Supplemental Report for Foundation Settlement Investigation

301 Mission Street
San Francisco, CA
21 July 2017
Revised 26 July 2017

SGH Project 147041.10

SIMPSON GUMPERTZ & HEGER
Engineering of Structures
and Building Enclosures

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26 July 2017

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Project 147041.10 – Structural Evaluation of the Millennium Tower, 301 Mission Street, San Francisco, CA; Revised Supplemental Report

Dear Ms. Kelly:

We are pleased to send the attached report documenting supplemental evaluations performed by us in response to requests forwarded by Professor Gregory Deierlein, Chair of the City of San Francisco-appointed review panel for the Millennium Tower. This revised report includes a corrected plot of ground motion spectra used in our analysis, plots for shear wall strain demand capacities and residual drift, and a discussion of settlement that has occurred since the readings upon which our analyses are based.

Sincerely yours,

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ABSTRACT

The building at 301 Mission Street, San Francisco, California is a fifty-eight-story residential structure founded on a pile-supported mat foundation. The building, which was completed in 2009, has experienced and continues to experience significant foundation settlement. Paul Hastings, LLP retained Simpson Gumpertz & Heger Inc. in 2014 to conduct an evaluation of the impact of site settlement on the building's structural stability and earthquake resistance. We performed initial evaluations in 2014 and updated these in 2016 to consider additional settlement that occurred in the interim period. In an October 2016 report we concluded that settlement had not compromised the building's stability or its ability to resist strong earthquakes.

The City of San Francisco retained a panel of structural and geotechnical engineers to review our October 2016 report and provide the City an independent opinion of the building's safety. In performing their work, this panel requested that we supplement our original evaluations to:

- Address the effects of potential strength degradation of reinforced concrete coupling beams in outrigger elements.
- Select and scale ground motions used in our analyses in accordance with the requirements of ASCE 7-10.
- Evaluate the adequacy of the foundation piles to support the structure under strong ground shaking.
- Evaluate the effect of additional settlement that occurred since June, 2016.

We performed a literature search to obtain information on the potential strength degradation of the outrigger coupling beams. We obtained data on the construction and installation of the foundation piles and worked with SAGE Engineers, a geotechnical consultant retained by Paul Hastings LLP to improve our modeling of the pile foundation's response. We also reviewed updated building settlement data provided by Arup in June 2017.

Our supplemental analyses and evaluations confirm the conclusions of our October 2016 report. We conclude that although the coupling beams are expected to degrade in strength when the building is subjected to strong ground shaking, this does not affect the response to earthquake shaking of the building overall, which has adequate capacity to withstand the Maximum Considered Earthquake shaking specified by the present San Francisco Building Code. Further, the foundation piles are adequate to withstand the shaking associated with such an event. Finally, the additional settlement that has occurred since June 2016 has not caused any significant impact on stress in the structure to date, nor had significant impact on the building's stability or ability to

resist strong earthquakes; and does not change any of our conclusions expressed in our October 2016 report or in this report of our supplemental analyses and evaluations.

SUPPLEMENTAL REPORT
FOUNDATION SETTLEMENT INVESTIGATION
301 MISSION STREET
SAN FRANCISCO, CALIFORNIA

1. INTRODUCTION

1.1 Background

The building at 301 Mission Street, San Francisco, California, also known as the Millennium Tower, is a fifty-eight-story, reinforced concrete structure developed by Mission Street Development LLC in 2007 for sale as residential condominium units. The building is located at the southeast corner of Mission Street and Fremont Street. The building comprises two separate structures, a fifty-eight-story tower and an adjacent, functionally connected, twelve-story reinforced concrete podium.

The project site is underlain by approximately 15 ft of 19th century fill, approximately 30 ft of recently deposited clays and silts, known as Bay Mud; approximately 50 ft of dense silty sands, known as the Colma formation; more than 100 ft of silts and clays known as Older Bay Clay and then by Franciscan formation bedrock. The tower structure is founded on a thick reinforced concrete mat, supported by 946, 14 in. square precast concrete piles that extend into the Colma formation at depths that vary from approximately 50 to 90 ft below surrounding grade. Since construction initiated, the tower has been experiencing noticeable settlement. At this time, total settlement exceeds 16 in. with some dishing and tilting of the mat foundation.

In 2014, Paul Hastings LLP retained Simpson Gumpertz & Heger Inc. (SGH) on behalf of Mission Street Development LLC to provide an independent evaluation of the effects of this settlement on the building's stability and earthquake resistance. SGH completed these analyses and prepared a preliminary draft report of findings. The building continued to settle. In 2016, Paul Hastings LLP again retained SGH to update our analyses in order to evaluate the effect of additional settlement which had occurred since our initial investigation. On 3 October 2016, we published a report documenting the results of our investigation and our conclusion that building settlement to date had not impacted the building's stability or its ability to resist strong earthquake shaking.

Following publication of our investigation report in October 2016, the City of San Francisco (City) retained an independent engineering review panel to provide the City an opinion as to the safety of the building. This independent panel reviewed our October 2016 report, met with us over a period of approximately 7 months, and requested additional data and analyses in support of their investigation. This report presents the supplemental analyses we performed in response to the review panel's requests.

1.2 Objective

The overall objective of our investigation, since inception of our work, is to determine if the differential settlement experienced by the 301 Mission Street building significantly affects the building's stability and capacity to resist strong earthquakes.

A secondary objective of our investigation, and the subject of this report, is to provide the City-appointed review panel information on the building's structural characteristics to assist the panel in responding to questions posed to the panel by the City. We also revisit our prior conclusions given the updated evaluations we performed at the request of the City panel.

1.3 Scope of Work

Our 3 October 2016 report presents the scope of work we performed in our initial investigation. Supplemental tasks we performed, at the request of the City's independent panel, include:

1. Modify our nonlinear settlement and earthquake analysis to simulate the effects of potential strength degradation of outrigger coupling beams under cyclic earthquake action.
2. Modify our nonlinear settlement and earthquake analysis to use re-scaled ground motions complying with the requirements of ASCE 7-10 for MCE_R shaking.
3. Evaluate the axial, flexural and shear demands on individual piles.
4. Evaluate the effect of additional settlement that has occurred since our analyses presented in our October 2016 report.
5. Meet with the City panel to present our results and respond to supplemental questions.
6. Prepare this report documenting our findings and conclusions.

Our original work scope and also this supplemental work scope address only the fifty-eight-story tower and its foundation, not the adjacent podium.

1.4 Project Description

The building at 301 Mission Street, San Francisco, California, also known as the Millennium Tower is a fifty-eight-story, 628 ft tall, reinforced concrete tower with an adjacent, structurally separate, podium. The podium structure is further divided into a three-story low-rise and a twelve-story mid-rise. Refer to our 3 October 2016 report for a more complete description of the building.

2. SOURCES OF INFORMATION

Our 3 October 2016 report presents a complete list of documents we reviewed as part of our original work scope. This section discusses additional information we obtained to support our supplemental analyses.

2.1 Outrigger Coupling Beam Hysteresis

The building's outrigger elements have low aspect (length to depth) ratio of 0.5. Recent testing of coupling beams has typically used specimens with aspect ratios in the range of 2.5 or higher. We therefore focused our literature search on test data for walls with lower aspect ratios.

2.1.1 Paulay and Binney

Paulay and Binney[1] report the results of cyclic testing of a series of low aspect ratio coupling beams that formed the basis for the ACI 318 requirements for diagonally reinforced coupling beams. Paulay and Binney tested four specimens with diagonal reinforcement, negligible conventional reinforcing steel and minimal hoop reinforcement. Three specimens had aspect ratios of 1.29 and one specimen had an aspect ratio of 1.0. One specimen (Figure 1) with an aspect ratio of 1.29 exhibited stable strain hardening behavior with minimal stiffness degradation through cyclic response to 0.01 radian followed by a monotonic push to 0.06 radian. A second similar specimen (Figure 2) exhibited stable, strain hardening response through multiple unsymmetrical cycles to 0.03 radians positive displacement and 0.06 radians negative displacement. The specimen with an aspect ratio of 1.0 (Figure 3) exhibited stable behavior in response to cyclic positive loading to 0.06 radians before initiation of buckling of the diagonal bars in compression.

2.1.2 Canbolat, Parra-Montesinos and Wight

Canbolat, Parra-Montesinos and Wight[2] report the results of a testing program conducted at the University of Michigan to evaluate the behavior of low aspect ratio coupling beams using fiber-reinforcement of concrete to control cracking and spalling behavior. One specimen, used as a control, was a standard diagonally reinforced coupling beam with an aspect ratio of 1.0 (Figure

[1] Paulay, T. and Binney, J.R. "Diagonally Reinforced Coupling Beams of Shear Walls SP 4-26" ACI Structural Journal, 1974, pp.579-598

[2] Canbolat, B.A., Parra-Montesinos, G.J., Wight, J.K., "Experimental Study on Seismic Behavior of High Performance Fiber-Reinforced Cement Composite Coupling Beams, 102 S-17", *ACI Structural Journal*, January –February 2005

4). This specimen exhibited stable behavior in response to fully reversed cyclic loading to 0.04 radians. Under positive loading (loading within the upper right hand quadrant of the force-deformation plot), the specimen exhibited stable response with no apparent degradation. Under negative loading (loading within the lower left hand quadrant of the plot) the specimen exhibited stable response through the first cycle to -.02 radian, then lost approximately 25% of its strength. Strength under negative loading then stabilized through displacements to 0.04 radian.

2.2 Pile Capacity Data

2.2.1 Information Obtained from Shop Drawings

We reviewed a series of documents prepared by Kie-Con, the pile supplier for the project, documenting the construction of the precast concrete piles. Specifically we reviewed:

- Kie-Con Drawing 568-7 Revision 2, dated 19 August 2005 and entitled: 14" Square P/S Concrete Pile Details, Production Pile, 301 Mission Street, San Francisco, California.
- Kie-Con Drawing 568-8, Revision 0, dated 16 June 2005 and entitled: 14" Square P/S Concrete Pile Details, Indicator Pile, 301 Mission Street, San Francisco, California.

Drawing 568-7 (Figure 5) shows:

1. Production piles are 14 in. square.
2. Concrete has a specified 28-day compressive strength of 7,000 psi.
3. Prestress reinforcement consist of eight strands of 1/2 in. diameter, Grade 270 steel, arranged in a circular pattern. Strands extend 4 ft beyond the top of the pile for embedment in the mat.
4. Eight #8, Grade 60 reinforcing bars (either ASTM A615 or A706), 23 ft long are present at the top of each pile and project 4 ft beyond the pile top for embedment in the mat.
5. The pile tops are provided with a 10 ft long cut-off length.

Drawing 568-8 (Figure 6) shows that Indicator Piles are identical to Production Piles except that a total of 20 ft long cut-off length is provided.

2.2.2 Information Obtained from Treadwell & Rollo

We reviewed a 2 May 2005 letter report prepared by Treadwell & Rollo re: Summary of Pile Driving, 301 Mission Street, San Francisco, California. Treadwell & Rollo served as project geotechnical engineer for the original development of the building. The letter includes a pile plan for the project, reproduced here as Figure 7. This pile plan indicates a numbering system for the piles and also the locations of Indicator Piles. Attachments to this letter also include a table, reproduced in Appendix A to this report that indicates for each pile: the date driven; furnished length; design cut-off elevation; actual top of pile elevation; approximate tip elevation; approximate cut-off length; and number of blows per foot during the last 5 ft of driving.

2.2.3 Information Obtained from SAGE Engineers

SAGE Engineers is a geotechnical engineering consultant, retained on behalf of Mission Street Development LLC by Paul Hastings LLP, to evaluate various matters related to the foundation behavior. SAGE Engineers evaluated geotechnical reports prepared by Treadwell & Rollo, as well as available data for adjacent sites prepared by other geotechnical engineers, reviewed pile driving and other construction records for the 301 Mission project, and performed independent calculations of foundation geotechnical capacity and settlement characteristics. At our request, SAGE provided data related to the likely capacity of piles and resistance of soils for our use in our analyses.

Primarily based on the driving data, shown in Appendix A, SAGE provided a spreadsheet indicating their estimate of pile ultimate static axial compressive capacity as limited by a combination of skin friction and end bearing in the surrounding soils. The spreadsheet provides a unique value for each pile. Projected values generally range from approximately 400 kips to 1,175 kips. Figure 8 is a plan view of the foundation derived from the tabulated values showing these capacities in the form of contours. The lowest values occur near the northeast corner of the core. These capacities relate to the ability of the piles to transfer loads to the surrounding soil and do not represent the structural capacity of the pile itself.

In addition to estimates of pile ultimate compressive capacity, SAGE provided a plot, reproduced here as Figure 9, indicating the load-deformation characteristics of the piles under static axial load normalized to the ultimate compressive capacity. This figure additionally shows a similar relationship for the piles under dynamic compressive loading, applicable to seismic load cases and also static and dynamic uplift loading.

SAGE also provided an estimate of the modulus of subgrade reaction of the soils beneath the PG&E vault, which is directly supported by soil at the south end of the mat. Figure 10 presents this data.

2.3 Settlement Data

Since 2009, Arup, geotechnical engineer for the Transbay Transit Center project under construction adjacent to and south of the 301 Mission Street Building, and also the Salesforce Tower, across Fremont Street to the west of the building, has obtained and published survey data at 33 points across the plan of the 301 Mission tower mat. Arup periodically updates this data. As noted in our October 2016 report, we obtained information on the building's settlement from a June, 2016 Arup report on settlement and compared this against earlier reports of settlement used as the basis for analyses we conducted in 2014. That report included plots, produced by us using the Arup data, showing the settlement profile across different sections of the mat between 2014 and 2016. Figure 11 presents a plot showing the change in settlement for 31 of Arup's data points over the period June 2016 to June 2017. Data for two of the points was not reported by Arup.

3. STRUCTURAL ANALYSIS

3.1 Coupling Beam Degradation

Our 3 October 2016 report documents the three-dimensional, nonlinear, PERFORM-3D, analytical model we developed to simulate the 301 Mission Street building's response to foundation settlement and earthquake ground motions. At the request of the City-appointed review panel, we modified our analytical model to incorporate strength degradation for the low-aspect ratio coupling beams located in outriggers at Levels 8 through 12, 17 through 21 and 42 through 48, along framing Lines C and F. Figure 12 presents an elevation of a typical outrigger indicating the locations of these low aspect ratio beams.

Of the available test data for low aspect ratio walls, the tests by Paulay and Binney indicate relatively little strength degradation while the test by Canbolat, et. al. do show some degradation. This is likely because the Canbolat tests used a ramped, fully reversed, cyclic loading protocol similar to that commonly used as the basis for most recent nonlinear response modeling, while the Paulay tests employed a loading protocol more like that of real earthquakes, with little reversed cyclic loading. Recent research, by Lignos[3] and others suggests that fully reversed cyclic loading protocols over-estimate the strength degradation that typically occurs in structures in response to earthquakes. However, to be consistent with the modeling approaches used for other elements, and to conservatively model the effects of strength degradation, we adopted the Canbolat tests as the basis for our updated hysteretic model for the coupling beams.

For these elements, we implemented the degrading hysteretic model illustrated in Figure 13. The cyclic backbone for this model maintains elastic-perfectly-plastic behavior through a shear deformation of 2% radians then degrades to a residual strength equal to 25% of the yield strength at a shear deformation of 4% radians. The model retains this residual displacement through shear deformation of 6% radians, after which it has nil residual strength. Figure 14 shows an overlay of the response obtained from this hysteretic model with that recorded in the University of Michigan testing discussed in Section 2.1.2 of this report. The hysteretic model conservatively represents the behavior obtained in the test and exhibits greater strength and stiffness degradation than did the tested specimen.

[3] Applied Technology Council, *Recommended Modeling Parameters and Acceptance Criteria for Nonlinear Analysis in Support of Seismic Evaluation, Retrofit and Design, NIST GCR 17-917-45*, National Institute of Standard and Technology, Gaithersburg, Md., 2017

3.2 Ground Motions

The City-appointed review panel requested that we re-evaluate the building using the degrading hysteretic model for outrigger coupling beams described in the previous section and a suite of ground motions selected and scaled to the requirements of ASCE 7-10[4]. ASCE 7-10 is the loading standard referenced by the present edition of the San Francisco Building Code. We selected and amplitude-scaled a suite of seven ground motion pairs to the criteria of ASCE 7-10 Section 16.1.3.1. Section 16.1.3.1 states:

> "*Where three-dimensional analyses are performed, ground motions shall consist of pairs of appropriate horizontal ground motion acceleration components that shall be selected and scaled from individual recorded events. Appropriate ground motions shall be selected from events having magnitudes, fault distance, and source mechanisms that are consistent with those that control the maximum considered earthquake. Where the required number of recorded ground motion pairs is not available, appropriate simulated ground motion pairs are permitted to be used to make up the total number required. For each pair of horizontal ground motion components, a square root of the sum of the squares (SRSS) spectrum shall be constructed by taking the SRSS of the 5% damped response spectra for the scaled components (where an identical scale factor is applied to both components of a pair). Each pair of motions shall be scaled such that in the period range from 0.2T to 1.5T, the average of the SRSS spectra from all horizontal component pairs does not fall below the corresponding ordinate of the response spectrum used in the design, determined in accordance with Section 11.4.5 or 11.4.7.*"

Table 1 indicates the seven records we selected and scaled for our analysis. The table indicates for each record the earthquake event, station name, fault mechanism, magnitude, distance of the recording station from the site and scale factor we applied. Figure 15 overlays plots of the scaled SRSS spectra for the seven records with the MCE_R spectrum specified in ASCE 7 Section 11.4.5; the average of the scaled SRSS spectra; and the period range (0.2T to 1.5T) over which the average SRSS spectrum is required to envelope the MCE_R spectrum. Figure 16 compares the average X and Y components of the records, as they were applied to the model against the MCE_R spectrum.

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[4] American Society of Civil Engineers. *Minimum Design Loads for Buildings and Other Structures, ASCE 7-10*; ASCE, Reston, VA

Table 1 – Suite of Ground Motion Records

Earthquake	Mag.	Rupture Type	Station	Distance (km)	Scale Factor
1989 Loma Preita	6.9	Reverse Oblique	West Valley College	9.3	1.40
1999 Koaceli, Turkey	7.5	Strike Slip	Duzce	15.4	1.24
1999 Chi Chi Taiwan	7.6	Reverse Oblique	TCU123	14.9	1.47
1990 Manjil, Iran	7.4	Strike Slip	Abbar	12.6	1.87
2002 Denali, Alaska	7.9	Strike Slip	Pumps Station #10	2.7	1.25
2010 El Mayor, Mx	7.2	Strike Slip	Michoacan de Ocampo	15.9	1.86
2010 Darfield, NZ	7.0	Strike Slip	HORC	7.3	0.95

3.3 Pile Modeling

To more accurately capture the demands on the foundation mat and the piles supporting this mat, we updated the way in which our analytical model represents the soil and piles supporting the mat and the effects of site settlement. We also implemented a series of elements to represent the lateral behavior of the piles under earthquake response. Section 3.3.1 describes our updated modeling of vertical foundation response and Section 3.3.2 describes our implementation of lateral behavior of the piles in our analytical model.

3.3.1 Vertical Foundation Response

We used a staged analysis approach to represent the vertical stiffness and action of the piles. As noted in our October 2016 report, our model does not explicitly include each of the 946 piles. To facilitate the meshing of the mat and the soil supporting the mat in our model, we use a total of 853 pile/soil springs (738 springs representing piles and 115 representing soil), distributed throughout the foundation plan, and located at the nodes connecting the grid beams that represent the mat. The 115 soil springs are all located at the 3 ft thick soil-supported region along the south edge of the mat.

As a first stage in the analysis we applied springs representing the soil/pile stiffness under long-term loading. We applied these as non-linear, compression only springs. In the soil-supported portion of the mat these springs are simply taken as having the force-deformation relationship shown in Figure 10, factored by the tributary area for each spring. For the pile springs, we obtained the value of the spring force-deformation relationship by interpolating between the data provided by SAGE (Figure 8 and Figure 9) for the piles nearest to the grid point at which we applied a spring, and then factoring these properties by the tributary area for each spring. We used the Kriging Method available in the Surfer 8 computer program to perform the 2-dimensional interpolation.

We next applied gravity loads (Dead Load + 25% Live Load) to the structure, resulting in downward displacement of the pile springs and deformation of the mat. We then iteratively applied thermal loading to the individual piles to produce a deformed shape of the mat that reasonably represented the surface we obtained from the 10 June 2016 Arup settlement data. Figure 17 compares the deformation contours across the mat resulting from our model, and those computed from the settlement data.

As a next step in the analysis we applied an additional set of springs at each of the node points representing a pile support. One compression-only spring added at each node represents the incremental pile strength and stiffness estimated by SAGE for seismic response and illustrated in Figure 9 as a solid blue line. We also added a tension-only spring to represent the dynamic strength and stiffness of the piles in uplift, as indicated in Figure 9. We connected the tension only springs to the mat using a combination of gap and hook elements, such that the springs are effective only when the piles actually experience uplift forces. We determined the strength and stiffness values for each of these spring elements using the normalized relationships in Figure 9 and the long term compressive capacities obtained using the geographic interpolation approach described earlier.

3.3.2 Lateral Foundation Response

To determine the lateral response of the piles we conducted a series of individual nonlinear static analyses of a typical pile to determine its force-deformation characteristics at different levels of displacement and under different levels of axial loading.

The piles have three critical sections with unique reinforcing including a top section, having eight #9 vertical reinforcing bars, 8-1/2 in. diameter prestressing strands, and W10 spiral reinforcing at a 2 in. pitch; a middle section containing the same prestressing steel and spiral reinforcing, but no vertical steel bars; and a bottom section having the same prestressing steel, no vertical steel bars, and larger, W4 spirals at a larger, 6 in. pitch. Figure 5 and Figure 6 show the location of these three sections along the pile respectively for production piles and indicator piles.

Notes on the pile drawings (Figure 5 and Figure 6) indicate that pile cut-off lengths of 10 ft and 20 ft are provided respectively on production and indicator piles. The cutoff length is a sacrificial section at the pile top having the same reinforcing as the pile top and intended to be removed in the field, if necessitated by the pile reaching refusal (design driving resistance) without driving to the design length. We performed independent calculations of the required development length for the prestressing and mild reinforcing steel and determined that in actuality, the production piles have 12 ft-3 in. of sacrificial length at the top.

We used XTRACT Version 3.0.7 software to perform section analysis of the three different pile sections and determined both their axial force-moment envelopes and their moment-curvature relationships under a series of axial loads ranging from 0 to 950 kips. Originally developed at the University of California at Berkeley, XTRACT is presently maintained and marketed by the TRC Company of Rancho Cordova, California. XTRACT uses a fiber element formulation to evaluate the nonlinear behavior of reinforced concrete sections comprising confined and unconfined concrete, reinforcing steel and prestressing steel. This software is widely used to evaluate the nonlinear force-deformation behaviors of concrete elements subjected to bending and axial loads.

Next, we used LPile, version 2016.9.08 to obtain P-Y values for the soil at various depths below grade. LPile, developed and marketed by Ensoft, Inc. of Austin, TX, was specifically developed to evaluate the lateral resistance of piles in soil under different levels of applied displacement. The program models piles as a linear series of beam-column elements, with user-defined linear or nonlinear properties supported laterally by a series of nonlinear springs. The software has default properties for spring nonlinear behavior based on input of basic geotechnical data including soil type and soil index properties. We used the soil properties presented for boring B-1 in the 2005 Treadwell & Rollo[5] project geotechnical report. We used an in-house computer program to calculate a group factor for the piles based on the empirical method outlined in Reese[6] et al. We obtained a group factor of 0.6 and assigned it to LPile as a modifier. We then used LPile to obtain P-Y curves that represent the nonlinear force-deformation characteristics of the soil strata at the site. Figure 18 shows some of the P-Y curves we obtained. The figure shows representative plots at depths of 2.5, 7.5, 12.5, 17.5, 22.5 and 27.5 below the top of pile. We obtained P-Y curves for the soil in 2 ft depth increments for the upper 25 ft and in 4 ft increments

[5] Treadwell & Rollo, *Revised Geotechnical Investigation, 301 Mission Street, San Francisco, California, Project no. 3157.02* 13 January 2005

[6] Reese, L.C., Isenhower, W.M., and Wang, S-T, Analysis and Design of Shallow and Deep Foundations, Dec 2007

below. Figure 19 illustrates the definition of depth and the boring log data we used for our analysis.

Next, we developed a simple nonlinear model using SAP 2000, version 17.3.0. SAP 2000 is a general structural analysis finite element program developed and marketed by Computers and Structures Inc. of Berkeley, California. It is used by engineers worldwide to evaluate linear and nonlinear behavior of structures. Figure 20 illustrates our SAP 2000 model. In this model, we implemented nonlinear soil springs obtained from the LPile analysis and illustrated in Figure 18 and moment-curvature properties for the different stations along the pile length, obtained from our XTRACT analyses. We modeled the pile as having a fixed-end condition at the top. For each of eleven axial loads, representing the range of gravity loads on individual piles obtained from our PERFORM analysis under modeling of gravity loading and settlement effects, we performed three different non-linear static analysis cases: Case 1 having zero end rotation; Case 2 having positive 0.01 radian and Case 3 negative 0.01 radian of end rotation at the pile top. These end rotations (-0.01 radian to +0.01 radian) represent the range of pile end rotations predicted by our PERFORM analysis under gravity load and site settlement. Figure 21 presents the force-deformation plots we obtained from these thirty-three (eleven axial loads, three load cases each) individual non-linear static analyses.

Next, using the predicted gravity load and initial head rotation at each spring from our PERFORM analysis of the gravity load and settlement case, we performed 2-dimensional interpolation to determine the appropriate nonlinear force deformation curve for each pile spring from the set of analyses under varying head rotation and axial loads. We then summed these individual nonlinear force-deformation relationships to form the properties for a global nonlinear force-deformation behavior for each of positive translations to the north, east, south and west. As shown in Figure 22, the nonlinear force-deformation plots in each of these directions are quite similar. Therefore, we adopted a single nonlinear-force deformation relationship, shown in the figure as the 'global" force-deformation plot to represent the nonlinear behavior of the piled foundation in response to seismic shaking.

3.4 Acceptance Criteria

Table 2 below summarizes the acceptance criteria we used to evaluate building response to gravity loads, settlement and earthquake. This section provides brief discussion of the derivation of these criteria. Our October, 2016 report provide a more thorough presentation of this.

Table 2 – Nonlinear Acceptance Criteria

Element	Deformation	Limit (CP)
Core shear wall	Confined Concrete compressive strain, $\varepsilon_{cu,Compr}$	0.011
	Reinforcing steel tensile strain, $\varepsilon_{su,Tens}$	0.05
	Shear strain (drift ratio, Δ/h)	1.0%
Outrigger coupling beams	Shear strain	2.5%
Reinforced concrete frame beams	Plastic hinge rotation, θ_{pl}	varies 3.6%-5.0%
Embedded steel coupling beams	Plastic hinge rotation, θ_{pl}	3.0%
Reinforced concrete columns	Plastic hinge rotation, θ_{pl}	varies 0.8-0.9%
Pile cap foundation	Plastic hinge rotation, θ_{pl}	1.0%
Building	Interstory drift ratio	3.0%

3.4.1 Core Wall and Outrigger Column Compressive Strain

We computed permissible compressive stress-strain relationships for 7, 8, and 10 ksi concrete using the method developed by Mander and Chang[7]. We used vertical spacing of confinement reinforcing consistent with the core and outrigger wall details shown in the project drawings. We calculated ε_{cu} values ranging from 0.0225 to 0.0304. We conservatively reduced these values by a factor of 2.0, and adopted a limit of 0.011 for confined concrete compressive strain.

[7] Chang, G.A. and Mander, J.B., 1994, Seismic energy based fatigue damage analysis of bridge columns: Part I — evaluation of seismic capacity, NCEER Technical Report No. NCEER-94-0006. State University of New York, Buffalo, NY

3.4.2 Core Wall and Outrigger Column Tensile Strain

We adopted a limit of 0.05 for steel tensile strains. This value is commonly used for the design of tall buildings using performance-based procedures.

3.4.3 Wall Shear Strain

We defined shear behavior of concrete walls using the recommendations for walls with high axial load listed in ASCE 41-13 Table 10-20. The collapse prevention limit for such walls is 1.0% total shear strain.

3.4.4 Outrigger Coupling Beam Shear Strain

At the request of the City-appointed panel we modified our analytical model to incorporate strength degradation for the low-aspect ratio outrigger coupling beams. We adopted a collapse prevention limit of 2.5% total shear strain based on hysteretic results from testing by Canbolat, Parra-Montesinos and Wight and following the procedures of ASCE 41-13, Section 7.6.3.

3.4.5 Reinforced Concrete Beams

We used ASCE 41-13 Table 10-7 to define the backbone parameters and acceptance criteria of the reinforced concrete perimeter moment frame beams. We computed the shear stress and longitudinal steel ratio of these beams and used linear interpolation between the shear demands and reinforcement ratios given in Table 10-7 for conforming transverse reinforcement. We obtained CP inelastic rotation limits ranging from 3.6% to 5.0%.

For conventionally-reinforced concrete core wall coupling beams, we adopted the recommendations of Table 10-19 in ASCE 41-13 for beams with conforming transverse reinforcement and low shear stress. For those beams we used an inelastic rotation CP limit of 5.0%.

