since site specific design spectra have been provided by the Geotechnical Engineer, it is appropriate to use 80% of the base shear determined in accordance with UBC 1630.2. (See UBC 1631.5.4.2)

Due to the long period, the base shear used for determining all reinforcing, member sizes, etc. will be controlled by 80% of the value obtained with Eq. (30-6).

Drift Limits

UBC 1630.10.3 allows the designer to ignore Eq. (30-6) and Eq. (30-7) when checking building displacements and inter-story drifts. When checking drifts at this lower force level the designer must include 5% accidental torsion per 1630.6.

Professor Moehle recommended a second drift check be performed per the 2003 NEHRP provisions, whereby the higher base shear associated with Eq. (30-7) is used. At this force level the building drifts can be checked at the center of mass, thereby effectively ignoring any contribution to drift resulting from the 5% accidental torsion.

Effective Stiffness

The same effective concrete stiffness modifiers should be used for checking both drifts and forces.

The axial modifiers used for the outrigger columns, as well as those of the moment frames, are the average of tension-only (approx. 0.10) and compression-only (approx. 1.1) values. This averaging is appropriate for modal analysis, since directionality of forces cannot be controlled.

Bending modifiers for the core should range from 0.7 for cracked sections, to 0.9 or even 1.0 for locations where analysis shows sections are un-cracked for a MCE event.

A shear modifier of 0.4 is appropriate for all elements.

Rebar Strength

Use of Grade 75 rebar should be acceptable for use in the lateral system so long as ductility requirements similar to those of ASTM A706 can be obtained.

Concrete Modulus

Modulus of Elasticity of concrete should be computed based on the equation given by ACI 363 for high strength concrete. The equation given by ACI 318 is not appropriate for concrete in the 8 – 10 ksi range planned for use on this project.

Foundation design

A capacity design approach should be used for the pile cap. The capacities of the outrigger columns and the core walls should be used to determine pile cap reinforcing. These forces could be capped at Ω_o times the seismic forces obtained through modal analysis, if combined appropriately with gravity forces.

Shear wall design

The box-shaped area around each of the stairs at the north and south ends of the core will act as solid units and could be designed as such. Doing so would not require any length of wall beyond the code-required 0.25 Lw to be confined as a boundary element.

It is appropriate to consider horizontal wall reinforcing as able to simultaneously resist horizontal shear and provide confinement within boundary element regions.

Outrigger design

A capacity design approach should be used for the outriggers. The single-story height areas where the concrete outrigger walls connect to the columns should be designed as concrete link beams with diagonal reinforcing. The portions of the outriggers between the link beams and the core walls should then be designed for the capacities of the link beams to insure the ductility demand is concentrated in the link beams. The outrigger columns should also be designed for the capacities of the link beams.

Steel Link Beams

The steel beams used to link the wall segments running north-south in the core area should be designed as structural steel eccentrically braced frame (EBF) links. No penetrations should be allowed in these beams.

The use of built-up shapes from plate material should be acceptable so long as the webs are welded to the flanges with complete penetration welds.

Peer Review by Middlebrook + Louie, San Francisco, CA

Middlebrook + Louie of San Francisco are presently engaged in a peer review of the project. The following timeline summarizes the course of related events to date.

- January 24, 2005. M+L was introduced to the project by attending the weekly structural review meeting at DeSimone's office with Webcor and Millenium Partners in attendance.
- January 31, 2005. M+L and DeSimone met independently at DeSimone's office to discuss the basic design criteria and the Schematic Design drawings issued on November 3, 2004.
- February 28, 2005. M+L issued their initial peer review comments.
- March 14, 2005. M+L observed first concrete mockup completed by Webcor. DeSimone, Webcor, and Millennium Partners in attendance.
- March 18, 2005. DeSimone responded to M+L's February 28 comments.