3.4.6 Steel Coupling Beams

We matched coupling beam nonlinear shear behavior including element stiffness, yield, and degradation characteristics to coupling beam testing performed by Dr. John Wallace[8] at UCLA.

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[8] Wallace, J.W., "Large-Scale Testing and Analysis of Concrete Encased Steel Coupling Beams under High Ductility Demands", *Proceedings of the 15th World Conference on Earthquake Engineering*, September 2012

We defined the limiting inelastic shear strain between 2.6% and 3.0% depending on the beam aspect ratio. This value corresponds to the initiation of strength loss in the beam. Test results indicate that beams are able to maintain a significant portion of their strength under rotations on the order of 7% to 13%.

3.4.7 Reinforced Concrete Columns

We used the values listed in ASCE 41-13 Table 10-8 for columns with high axial load to define the backbone parameters and acceptance criteria of the reinforced concrete perimeter moment frame beams. We computed the shear stress and vertical steel ratio of the columns and used linear interpolation between the shear demands and reinforcement ratios given in Table 10-8 for transverse reinforcement conforming to condition ii. We obtained CP inelastic rotation limits ranging from 0.8% to 0.9%.

3.4.8 Pile Cap Grillage

We used ASCE 41-13 Table 10-7 to define the backbone parameters and acceptance criteria for pile cap grillage beams. We assumed conforming transverse reinforcement and high shear stress to obtain the backbone parameters. We adopted a CP inelastic rotation limit of 1.0% which is less than the ASCE 41-13 recommended value of 2.0%.

3.5 Analysis Results

We evaluated the building's response to the seven scaled ground motions described in Section 3.2 using two different versions of our PERFORM-3D model. Both versions of the model implemented the degrading hysteresis model for the outrigger coupling beams described in 3.1 and the nonlinear vertical pile springs described in Section 3.3.1. Both versions also include the application of gravity loading and settlement as initial load steps. One of these models is fixed against lateral translation at the foundation level. The second model implements the nonlinear lateral springs at the base mat described in Section 3.3.2.

3.5.1 Fixed Lateral Translation Model

Figure 23 and Figure 24 respectively present the predicted peak absolute value story drift obtained from the analysis in the east-west and north-south directions. Mean drift in each direction is substantially below the 3% limit recommended by the PEER Tall Buildings Design

Guideline[9]. All records exhibit story drifts less than the 4.5% limit recommended by the PEER Guideline.

Figure 25 and Figure 26 present the residual drift obtained for each of the seven ground motions for response in the east-west and north-south directions, respectively. Average and individual drifts for the seven records are all substantially less than the 1% limit for mean residual drift recommended by the PEER Guidelines.

Figure 27 presents the demand to capacity ratios, in percent, for column plastic rotation. A value of 100% represents the ASCE 41-13 CP limit, which ranges from 0.008 to 0.009 radians for columns in this structure. The figure shows the maximum predicted value for any of the columns at each story, for each ground motion, and also the average peak value for all ground motions.

Figure 28Figure 28 presents the demand to capacity ratios, in percent, for compressive strains in concrete walls and also outrigger columns, which were also modeled using shell elements. As extreme fibers of the walls and the columns at all levels are confined, an acceptable value of strain is taken as 0.011. Demands are substantially below these values at all levels and for all ground motions.

Figure 29Figure 29 presents the demand to capacity ratios, in percent, for concrete core wall and outrigger column reinforcing tensile strains. An acceptable value of 0.05 is used. Demands are substantially below these values at all levels and for all ground motions.

Figure 30 shows the demand to capacity ratios for core wall shear strain. Strain for all records is substantially less than the 0.01 permitted by ASCE 41.

Figure 31 shows the demand to capacity ratios for coupling beams in outriggers. A value of 100% represents a chord rotation of 0.025 radian and the hysteretic relationship illustrated in Figure 13. All coupling beams degrade in strength without negative impact on other elements or overall stability.

Figure 32 presents demand to capacity ratios for reinforced concrete beams in moment frames and core walls. Acceptable values range from 0.03 radians to 0.05 radians depending on the

[9] Pacific Earthquake Engineering Research Center, *PEER TBI Guidelines for Performance-based Seismic Design of Tall Buildings, Version 2, Report No. 2017/06*, April, 2017

beam horizontal reinforcing ratio and shear stress, in accordance with ASCE 41. All beams at all levels and for all ground motions are substantially below these values.

Figure 33 presents demand to capacity ratios for steel coupling beams. A value of 100% corresponds to a plastic hinge rotation of 0.03 radians. Mean demands are substantially less than this amount although two ground motions do produce locally somewhat higher demands at upper levels. The predicted demands are within the valid modeling range at all levels for all ground motions.

Figure 34 shows the peak mat grillage beam plastic rotation demands from the 1999 Chi Chi Taiwan, TCU3 record, which of the suite of records evaluated, was the most taxing on the mat. The peak value at any location is 0.003 radians. A value of 0.01 is taken as acceptable. All values are substantially less than this.

Figure 35 shows the peak compressive demand to capacity ratio for piles. A value of 1.0 indicates that a pile has achieved its estimated geotechnical capacity as indicated in Figure 8 and Figure 9. It is important to note that this plot shows the peak value obtained for all ground motions. Individual ground motions would have lower peak values at most piles. Regardless, no piles exceed a value of 0.98. Also, since pile geotechnical capacity exceeds pile structural capacity, a value of 1.0 would indicate the onset of a yielding mode of behavior, rather than failure.

Figure 36 indicates peak pile uplift demand to capacity ratios for all ground motions. As with Figure 35, any one ground motion will produce lower values for most piles. For an individual pile spring, a value of 1.0 represents the lesser of the pile geotechnical seismic capacity, as given by Figure 8 and Figure 9 or the steel yield strength, whichever is less. Several piles are predicted to have a peak demand equal to their capacity. This is suggestive of a benign yielding mode of behavior.

3.5.2 Nonlinear Lateral Translational Pile Springs

Figure 37 and Figure 38 respectively present the peak lateral displacement demands on the pile cap in the east-west and north-south directions, overlain on the global pile nonlinear force-displacement behavior previously shown in Figure 22. Predicted pile lateral displacement is typically less than 1 inch and does not approach the displacement at which foundation strength degradation initiates.

Figure 39 compares plots of mean story drift in the east-west and north-south directions for the model fixed against lateral translation at the base and the model with nonlinear lateral translational pile springs. In each of the two directions, the story drift predicted by our analyses is nearly identical for the two models.

4. DISCUSSION

In response to requests from the City's review panel we evaluated the effect of the following on our predictions of building response and behavior:

1. Inclusion of strength degradation in hysteretic modeling of outrigger coupling beams.
2. Selection and scaling of ground motions to comply with the procedures in ASCE 7-10.

In addition, the panel requested that we evaluate the demands on foundation piles.

As described in Chapter 3 of this report, we modified our PERFORM-3D model used in our previous analyses to include a strength-degrading hysteretic behavior for the coupling beams, as described in Section 3.1. We also improved representation of foundation piles to represent both their nonlinear vertical and lateral behaviors.

The updated outrigger coupling beam model, updated suite of ground motions, and improved representation of the piles had negligible effect on our predictions of the behavior of the building superstructure, when subjected to MCE motions. The coupling beams degrade in strength without negative impact on other structural elements, which have adequate capacity to resist these ground motions. The building retains adequate lateral resistance in other elements to remain stable under these ground motions and to maintain lateral drift under these earthquake motions at levels that are comparable to those predicted by our earlier analyses.

Compared with our earlier modeling, our updated model, incorporating pile behavior and resistance information obtained from SAGE Engineers, provides a more reliable estimate of the demands on piles under the combined effects of dead and live loads, settlement and MCE shaking. Although our analyses predict demands on some piles close to their computed capacities, these analyses indicate that the foundation has adequate strength to support the structure. Of particular importance, pile capacity is generally controlled by the geotechnical capacity, that is the ability of the piles to transfer load to the surrounding soil, rather than structural capacity. Should overstress of individual piles occur, this will result in yielding of the pile to soil interface, which allows deformation to occur without loss of load carrying capacity. This should enable the structure to experience demands substantially larger than we have evaluated without failure.

Our analyses reported above are based on settlement data reported by Arup in June 2016. Following completion of these analyses, the City's panel requested that we evaluate the effect of settlement that occurred since that time.

Figure 49 through 56 of our October 2016 report compare settlement profiles for the mat across east-west and north-south framing lines, based on Arup's measurements in June 2014 and June 2016. These figures indicate that during that two-year period settlement of the mat consisted largely of downward translation and tilting to the west, with the building undergoing primarily rigid body translation. As described in our October 2016 report, we found negligible difference in the effect on the building of the additional settlement that had occurred over that two-year period. This is also consistent with the building moving as a rigid body. Under such conditions the only change in stress that occurs in the building is a result of P-delta effects, as the structure leans to the side and the line of action of the building's weight is displaced relative to the building's center of resistance.

Figure 11 of this report compares the settlement of 31 of the 33 measurement points during the period between June 2016 and June 2017. The profiles indicate continued motion of the building as a rigid body without noticeable difference from linear differential settlement across the mat. In this period approximately 1/2 in. additional settlement occurred at the west edge of the mat than at the east edge. Given the 100-foot width of the mat, this amounts to an incremental tilting of the building of 0.04%. This amount is negligible and has not caused any significant impact on stress in the structure.

5. CONCLUSIONS

Our updated analyses confirm the findings of our earlier analyses, as set forth in our October 2016 report. Specifically, these analyses confirm that settlement recorded to date has not compromised the ability of the building to resist strong earthquakes. Our analyses also confirm that the response of the outrigger coupling beam elements to seismic demands does not significantly affect the building's earthquake behavior and the building otherwise meets criteria commonly used for the design of tall buildings today using performance-based design procedures. Pile foundations are adequate to resist the MCE demands. Further, given the current pattern of settlement, the additional settlement that has occurred since June 2016 has not caused any significant impact on stress in the structure, nor had significant impact on the building's stability or ability to resist strong earthquakes; and does not change any of our conclusions expressed in our October 2016 report or in this report of our supplemental analyses and evaluations.

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ILLUSTRATIONS

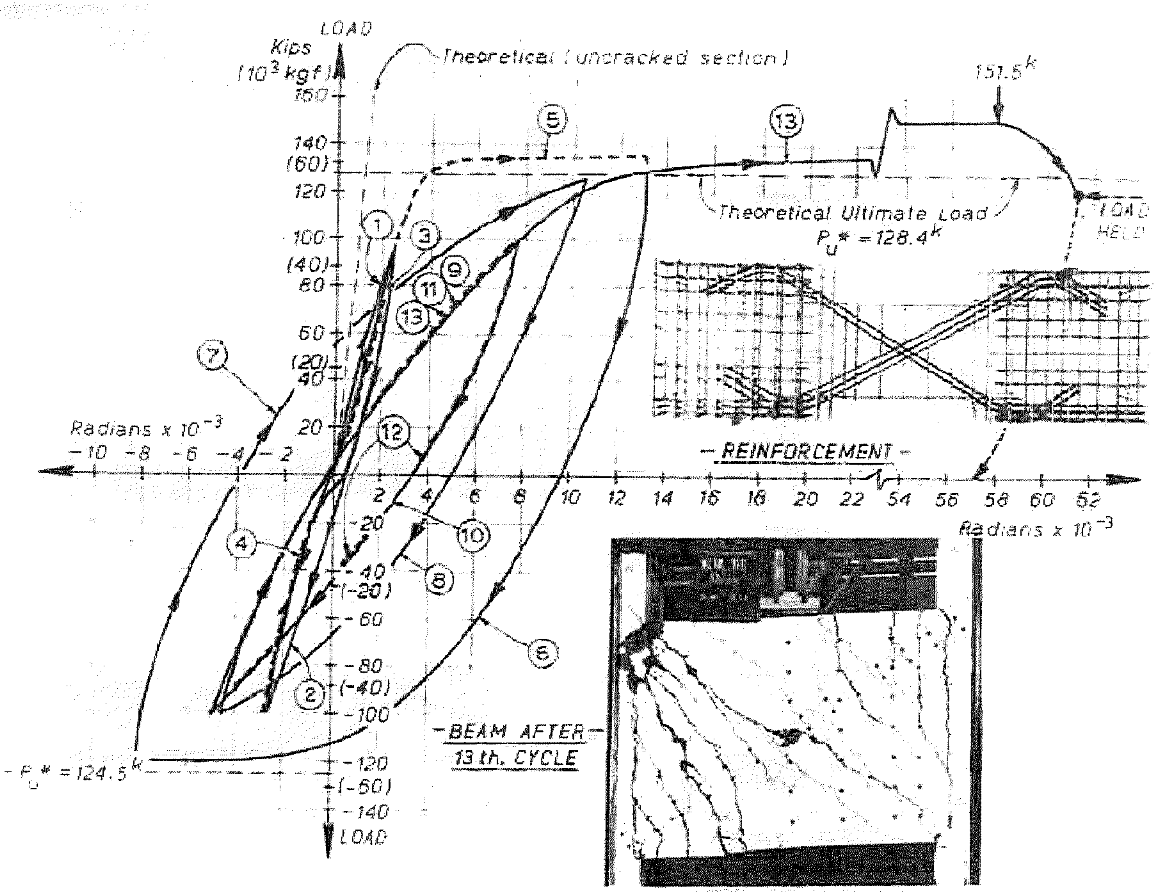

Figure 1. Paulay and Binney Specimen 316

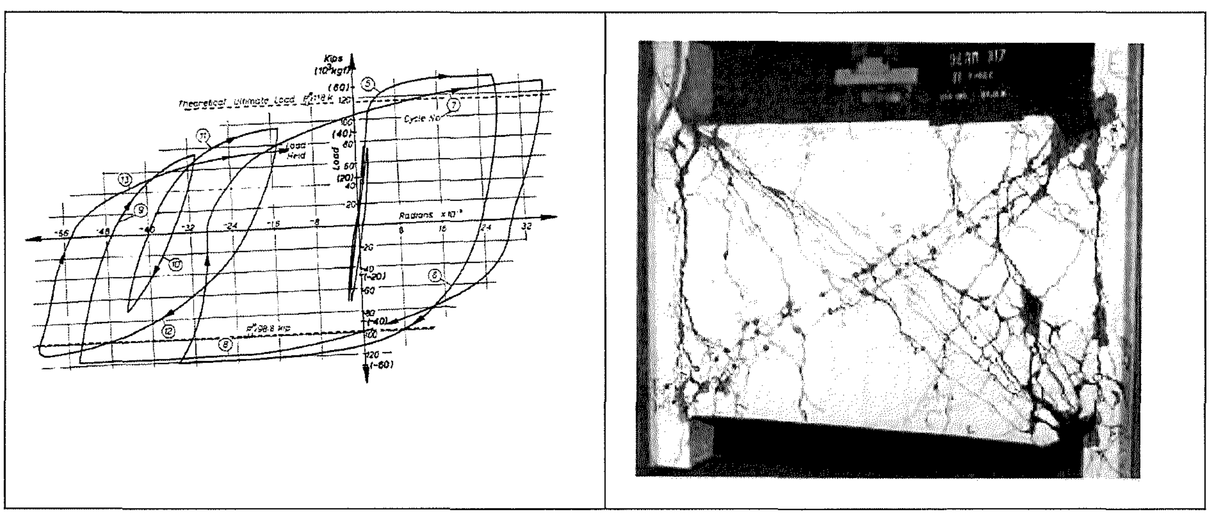

Figure 2. Paulay and Binney Specimen 317

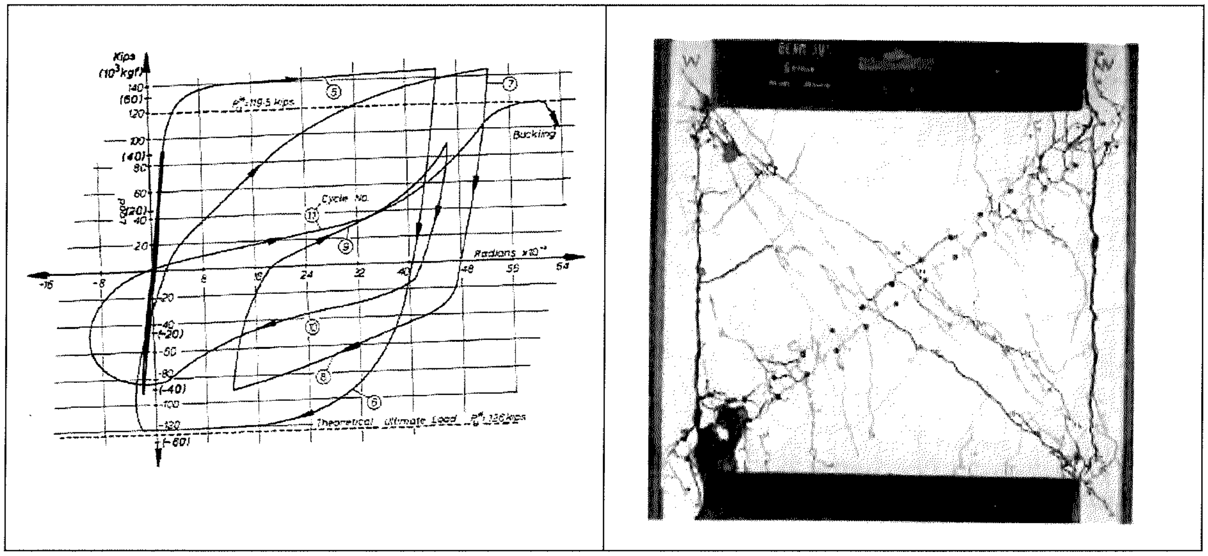

Figure 3. Paulay and Binney Specimen 395

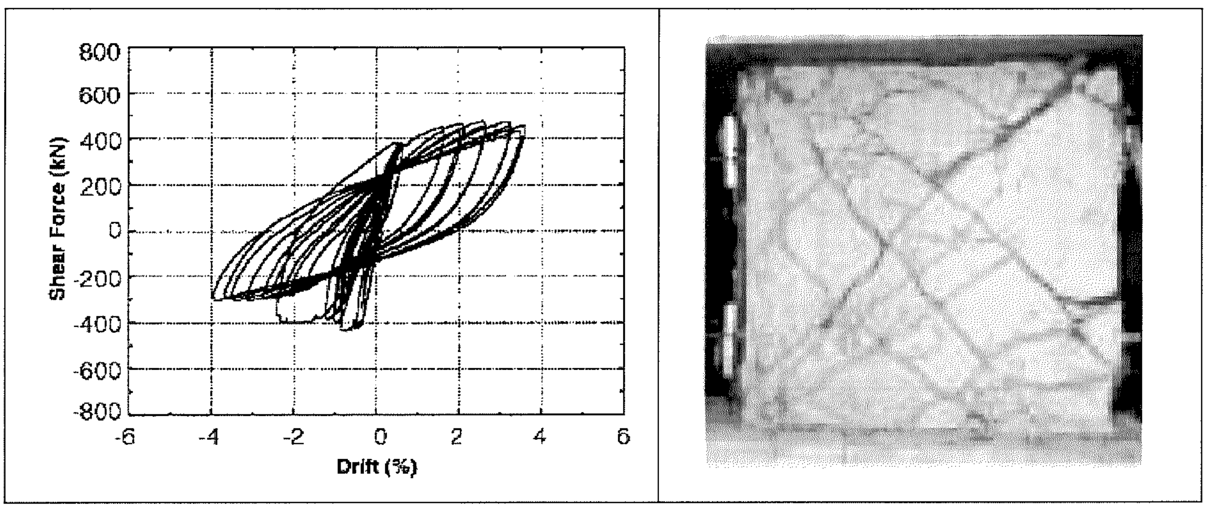

Figure 4. Canbolat, et. al. Control Specimen

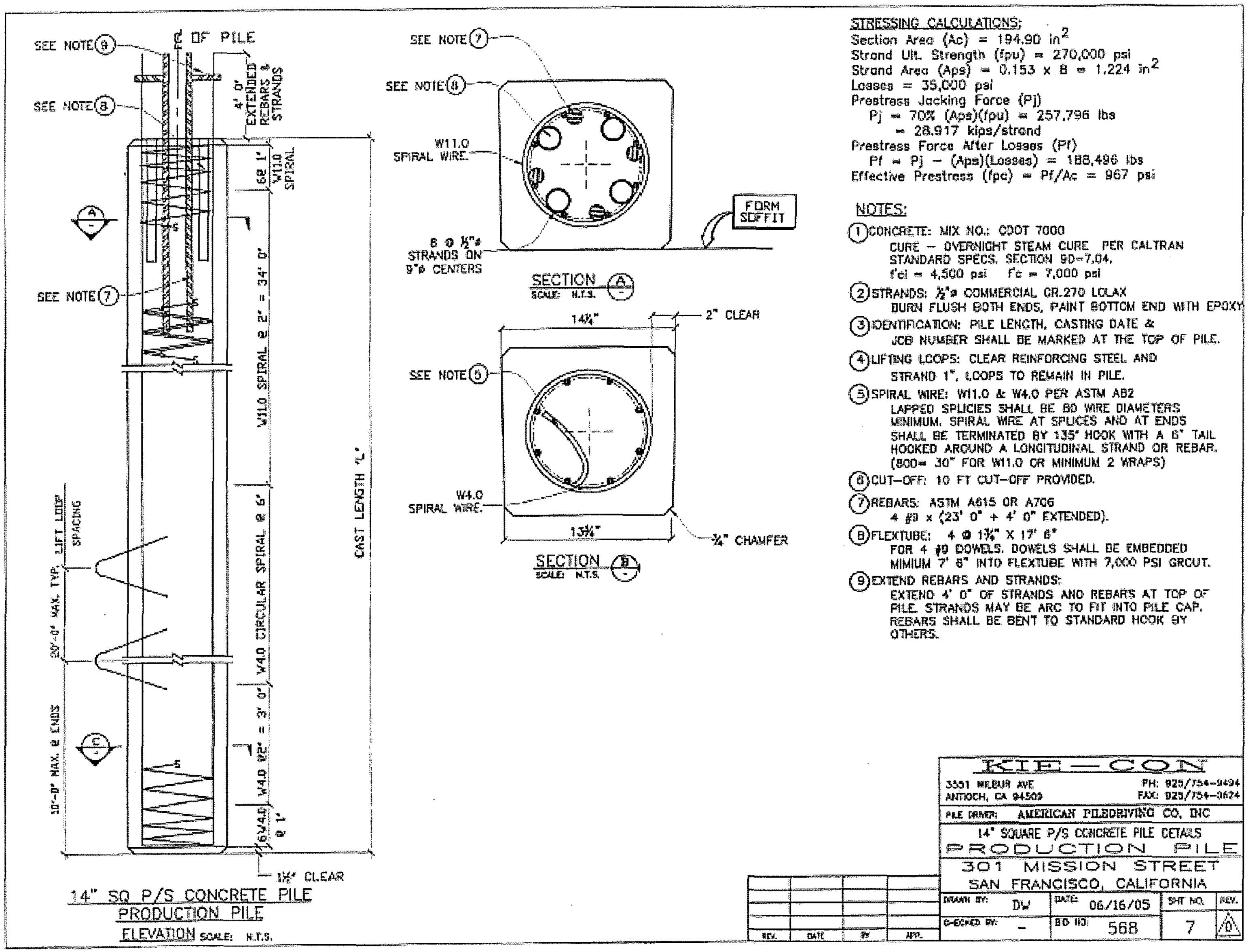

Figure 5. KieCon Drawing 568-7, Production Pile

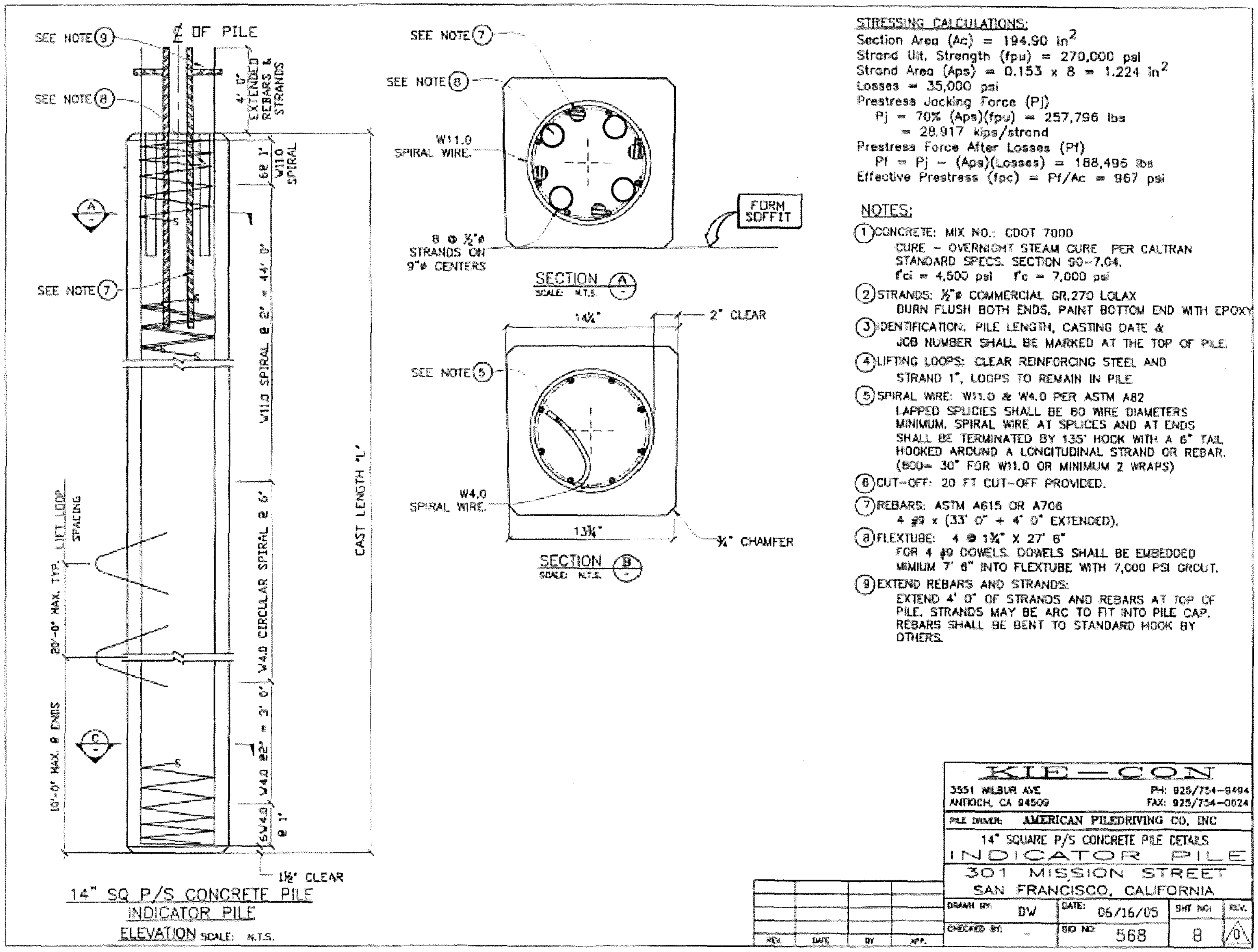

Figure 6. KieCon Drawing 568-8, Indicator Pile

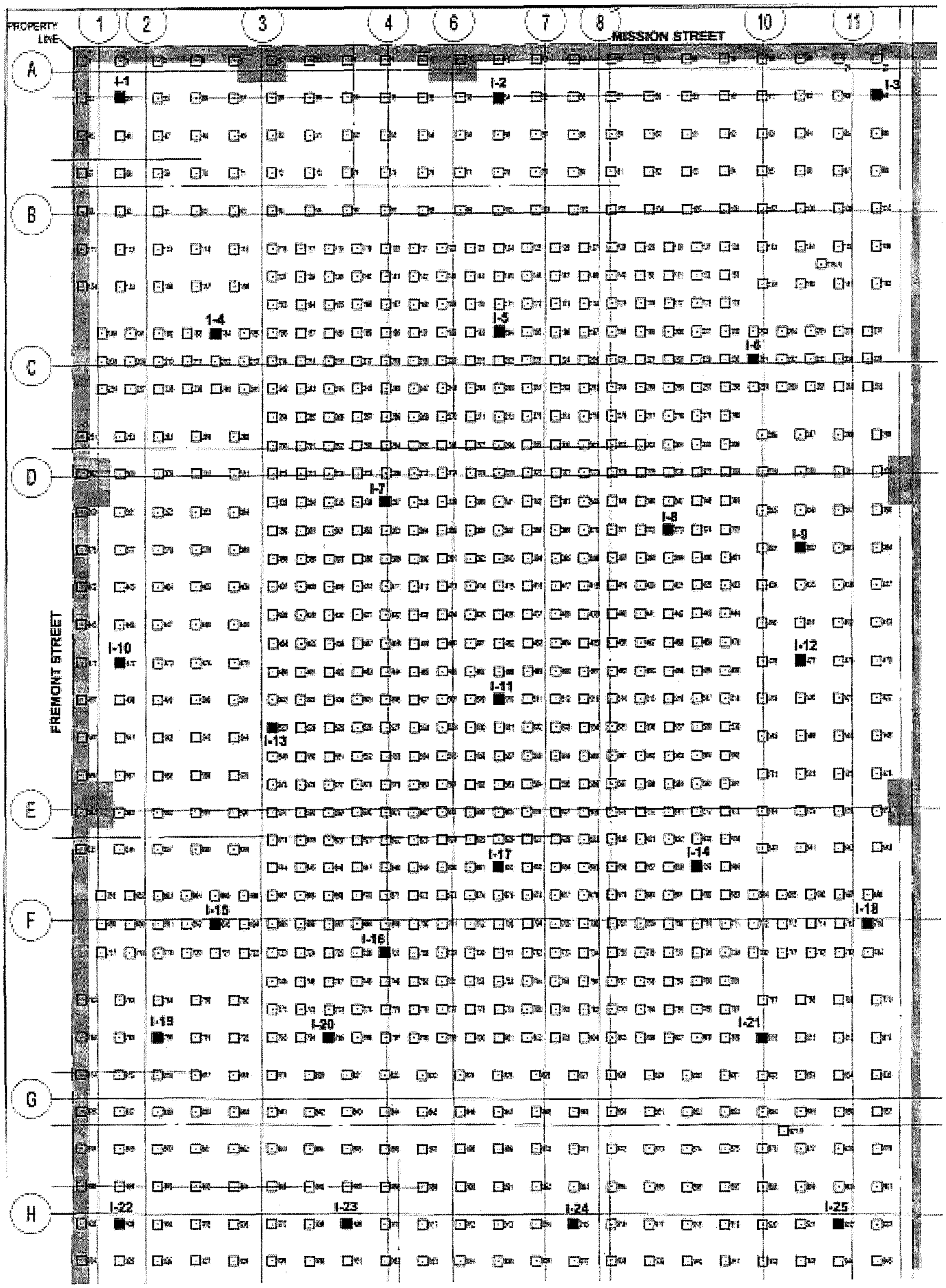

Figure 7. Pile Plan (Treadwell & Rollo)

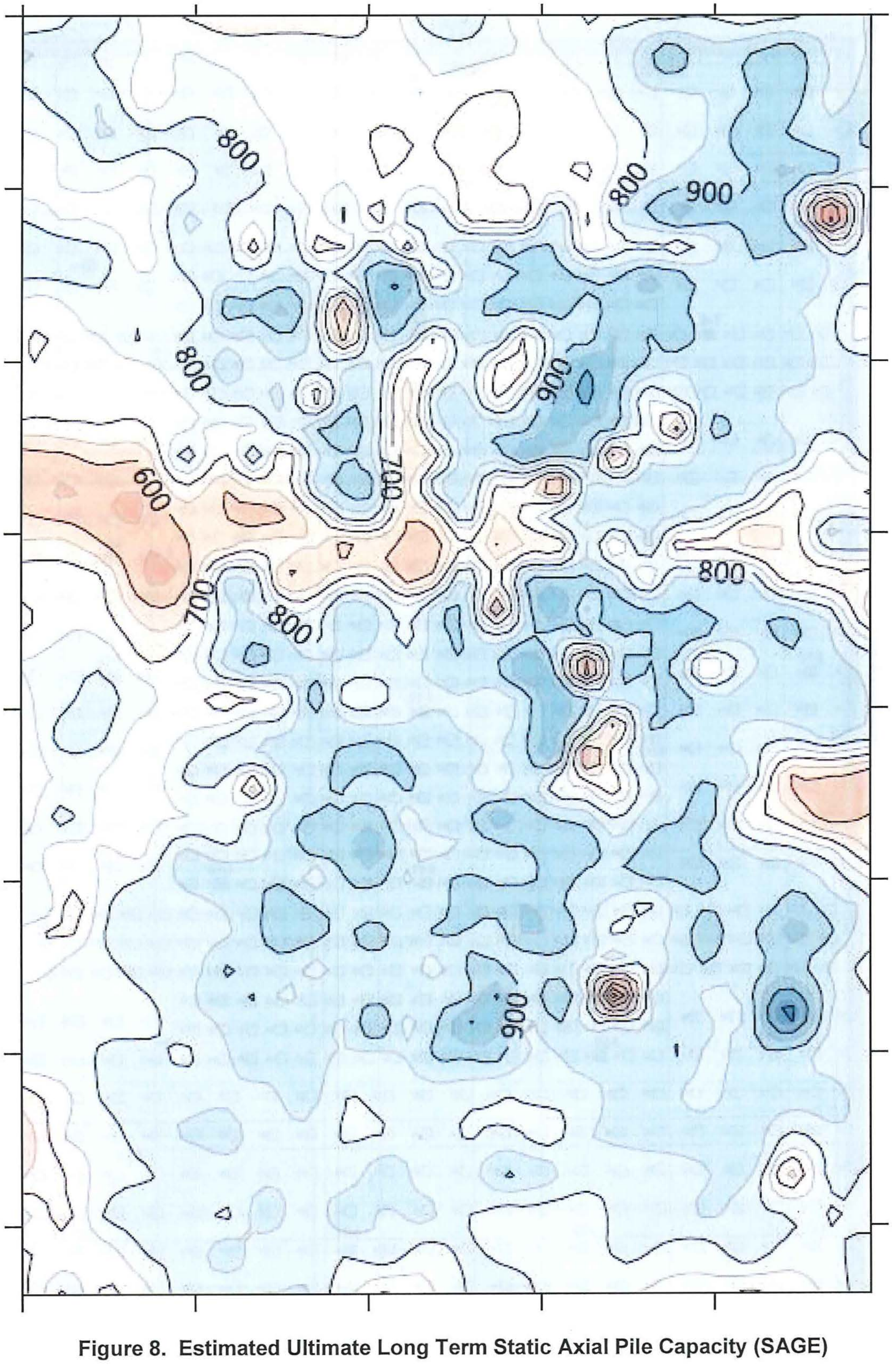

Figure 8. Estimated Ultimate Long Term Static Axial Pile Capacity (SAGE)

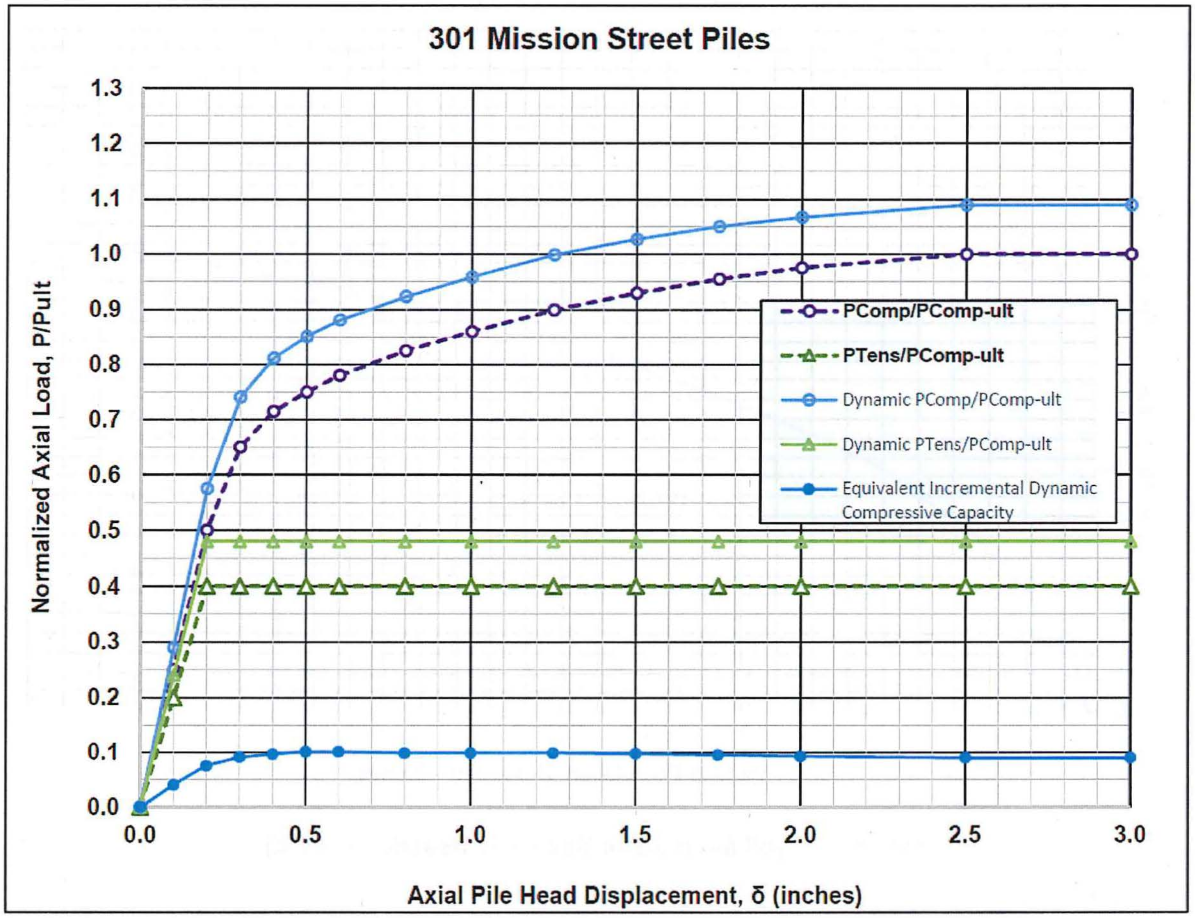

Figure 9. Pile Load – Deformation Characteristics (SAGE)

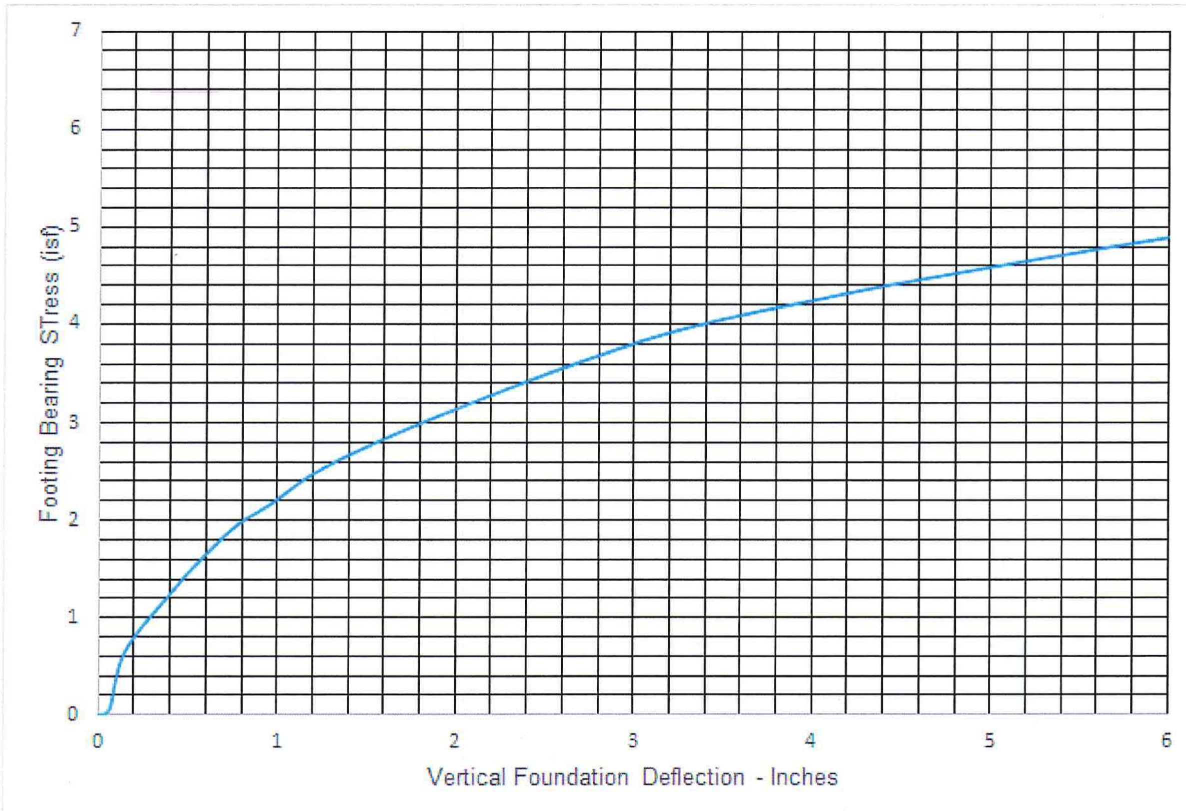

Figure 10. Soil Modulus of Subgrade Reaction (SAGE)

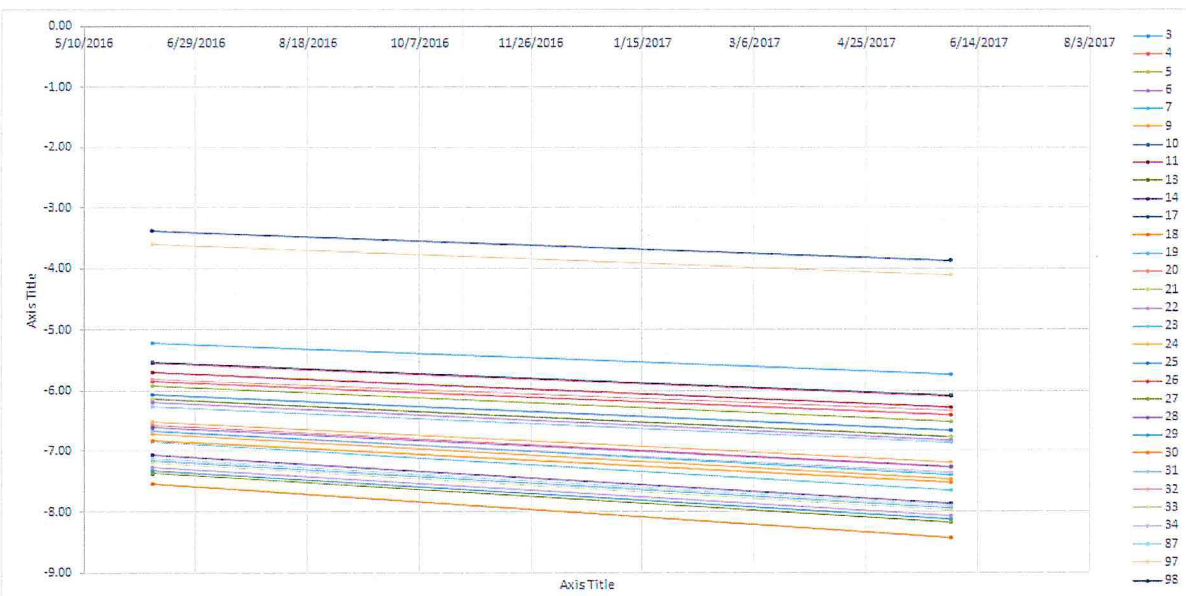

Figure 11. Settlement data, June 2016 through June 2017

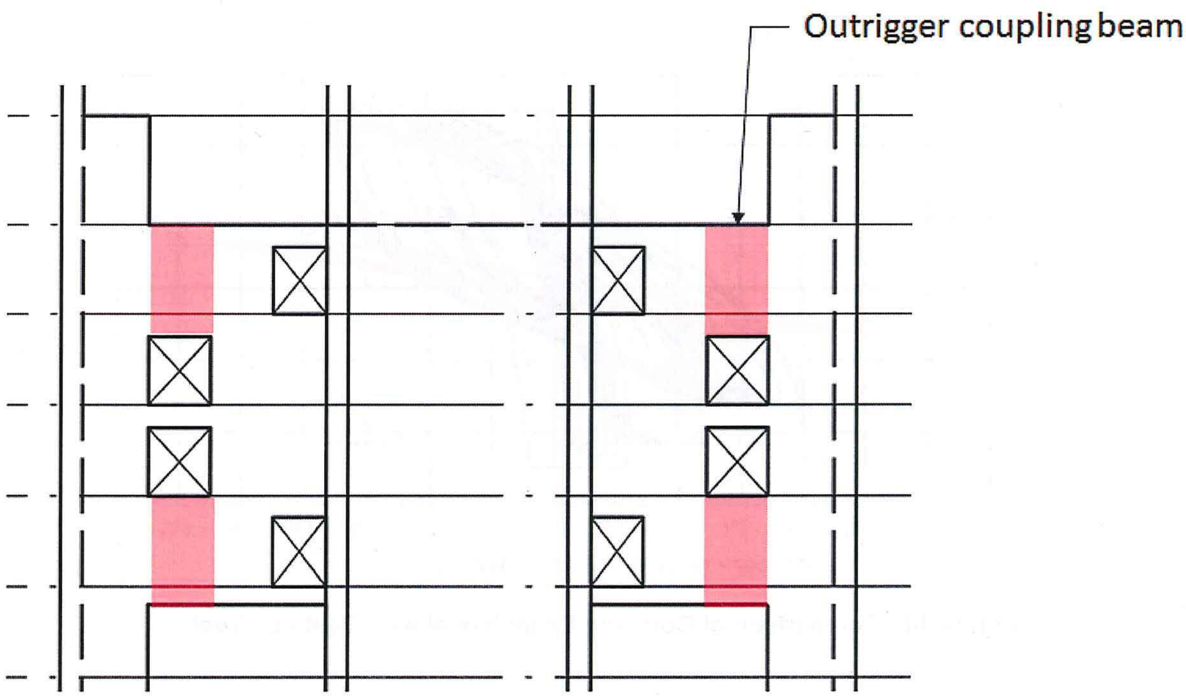

Figure 12. Outrigger Elevation Showing Coupling Beams

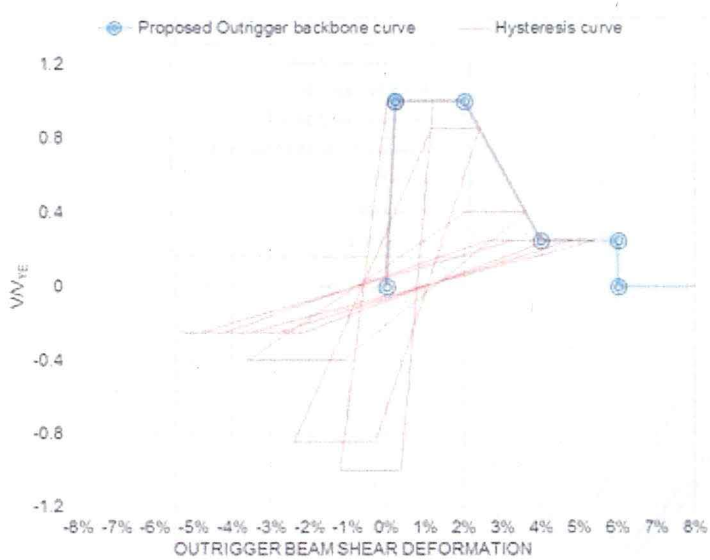

Figure 13. Coupling Beam Degrading Hysteretic Model

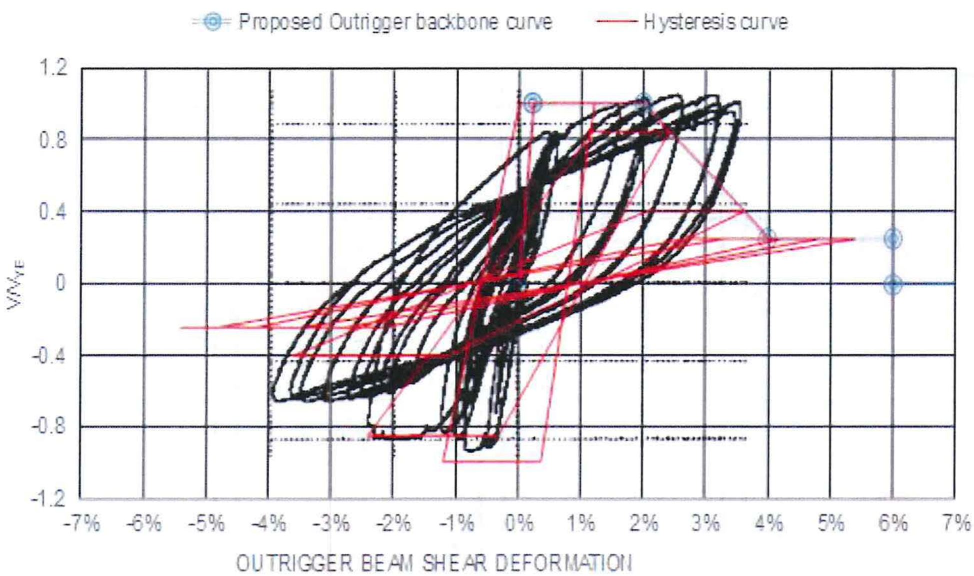

Figure 14. Comparison of Coupling Beam Model with Canbolat Test

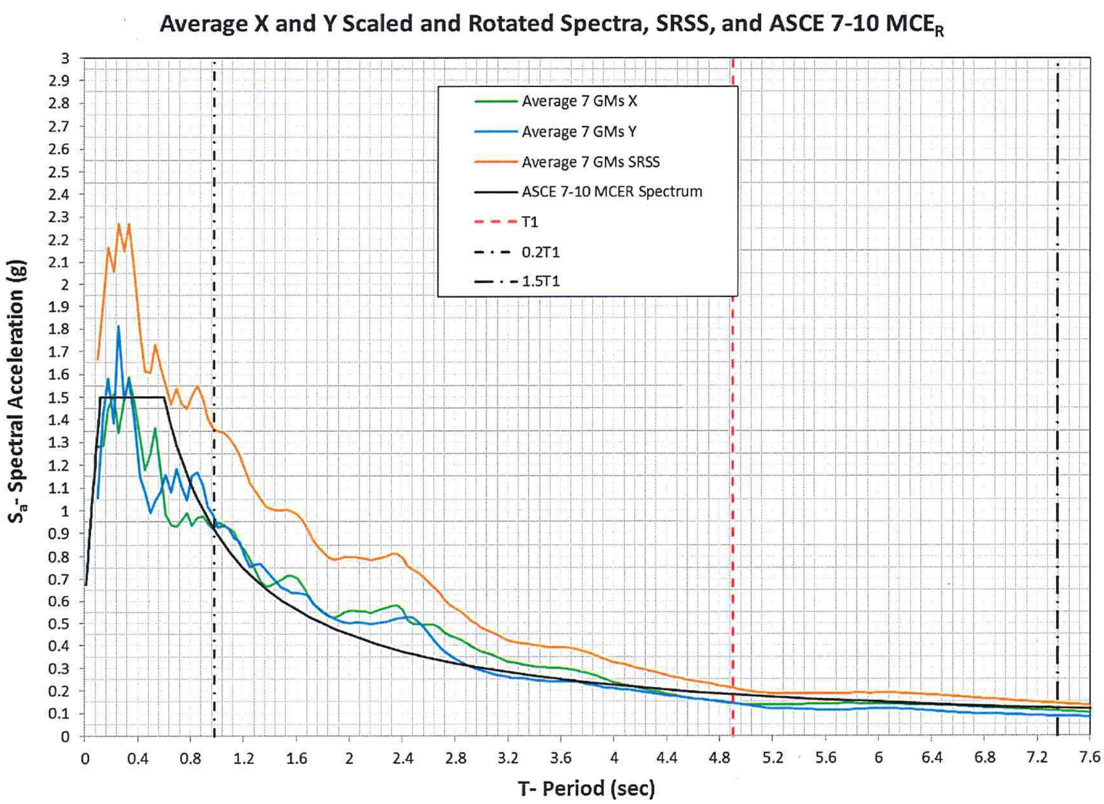

Figure 15. Comparison of Scaled Spectra and Target Spectrum

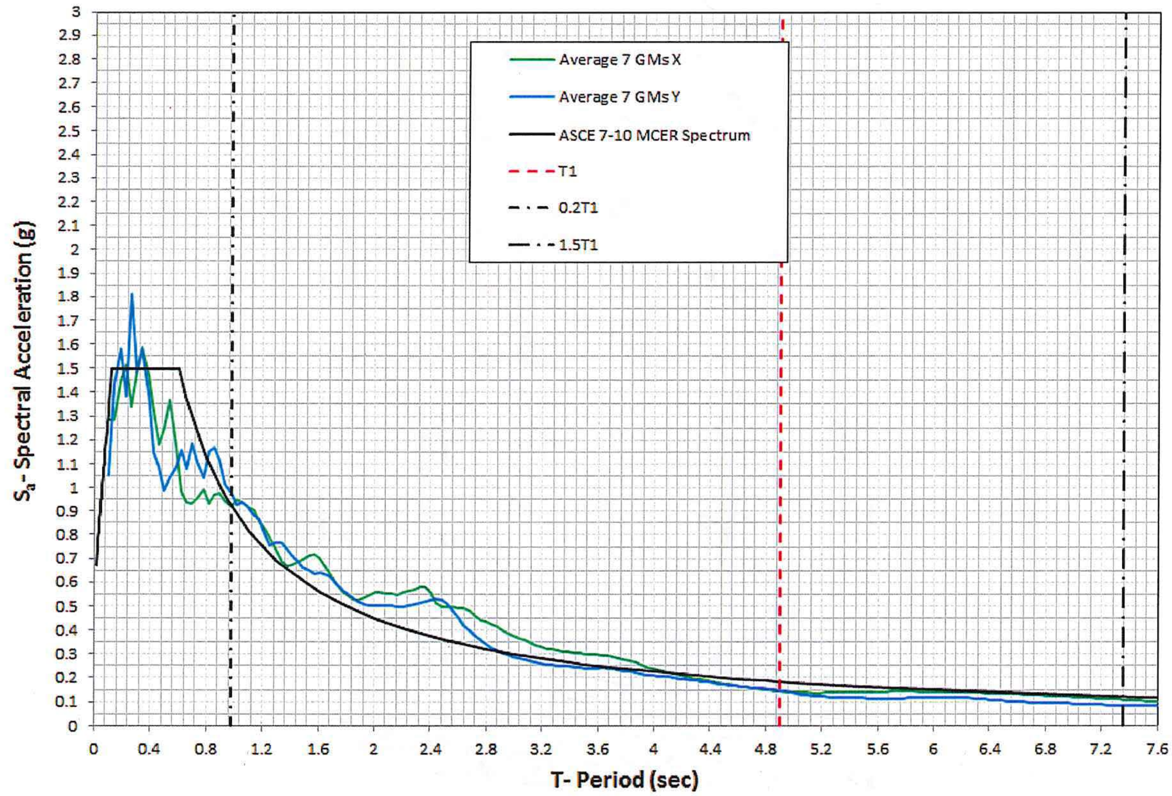

Figure 16. Average X, Y,and MCE_R spectra

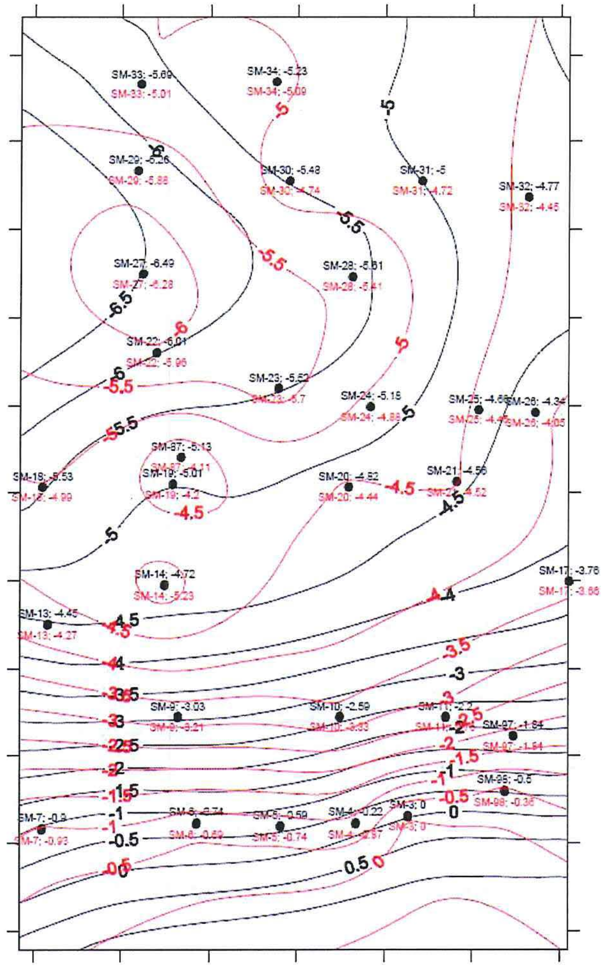

Figure 17. Comparison of Measured and Analytical Representation of Mat Deformation Profile