1 of 4 pp

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REVIEW LETTERS

SUBMITTED BY JACK MEHLE
07/07/2017

JPM 3/9

MIDDLEBROOK + LOUIE
Structural Engineers

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San Francisco, CA 94104
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Ronald F. Middlebrook, S.E.
Hardip S. Pannu, S.E.
Robert D. McCarthey, S.E.
Jeppe Iversen, EUR ING, S.E.
Navin R. Amin, S.E.

July 20, 2005

Haijson Tom
City and County of San Francisco
1660 Mission Street, 2nd Floor
San Francisco, CA 94103

RE: 301 Mission Street – Site Permit Only
San Francisco, California
M + L Job #8977

I/We have reviewed the design criteria prepared by DeSimone Consulting Engineers for the 301 Mission Street project dated July 20, 2005 for the Site Permit Submittal Only and find it to be acceptable. The Structural Peer Review is ongoing at this time and more information will become part of the Design Criteria.

MIDDLEBROOK + LOUIE

Hardip S. Pannu, S.E.
Principal

HSP/rhc

HPannu@MplusL.com
www.MplusL.com

(H:\Admin\Letters\8977Comm301mis Tom.doc)

Jack P. Moehle
Consulting Civil Engineer

3444 Echo Springs Road
Lafayette, CA 94549
Ph. (925) 937-5225
FAX (925) 937-5225

25 July 2005

City and County of San Francisco
1660 Mission Street
2nd Floor
San Francisco, CA 94103

Attn: Hanson Tom
Re: 301 Mission Street – Structural Design Criteria

Mr. Tom,

I have reviewed the design criteria prepared by DeSimone Consulting Engineers for the 301 Mission Street project dated July 20, 2005 and find it acceptable for use on the project.

Respectfully,

Jack Moehle

Jack P. Moehle, Ph.D., PE

MIDDLEBROOK + LOUIE
Structural Engineers

One Bush Street
Suite 200
San Francisco, CA 94104
415.477.3000
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Robert D. McCarthy, S.E.
Jorge Lunan, EIR ING, S.E.
Navin R. Amin, S.E.

1

August 30, 2005
Revised Jan 24th, 2006

Henson Tom
City and County of San Francisco
1660 Mission Street, 2nd Floor
San Francisco, CA 94103

RE: 301 Mission Street – Foundation Permit Only
San Francisco, California
M + L Job #6977

1

We have completed the peer review of the foundation system prepared by DeSimone Consulting Engineers for the 301 Mission Street project dated May 24, 2005 for the Foundation Permit Submittal Only including all the structural drawings listed on sheet S0.01 with following assumptions and exceptions:

The design of the superstructure has not been completed at this time. Our understanding from meetings with DeSimone is that the superstructure's lateral system will be designed to comply with the following:

- The outriggers connecting to the central shear core of the tower contains links connecting to the Special Moment Resisting Frame columns. These links will be designed to remain elastic under the code-prescribed Gravity, Wind and Seismic load combinations; including loads caused by column shortening affects in tall buildings.
- The Special Moment Resisting Frame Columns will be designed to remain elastic under gravity plus loads caused by the yielding of outrigger link. In order to ensure this behavior, the capacities of the outrigger links will be calculated and increased by an over-strength factor. The resulting forces were used as the seismic loads.
- The pile cap under the tower is designed to remain elastic when subjected to the capacities of the Special Moment Resisting Frame/outrigger columns, as well as the expected maximum moment at the base of the shear wall core.
- We were not asked to review the effects of the Transbay Terminal project on this project.

The Structural Peer Review is ongoing at this time for the superstructure portion. It is our understanding that the scope of Middlebrook + Louie's (M + L) review is to provide our professional opinions on the design based on the Building Code design provisions. We also understand that M + L's review is limited to reviewing the structural system concepts and general design approaches for compliance with requirements of the building code. It is not intended for M + L to verify the validity and/or correctness of any particular numerical values in the design calculations.

MIDDLEBROOK + LOUIE

[signature]

Hardip S. Pannu, S.E.
Principal

HSP/rhc
HPANNU@MPLUSL.COM
www.Mplusl.com

Jack P. Moehle
Consulting Civil Engineer

1

29 January 2006

Hanson Tom
City and County of San Francisco
1660 Mission Street
2nd Floor
San Francisco, CA 94103

Attn: Hanson Tom
Re: 301 Mission Street – Foundation Permit

Mr. Tom,

I have completed my peer review of the foundation system supporting materials prepared by DeSimone Consulting Engineers for the 301 Mission Street Project, including:

1

- the foundation permit calculations and drawings (dated 24 May 2005), including the 80 drawings listed on S0-010.
- supplemental written clarifications (dated 1 September 2005).

On the basis of my review, it is my opinion that the foundation design is compliant with the principles and requirements of the building code, and that a foundation permit can be issued for this project.

1

This review is for the purpose of the foundation Permit Submittal only. The structural peer review is ongoing at this time. It is my understanding that the scope of my review is to provide my professional opinion on the design based on the building code provisions, for the sole purpose of advising you in your capacity as the responsible building official. I also understand that my review is limited to the structural system concepts and general design approaches for compliance with the building code. It is not intended that my review verify any particular numerical values in the design calculations. Furthermore, this review in no way accepts responsibility for the building design or the issuance of permits, which remain responsibilities of the Engineer of Record and the San Francisco Department of Building Inspection, respectively.

Respectfully,

Jack P. Moehle, Ph.D., PE

Treadwell&Rollo

21 June 2005
Project 3157.02

Mr. Gary Ho
Department of Building Inspection
City and County of San Francisco
1660 Mission Street, 2nd Floor
San Francisco, California 94103-2414

Subject: Geotechnical Review of Structural Drawings (Application #2002/1023/9696)
301 Mission Street
San Francisco, California

Dear Mr. Ho:

This letter presents the results of a review by Treadwell & Rollo, Inc. of the geotechnical aspects of the structural drawings for the 301 Mission Street project in San Francisco. The architect and structural engineers for the project are Gary E. Handel Architects, Inc. and DeSimone Consulting Engineers, respectively. We previously performed a geotechnical investigation for the project and presented our conclusions and recommendations in a report titled "Geotechnical Investigation, 301 Mission Street, San Francisco, California" dated 13 January 2005.

We reviewed the geotechnical aspects of the following documents:

- Structural Drawings (Foundation Permit Set), Sheets S0.0.10, S0.0.20, S2-0.B5.11, S2-0.B1.11, S3-1.01, S3-1.11, S3-1.12, S3-1.13, S3-1.14, S3-1.15, S3-3.12 and S3-3.13, titled "301 Mission Street, Mission Street Development Partners LLC" prepared by DeSimone Consulting Engineers, dated 24 May 2005.

On the basis of our review, we conclude the geotechnical aspects of the design are in general conformance with the intent of the geotechnical recommendations presented in our 13 January 2005 report.

We trust this letter provides the information requested. If you have any questions, please call.

Sincerely yours,
TREADWELL & ROLLO, INC.

Christopher A. Ridley
Civil Engineer

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER A. RIDLEY C No. C 61378 Exp. 12-31-07 CIVIL STATE OF CALIFORNIA

Ramin Golesorkhi
Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER RAMIN GOLESORKHI GE 2951 Exp. 4-30-07 GEOTECHNICAL STATE OF CALIFORNIA

3157020I.CAR

cc: Mr. Steve Patterson – Millennium Partners
Mr. Gerald Sams – Gary E. Handel Architects
Mr. Derrick Roorda – DeSimone Consulting Engineers

Treadwell & Rollo, Inc. *Environmental & Geotechnical Consultants*
555 Montgomery Street, Suite 1300, San Francisco, CA 94111
Telephone (415) 955-9040 Facsimile (415) 955-9041

MIDDLEBROOK + LOUIE
Structural Engineers

Jack P. Moehle
Consulting Civil Engineer

3444 Echo Springs Road
Lafayette, CA 94549
Ph. (925) 937-5225
FAX (925) 949-7595

12 June 2006

Hanson Tom
City and County of San Francisco
1660 Mission Street
2nd Floor
San Francisco, CA 94103

RE: Independent Peer Review - Final
301 Mission Street Project in San Francisco, California

Dear Mr. Tom:

This letter summarizes the structural peer review conducted by the undersigned for the proposed 301 Mission Street project. The review is limited to the highrise tower and that portion of the substructure that is integrally attached to and supporting it; the review excludes the midrise tower. This peer review was conducted by the undersigned in parallel with independent review by engineers from Middlebrook + Louie. This letter documents only the review provided by the undersigned.