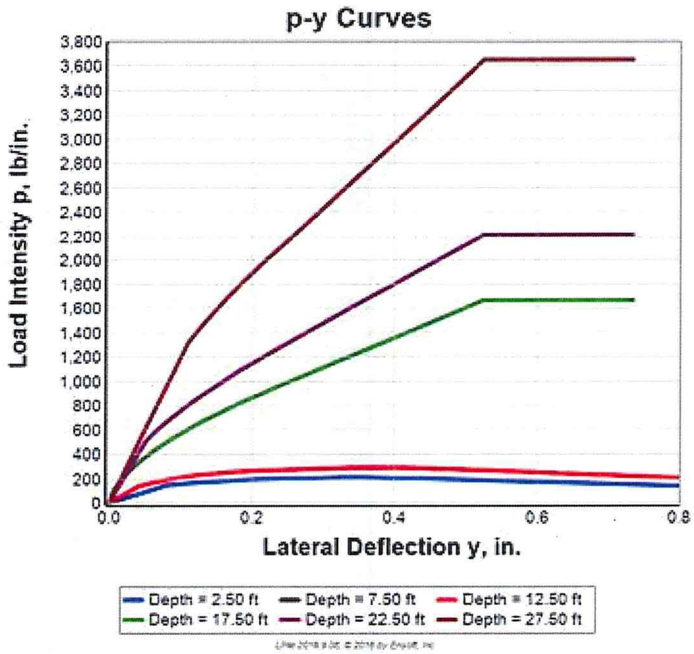

Figure 18. P-Y Curves Obtained From LPile

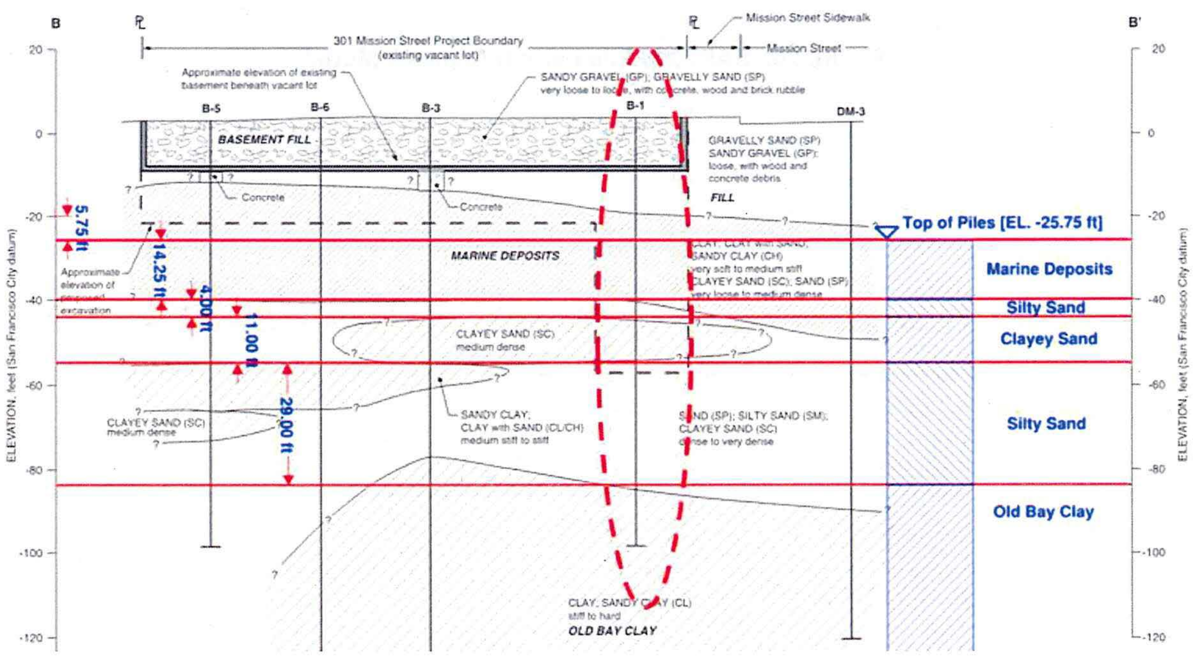

Figure 19. Soil Profile used in LPile Analysis (Treadwell & Rollo)

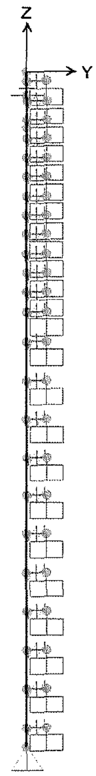

Figure 20. SAP2000 Pile Lateral Analysis Model

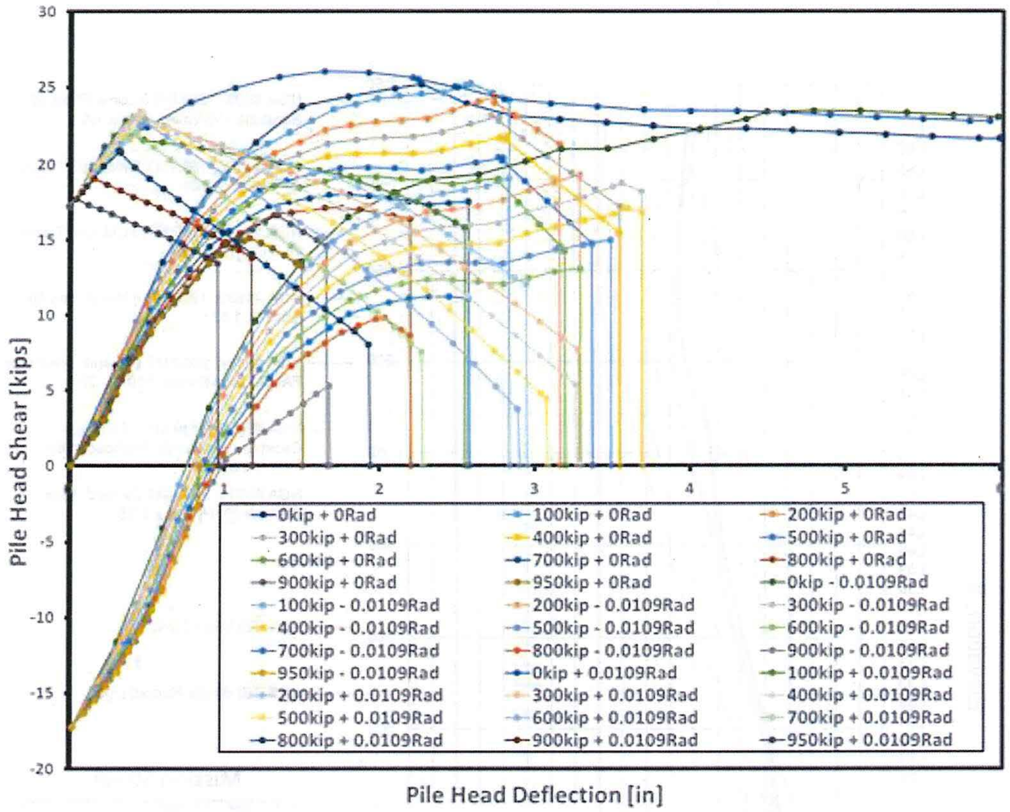

Figure 21. Pile nonlinear force-deformation plots

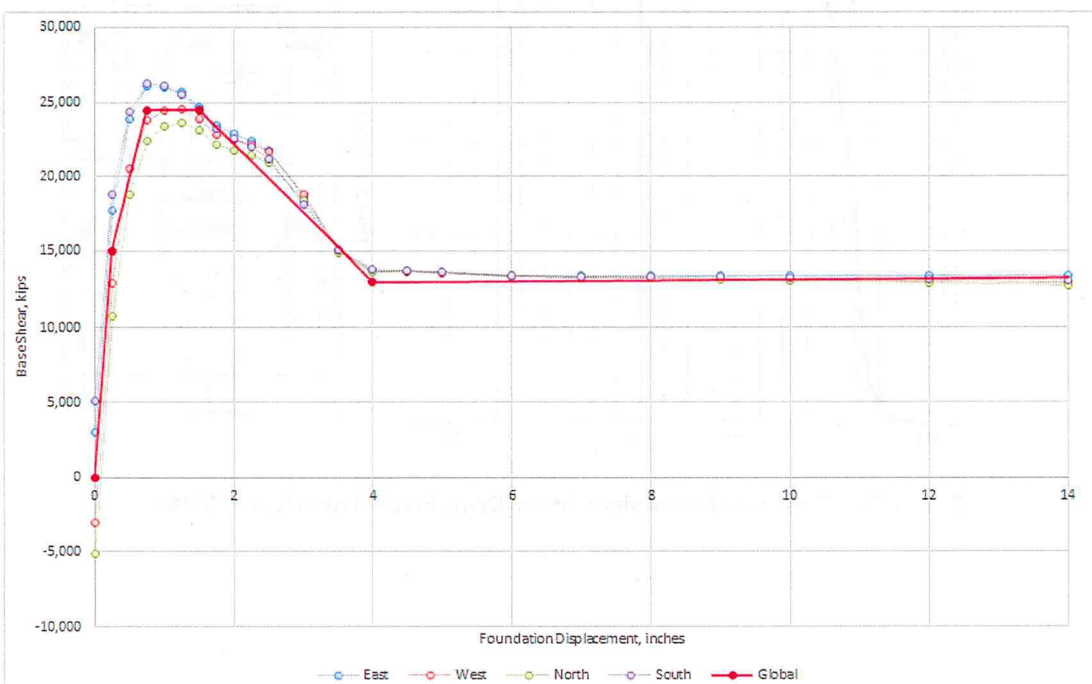

Figure 22. Global Foundation Nonlinear Force-Deformation Behaviors

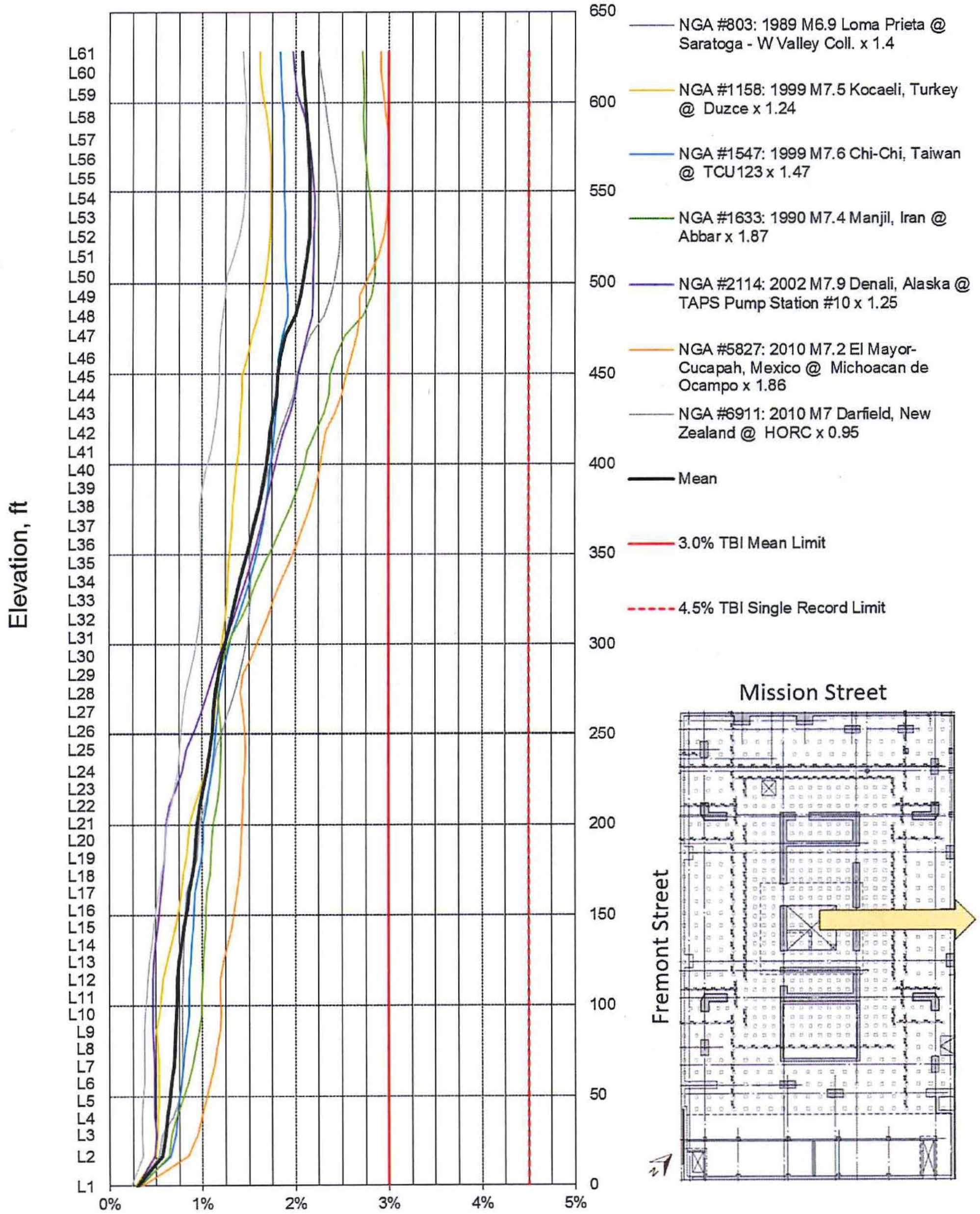

Figure 23. East-West Transient Story Drift, Fixed Translation Model

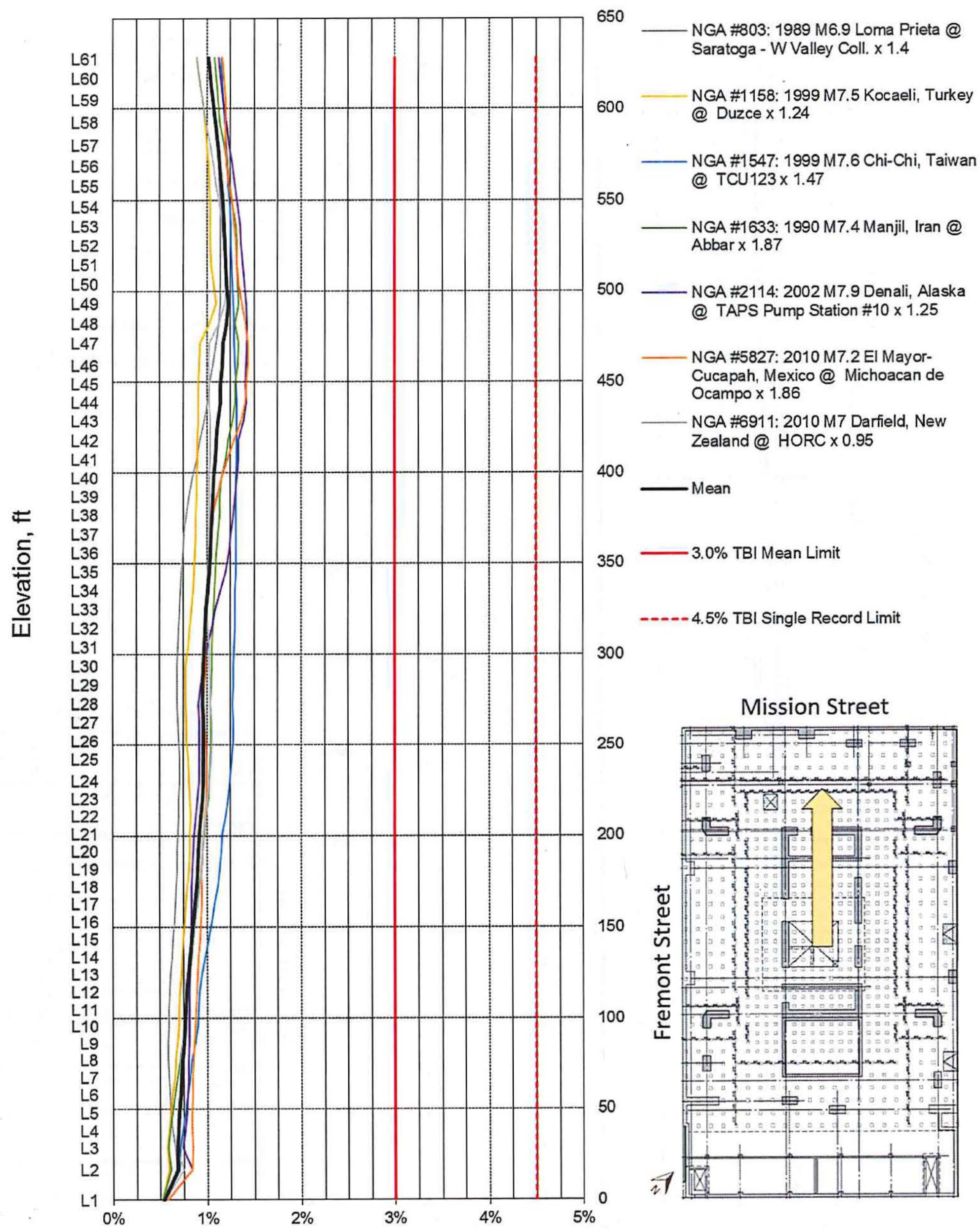

Figure 24. North-South Transient Story Drift, Fixed Translation Model

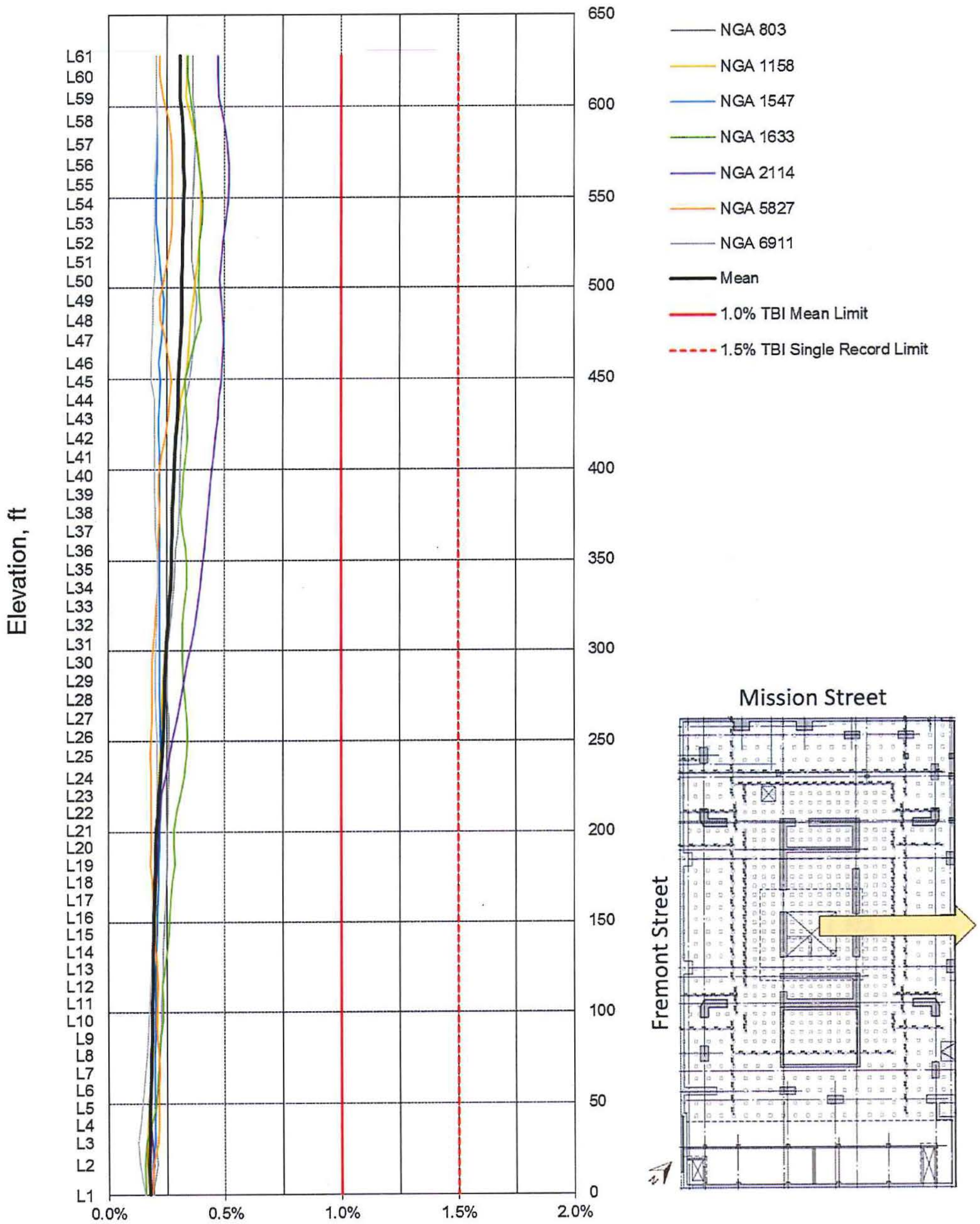

Figure 25. Residual Story Drift East-West Response

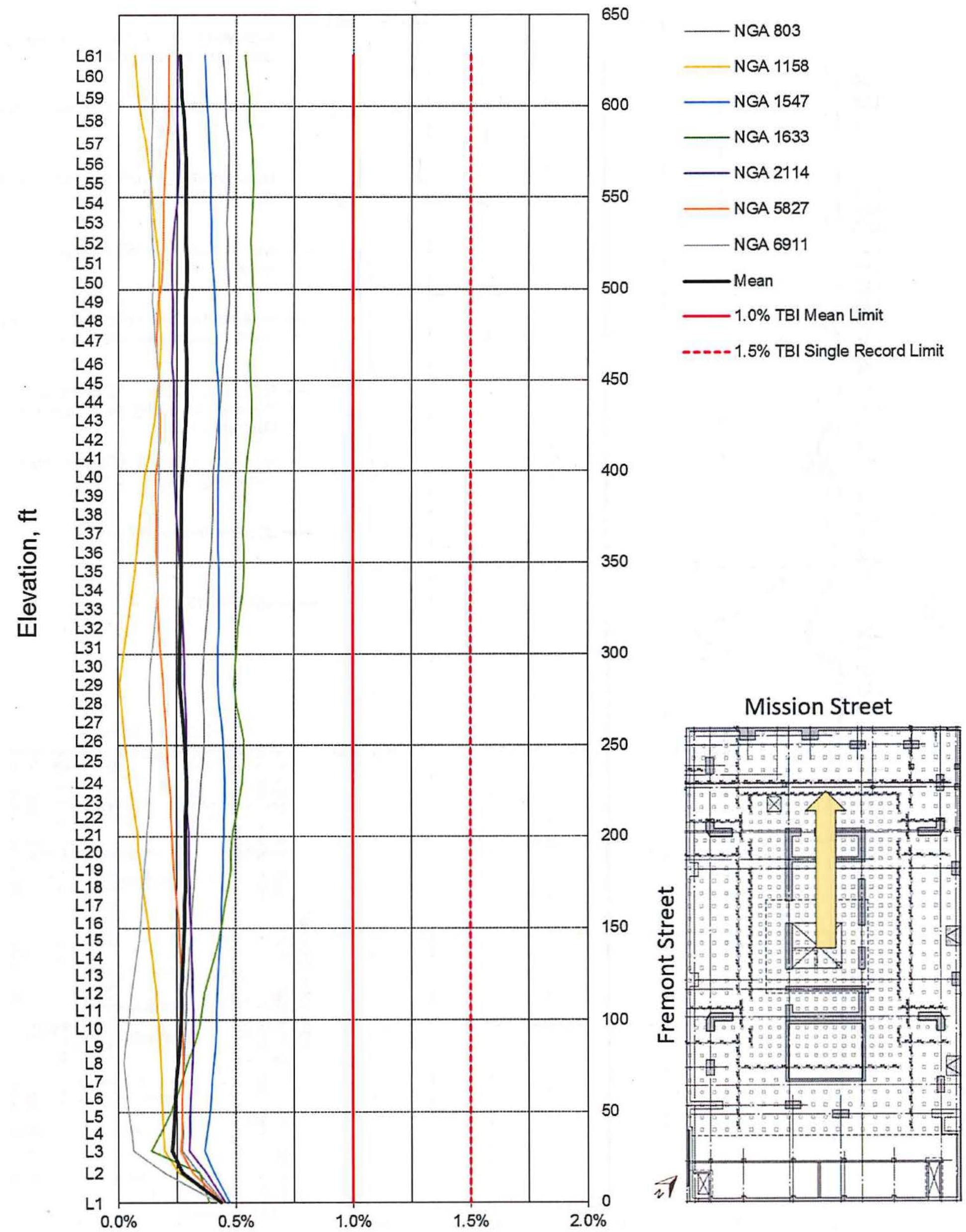

Figure 26. Residual Story Drift North-South Response

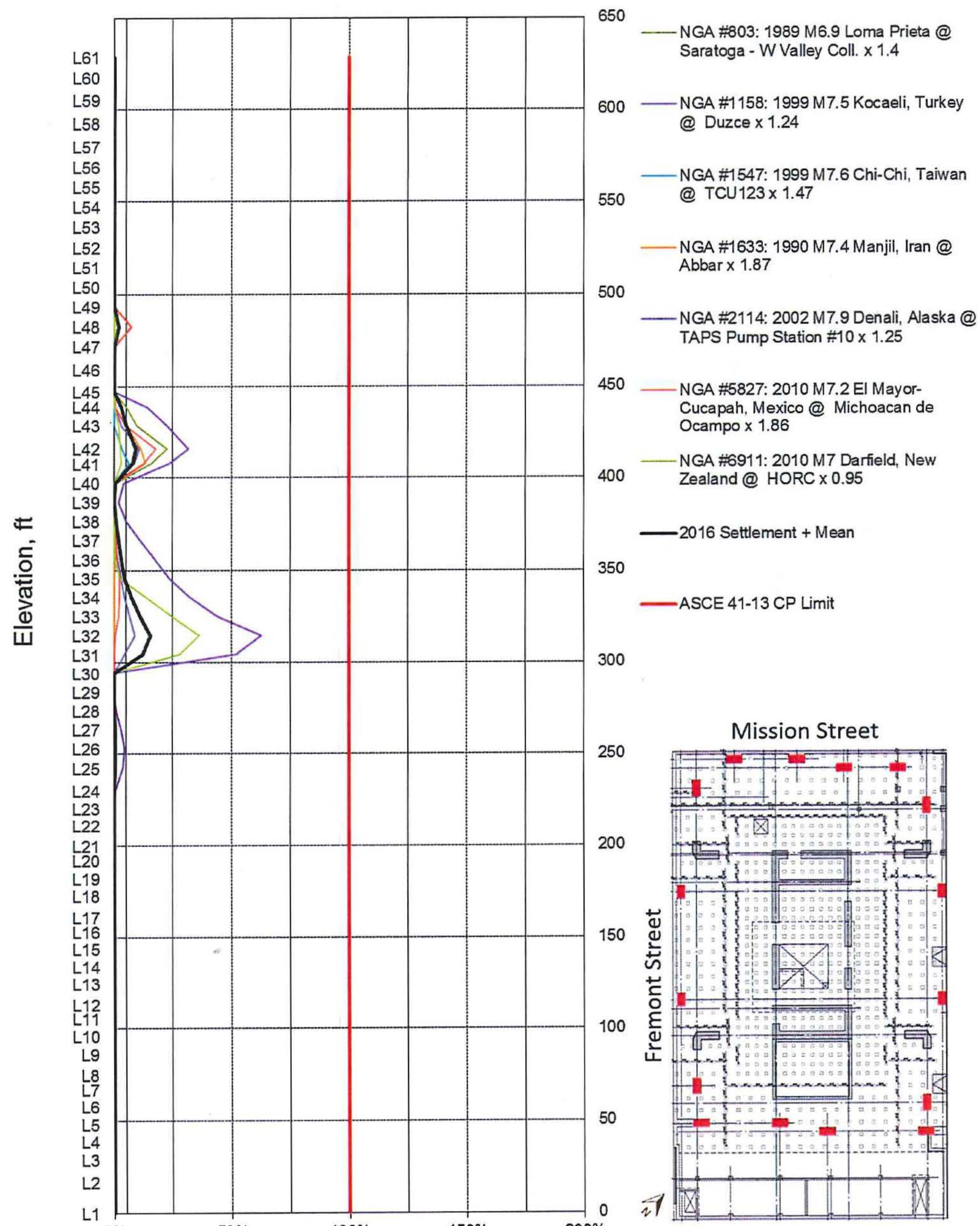

Figure 27. Demand to Capacity Ratios, Column Plastic Rotation, Fixed Translation Model

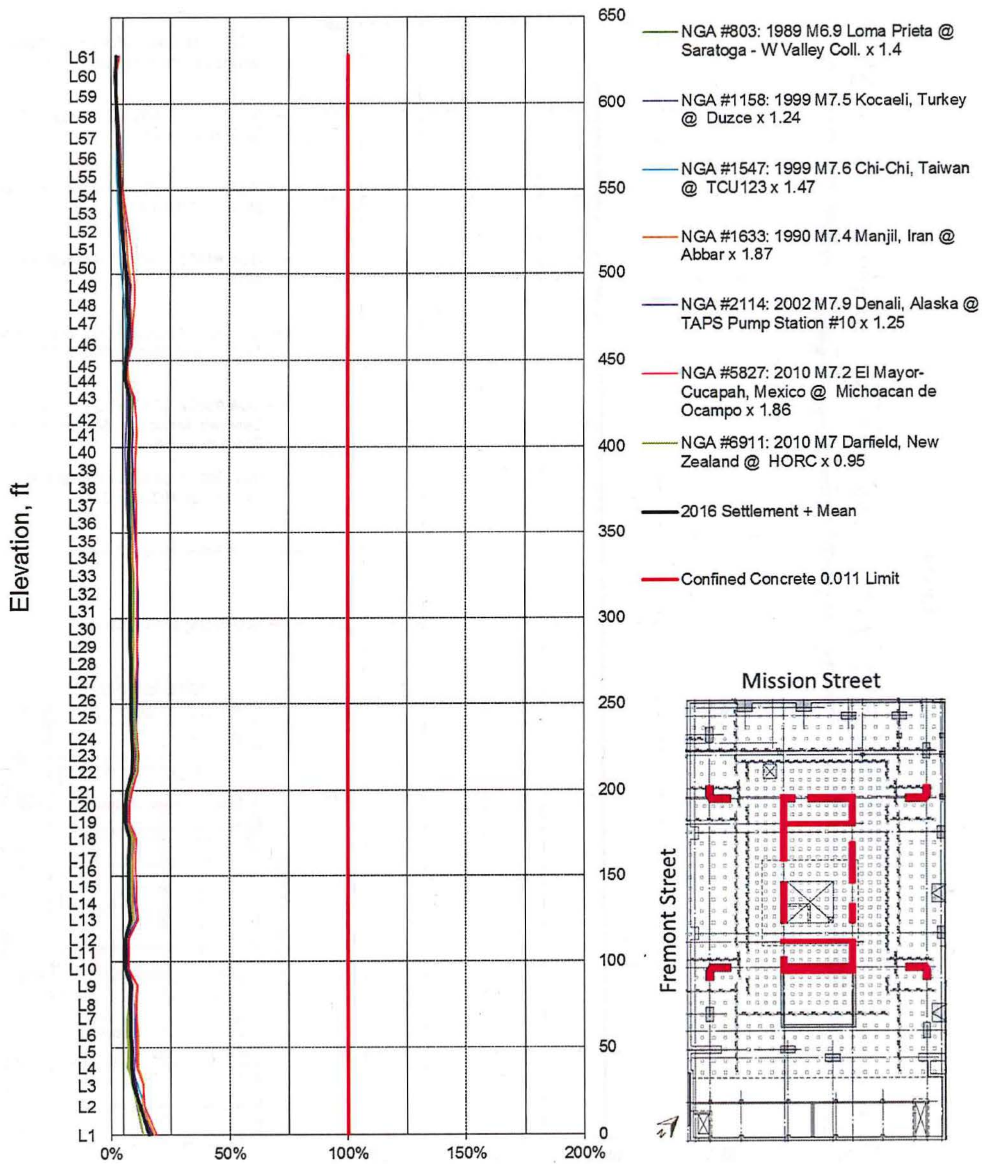

Figure 28. Demand to Capacity Ratio, Core Wall and Outrigger Column Compressive Strain, Fixed Translation Model

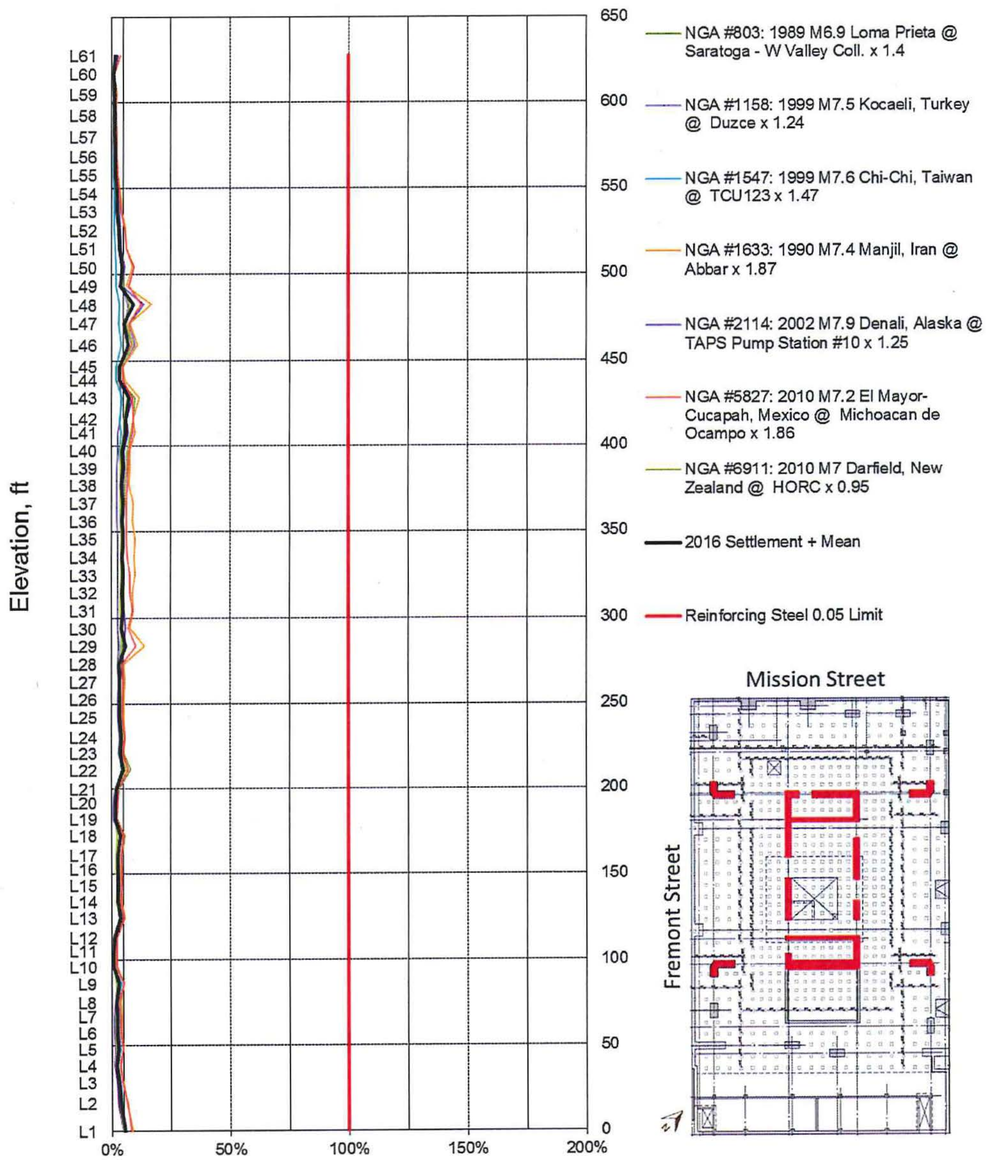

Figure 29. Demand to Capacity Ratio, Core Wall and Outrigger Column Tensile Strain, Fixed Translation Model

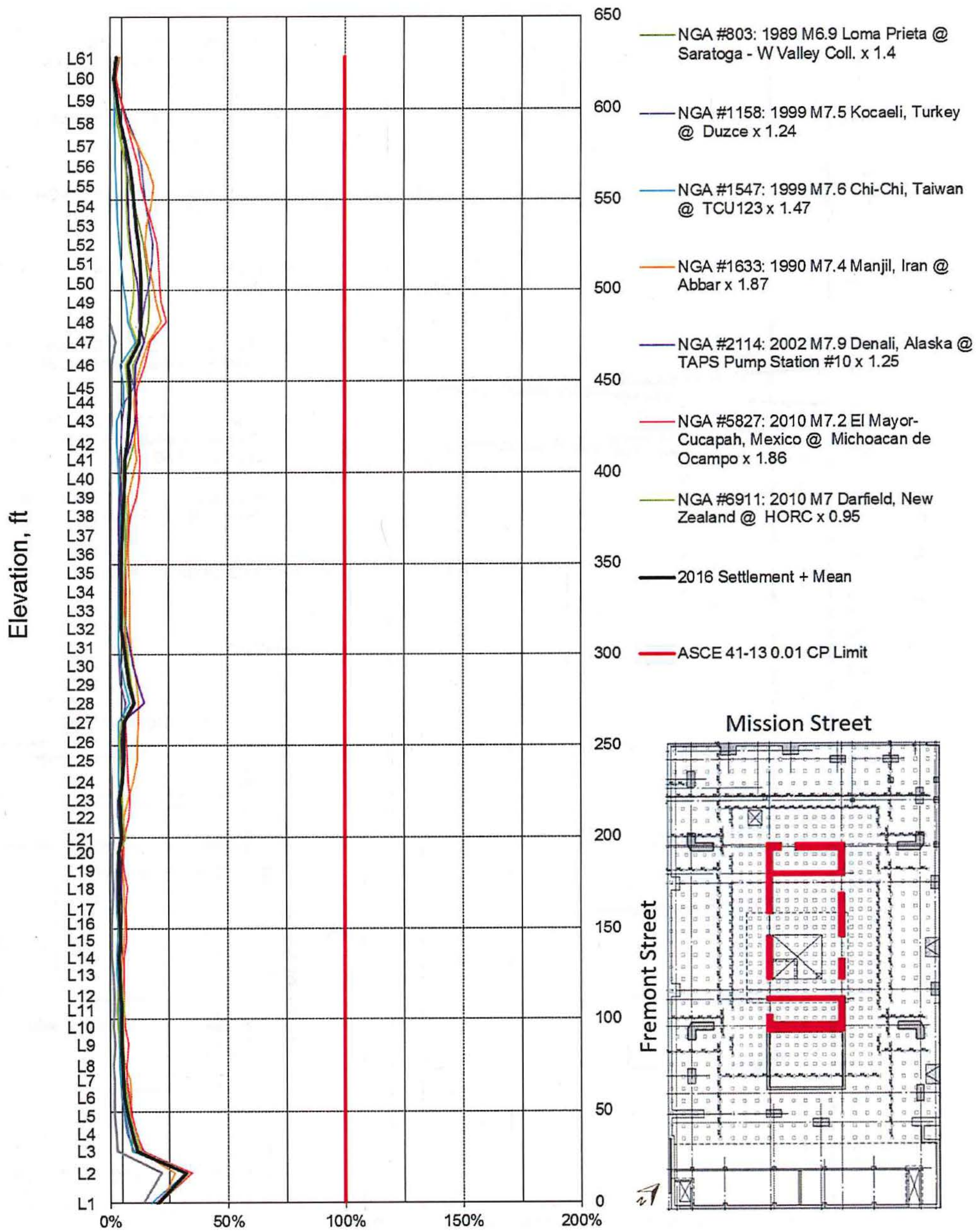

Figure 30. Demand to Capacity Ratio, Core Wall Shear Strain

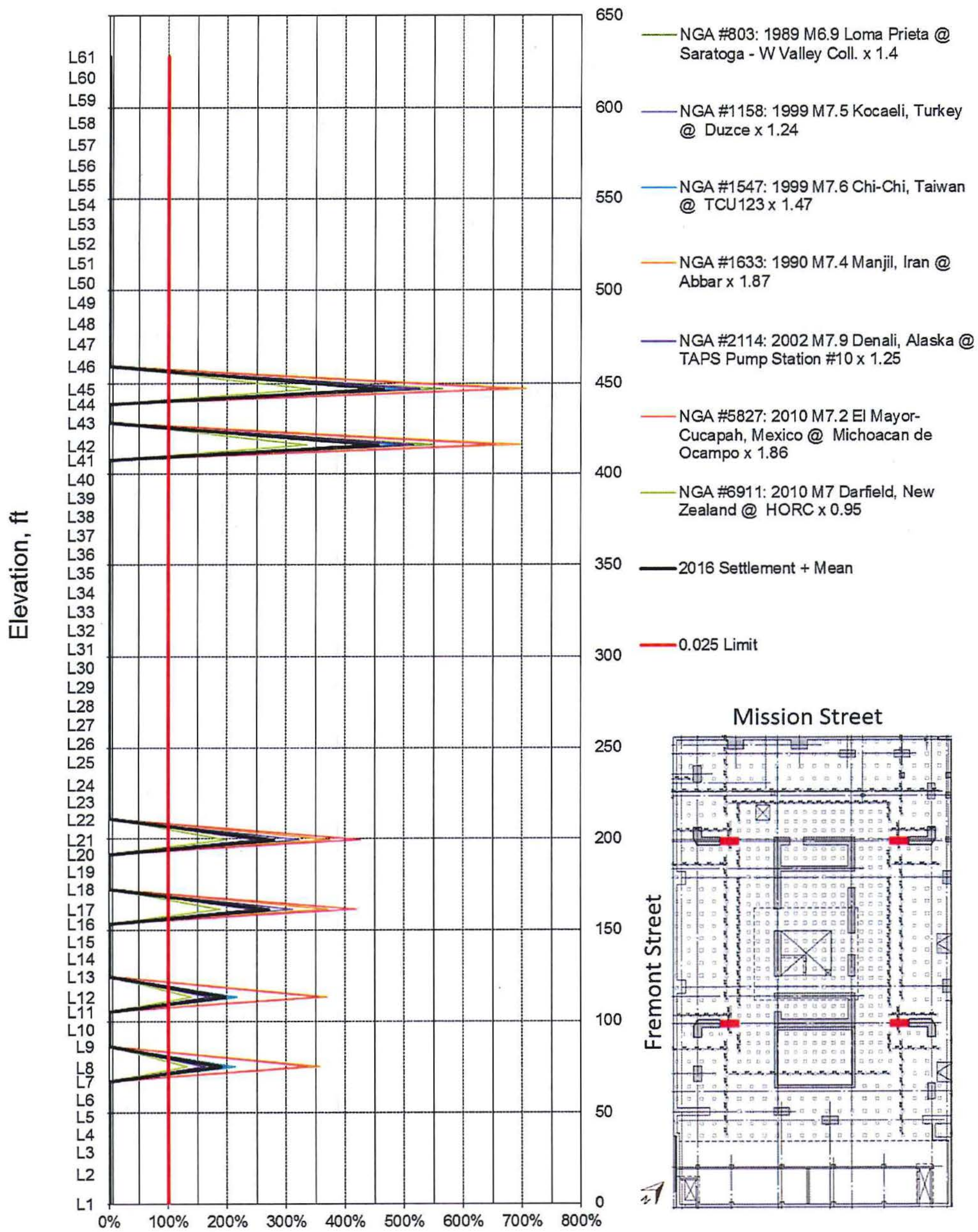

Figure 31. Demand to Capacity Ratios, Outrigger Coupling Beam Rotation, Fixed Translation Model

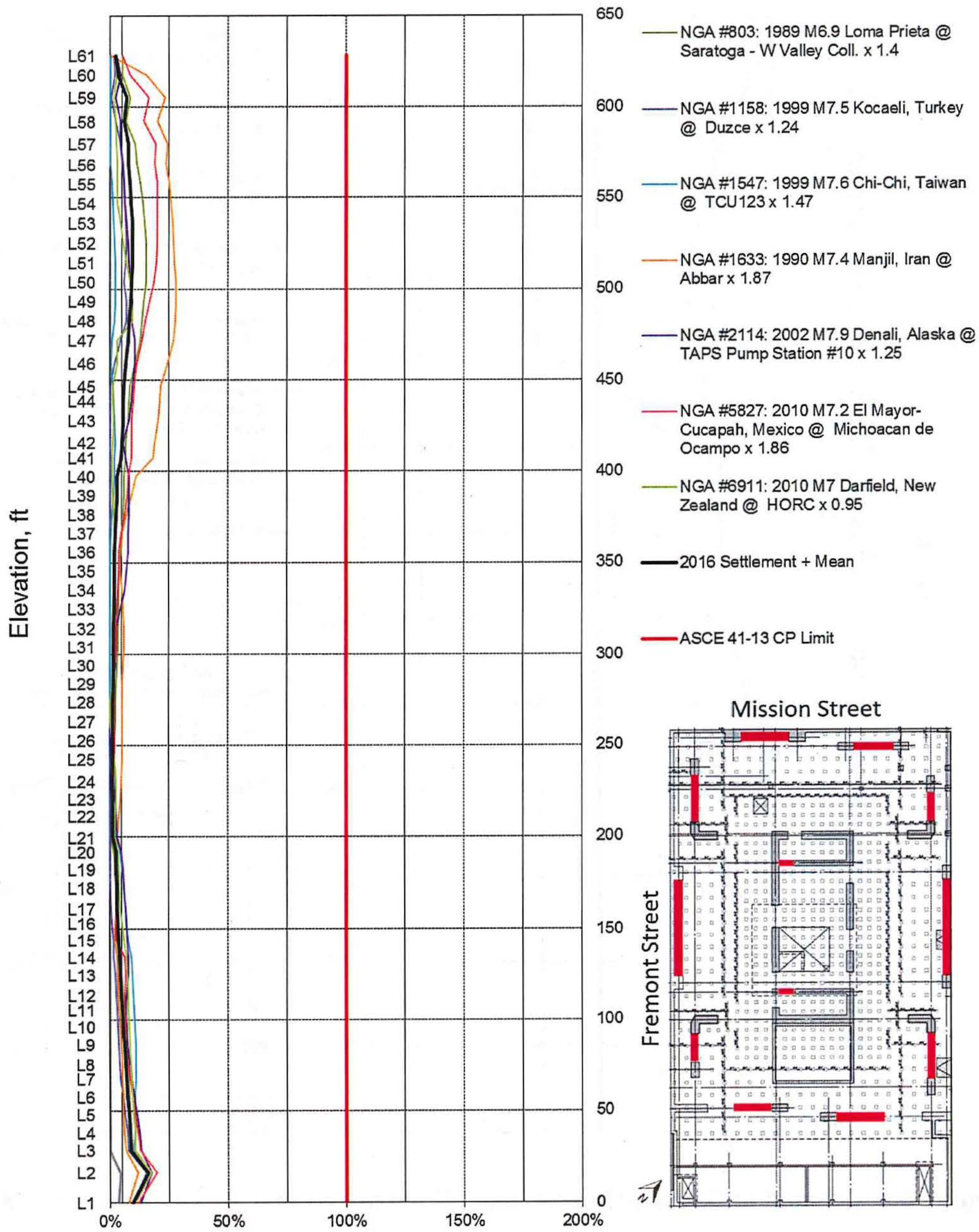

Figure 32. Demand to Capacity Ratios, Concrete Beams, Fixed Translation Model

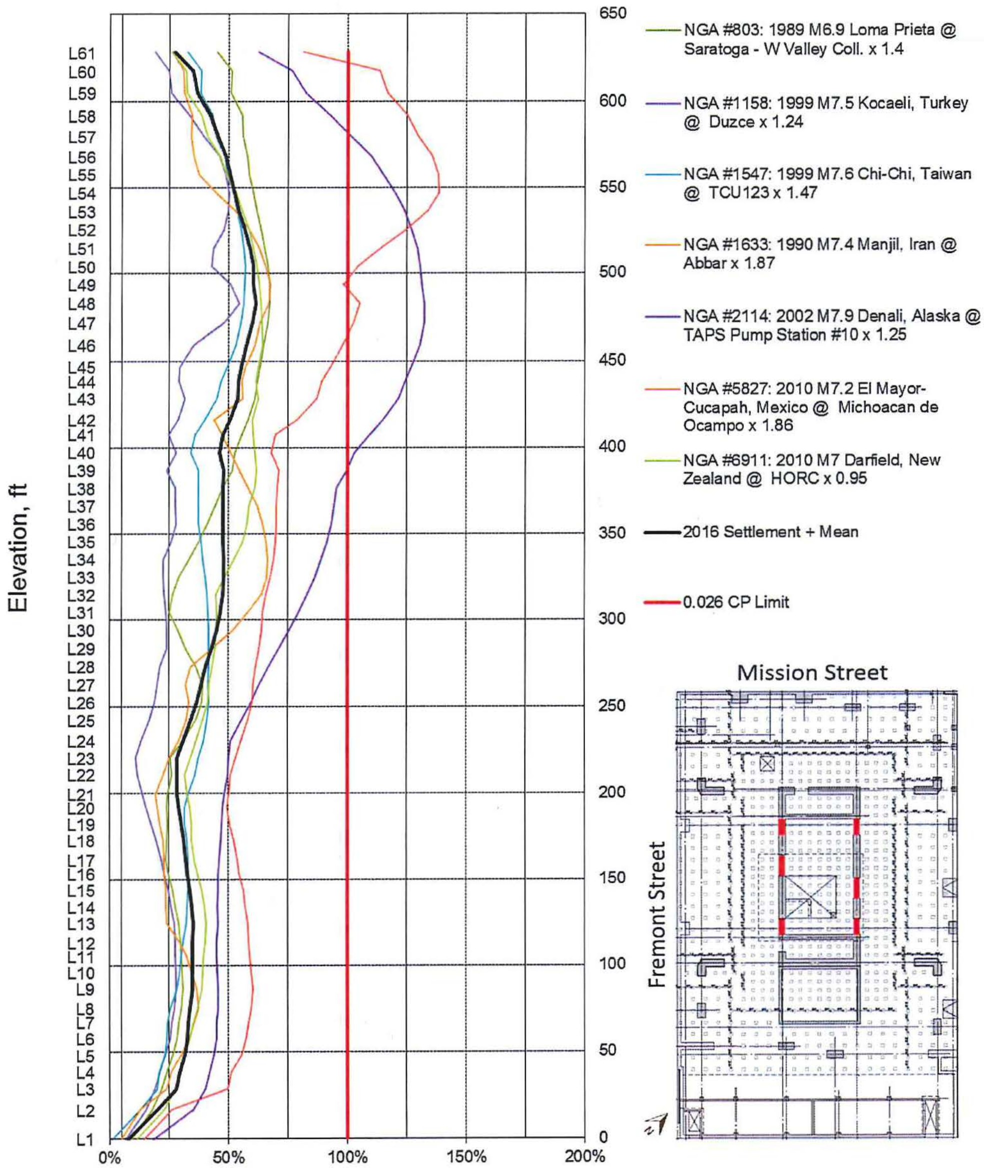

Figure 33. Demand to Capacity Ratios, Steel Coupling Beams, Fixed Translation Model

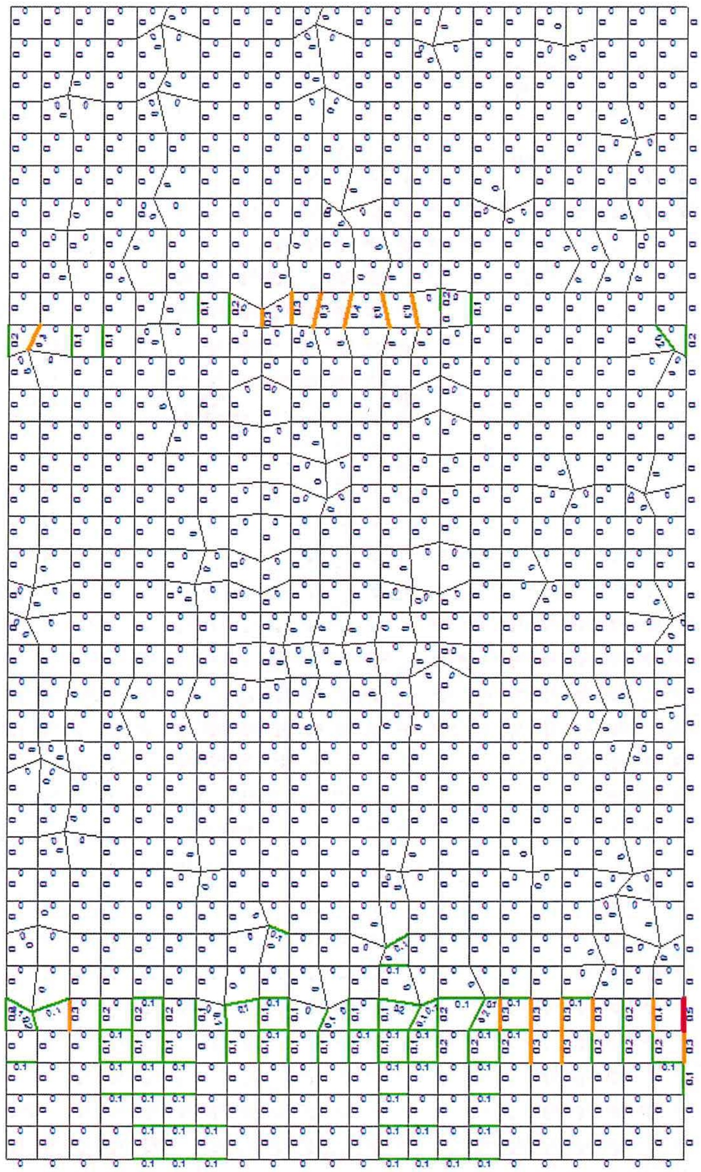

Figure 34. Peak Plastic Hinge Rotations (1999 Chi Chi, TCU3), Mat Grillage, Fixed Translation Model

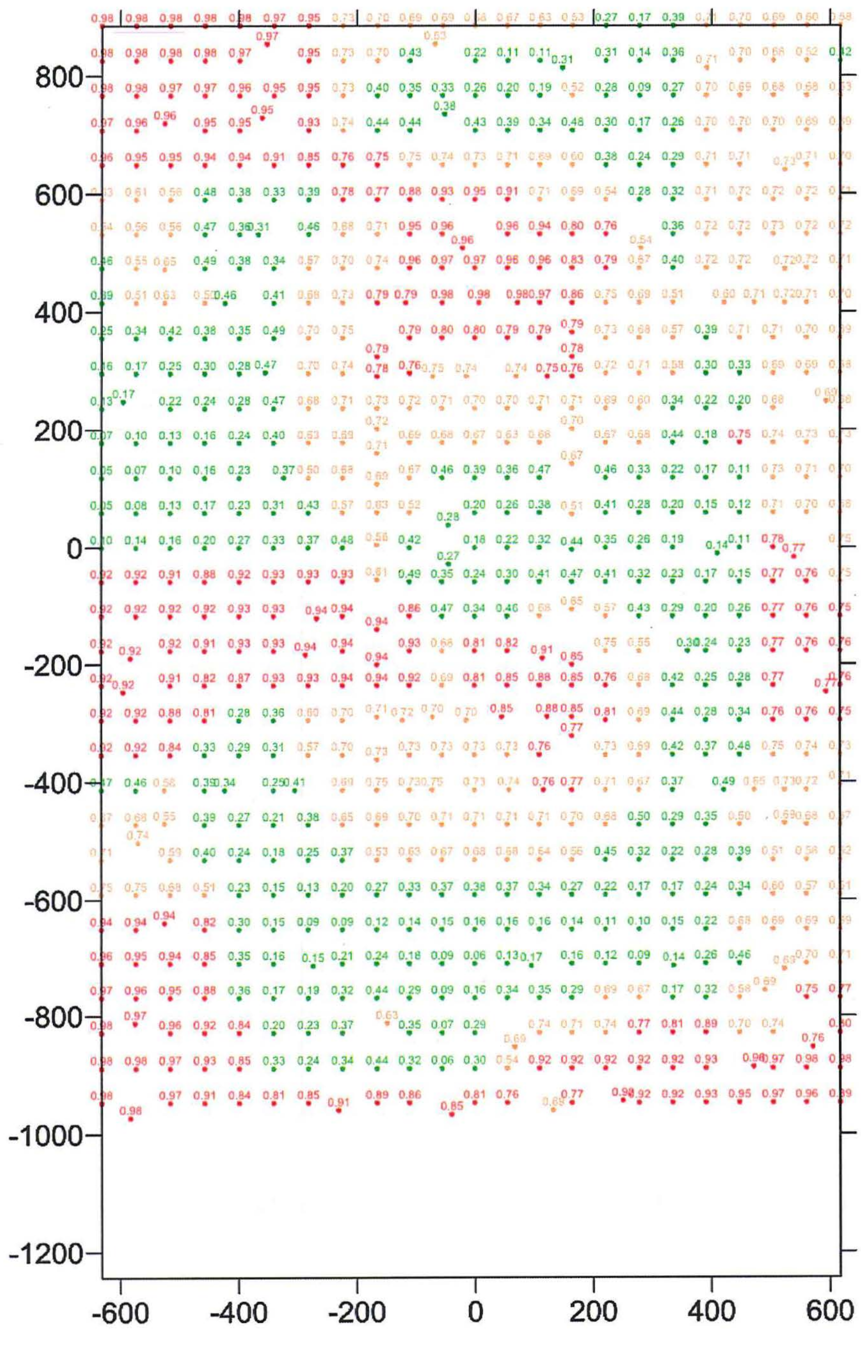

Figure 35. Pile Compressive Demand to Capacity Ratios, Maximum of Seven Ground Motions, Fixed Translation Model