As noted on the project construction documents, dated 26 May 2006, this project consists of two separate structures located on the same site. This review is limited to the western structure (tower), which is a 58-story, 605-foot tall building over one sub-grade level. The eastern structure (mid-rise) is a 12-story, 128-foot tall building over five sub-grade levels. The two buildings are completely separate structurally, being connected through joints at the B1, Ground, 2nd, and 3rd floors. The structures are to be of cast-in-place concrete construction. The floor slabs above grade level will be post-tensioned, whereas the lower slabs will use only mild reinforcement. The tower has a dual system comprising concrete shear walls with outriggers, and concrete special moment-resisting frames. The tower foundation consists of a 10-foot thick cap supported by precast concrete piles.

The basic criterion of the review is that it be in accordance with the requirements of the 2001 San Francisco Building Code. The specific elements of the review have included:

1. The structural design concepts proposed by the Engineering of Record and their suitability for this building considering the building code requirements, the building site, and principles of mechanics;
2. The structural design criteria, including appropriate prescriptive criteria of the building code and supplementary design procedures to account for unique components of the lateral force resisting system;
3. The design procedures and verification procedures to meet the code requirements;
4. The project geotechnical report, as a basis for design of foundations and assessing seismic hazards;
5. The architectural design and layout of the building, to develop an understanding of the building configuration and loading;
6. The analytical models used to evaluate compliance with the building code provisions;
7. Summary calculations of dynamic response indicating compliance with the building code provisions;

8. Summary calculations of structural capacity of critical elements including piles, mat foundation, walls, columns, beams, beam-column joints, link beams, and outrigger beams;
9. Detailing of critical elements of the structural system to ensure compliance with the criteria, compatibility with anticipated behavior modes, and constructability;
10. The structural drawings, to confirm that design and modeling assumptions are consistent with the overall structural configuration, design, and detailing;
11. The project specifications, to assure that critical aspects of the design and construction are appropriately portrayed.

In addition to the above, I relied on my own professional judgment derived through many years of professional practice, research, and participation in the development of design codes and standards.

My review was initiated in July of 2004, at which time Millennium Partners (the owners) hired me to review design work and advise them of its progress. Formal peer review work was initiated on 15 July 2005, at which time the San Francisco Department of Building Inspection requested that I act as an independent peer reviewer. In the period since then, I have reviewed several submittals of criteria, calculations, drawings, specifications, and supporting reports submitted by the Engineer of Record. I have met with the design team and with reviewers from Middlebrook + Louie several times to clarify questions, present comments, and reach resolution on the various technical issues that arose in the course of our review. The review process is documented in the document "Peer Review, Volumes 1 and 2," dated 31 May 2006, prepared by DeSimone Consulting Engineers.

I have completed my independent peer review of the above-mentioned project, including the following supporting materials prepared by DeSimone Consulting Engineers for the 301 Mission Street Project:

- The foundation permit calculations and drawings (dated 24 May 2005), including the 80 drawings listed on S0-010;
- Supplemental written clarifications (dated 1 September 2005);
- The superstructure permit submittal (dated 18 November 2005);
- Various clarifications and modifications as documented in the "Peer Review, Volumes 1 and 2," dated 31 May 2006, prepared by DeSimone Consulting Engineers
- Addendums to the Foundation Permit drawings (Addendum-2 Structure, dated 11/18/2005; Addendum 2 Revisions, dated 03/06/2006; and Add2-Rev2 Peer Review, dated 05/26/2006). Review included the 103 sheets listed on the drawing index of sheet S0-0.10 dated 05/26/2006.