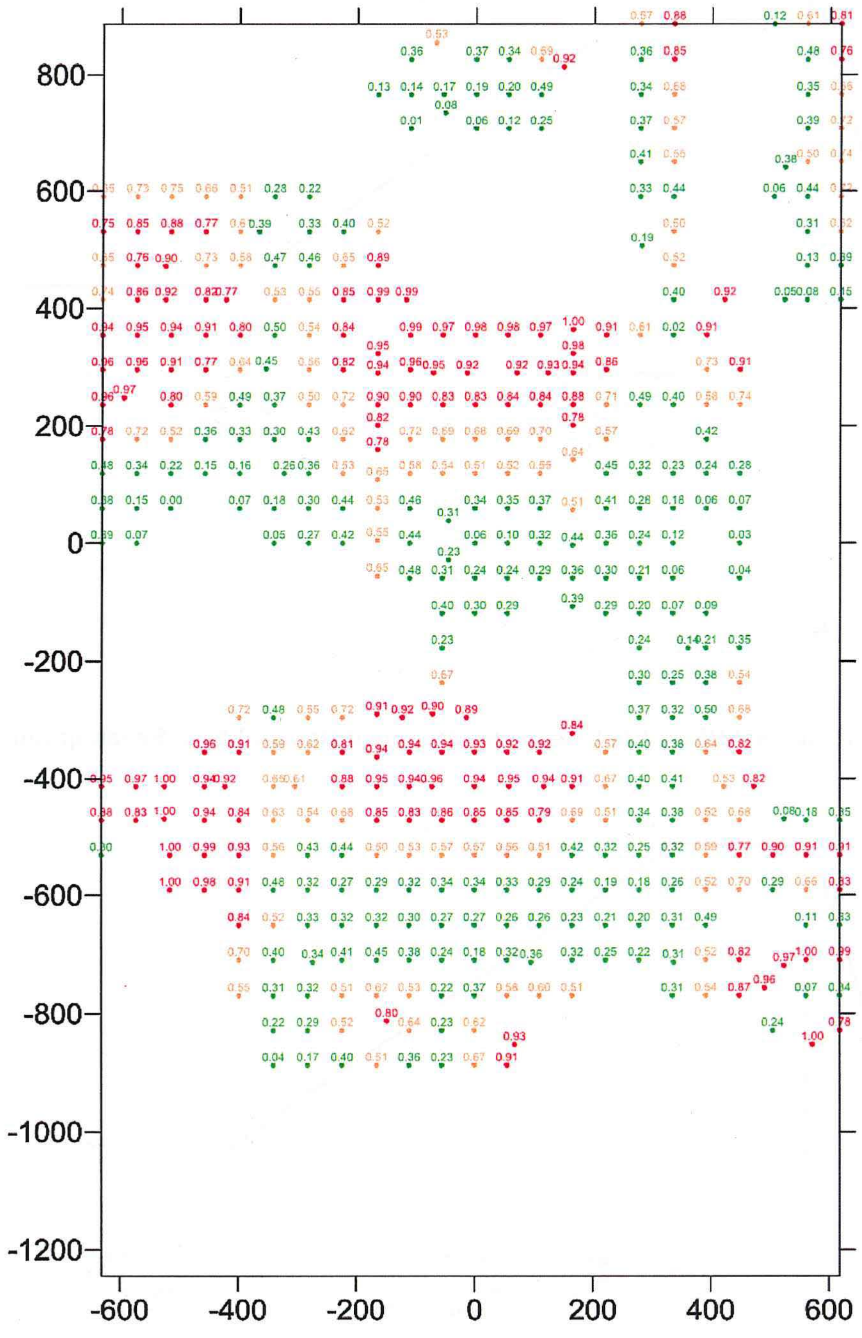

Figure 36. Peak Pile Tensile Demands to Capacity Ratios, Maximum of Seven Ground Motions, Fixed Translation Model

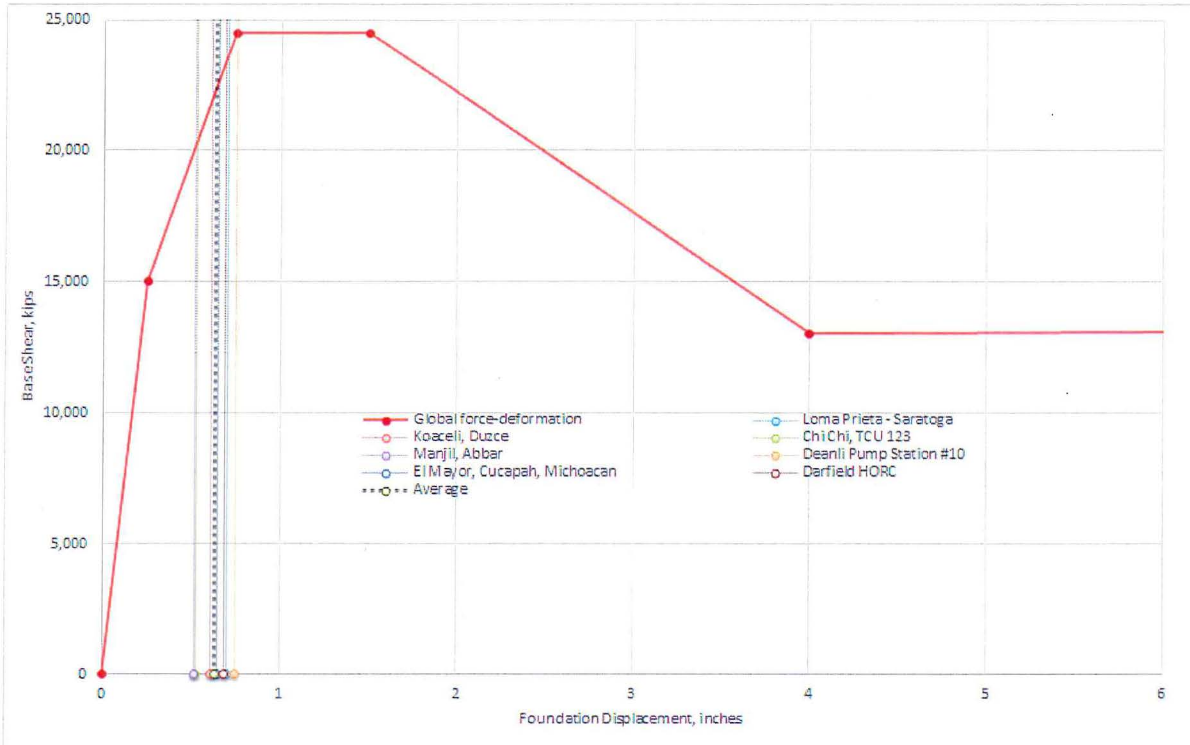

Figure 37. Peak East-West Pile Lateral Displacement Demand from Seven ground motions

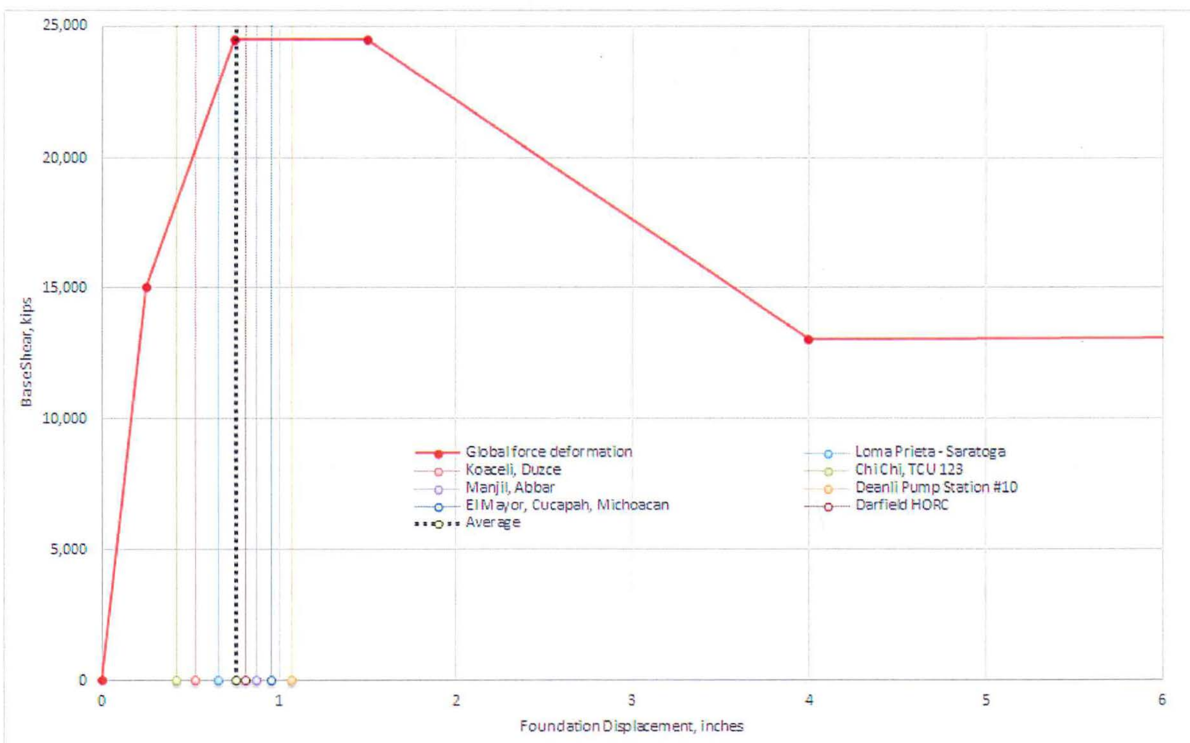

Figure 38. Peak North-South Pile Lateral Displacement Demand from seven Ground Motions

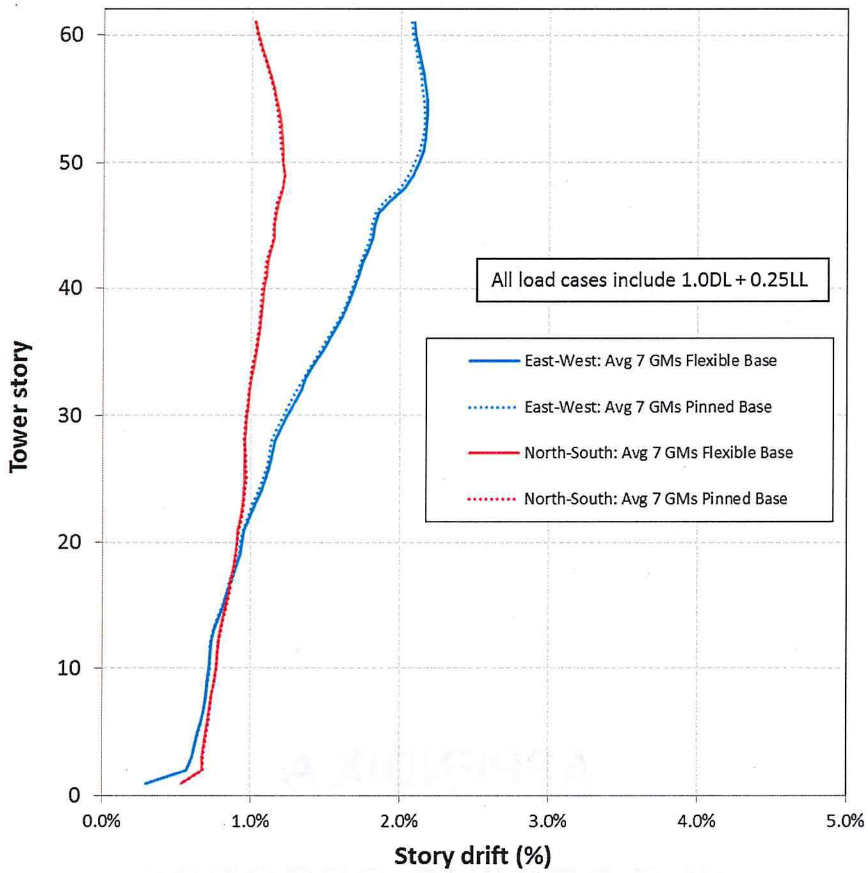

Figure 39. Comparison of Story Drift Ratios for Fixed Translation and Nonlinear Pile Models

APPENDIX A

PILE DRIVING RECORDS

TABLE 1
Indicator and Production Pile Summary
301 Mission Street
San Francisco, California

Treadwell & Rollo Pile No.	Project Pile Number[1]	Date Driven	Furnished Length (feet)[2]	Predrill Depth (feet)	Design Pile Cutoff Elevation (feet)[3]	Actual Top of Pile Elevation (feet)[3,4]	Approximate Tip Elevation (feet)[3]	Approximate Cut-off Length (feet)	Final Driving (Blows/foot for final 5 feet)					Remarks
I-1	24	10/31/05	68	5	-21.90	-23.25	-91.3	-1.4	24	20	21	20	5-3"	PDA performed
I-2	34	10/31/05	67	5	-21.90	-24.00	-91.0	-2.1	24	19	18	19	15	PDA performed
I-3	44	10/31/05	67	5	-21.90	-26.50	-93.5	-4.6	24	31	27	24	21	PDA & CAPWAP performed
I-4	184	10/31/05	70	5	-21.90	DNO[5]	DNO[5]	DNO[5]						PDA performed, T&R did not observe the final 14 feet of driving
I-5	194	11/04/05	67	5	-21.90	-25.00	-92.0	-3.1	32	28	26	22	27	
I-6	231	10/31/05	67	5	-21.90	-26.00	-93.0	-4.1	62	76	80	32	24	PDA & CAPWAP performed
I-7	337	11/04/05	68	5	-21.90	-24.30	-92.3	-2.4	24	20	23	34	8-3"	
I-8	373	11/03/05	83	5	-21.90	-24.00	-107.0	-2.1	18	17	18	17	18	PDA & CAPWAP performed
I-9	382	11/02/05	67	10	-21.90	-25.30	-92.3	-3.4	30	19	22	24	8-3"	
I-10	472	11/03/05	70	5	-21.90	-13.80	-83.8	8.1	38	31	40	68	100-10"	
I-11	510	11/04/05	68	5	-32.90	-24.50	-92.5	8.4	69	38	40	32	14-6"	
I-12	477	10/28/05	67	20	-21.90	-21.70	-88.7	0.2	34	50	58	50	40-8"	
I-13	523	11/03/05	70	5	-21.90	-23.30	-93.3	-1.4	47	18	24	21	8-4"	PDA & CAPWAP performed
I-14	659	10/27/05	70	5	-21.90	-22.00	-92.0	-0.1	41	32	24	20	17	
I-15	693	11/03/05	78	5	-21.90	-5.50	-83.5	16.4	14	36	37	62	90-6"	
I-16	727	11/03/05	73	5	-21.90	-25.30	-98.3	-3.4	20	18	16	15	7-4"	
I-17	653	11/04/05	73	5	-21.90	-10.80	-83.8	11.1	9	15	42	72	95-10"	
I-18	716	11/03/05	68	5	-21.90	-17.80	-85.8	4.1	50	48	50	79	95-10"	PDA performed
I-19	790	10/27/05	82	5	-21.90	-20.00	-102.0	1.9	16	15	13	13	14	
I-20	795	11/03/05	80	5	-21.90	-2.80	-82.8	19.1	23	20	39	70	92-10"	PDA & CAPWAP performed
I-21	810	11/03/05	73	5	-21.90	-25.70	-98.7	-3.8	24	12	12	13	8-8"	PDA performed
I-22	903	02/22/06	78	20	-21.90	-22.00	-100.0	-0.1	15	24	16	11	12	
I-23	909	02/22/06	83	20	-21.90	-16.50	-99.5	5.4	17	13	11	12	6-6"	
I-24	915	02/22/06	75	20	-21.90	-22.00	-97.0	-0.1	22	17	17	16	15	
I-25	922	02/22/06	73	20	-21.90	-22.00	-95.0	-0.1	13	13	13	14	15	
1	13	03/01/06	50.1	15	-21.90	-21.90	-72.0	0.0	31	32	38	43	28-9"	
2	12	03/01/06	50.1	15	-21.90	-21.00	-71.1	0.9	18	26	34	30	72	
3	35	03/01/06	50.1	15	-21.90	-21.90	-72.0	0.0	23	36	34	33	20-6"	
4	56	03/01/06	50.1	15	-21.90	-21.90	-72.0	0.0	20	23	28	29	29	
5	57	03/01/06	50.1	15	-21.90	-21.90	-72.0	0.0	18	25	31	33	27	
6	1	03/01/06	50.1	5	-21.90	-21.90	-72.0	0.0	31	30	44	50	29-9"	
7	2	03/01/06	50.1	10	-21.90	-21.90	-72.0	0.0	13	20	33	44	49	
8	25	03/02/06	50.1	10	-21.90	-21.90	-72.0	0.0	22	30	40	48	23-6"	
9	3	03/02/06	50.1	10	-21.90	-21.00	-71.1	0.9	13	13	28	38	73	
10	350	03/02/06	56.1	10	-21.90	-21.90	-78.0	0.0	19	16	13	13	14	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
11	351	03/02/06	56.1	10	-21.90	-21.90	-78.0	0.0	17	16	16	12	11	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
12	352	03/02/06	56.1	10	-21.90	-21.90	-78.0	0.0	15	13	14	11	12	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
13	307	03/02/06	56.1	10	-21.90	-21.90	-78.0	0.0	20	16	16	15	13	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
14	308	03/02/06	56.1	10	-21.90	-21.90	-78.0	0.0	29	24	25	21	14	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
15	309	03/02/06	56.1	10	-21.90	-21.90	-78.0	0.0	26	24	18	20	18	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
16	689	03/02/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	8	13	20	27	
17	635	03/02/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	8	14	20	48	
18	661	03/02/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	8	12	34	28-6"	
19	690	03/02/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	8	9	26	28	

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Treadwell & Rollo Pile No.	Project Pile Number[1]	Date Driven	Furnished Length (feet)[2]	Predrill Depth (feet)	Design Pile Cutoff Elevation (feet)[3]	Actual Top of Pile Elevation (feet)[3,4]	Approximate Tip Elevation (feet)[3]	Approximate Cut-off Length (feet)	Final Driving (Blows/foot for final 5 feet)					Remarks
20	662	03/02/06	61.1	15	-21.90	-21.90	-83.0	0.0	7	7	9	10	22	
21	691	03/02/06	61.1	15	-21.90	-21.30	-82.4	0.6	9	9	11	23	57	
22	663	03/02/06	61.1	15	-21.90	-21.90	-83.0	0.0	8	12	18	49	25-6"	
23	636	03/02/06	61.1	15	-21.90	-21.90	-83.0	0.0	7	10	13	28	29	
24	637	03/02/06	61.1	15	-21.90	-21.90	-83.0	0.0	7	7	14	30	21-6"	
25	14	03/03/06	50.1	15	-21.90	-21.90	-72.0	0.0	17	27	34	32	20-6"	
26	15	03/03/06	50.1	15	-21.90	-21.90	-72.0	0.0	31	34	50	48	28-6"	
27	16	03/03/06	50.1	15	-21.90	-21.90	-72.0	0.0	26	39	46	42	47	
28	36	03/03/06	50.1	15	-21.90	-21.90	-72.0	0.0	18	30	34	46	19-6"	
29	37	03/03/06	50.1	15	-21.90	-21.90	-72.0	0.0	28	37	39	43	44	
30	38	03/03/06	50.1	15	-21.90	-21.90	-72.0	0.0	30	50	53	58	33-6"	
31	58	03/03/06	50.1	15	-21.90	-21.90	-72.0	0.0	20	32	36	34	18-6"	
32	59	03/03/06	50.1	15	-21.90	-21.90	-72.0	0.0	22	34	38	37	36	
33	60	03/03/06	50.1	15	-21.90	-20.90	-71.0	1.0	22	30	46	43	61	
34	17	03/03/06	50.1	15	-21.90	-21.90	-72.0	0.0	21	39	44	41	47	
35	39	03/03/06	50.1	15	-21.90	-19.90	-70.0	2.0	85	77	79	120	70-6"	
36	61	03/03/06	50.1	15	-21.90	-20.90	-71.0	1.0	27	33	52	52	63	
37	18	03/03/06	50.1	15	-21.90	-21.90	-72.0	0.0	45	34	57	53	13-3"	
38	40	03/03/06	50.1	15	-21.90	-19.90	-70.0	2.0	42	29	44	60	40-6"	
39	592	03/03/06	61.1	10	-21.90	-21.90	-83.0	0.0	11	12	11	17	32	
40	566	03/03/06	61.1	10	-21.90	-21.90	-83.0	0.0	10	10	11	15	30	
41	540	03/03/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	7	9	12	29	
42	497	03/03/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	9	10	27	36	
43	471	03/03/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	8	11	14	40	
44	445	03/03/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	7	7	9	24	
45	593	03/03/06	61.1	10	-21.90	-21.90	-83.0	0.0	10	13	18	31	66	
46	567	03/03/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	9	10	22	40	
47	541	03/03/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	9	16	28	66	
48	498	03/03/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	9	11	16	46	
49	446	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	8	11	22	36	
50	447	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	6	7	15	32	
51	473	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	8	9	13	51	
52	499	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	9	10	31	60	
53	542	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	11	12	35	58	
54	568	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	9	18	33	38	
55	594	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	10	17	30	34	
56	717	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	5	7	16	30	36	
57	762	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	10	19	31	44	
58	788	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	7	14	30	54	
59	789	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	8	20	35	50	
60	763	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	8	13	26	48	
61	718	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	8	16	34	49	
62	764	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	7	15	30	51	
63	719	03/04/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	10	21	37	50	

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64	62	03/04/06	50.1	15	-21.90	-19.90	-70.0	2.0	45	28	49	68	35-6"	
65	4	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	27	28	31	36	35	
66	5	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	22	22	25	27	28	
67	6	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	22	26	29	23	18-9"	
68	7	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	21	25	30	30	27	
69	8	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	21	29	26	29	26	
70	9	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	25	29	24	30	26	
71	10	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	17	26	30	34	32	
72	11	03/04/06	50.1	15	-21.90	-19.40	-69.5	2.5	27	24	39	61	32-6"	
73	26	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	21	34	40	41	19-6"	
74	48	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	19	26	33	31	14-6"	
75	27	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	20	31	41	44	21-6"	
76	49	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	14	26	38	40	44	
77	28	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	32	39	41	32	18-6"	
78	50	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	14	29	36	38	24-6"	
79	29	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	30	41	46	44	32	
80	51	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	15	31	37	37	36	
81	30	03/04/06	50.1	15	-21.90	-21.90	-72.0	0.0	30	50	45	39	17-6"	
82	52	03/06/06	50.1	15	-21.90	-21.90	-72.0	0.0	25	34	32	35	33	
83	31	03/06/06	50.1	15	-21.90	-21.90	-72.0	0.0	20	30	37	35	32	
84	32	03/06/06	50.1	15	-21.90	-21.90	-72.0	0.0	38	39	35	41	15-6"	
85	33	03/06/06	50.1	15	-21.90	-21.90	-72.0	0.0	28	40	38	40	40	
86	53	03/06/06	50.1	15	-21.90	-21.90	-72.0	0.0	23	32	31	32	15-6"	
87	54	03/06/06	50.1	15	-21.90	-21.90	-72.0	0.0	16	29	35	36	36	
88	55	03/06/06	50.1	15	-21.90	-21.90	-72.0	0.0	31	44	57	39	20-6"	
89	19	03/06/06	50.1	15	-21.90	-21.90	-72.0	0.0	30	39	35	35	42	
90	20	03/06/06	50.1	15	-21.90	-21.90	-72.0	0.0	31	39	45	44	47	
91	402	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	9	13	30	3-1"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
92	376	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	7	9	13	15-9"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
93	377	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	11	10	10	14	21	
94	403	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	13	11	11	25	18-6"	
95	378	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	10	10	9	10	14	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
96	404	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	11	9	10	22	13-5"	
97	924	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	9	17	22	13-6"	
98	902	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	11	12	17	26	11-5"	
99	880	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	11	9	15	18	4-1"	
100	858	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	10	7	10	10-6"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
101	836	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	9	7	11	15-11"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
102	814	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	6	6	10	18-9"	
103	925	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	7	17	26	5-1"	
104	926	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	10	8	10	25	13-6"	
105	904	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	12	12	12	18	13-5"	
106	881	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	10	12	9	13	20-10"	
107	882	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	11	13	14	33	29-6"	

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108	859	03/06/06	61.1	10	-21.90	-21.90	-83.0	0.0	13	8	10	16	7-3"	
109	21	03/07/06	50.1	15	-21.90	-20.90	-71.0	1.0	24	26	39	41	62	
110	22	03/07/06	50.1	15	-21.90	-19.90	-70.0	2.0	26	34	47	80	37-6"	
111	43	03/07/06	50.1	15	-21.90	-19.90	-70.0	2.0	44	34	47	63	67	
112	42	03/07/06	50.1	15	-21.90	-20.40	-70.5	1.5	28	31	43	50	70-6"	
113	41	03/07/06	50.1	15	-21.90	-19.90	-70.0	2.0	32	41	58	66	25-3"	
114	63	03/07/06	50.1	15	-21.90	-19.90	-70.0	2.0	55	42	51	74	90	
115	64	03/07/06	50.1	15	-21.90	-19.90	-70.0	2.0	42	56	86	117	31-3"	
116	65	03/07/06	50.1	15	-21.90	-20.90	-71.0	1.0	27	40	46	64	63	
117	66	03/07/06	50.1	15	-21.90	-19.90	-70.0	2.0	26	34	63	65	40-6"	
118	281	03/07/06	50.1	15	-21.90	-21.90	-72.0	0.0	16	20	23	30	30	
119	236	03/07/06	50.1	15	-21.90	-21.90	-72.0	0.0	23	26	23	30	29	
120	208	03/07/06	50.1	15	-21.90	-21.90	-72.0	0.0	33	27	29	27	14-6"	
121	180	03/07/06	50.1	15	-21.90	-21.90	-72.0	0.0	30	30	25	30	30	
122	154	03/07/06	50.1	15	-21.90	-21.90	-72.0	0.0	25	30	26	37	29	
123	860	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	10	11	25	34-9"	
124	837	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	11	13	11	22	14-4"	
125	838	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	5	5	31	32-9"	
126	815	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	10	10	23	26-9"	
127	816	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	11	14	37	42-9"	
128	927	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	11	12	14	17-6"	
129	928	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	8	31	46	67	
130	924	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	12	27	46	53	
131	930	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	11	26	37	18-3"	
132	931	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	13	28	45	19-3"	
133	932	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	14	20	24	7-2"	
134	933	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	4	10	22	27	20-9"	
135	934	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	10	15	20	25	9-3"	
136	912	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	13	22	39	21-6"	
137	911	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	7	20	42	36-6"	
138	910	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	5	8	17	40	53	
139	908	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	19	26	40	47-10"	
140	907	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	12	29	58	70-9"	
141	906	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	14	22	49	42-9"	
142	905	03/07/06	61.1	10	-21.90	-21.90	-83.0	0.0	11	9	12	31	54	
143	282	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	16	25	21	24	31	
144	237	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	31	32	33	31	34	
145	209	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	37	43	42	43	37	
146	181	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	38	40	40	41	20-6"	
147	283	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	24	24	30	26	32	
148	238	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	33	35	38	44	17-6"	
149	210	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	40	48	34	42	38	
150	182	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	62	57	54	47	25-6"	
151	155	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	40	35	38	39	42	

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Treadwell & Rollo Pile No.	Project Pile Number[1]	Date Driven	Furnished Length (feet)[2]	Predrill Depth (feet)	Design Pile Cutoff Elevation (feet)[3]	Actual Top of Pile Elevation (feet)[3,4]	Approximate Tip Elevation (feet)[3]	Approximate Cut-off Length (feet)	Final Driving (Blows/foot for final 5 feet)					Remarks
152	156	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	42	48	40	40	22-6"	
153	111	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	39	50	48	54	26-6"	
154	112	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	34	34	35	40	35	
155	113	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	45	47	38	36	18-6"	
156	89	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	32	32	38	32	15-6"	
157	90	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	38	40	46	44	21-6"	
158	91	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	38	43	55	57	44	
159	23	03/08/06	50.1	15	-21.90	-20.40	-70.5	1.5	12	24	38	44	40-6"	
160	45	03/08/06	50.1	15	-21.90	-21.90	-72.0	0.0	28	42	42	41	22-6"	
161	883	3/7 & 3/8/06	61.1	10	-21.90	-21.90	-83.0	0.0	12	9	15	40	62	
162	884	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	11	24	45	61	
163	885	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	17	30	43	36-9"	
164	886	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	16	38	51	46-6"	
165	887	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	13	30	52	48-10"	
166	888	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	14	32	51	23-3"	
167	889	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	10	29	45	49-9"	
168	890	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	15	35	51	49-7"	
169	891	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	8	13	35	53	
170	892	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	11	33	36	18-5"	
171	913	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	7	24	50	24-5"	
172	893	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	10	9	18	34	22-6"	
173	914	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	8	16	36	46	
174	935	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	6	17	42	54	
175	936	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	5	14	32	41	6-1"	
176	937	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	11	28	39	8-2"	
177	938	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	11	10	22	35	13-4"	
178	939	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	12	15	27	30-9"	
179	940	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	11	11	25	34	
180	941	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	9	14	26	37	
181	942	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	12	25	32	11-5"	
182	943	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	13	25	29	15-6"	
183	944	03/08/06	61.1	10	-21.90	-21.90	-83.0	0.0	10	13	26	33	14-4"	
184	67	03/09/06	50.1	15	-21.90	-21.90	-72.0	0.0	28	35	37	48	38	
185	46	03/09/06	50.1	15	-21.90	-20.40	-70.5	1.5	20	35	54	57	35-6"	
186	68	03/09/06	50.1	15	-21.90	-21.90	-72.0	0.0	30	40	34	48	40	
187	47	03/09/06	50.1	15	-21.90	-20.40	-70.5	1.5	15	25	28	39	36-6"	
188	69	03/09/06	50.1	15	-21.90	-19.90	-70.0	2.0	13	14	39	44	40-6"	
189	945	03/09/06	61.1		-21.90	-21.90	-83.0	0.0	8	11	32	46	34-6"	
190	894	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	10	13	30	39-11"	
191	895	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	10	22	41	32-6"	
192	896	03/09/06	61.1	10	-21.90	-21.90	-83	0.0	7	10	23	37	31-6"	
193	917	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	14	25	51	10-2"	
194	897	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	11	30	45	13-2"	
195	918	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	9	21	32	36-9"	

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Treadwell & Rollo Pile No.	Project Pile Number[1]	Date Driven	Furnished Length (feet)[2]	Predrill Depth (feet)	Design Pile Cutoff Elevation (feet)[3]	Actual Top of Pile Elevation (feet)[3,4]	Approximate Tip Elevation (feet)[3]	Approximate Cut-off Length (feet)	Final Driving (Blows/foot for final 5 feet)					Remarks
196	898	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	8	17	37	45-9"	
197	919	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	6	7	16	26	42	
198	916	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	5	8	11	31	47	
199	920	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	10	26	41	6-1"	
200	899	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	11	23	42	27-6"	
201	921	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	11	25	37	47	
202	900	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	9	23	36	9-2"	
203	923	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	10	35	55	24-5"	
204	901	03/09/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	7	17	36	48	
205	183	03/10/06	50.1	15	-21.90	-21.90	-72.0	0.0	54	43	50	41	25-6"	
206	157	03/10/06	50.1	15	-21.90	-21.90	-72.0	0.0	34	36	31	44	38	
207	114	03/10/06	50.1	15	-21.90	-21.90	-72.0	0.0	48	42	53	43	18-6"	
208	92	03/10/06	50.1	20	-21.90	-21.90	-72.0	0.0	29	39	37	44	36	
209	70	03/10/06	50.1	20	-21.90	-21.90	-72.0	0.0	30	34	56	48	30-6"	
210	71	03/10/06	50.1	15	-21.90	-20.90	-71.0	1.0	16	24	38	36	63	
211	93	03/10/06	50.1	15	-21.90	-21.90	-72.0	0.0	27	41	53	52	44	
212	115	03/10/06	50.1	15	-21.90	-19.90	-70.0	2.0	21	32	44	57	40-6"	
213	158	03/10/06	50.1	15	-21.90	-21.90	-72.0	0.0	38	51	50	46	27-6"	
214	185	03/10/06	50.1	15	-21.90	-21.90	-72.0	0.0	30	49	31	45	39	
215	72	03/10/06	50.1	15	-21.90	-21.90	-72.0	0.0	12	20	27	53	53	
216	94	03/10/06	50.1	15	-21.90	-20.90	-71.0	1.0	15	23	39	52	36-6"	
217	116	03/10/06	50.1	15	-21.90	-21.90	-72.0	0.0	22	29	56	49	54	
218	137	03/10/06	50.1	15	-21.90	-20.90	-71.0	1.0	28	43	52	53	38-6"	
219	163	03/10/06	50.1	15	-21.90	-19.90	-70.0	2.0	16	40	70	64	33-6"	
220	186	03/10/06	50.1	15	-21.90	-19.90	-70.0	2.0	27	52	70	105	32-3"	
221	73	03/10/06	50.1	15	-21.90	-21.90	-72.0	0.0	23	42	48	42	21-6"	
222	95	03/10/06	50.1	15	-21.90	-21.90	-72.0	0.0	33	52	49	53	54	
223	692	03/10/06	61.1	10	-21.90	-21.90	-83.0	0.0	10	12	27	56	30-6"	
224	720	03/10/06	61.1	10	-21.90	-21.90	-83.0	0.0	9	11	25	52	23-5"	
225	765	03/10/06	61.1	10	-21.90	-21.90	-83.0	0.0	8	8	12	27	45	
226	791	03/10/06	61.1	10	-21.90	-21.90	-83.0	0.0	7	8	12	32	60	
227	817	3/10/2006	61.1	10	-21.90	-21.90	-83.0	0.0	7	12	30	54	17-3"	
228	818	3/10/2006	61.1	10	-21.90	-21.90	-83.0	0.0	7	9	32	52	26-5"	
229	819	3/10/2006	61.1	10	-21.90	-21.90	-83.0	0.0	10	11	22	56	63-11"	
230	820	3/10/2006	61.1	10	-21.90	-21.40	-82.5	0.5	7	9	10	34	62	
231	117	3/13/2006	50.1	15	-21.90	-21.90	-72.0	0.0	41	42	48	46	20-6"	
232	118	3/13/2006	50.1	15	-21.90	-20.90	-71.0	1.0	26	36	48	56	32-6"	
233	284	3/13/2006	50.1	15	-21.90	-21.90	-72.0	0.0	23	21	24	23	15-6"	
234	239	3/13/2006	50.1	15	-21.90	-21.90	-72.0	0.0	29	33	27	36	34	
235	211	3/13/2006	50.1	15	-21.90	-21.90	-72.0	0.0	54	48	38	48	14-3"	
236	212	3/13/2006	50.1	15	-21.90	-21.90	-72.0	0.0	42	43	39	46	48	
237	240	3/13/2006	50.1	15	-21.90	-21.90	-72.0	0.0	42	47	39	36	10-3"	
238	285	3/13/2006	50.1	15	-21.9	-21.9	-72.0	0.0	29	28	37	31	33	
239	241	3/13/2006	50.1	15	-21.9	-21.9	-72.0	0.0	24	42	38	47	53	

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240	213	3/13/2006	50.1	15	-21.9	-19.9	-70.0	2.0	26	40	54	65	63	
241	138	3/13/2006	50.1	15	-21.9	-19.9	-70.0	2.0	19	22	40	59	72	
242	139	3/13/2006	50.1	15	-21.9	-19.9	-70.0	2.0	15	29	45	83	62	
243	164	3/13/2006	50.1	15	-21.9	-19.9	-70.0	2.0	21	28	42	73	65	
244	165	3/13/2006	50.1	15	-21.9	-19.9	-70.0	2.0	20	25	49	88	79	
245	187	3/13/2006	50.1	15	-21.9	-19.9	-70.0	2.0	32	49	74	107	50-6"	
246	188	3/13/2006	50.1	15	-21.9	-19.9	-70.0	2.0	29	68	100	143	82-6"	
247	290	3/13/2006	50.1	15	-21.9	-21.9	-72.0	0.0	33	30	41	37	35	
248	264	3/13/2006	50.1	15	-21.9	-19.9	-70.0	2.0	21	32	45	56	64	
249	861	3/13/2006	61.1	10	-21.9	-21.9	-83.0	0.0	12	12	24	35	50	
250	839	3/13/2006	61.1	10	-21.9	-21.9	-83.0	0.0	8	9	20	45	42-8"	
251	862	3/13/2006	61.1	10	-21.9	-21.9	-83.0	0.0	8	9	14	38	55	
252	840	3/13/2006	61.1	10	-21.9	-21.9	-83.0	0.0	10	10	21	46	75	
253	863	3/13/2006	61.1	10	-21.9	-21.9	-83.0	0.0	9	9	17	51	64	
254	841	3/13/2006	61.1	10	-21.9	-21.15	-82.3	0.8	9	10	11	30	62-9"	
255	864	3/13/2006	61.1	10	-21.9	-21.9	-83.0	0.0	9	9	26	48	45-8"	
256	842	3/13/2006	61.1	10	-21.9	-20.7	-81.8	1.2	14	12	12	20	62	
257	721	3/13/2006	61.1	10	-21.9	-21.9	-83.0	0.0	10	12	24	48	44-8"	
258	792	3/13/2006	61.1	10	-21.9	-21.9	-83.0	0.0	8	12	37	55	8-2"	
259	766	3/13/2006	61.1	10	-21.9	-21.9	-83.0	0.0	9	9	9	41	68	
260	722	3/13/2006	61.1	10	-21.9	-21.9	-83.0	0.0	10	14	34	62	16-3"	
261	694	3/13/2006	61.1	10	-21.9	-21.4	-82.5	0.5	12	10	11	15	62	
262	695	3/13/2006	61.1	10	-21.9	-21.4	-82.5	0.5	10	12	12	34	67	
263	723	3/13/2006	61.1	10	-21.9	-21.4	-82.5	0.5	14	13	16	35	61-7"	
264	745	3/13/2006	61.1	10	-21.9	-21.9	-83.0	0.0	14	16	24	49	50-7"	
265	242	3/14/2006	50.1	15	-21.9	-19.9	-70.0	2.0	23	40	63	73	87	
266	214	3/14/2006	50.1	15	-21.9	-19.9	-70.0	2.0	36	52	60	67	34-6"	
267	215	3/14/2006	50.1	15	-21.9	-19.9	-70.0	2.0	24	32	59	60	33-6"	
268	243	3/14/2006	50.1	15	-21.9	-19.9	-70.0	2.0	24	43	69	78	64	
269	265	3/14/2006	50.1	15	-21.9	-19.9	-70	2	20	30	42	62	61	
270	291	3/14/2006	50.1	15	-21.9	-21.9	-72	0	34	33	47	34	35	
271	216	3/14/2006	50.1	15	-21.9	-19.9	-70	2	30	56	65	71	45-6"	
272	244	3/14/2006	50.1	15	-21.9	-20.9	-71	1	21	48	48	45	67	
273	353	3/14/2006	56.1	15	-21.9	-21.9	-78	0	17	18	16	12	11	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
274	310	3/14/2006	56.1	15	-21.9	-21.9	-78	0	21	20	20	14	8-6"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
275	354	3/14/2006	56.1	15	-21.9	-21.9	-78	0	23	19	21	21	12-6"	
276	311	3/14/2006	56.1	15	-21.9	-16.9	-73	5	44	40	45	50	73	
277	359	3/14/2006	56.1	15	-21.9	-21.9	-78	0	30	22	18	20	16	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
278	333	3/14/2006	56.1	15	-21.9	-21.9	-78	0	26	28	17	22	15	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
279	312	3/14/2006	56.1	15	-21.9	-21.9	-78	0	42	35	28	24	13-6"	
280	360	3/14/2006	56.1	15	-21.9	-21.9	-78	0	24	20	19	15	13	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
281	334	3/14/2006	56.1	15	-21.9	-21.9	-78	0	50	38	35	29	25	
282	313	3/14/2006	56.1	15	-21.9	-14.9	-71	7	24	52	65	65	82	
283	266	3/14/2006	56.1	15	-21.9	-13.9	-70	8	16	32	50	109	86	

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284	771	3/14/2006	61.1	10	-21.9	-21.9	-83	0	10	11	13	32	74	
285	793	3/14/2006	61.1	10	-21.9	-21.65	-82.75	0.25	10	10	12	38	68	
286	664	3/14/2006	61.1	10	-21.9	-21.9	-83	0	10	9	24	43	36-6"	
287	638	3/14/2006	61.1	10	-21.9	-21.9	-83	0	11	10	11	26	27-9"	
288	595	3/14/2006	61.1	10	-21.9	-21.9	-83	0	9	9	14	27	18-6"	
289	569	3/14/2006	61.1	10	-21.9	-21.9	-83	0	8	8	8	13	30	
290	543	3/14/2006	61.1	10	-21.9	-21.9	-83	0	8	10	9	20	29	
291	500	3/14/2006	61.1	10	-21.9	-21.9	-83	0	7	9	12	28	12-3"	
292	665	3/14/2006	61.1	10	-21.9	-21.9	-83	0	7	9	23	51	34-6"	
293	666	3/14/2006	61.1	10	-21.9	-21.9	-83	0	10	11	17	43	64	
294	639	3/14/2006	61.1	10	-21.9	-21.9	-83	0	11	10	15	52	37-5"	
295	596	3/14/2006	61.1	10	-21.9	-21.9	-83	0	9	9	12	26	37	
296	570	3/14/2006	61.1	10	-21.9	-21.9	-83	0	11	10	11	25	24-5"	
297	544	3/14/2006	61.1	10	-21.9	-21.9	-83	0	12	14	20	37	10-3"	
298	501	3/14/2006	61.1	10	-21.9	-21.9	-83	0	8	9	14	17	16-6"	
299	502	3/14/2006	61.1	10	-21.9	-21.9	-83	0	8	8	10	12	21	
300	503	3/14/2006	61.1	10	-21.9	-21.9	-83	0	9	9	9	17	26	
301	524	3/14/2006	61.1	10	-21.9	-21.9	-83	0	11	9	13	31	32-6"	
302	549	3/14/2006	61.1	10	-21.9	-21.9	-83	0	10	12	33	56	12-2"	
303	550	3/14/2006	61.1	10	-21.9	-21.9	-83	0	13	13	15	28	70	
304	292	3/15/2006	56.1	15	-21.9	-13.9	-70	8	22	37	54	67	72	
305	314	3/15/2006	56.1	15	-21.9	-21.9	-78	0	25	24	21	15	9-6"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
306	335	3/15/2006	56.1	15	-21.9	-21.9	-78	0	36	29	26	21	12-6"	
307	361	3/15/2006	56.1	15	-21.9	-21.9	-78	0	26	23	16	18	14	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
308	74	3/15/2006	50.1	15	-21.9	-21.9	-72	0	20	30	29	35	36	
309	75	3/15/2006	50.1	15	-21.9	-21.9	-72	0	24	26	30	36	33	
310	76	3/15/2006	50.1	15	-21.9	-21.9	-72	0	16	23	29	30	26	
311	77	3/15/2006	50.1	15	-21.9	-21.9	-72	0	17	29	31	30	15-6"	
312	96	3/15/2006	50.1	20	-21.9	-21.9	-72	0	31	38	41	36	15-6"	
313	97	3/15/2006	50.1	15	-21.9	-21.9	-72	0	28	49	44	49	39	
314	98	3/15/2006	50.1	15	-21.9	-21.9	-72	0	25	44	40	42	28	
315	119	3/15/2006	50.1	15	-21.9	-21.9	-72	0	28	39	44	41	25-9"	
316	140	3/15/2006	50.1	15	-21.9	-21.9	-72	0	58	44	45	36	15-6"	
317	99	3/15/2006	50.1	15	-21.9	-21.9	-72	0	25	28	37	39	17-6"	
318	120	3/15/2006	56.1	15	-21.9	-14.9	-71	7	20	37	39	51	68	
319	575	3/15/2006	61.1	10	-21.9	-21.9	-83	0	11	11	14	27	30-7"	
320	576	3/15/2006	61.1	10	-21.9	-21.9	-83	0	12	11	14	14	5-4"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
321	597	3/15/2006	61.1	10	-21.9	-21.9	-83	0	11	10	10	21	35-10"	
322	598	3/15/2006	61.1	10	-21.9	-21.9	-83	0	11	9	9	15	67	
323	618	3/15/2006	61.1	10	-21.9	-21.9	-83	0	12	13	13	28	38-9"	
324	644	3/15/2006	61.1	10	-21.9	-20.9	-82	1	11	12	14	24	70-9"	
325	667	3/15/2006	61.1	10	-21.9	-21.65	-82.75	0.25	16	16	20	41	61-10"	
326	474	3/15/2006	61.1	10	-21.9	-21.9	-83	0	8	8	10	12	27	
327	448	3/15/2006	61.1	10	-21.9	-21.9	-83	0	10	9	10	11	13-8"	

TABLE 1
Indicator and Production Pile Summary
301 Mission Street
San Francisco, California

Treadwell & Rollo Pile No.	Project Pile Number[1]	Date Driven	Furnished Length (feet)[2]	Predrill Depth (feet)	Design Pile Cutoff Elevation (feet)[3]	Actual Top of Pile Elevation (feet)[3,4]	Approximate Tip Elevation (feet)[3]	Approximate Cut-off Length (feet)	Final Driving (Blows/foot for final 5 feet)					Remarks
328	405	3/15/2006	61.1	10	-21.9	-21.9	-83	0	10	10	10	10	10-11"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
329	379	3/15/2006	61.1	10	-21.9	-21.9	-83	0	10	7	10	12	12	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
330	380	3/15/2006	61.1	10	-21.9	-21.9	-83	0	11	13	9	14	8-6"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
331	406	3/15/2006	61.1	10	-21.9	-21.9	-83	0	9	10	9	10	12	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
332	449	3/15/2006	61.1	10	-21.9	-21.9	-83	0	10	7	10	12	10-6"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
333	141	3/16/2006	56.1	15	-21.9	-14.65	-70.75	7.25	22	53	52	57	66	
334	121	3/16/2006	56.1	15	-21.9	-21.9	-78	0	20	26	21	22	21	
335	142	3/16/2006	56.1	15	-21.9	-14.4	-70.5	7.5	20	30	43	45	65	
336	122	3/16/2006	56.1	15	-21.9	-15.15	-71.25	6.75	20	38	40	52	64	
337	143	3/16/2006	56.1	15	-21.9	-21.9	-78	0	25	23	24	23	22	
338	123	3/16/2006	56.1	15	-21.9	-14.9	-71	7	12	22	33	57	72	
339	144	3/16/2006	56.1	15	-21.9	-13.9	-70	8	17	32	56	76	90	
340	475	3/16/2006	61.1	10	-21.9	-21.9	-83	0	13	9	11	16	25-9"	
341	385	3/16/2006	61.1	10	-21.9	-21.9	-83	0	14	13	13	11	11-11"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
342	386	3/16/2006	61.1	10	-21.9	-21.9	-83	0	13	16	15	17	15	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
343	407	3/16/2006	61.1	10	-21.9	-10.33	-71.43	11.57	32	41	50	55	85	
344	408	3/16/2006	61.1	10	-21.9	-10	-71.1	11.9	41	50	67	69	77	
345	428	3/16/2006	61.1	10	-21.9	-10.33	-71.43	11.57	19	34	48	50	64	
346	429	3/16/2006	61.1	10	-21.9	-10	-71.1	11.9	28	34	47	58	68	
347	454	3/16/2006	61.1	10	-21.9	-10.43	-71.53	11.47	25	44	48	60	61	
348	455	3/16/2006	61.1	10	-21.9	-10.33	-71.43	11.57	37	60	95	118	80-10"	
349	480	3/16/2006	61.1	10	-21.9	-10.33	-71.43	11.57	39	58	61	62	81	
350	481	3/16/2006	61.1	10	-21.9	-10	-71.1	11.9	23	35	51	90	110	
351	166	3/17/2006	50.1	15	-21.9	-20.9	-71	1	27	37	62	49	65	
352	189	3/17/2006	50.1	15	-21.9	-20.4	-70.5	1.5	33	35	53	59	62	
353	217	3/17/2006	50.1	15	-21.9	-20.15	-70.25	1.75	21	40	44	60	65	
354	267	3/17/2006	56.1	15	-21.9	-21.9	-78	0	24	22	20	18	17	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
355	293	3/17/2006	56.1	15	-21.9	-14.9	-71	7	28	46	57	55	98	
356	315	3/17/2006	56.1	15	-21.9	-14.9	-71	7	35	46	59	55	63	
357	336	3/17/2006	56.1	15	-21.9	-14.4	-70.5	7.5	25	46	53	75	88	
358	362	3/17/2006	56.1	15	-21.9	-21.9	-78	0	35	30	26	26	12-6"	
359	363	3/17/2006	56.1	15	-21.9	-14.9	-71	7	40	41	55	56	67	
360	364	3/17/2006	56.1	15	-21.9	-15.9	-72	6	41	39	57	43	65	
361	338	3/17/2006	56.1	15	-21.9	-13.9	-70	8	17	42	70	71	117	
362	316	3/17/2006	56.1	15	-21.9	-14.15	-70.25	7.75	37	60	71	80	46-6"	
363	317	3/17/2006	56.1	15	-21.9	-14.65	-70.75	7.25	39	50	57	66	69	
364	294	3/17/2006	56.1	15	-21.9	-13.9	-70	8	61	60	116	124	100-9"	
365	619	3/17/2006	61.1	10	-21.9	-21.9	-83	0	13	14	16	40	19-4"	
366	645	3/17/2006	61.1	10	-21.9	-21.9	-83	0	15	14	17	34	69-9"	
367	668	3/17/2006	61.1	10	-21.9	-21.4	-82.5	0.5	11	13	15	48	64-9"	
368	696	3/17/2006	61.1	10	-21.9	-21.9	-83	0	12	12	16	49	67-9"	
369	724	3/17/2006	61.1	10	-21.9	-21.9	-83	0	14	11	16	48	84	
370	746	3/17/2006	61.1	10	-21.9	-21.9	-83	0	14	14	14	25	99	
371	772	3/17/2006	61.1	10	-21.9	-20.9	-82	1	14	10	17	25	71-9"	

TABLE 1
Indicator and Production Pile Summary
301 Mission Street
San Francisco, California

Treadwell & Rollo Pile No.	Project Pile Number[1]	Date Driven	Furnished Length (feet)[2]	Predrill Depth (feet)	Design Pile Cutoff Elevation (feet)[3]	Actual Top of Pile Elevation (feet)[3,4]	Approximate Tip Elevation (feet)[3]	Approximate Cut-off Length (feet)	Final Driving (Blows/foot for final 5 feet)					Remarks
372	794	3/17/2006	61.1	10	-21.9	-21.9	-83	0	11	10	22	58	94	
373	773	3/17/2006	61.1	10	-21.9	-20.9	-82	1	11	11	14	30	66-9"	
374	747	3/17/2006	61.1	10	-21.9	-21.5	-82.6	0.4	11	11	13	24	64	
375	725	3/17/2006	61.1	10	-21.9	-20.9	-82	1	15	16	20	36	65-9"	
376	697	3/17/2006	61.1	30	-21.9	-21.4	-82.5	0.5	11	12	17	47	62-6"	
377	796	3/17/2006	61.1	30	-21.9	-21.9	-83	0	11	11	13	35	78	
378	245	3/18/2006	50.1	15	-21.9	-19.9	-70	2	21	32	45	69	63	
379	268	3/18/2006	56.1	15	-21.9	-14.4	-70.5	7.5	31	47	61	66	44-6"	
380	246	3/18/2006	56.1	15	-21.9	-13.9	-70	8	32	46	77	103	83	
381	218	3/18/2006	56.1	15	-21.9	-21.9	-78	0	21	10	8	10	12	Pile Broken, no replacement pile needed, see RFI #139
382	190	3/18/2006	56.1	15	-21.9	-21.9	-78	0	38	9	7	6	7	Pile Broken, no replacement pile needed, see RFI #139
383	167	3/18/2006	56.1	15	-21.9	-13.9	-70	8	23	29	41	64	72	
384	295	3/18/2006	56.1	15	-21.9	-13.9	-70	8	19	39	65	65	70	
385	269	3/18/2006	56.1	15	-21.9	-13.9	-70	8	19	33	57	66	74	
386	247	3/18/2006	56.1	15	-21.9	-13.9	-70	8	25	42	69	77	76	
387	219	3/18/2006	56.1	15	-21.9	-12.4	-68.5	9.5	69	50	44	66	90	
388	191	3/18/2006	56.1	15	-21.9	-13.9	-70	8	40	65	118	116	45-3"	
389	168	3/18/2006	56.1	15	-21.9	-13.9	-70	8	35	50	84	118	70-6"	
390	169	3/18/2006	56.1	15	-21.9	-13.1	-69.2	8.8	22	42	150	172	35-2"	
391	646	3/18/2006	61.1	10	-21.9	-21.9	-83	0	12	14	29	53	15-2"	
392	669	3/18/2006	61.1	10	-21.9	-21.9	-83	0	15	16	23	57	75-7"	
393	647	3/18/2006	61.1	30	-21.9	-21.9	-83	0	10	9	13	44	9-2"	
394	670	3/18/2006	61.1	30	-21.9	-20.9	-82	1	12	14	16	32	64-8"	
395	698	3/18/2006	61.1	30	-21.9	-19.9	-81	2	29	39	55	54	64-7"	
396	648	3/18/2006	61.1	30	-21.9	-21.9	-83	0	11	9	12	23	99	
397	671	3/18/2006	61.1	30	-21.9	-21.9	-83	0	11	12	13	29	92	
398	699	3/18/2006	61.1	30	-21.9	-21.9	-83	0	12	12	19	37	89	
399	649	3/18/2006	61.1	30	-21.9	-21.9	-83	0	9	10	15	54	32-3"	
400	672	3/18/2006	61.1	35	-21.9	-21.6	-82.7	0.3	10	11	13	21	67	
401	700	3/18/2006	61.1	30	-21.9	-20.9	-82	1	13	15	19	30	68-6"	
402	726	3/18/2006	61.1	30	-21.9	-20.9	-82	1	18	12	13	22	62	
403	748	3/18/2006	61.1	30	-21.9	-20.7	-81.8	1.2	14	16	12	25	65-9"	
404	774	3/18/2006	61.1	30	-21.9	-20.9	-82	1	11	13	14	22	77	
405	504	3/20/2006	51.77	15	-32.9	-32.9	-84.67	0	10	12	15	18	34	
406	505	3/20/2006	51.77	15	-32.9	-32.9	-84.67	0	12	15	22	34	71-6"	
407	506	3/20/2006	55.77	15	-32.9	-32.9	-88.67	0	27	39	57	43	20-6"	
408	507	3/20/2006	55.77	15	-32.9	-32.9	-88.67	0	31	46	51	52	43	
409	525	3/20/2006	51.77	15	-32.9	-32.9	-84.67	0	14	16	32	54	62	
410	526	3/20/2006	51.77	15	-32.9	-31.9	-83.67	1	11	13	23	49	46-6"	
411	879	3/20/2006	61.1	45	-21.9	-21.9	-83	0	8	11	15	30	49	
412	857	3/20/2006	61.1	45	-21.9	-21.9	-83	0	10	10	30	55	23-4"	
413	835	3/20/2006	61.1	45	-21.9	-21.9	-83	0	9	8	16	30	43-9"	
414	813	3/20/2006	61.1	45	-21.9	-21.9	-83	0	9	9	19	45	28-6"	
415	770	3/20/2006	61.1	45	-21.9	-21.9	-83	0	8	7	12	34	24-5"	

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301 Mission Street
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Treadwell & Rollo Pile No.	Project Pile Number[1]	Date Driven	Furnished Length (feet)[2]	Predrill Depth (feet)	Design Pile Cutoff Elevation (feet)[3]	Actual Top of Pile Elevation (feet)[3,4]	Approximate Tip Elevation (feet)[3]	Approximate Cut-off Length (feet)	Final Driving (Blows/foot for final 5 feet)					Remarks
416	749	3/20/2006	61.1	35	-21.9	-21.6	-82.7	0.3	11	11	15	42	64-9"	
417	775	3/20/2006	61.1	35	-21.9	-21.9	-83	0	13	12	16	50	67	
418	797	3/20/2006	61.1	35	-21.9	-21.9	-83	0	9	9	12	34	35-6"	
419	822	3/20/2006	61.1	0	-21.9	-21.9	-83	0	8	10	13	28	39-9"	
420	844	3/20/2006	61.1	35	-21.9	-21.9	-83	0	7	8	14	50	50	
421	866	3/20/2006	61.1	35	-21.9	-21.9	-83	0	7	10	22	35	58	
422	821	3/20/2006	61.1	35	-21.9	-21.9	-83	0	9	8	14	38	89	
423	387	3/21/2006	56.1	15	-21.9	-21.9	-78	0	20	19	15	18	15	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
424	388	3/21/2006	56.1	15	-21.9	-21.9	-78	0	22	20	13	15	12	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
425	389	3/21/2006	56.1	15	-21.9	-21.9	-78	0	47	39	41	31	14-6"	
426	390	3/21/2006	56.1	15	-21.9	-21.9	-78	0	28	28	18	20	15	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
427	88	3/21/2006	50.1	45	-21.9	-19.9	-70	2	33	36	60	81	112	
428	110	3/21/2006	50.1	45	-21.9	-19.9	-70	2	22	24	35	59	63	
429	136	3/21/2006	56.1	45	-21.9	-14.65	-70.75	7.25	36	52	66	79	50-6"	
430	162	3/21/2006	56.1	45	-21.9	-13.9	-70	8	28	32	47	73	75	
431	207	3/21/2006	56.1	45	-21.9	-21.9	-78	0	50	46	26	29	36	
432	235	3/21/2006	56.1	45	-21.9	-21.9	-78	0	32	36	28	29	35	
433	263	3/21/2006	56.1	45	-21.9	-14.9	-71	7	13	13	37	65	71	
434	843	3/21/2006	61.1	30	-21.9	-21.9	-83	0	10	12	13	29	70	
435	865	3/21/2006	61.1	35	-21.9	-21.9	-83	0	10	15	30	52	34-6"	
436	823	3/21/2006	61.1	35	-21.9	-21.9	-83	0	10	9	17	35	31-6"	
437	845	3/21/2006	61.1	35	-21.9	-21.9	-83	0	10	11	16	42	51	
438	867	3/21/2006	61.1	35	-21.9	-21.9	-83	0	11	16	42	54	25-3"	
439	744	3/21/2006	61.1	45	-21.9	-21.9	-83	0	7	8	10	25	38-9"	
440	688	3/21/2006	61.1	45	-21.9	-21.9	-83	0	14	12	19	39	30-5"	
441	643	3/21/2006	61.1	45	-21.9	-21.9	-83	0	17	12	14	15	11-6"	
442	617	3/21/2006	61.1	45	-21.9	-21.9	-83	0	18	11	11	11	4-3"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
443	574	3/21/2006	61.1	45	-21.9	-21.9	-83	0	18	12	10	10	9-9"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
444	551	3/21/2006	51.77	10	-32.9	-32.9	-84.67	0	14	13	25	63	92	
445	289	3/22/2006	56.1	45	-21.9	-14.9	-71	7	16	32	42	44	67	
446	332	3/22/2006	56.1	45	-21.9	-15.9	-72	6	32	44	51	58	62	
447	358	3/22/2006	56.1	45	-21.9	-21.9	-78	0	25	27	32	27	26	
448	384	3/22/2006	56.1	45	-21.9	-21.9	-78	0	21	19	22	22	17-9"	
449	427	3/22/2006	56.1	45	-21.9	-21.9	-78	0	31	28	30	26	23	
450	87	3/22/2006	50.1	45	-21.9	-20.4	-70.5	1.5	25	26	48	55	73	
451	109	3/22/2006	50.1	45	-21.9	-19.9	-70	2	23	45	55	87	30-3"	
452	135	3/22/2006	56.1	45	-21.9	-19.9	-76	2	6	6	4	2	2	Pile Broken, replacement pile (#135-R) driven on 4/17/06 see RFI #163
453	161	3/22/2006	56.1	45	-21.9	-13.9	-70	8	22	33	46	48	35-6"	
454	206	3/22/2006	56.1	45	-21.9	-14.9	-71	7	18	35	43	47	67	
455	205	3/22/2006	56.1	45	-21.9	-13.9	-70	8	21	24	30	54	70	
456	160	3/22/2006	56.1	45	-21.9	-9.4	-65.5	12.5	34	62	77	76	45-6"	
457	134	3/22/2006	56.1	40	-21.9	-11.4	-67.5	10.5	71	58	42	44	17-2"	
458	577	3/22/2006	51.77	10	-32.9	-32.9	-84.67	0	12	21	38	47	72	
459	599	3/22/2006	51.77	10	-32.9	-32.9	-84.67	0	14	18	30	52	90	