On the basis of my review as outlined above, it is my opinion that the tower design is compliant with the principles and requirements of the building code, and that a permit can be issued for its construction.

It is my understanding that the scope of my review is to provide my professional opinion on the design based on the building code provisions, for the sole purpose of advising you in your capacity as the responsible building official. I also understand that my review is limited to the structural system concepts and general design approaches for compliance with the building code. It is not intended that my review verify any particular numerical values in the design calculations. Furthermore, this review in no way accepts responsibility for the building design or the issuance of permits, which remain responsibilities of the Engineer of Record and the San Francisco Department of Building Inspection, respectively.

Respectfully,

Jack P. Moehle, Ph.D., PE

APPROVED
Dept. of Building Insp.
JUL - 7 2006
ACTING DIRECTOR
DEPT. OF BUILDING INSPECTION

2/1/96/13/01, 202

Jack P. Moehle
Consulting Civil Engineer

3444 Echo Springs Road
Lafayette, CA 94549
Ph. (925) 937-5225
FAX (925) 949-7595

29 June 2006

Mr. Hanson Tom
Department of Building Inspection
1660 Mission Street, 2nd Floor
San Francisco, CA 94103

Subject: Termination of Post Tensioning Tendons at Core Wall
301 Mission Project

Dear Mr. Tom:

As part of my independent peer review of the structural design of the 301 Mission project, I have investigated the performance of the detail proposed for termination of floor slab post-tensioning tendons that are interrupted by the building's central shear core. The proposed detail consists of terminating the tendons, with a tendon anchor, in the slab a short distance from the exterior face of the wall. The slab is then connected to the core wall using "form saver" dowel inserts within the wall to which dowels are attached, following removal of the wall forms.

In an unrelated project, I have worked with engineers at MKA to test a full-scale laboratory specimen having details closely resembling the subject details of the 301 Mission project. You previously have received a draft test report summarizing test details and the results. Of the two test specimens reported, the second incorporated improved details including use of equal amounts of dowel reinforcement in the top and bottom of the slab and placement of the tendon anchors approximately one slab depth from the face of the wall. It is my opinion that this test specimen performed well within the expectations of the building code.

The details of the aforementioned second test are representative of those proposed for use in the 301 Mission building. In my opinion, results of this test are applicable to the 301 Mission building. Therefore, based on the testing performed, and my understanding of the response of the 301 Mission building, I believe that termination of post tensioning tendons outside the core wall using form-saver type dowel bar inserts to provide gravity and shear attachment of the slab to the wall, as shown on the structural drawings for the 301 Mission building, is acceptable.

Please feel to contact me should you have any questions on this matter.

Respectfully,

Jack Moehle

Jack P. Moehle, Ph.D., PE

cc: Gary Ho
Nic Rodriguez
Derek Roorda
Steve Patterson
Hardip Pannu

APPROVED
Dept. of Building Insp.
JUL - 7 2006
ACTING DIRECTOR
DEPT. OF BUILDING INSPECTION

CITY AND COUNTY OF SAN FRANCISCO
DEPARTMENT OF BUILDING INSPECTION

GAVIN NEWSOM, MAYOR
FRANK Y. CHIU, C.B.O., DIRECTOR

160975

JPM 10

SUBMITTED BY JACK MOEHLE
08/02/2017

July 27, 2004

80 Natoma Street

Jack P. Moehle
3444 Echo Springs Road
Lafayette, CA 94549

Leonard Joseph
The Thornton-Tomasetti Group
15892 South Pasadena Avenue
Tustin, CA 92780-5415

Shah Vahdani
Fugro West, Inc.
1000 Broadway, Suite 200
Oakland, CA 94662

Dear Gentlemen:

I wanted to let you know that we have retained Professor Juan Pestana of the UC Berkeley Geo Engineering faculty to do the type of evaluations that Professor Andrew Whittle was doing with respect to the 80 Natoma project. I am enclosing a copy of my letter to Professor Pestana that lists the items that I have sent to him. I would appreciated it if you would each review your files and see if you have any additional items that might be relevant to his work on this project.

I would also like to schedule a meeting with our DBI staff, the PRP members and Professor Pestana. I have cancelled the vacation I had planned, so I will be here until the end of September. I would appreciate hearing from each of you as to your schedules, so that we can set up a meeting at the earliest convenient date. You can call me at (415) 575-6893 or e-mail me at: ken.harrington@sfgov.org.

I look forward to hearing from you.

Very truly yours,

Kenneth J. Harrington
Office of the Director

cc: Juan Pestana

Kenneth J. Harrington, Special Assistant to the Director
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CITY AND COUNTY OF SAN FRANCISCO
DEPARTMENT OF BUILDING INSPECTION

GAVIN NEWSOM, MAYOR
FRANK Y. CHIU, C.B.O., DIRECTOR

July 26, 2004

80 Natoma Street

Professor Juan Pestana
104 Marsha Place
Lafayette, CA 94549

Dear Professor Pestana:

This is a follow-up to our recent conversation, wherein I told you that the Department of Building Inspection wants to retain you as a consultant on a development project at the above address.

You will recall, I informed you that the subject project is a 51-story concrete residential high rise that is planned for construction at 80 Natoma Street, which is near the intersection of 2nd and Mission Streets in downtown San Francisco.

I am enclosing the following items, which will give you an overview of the project and the issues involved:

1. Report of Treadwell & Rollo dated October 24, 2003 with attached report dated September 15, 1998.
2. Report from Jack P. Moehle dated April 2, 2004.
3. Report from T.D. O'Rourke dated May 9, 2004.
4. Report from Youssef Hashash, Ph.D, P.E. dated May 12, 2004.
5. Report from Dennis C. McCarry dated May 14, 2004.
6. Report from Jonathan D. Bray, Ph.D., P.E. dated May 25, 2004.
7. Report from T.D. O'Rourke dated May 31, 2004.
8. Report from Youssef Hashash, Ph.D, P.E. dated June 2, 2004.
9. Report from Charles C. Ladd, Sc.D., P.E. dated June 2, 2004.
10. Report from Ron Klemenic, MKA; Mr. Hadi Yap, Treadwell & Rollo dated June 3, 2004.
11. Report from Andrew J. Whittle dated June 11, 2004.
12. Report from Demetrious C. Koutsoftas, P.E., G.E. dated June 14, 2004.
13. Report from Hadi J. Yap dated June 15, 2004.
14. Report from Hadi J. Yap dated June 17, 2004.
15. Report from Shah Vahdani dated June 24, 2004.

Our department, the Department of Building Inspection, had issued an addendum to begin the installation of piles, that, in retrospect, was premature, due to a great many unresolved questions.

The developer was in the process of installing piles, when we became aware of some questions with regard to the foundation. A number of experts who were retained to assess the construction of a train tunnel adjacent to the building foundation raised these questions. The

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project has been on hold since June 7, 2004 for some permit/entitlement questions, and due to our concern about the foundation as currently designed.

The Department's purpose in retaining you is to have you work with out peer review panel[1] to do the kind of assessment that Andrew Whittle did with respect to the design.

As you can see, there are conflicts among the various experts who have looked at the project. It is the Department's usual practice to hire its own independent consultants where there are such conflicts.

I would appreciate if you would review the enclosed materials and then call me so that we can discuss how we should proceed. I would like to set up a meeting with our peer review panel at your earliest convenience.

I know that I told you that I was going to be in Italy for the next 3 weeks, but I have decided to postpone my vacation because of this 80 Natoma matter, so you can reach me at the office whenever you would like to discuss the matter.

Thank you for agreeing to assist us in this matter.

Very truly yours,

Kenneth J. Harrington
Office of the Director

[1] Jack Moehle, Leonard Joseph and Shah Vahdani.