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Treadwell & Rollo Pile No.	Project Pile Number[1]	Date Driven	Furnished Length (feet)[2]	Predrill Depth (feet)	Design Pile Cutoff Elevation (feet)[3]	Actual Top of Pile Elevation (feet)[3,4]	Approximate Tip Elevation (feet)[3]	Approximate Cut-off Length (feet)	Final Driving (Blows/foot for final 5 feet)					Remarks
460	620	3/22/2006	51.77	10	-32.9	-31.9	-83.67	1	14	15	20	56	79	
461	409	3/22/2006	46.77	10	-32.9	-32.9	-79.67	0	20	18	16	14	13	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
462	410	3/22/2006	46.77	10	-32.9	-32.9	-79.67	0	22	21	20	19	17	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
463	411	3/22/2006	46.77	10	-32.9	-32.9	-79.67	0	65	65	45	35	30	
464	412	3/22/2006	46.77	10	-32.9	-32.9	-79.67	0	34	30	27	23	32	
465	432	3/22/2006	55.77	10	-32.9	-32.9	-88.67	0	21	29	81	73	50-6"	
466	458	3/22/2006	55.77	10	-32.9	-31.9	-87.67	1	22	25	31	57	67-9"	
467	484	3/22/2006	55.77	10	-32.9	-30.4	-86.17	2.5	16	20	21	43	64	
468	527	3/22/2006	55.77	10	-32.9	-29.4	-85.17	3.5	13	22	54	57	79	
469	108	3/23/2006	50.1	45	-21.9	-10	-60.1	11.9	14	23	36	65	75-6"	
470	86	3/23/2006	50.1	45	-21.9	-18.9	-69	3	34	35	41	62	92	
471	234	3/23/2006	56.1	45	-21.9	-14.4	-70.5	7.5	18	15	22	52	62	
472	262	3/23/2006	56.1	45	-21.9	-14.1	-70.2	7.8	19	17	37	54	68	
473	288	3/23/2006	56.1	45	-21.9	-15.7	-71.8	6.2	29	50	49	53	62	
474	331	3/23/2006	56.1	45	-21.9	-21.9	-78	0	43	35	33	34	16-6"	
475	357	3/23/2006	56.1	45	-21.9	-21.9	-78	0	42	47	38	35	31	
476	383	3/23/2006	56.1	45	-21.9	-21.9	-78	0	43	43	37	31	28	
477	426	3/23/2006	56.1	45	-21.9	-21.9	-78	0	29	24	23	23	22	
478	233	3/23/2006	56.1	45	-21.9	-13.9	-70	8	20	23	34	82	40-6"	
479	261	3/23/2006	56.1	45	-21.9	-13.9	-70	8	21	22	27	74	77	
480	287	3/23/2006	56.1	45	-21.9	-14.9	-71	7	21	26	45	59	65	
481	330	3/23/2006	56.1	45	-21.9	-13.9	-70	8	19	28	36	50	93	
482	356	3/23/2006	56.1	45	-21.9	-21.9	-78	0	28	27	27	24	24	
483	453	3/23/2006	64.1	45	-21.9	-21.9	-86	0	8	9	7	8	9-6"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
484	479	3/23/2006	65.1	45	-21.9	-21.9	-87	0	10	17	20	48	61	
485	522	3/23/2006	65.1	45	-21.9	-21.9	-87	0	14	13	21	29	70	
486	548	3/23/2006	65.1	45	-21.9	-19.9	-85	2	21	21	26	71	65	
487	431	3/23/2006	51.77	10	-32.9	-32.9	-84.67	0	18	19	24	29	13-4"	
488	430	3/23/2006	51.77	10	-32.9	-32.9	-84.67	0	26	33	34	47	10-3"	
489	457	3/23/2006	51.77	10	-32.9	-22.4	-74.17	10.5	98	101	98	54	45	
490	456	3/23/2006	51.77	10	-32.9	-17.9	-69.67	15	43	71	96	97	20-3"	
491	482	3/23/2006	51.77	35	-32.9	-32.9	-84.67	0	18	24	29	56	82	
492	452	3/24/2006	65.1	45	-21.9	-21.9	-87	0	14	17	34	54	75	
493	478	3/24/2006	65.1	45	-21.9	-21.9	-87	0	19	16	28	55	78	
494	521	3/24/2006	65.1	45	-21.9	-21.9	-87	0	48	30	58	81	45-6"	
495	547	3/24/2006	65.1	45	-21.9	-21.9	-87	0	20	33	54	85	46-6"	
496	520	3/24/2006	65.1	45	-21.9	-21.9	-87	0	12	19	34	75	88	
497	451	3/24/2006	65.1	45	-21.9	-9.9	-75	12	52	66	57	60	107	
498	425	3/24/2006	56.1	45	-21.9	-21.9	-78	0	27	23	25	21	22	
499	573	3/24/2006	61.1	45	-21.9	-21.9	-83	0	28	18	17	16	8-6"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
500	616	3/24/2006	61.1	45	-21.9	-21.9	-83	0	21	18	12	13	12	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
501	483	3/24/2006	51.77	35	-32.9	-19.9	-71.67	13	68	80	110	95	85	
502	552	3/24/2006	51.77	15	-32.9	-30.9	-82.67	2	14	15	20	44	72-10"	
503	578	3/24/2006	51.77	35	-32.9	-31.9	-83.67	1	12	14	23	58	79-10"	

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Treadwell & Rollo Pile No.	Project Pile Number[1]	Date Driven	Furnished Length (feet)[2]	Predrill Depth (feet)	Design Pile Cutoff Elevation (feet)[3]	Actual Top of Pile Elevation (feet)[3,4]	Approximate Tip Elevation (feet)[3]	Approximate Cut-off Length (feet)	Final Driving (Blows/foot for final 5 feet)					Remarks
504	600	3/24/2006	51.77	35	-32.9	-31.9	-83.67	1	14	16	20	57	73-9"	
505	621	3/24/2006	51.77	35	-32.9	-30.9	-82.67	2	20	25	25	65	32-3"	
506	553	3/24/2006	55.77	35	-32.9	-19.9	-75.67	13	110	75	61	60	104	
507	579	3/24/2006	51.77	35	-32.9	-31.9	-83.67	1	19	14	17	28	98	
508	601	3/24/2006	51.77	35	-32.9	-20.9	-72.67	12	40	67	108	116	97	
509	622	3/24/2006	51.77	35	-32.9	-31.4	-83.17	1.5	20	18	20	39	40-4"	
510	78	3/27/2006	50.1	15	-21.9	-21.9	-72	0	20	25	31	30	24	
511	79	3/27/2006	50.1	15	-21.9	-21.9	-72	0	19	22	29	27	27	
512	80	3/27/2006	50.1	15	-21.9	-21.9	-72	0	22	24	33	28	33	
513	81	3/27/2006	50.1	15	-21.9	-21.9	-72	0	22	24	36	28	33	
514	82	3/27/2006	50.1	15	-21.9	-21.9	-72	0	34	33	45	38	32-9"	
515	83	3/27/2006	50.1	15	-21.9	-20.15	-70.25	1.75	28	36	52	49	65	
516	100	3/27/2006	50.1	15	-21.9	-21.9	-72	0	17	26	30	32	27	
517		3/27/2006	50.1	15	-21.9	-21.9	-72	0	29	31	35	38	17-6"	
518	102	3/27/2006	50.1	15	-21.9	-21.9	-72	0	30	32	40	32	15-6"	
519	103	3/27/2006	50.1	15	-21.9	-21.9	-72	0	33	35	43	37	20-9"	
520	104	3/27/2006	50.1	15	-21.9	-21.9	-72	0	30	40	38	58	48	
521	105	3/27/2006	50.1	15	-21.9	-19.9	-70	2	31	33	46	50	70	
522	124	3/27/2006	56.1	15	-21.9	-21.9	-78	0	26	27	26	23	11-6"	
523	125	3/27/2006	56.1	15	-21.9	-21.9	-78	0	24	30	24	24	11-6"	
524	126	3/27/2006	56.1	15	-21.9	-21.9	-78	0	26	31	26	24	22	
525	743	3/27/2006	61.1	45	-21.9	-21.9	-83	0	9	12	17	58	35-6"	
526	715	3/27/2006	61.1	45	-21.9	-21.9	-83	0	16	10	32	80	18-2"	
527	687	3/27/2006	61.1	45	-21.9	-21.9	-83	0	17	14	19	53	26-4"	
528	642	3/27/2006	61.1	45	-21.9	-21.9	-83	0	15	17	18	22	51	
529	572	3/27/2006	61.1	45	-21.9	-22.9	-84	-1	12	10	9	11	15	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
530	615	3/27/2006	61.1	45	-21.9	-21.9	-83	0	18	20	17	16	14-7"	
531	641	3/27/2006	61.1	45	-21.9	-21.9	-83	0	20	20	19	25	69	
532	686	3/27/2006	61.1	45	-21.9	-21.9	-83	0	21	18	18	45	118	
533	714	3/27/2006	61.1	45	-21.9	-21.9	-83	0	17	16	19	52	116-9"	
534	742	3/27/2006	61.1	45	-21.9	-21.9	-83	0	10	10	18	61	49-6"	
535	769	3/27/2006	61.1	45	-21.9	-21.9	-83	0	9	8	12	33	72	
536	812	3/27/2006	61.1	45	-21.9	-21.9	-83	0	8	11	12	35	56	
537	834	3/27/2006	61.1	45	-21.9	-21.9	-83	0	10	11	37	70	22-3"	
538	485	3/28/2006	55.77	15	-32.9	-32.9	-88.67	0	30	36	57	64	30-6"	
539	459	3/28/2006	55.77	15	-32.9	-32.9	-88.67	0	21	27	40	47	74	
540	433	3/28/2006	55.77	15	-32.9	-32.9	-88.67	0	23	31	46	57	78	
541	127	3/28/2006	56.1	15	-21.9	-14.4	-70.5	7.5	19	29	60	72	112	
542	128	3/28/2006	56.1	15	-21.9	-21.9	-78	0	31	33	29	27	24	
543	129	3/28/2006	56.1	15	-21.9	-13.9	-70	8	55	32	65	62	82	
544	130	3/28/2006	56.1	15	-21.9	-8.4	-64.5	13.5	23	39	85	103	101	
545	84	3/28/2006	50.1	15	-21.9	-19.9	-70	2	49	53	50	57	70	
546	85	3/28/2006	50.1	15	-21.9	-17.4	-67.5	4.5	115	73	51	71	33-3"	
547	106	3/28/2006	50.1	45	-21.9	-18.4	-68.5	3.5	110	70	55	54	81	

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548	107	3/28/2006	50.1	15	-21.9	-16.9	-67	5	95	52	44	63	88	
549	131	3/28/2006	56.1	15	-21.9	-7.4	-63.5	14.5	17	35	67	123	85-6"	
550	623	3/28/2006	51.77	35	-32.9	-32.9	-84.67	0	18	22	58	113	29-2"	
551	856	3/28/2006	61.1	45	-21.9	-21.9	-83	0	9	12	30	44	28-5"	
552	878	3/28/2006	61.1	45	-21.9	-21.9	-83	0	8	10	22	44	31-6"	
553	811	3/28/2006	61.1	45	-21.9	-21.9	-83	0	11	11	33	50	13-2"	
554	768	3/28/2006	61.1	45	-21.9	-21.9	-83	0	8	10	12	34	46-11"	
555	833	3/28/2006	61.1	45	-21.9	-21.9	-83	0	10	12	36	62	34-5"	
556	855	3/28/2006	61.1	45	-21.9	-21.9	-83	0	9	9	16	32	13-3"	
557	877	3/28/2006	61.1	45	-21.9	-21.9	-83	0	12	15	38	63	9-7"	Pile Broken, replacement pile (#877-R) driven on 4/20/06 see RFI #163
558	832	3/28/2006	61.1	10	-21.9	-21.9	-83	0	10	12	30	57	31-4"	
559	854	3/28/2006	61.1	10	-21.9	-21.9	-83	0	10	17	38	68	29-4"	
560	876	3/28/2006	61.1	10	-21.9	-21.9	-83	0	11	15	39	74	36-5"	
561	528	3/28/2006	55.77	35	-32.9	-27.9	-83.67	5	12	13	32	65	73	
562	554	3/28/2006	55.77	35	-32.9	-27.1	-82.87	5.8	14	15	18	73	64-6"	
563	413	3/29/2006	46.77	15	-32.9	-32.9	-79.67	0	35	24	19	13	12	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
564	391	3/29/2006	56.1	15	-21.9	-20.9	-77	1	35	35	25	22	21	
565	365	3/29/2006	56.1	15	-21.9	-21.9	-78	0	29	24	21	17	8-6"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
566	339	3/29/2006	56.1	15	-21.9	-21.9	-78	0	26	30	21	21	17	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
567	318	3/29/2006	56.1	15	-21.9	-21.9	-78	0	26	26	23	19	16	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
568	296	3/29/2006	56.1	15	-21.9	-21.9	-78	0	28	27	20	20	17	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
569	270	3/29/2006	56.1	15	-21.9	-21.9	-78	0	22	23	26	20	15	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
570	248	3/29/2006	56.1	15	-21.9	-21.9	-78	0	22	27	22	21	21	
571	220	3/29/2006	56.1	15	-21.9	-13.9	-70	8	23	36	66	81	90	
572	192	3/29/2006	56.1	15	-21.9	-11.9	-68	10	87	73	49	48	102	
573	170	3/29/2006	56.1	15	-21.9	-21.9	-78	0	29	29	26	24	12-6"	
574	580	3/29/2006	51.77	35	-32.9	-30.9	-82.67	2	16	17	18	17	73	
575	602	3/29/2006	51.77	35	-32.9	-31.9	-83.67	1	13	16	22	46	62-6"	
576	868	3/29/2006	61.1	10	-21.9	-21.9	-83	0	9	15	35	47	14-3"	
577	846	3/29/2006	61.1	35	-21.9	-21.9	-83	0	9	12	30	46	38-6"	
578	824	3/29/2006	61.1	20	-21.9	-21.9	-83	0	8	12	21	30	21-4"	
579	869	3/29/2006	61.1	35	-21.9	-21.9	-83	0	8	8	19	30	65	
580	847	3/29/2006	61.1	35	-21.9	-21.9	-83	0	8	10	16	35	49	
581	825	3/29/2006	61.1	10	-21.9	-21.9	-83	0	8	9	11	23	58	
582	848	3/29/2006	61.1	35	-21.9	-21.9	-83	0	7	9	11	29	56	
583	870	3/29/2006	61.1	35	-21.9	-21.9	-83	0	8	10	34	72	37-4"	
584	826	3/29/2006	61.1	10	-21.9	-21.9	-83	0	10	10	15	34	53	
585	871	3/29/2006	61.1	10	-21.9	-21.9	-83	0	9	10	36	50	22-3"	
586	849	3/29/2006	61.1	10	-21.9	-21.9	-83	0	9	9	12	21	39	
587	827	3/29/2006	61.1	10	-21.9	-21.9	-83	0	11	14	30	57	21-4"	
588	872	3/29/2006	61.1	10	-21.9	-21.9	-83	0	10	17	42	53	15-3"	
589	193	3/30/2006	56.1	15	-21.9	-11.9	-68	10	44	33	37	77	30-3"	
590	221	3/30/2006	56.1	15	-21.9	-21.9	-78	0	25	47	36	28	13-6"	
591	249	3/30/2006	56.1	15	-21.9	-21.9	-78	0	34	37	38	33	31	

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592	271	3/30/2006	56.1	15	-21.9	-13.9	-70	8	16	35	55	78	86	
593	297	3/30/2006	56.1	15	-21.9	-16.9	-73	5	74	63	69	58	65	
594	319	3/30/2006	56.1	15	-21.9	-21.9	-78	0	41	36	27	23	11-6"	
595	340	3/30/2006	56.1	15	-21.9	-13.9	-70	8	19	38	49	69	84	
596	366	3/30/2006	56.1	15	-21.9	-21.9	-78	0	38	35	25	22	21	
597	392	3/30/2006	56.1	15	-21.9	-21.9	-78	0	33	25	24	17	16	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
598	145	3/30/2006	56.1	15	-21.9	-21.9	-78	0	29	27	34	29	23	
599	171	3/30/2006	56.1	15	-21.9	-13.9	-70	8	32	30	48	61	80	
600	146	3/30/2006	56.1	15	-21.9	-21.9	-78	0	44	34	41	33	27	
601	850	3/30/2006	61.1	10	-21.9	-21.9	-83	0	10	13	34	68	18-3"	
602	873	3/30/2006	61.1	10	-21.9	-21.9	-83	0	10	16	34	59	15-3"	
603	851	3/30/2006	61.1	10	-21.9	-21.9	-83	0	8	11	19	60	79	
604	874	3/30/2006	61.1	35	-21.9	-21.9	-83	0	9	11	30	52	48-9'	
605	852	3/30/2006	61.1	35	-21.9	-21.9	-83	0	10	10	15	50	80	
606	853	3/30/2006	61.1	35	-21.9	-21.9	-83	0	11	12	16	38	82	
607	875	3/30/2006	61.1	35	-21.9	-21.9	-83	0	10	17	35	58	51-9"	
608	831	3/30/2006	61.1	10	-21.9	-21.9	-83	0	10	11	18	50	35-7"	
609	728	3/30/2006	61.1	10	-21.9	-21.9	-83	0	32	33	34	55	76	
610	750	3/30/2006	61.1	35	-21.9	-21.9	-83	0	15	18	23	65	63-9"	
611	776	3/30/2006	61.1	35	-21.9	-21.9	-83	0	10	20	26	84	80-6"	
612	798	3/30/2006	61.1	35	-21.9	-21.9	-83	0	12	13	19	35	63	
613	172	3/31/2006	56.1	15	-21.9	-13.9	-70	8	21	33	52	71	84	
614	195	3/31/2006	56.1	15	-21.9	-13.9	-70	8	26	36	60	94	105	
615	222	3/31/2006	56.1	15	-21.9	-13.9	-70	8	21	36	57	60	80	
616	250	3/31/2006	56.1	15	-21.9	-13.9	-70	8	21	30	56	64	72	
617	272	3/31/2006	56.1	15	-21.9	-13.9	-70	8	26	42	56	66	85	
618	298	3/31/2006	56.1	15	-21.9	-13.9	-70	8	44	52	78	93	45-6"	
619	320	3/31/2006	56.1	15	-21.9	-13.9	-70	8	39	53	76	75	43-6"	
620	341	3/31/2006	56.1	15	-21.9	-13.9	-70	8	22	36	64	103	46-6"	
621	367	3/31/2006	56.1	15	-21.9	-13.9	-70	8	23	43	59	72	42-6"	
622	223	3/31/2006	56.1	15	-21.9	-13.9	-70	8	21	36	55	75	82	
623	251	3/31/2006	56.1	15	-21.9	-21.9	-78	0	40	33	28	30	13-6"	
624	273	3/31/2006	56.1	15	-21.9	-21.9	-78	0	36	29	27	25	23	
625	393	3/31/2006	56.1	15	-21.9	-21.65	-77.75	0.25	34	28	22	17	19-3"	Restrike performed on final 3-inches of driving on 4/1/06
626	729	3/31/2006	61.1	35	-21.9	-21.9	-83	0	11	13	14	31	82	
627	701	3/31/2006	61.1	35	-21.9	-21.9	-83	0	10	12	20	59	29-5"	
628	673	3/31/2006	61.1	35	-21.9	-21.9	-83	0	10	14	22	60	44-6"	
629	650	3/31/2006	61.1	35	-21.9	-21.9	-83	0	10	11	14	39	49-9"	
630	730	3/31/2006	61.1	35	-21.9	-21.9	-83	0	9	9	11	16	60	
631	702	3/31/2006	61.1	35	-21.9	-21.9	-83	0	10	9	13	43	62-7"	
632	674	3/31/2006	61.1	35	-21.9	-21.9	-83	0	10	10	11	46	40-6"	
633	651	3/31/2006	61.1	35	-21.9	-21.9	-83	0	9	12	13	40	69-9"	
634	731	3/31/2006	61.1	35	-21.9	-21.9	-83	0	10	12	14	46	52-6"	
635	703	3/31/2006	61.1	35	-21.9	-21.9	-83	0	11	10	12	32	71-9"	

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Treadwell & Rollo Pile No.	Project Pile Number[1]	Date Driven	Furnished Length (feet)[2]	Predrill Depth (feet)	Design Pile Cutoff Elevation (feet)[3]	Actual Top of Pile Elevation (feet)[3,4]	Approximate Tip Elevation (feet)[3]	Approximate Cut-off Length (feet)	Final Driving (Blows/foot for final 5 feet)					Remarks
636	675	3/31/2006	61.1	35	-21.9	-21.9	-83	0	11	12	24	72	29-3"	
637	652	3/31/2006	61.1	35	-21.9	-21.9	-83	0	11	12	27	70	51-6"	
638	732	3/31/2006	61.1	35	-21.9	-21.9	-83	0	10	10	13	56	50-6"	
639	704	3/31/2006	61.1	35	-21.9	-21.9	-83	0	10	10	13	47	80	
640	299	4/1/2006	56.1	15	-21.9	-13.9	-70	8	27	33	48	72	46-6"	
641	321	4/1/2006	56.1	15	-21.9	-13.9	-70	8	34	38	60	79	82	
642	342	4/1/2006	56.1	15	-21.9	-21.9	-78	0	41	39	30	26	24	
643	368	4/1/2006	56.1	15	-21.9	-21.9	-78	0	31	31	24	22	19	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
644	394	4/1/2006	56.1	15	-21.9	-21.9	-78	0	34	28	26	27	23	
645	434	4/1/2006	55.77	15	-32.9	-32.9	-88.67	0	23	51	61	58	32-9"	
646	414	4/1/2006	46.77	15	-32.9	-32.9	-79.67	0	25	20	18	23	17	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
647	415	4/1/2006	46.77	15	-32.9	-22.9	-69.67	10	32	45	68	88	105	
648	416	4/1/2006	46.77	15	-32.9	-32.9	-79.67	0	35	31	30	24	12-6"	
649	460	4/1/2006	55.77	15	-32.9	-32.9	-88.67	0	32	68	73	54	22-6"	
650	676	4/1/2006	61.1	35	-21.9	-21.9	-83	0	15	15	22	66	25-3"	
651	627	4/1/2006	51.77	35	-32.9	-32.9	-84.67	0	13	24	57	79	30-4"	
652	606	4/1/2006	51.77	35	-32.9	-31.9	-83.67	1	9	12	28	56	60-4"	
653	584	4/1/2006	51.77	35	-32.9	-32.9	-84.67	0	13	33	54	55	13-3"	
654	624	4/1/2006	51.77	35	-32.9	-32.9	-84.67	0	13	14	16	38	79	
655	603	4/1/2006	51.77	35	-32.9	-32.9	-84.67	0	13	14	15	19	56	
656	581	4/1/2006	51.77	35	-32.9	-31.9	-83.67	1	12	14	16	55	79-9"	
657	625	4/1/2006	51.77	35	-32.9	-31.9	-83.67	1	13	13	13	20	63	
658	604	4/1/2006	51.77	35	-32.9	-31.9	-83.67	1	16	16	15	30	97	
659	582	4/1/2006	51.77	35	-32.9	-31.9	-83.67	1	13	13	16	54	70-9"	
660	626	4/1/2006	51.77	35	-32.9	-30.9	-82.67	2	15	16	19	20	69	
661	605	4/1/2006	51.77	35	-32.9	-31.9	-83.67	1	18	17	18	30	90	
662	583	4/1/2006	51.77	35	-32.9	-30.9	-82.67	2	18	17	15	19	73	
663	147	4/3/2006	56.1	15	-21.9	-14.9	-71	7	26	30	58	81	78	
664	173	4/3/2006	56.1	15	-21.9	-13.9	-70	8	16	27	53	87	48-6"	
665	148	4/3/2006	56.1	15	-21.9	-21.9	-78	0	38	38	28	28	11-6"	
666	196	4/3/2006	56.1	15	-21.9	-13.4	-69.5	8.5	24	28	48	86	60-6"	
667	174	4/3/2006	56.1	15	-21.9	-13.4	-69.5	8.5	32	22	25	61	110	
668	149	4/3/2006	56.1	15	-21.9	-14.9	-71	7	20	42	66	73	75	
669	224	4/3/2006	56.1	15	-21.9	-21.9	-78	0	27	38	33	26	26	
670	197	4/3/2006	56.1	15	-21.9	-13.4	-69.5	8.5	23	33	53	93	60-6"	
671	175	4/3/2006	56.1	15	-21.9	-12.9	-69	9	42	33	30	44	103	
672	150	4/3/2006	56.1	15	-21.9	-12.65	-68.75	9.25	63	41	49	67	25-3"	
673	252	4/3/2006	56.1	15	-21.9	-21.9	-78	0	39	41	35	32	25	
674	225	4/3/2006	56.1	15	-21.9	-14.4	-70.5	7.5	22	33	68	79	82	
675	198	4/3/2006	56.1	15	-21.9	-11.9	-68	10	74	52	39	59	83	
676	555	4/3/2006	55.77	35	-32.9	-27.9	-83.67	5	13	17	25	57	72-9"	
677	529	4/3/2006	55.77	35	-32.9	-28.9	-84.67	4	12	16	36	44	74	
678	508	4/3/2006	55.77	35	-32.9	-32.9	-88.67	0	56	46	50	67	31-6"	
679	486	4/3/2006	55.77	35	-32.9	-29.9	-85.67	3	15	18	25	35	65	

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680	556	4/3/2006	55.77	35	-32.9	-27.9	-83.67	5	18	17	17	21	72	
681	530	4/3/2006	55.77	35	-32.9	-27.9	-83.67	5	16	15	16	27	86	
682	509	4/3/2006	55.77	35	-32.9	-29.9	-85.67	3	19	27	60	57	64	
683	487	4/3/2006	55.77	35	-32.9	-29.9	-85.67	3	21	21	34	55	85	
684	461	4/3/2006	55.77	35	-32.9	-28.9	-84.67	4	17	21	24	37	82	
685	435	4/3/2006	55.77	35	-32.9	-30.9	-86.67	2	22	24	26	46	89	
686	436	4/3/2006	55.77	35	-32.9	-18.9	-74.67	14	130	109	117	107	102	
687	176	4/4/2006	56.1	15	-21.9	-11.4	-67.5	10.5	95	55	36	54	48-6"	
688	274	4/4/2006	56.1	15	-21.9	-15.9	-72	6	55	64	69	69	66	
689	253	4/4/2006	56.1	15	-21.9	-13.4	-69.5	8.5	28	25	50	90	106	
690	226	4/4/2006	56.1	15	-21.9	-13.9	-70	8	25	32	70	96	20-3"	
691	199	4/4/2006	56.1	15	-21.9	-14.9	-71	7	49	35	39	80	110	
692	300	4/4/2006	56.1	15	-21.9	-15.7	-71.8	6.2	60	68	51	42	82	
693	275	4/4/2006	56.1	15	-21.9	-13.9	-70	8	31	46	81	92	132	
694	254	4/4/2006	56.1	15	-21.9	-12.9	-69	9	63	30	40	85	94-6"	
695	227	4/4/2006	56.1	15	-21.9	-12.9	-69	9	51	34	43	75	71-6"	
696	322	4/4/2006	56.1	15	-21.9	-11.9	-68	10	52	37	35	50	100-6"	
697	301	4/4/2006	56.1	15	-21.9	-11.4	-67.5	10.5	54	38	34	73	130-10"	
698	276	4/4/2006	56.1	15	-21.9	-12.9	-69	9	51	37	45	80	100-6"	
699	557	4/4/2006	55.77	35	-32.9	-28.9	-84.67	4	16	15	18	36	90	
700	531	4/4/2006	55.77	35	-32.9	-27.9	-83.67	5	17	15	19	22	66	
701	488	4/4/2006	55.77	35	-32.9	-30.9	-86.67	2	22	27	37	56	93	
702	462	4/4/2006	55.77	35	-32.9	-17.9	-73.67	15	127	94	133	100	102	
703	255	4/5/2006	56.1	15	-21.9	-8.5	-64.6	13.4	22	45	86	141	125	
704	323	4/5/2006	56.1	15	-21.9	-11.9	-68	10	52	49	42	50	107	
705	302	4/5/2006	56.1	15	-21.9	-11.9	-68	10	67	41	41	89	60-6"	
706	277	4/5/2006	56.1	15	-21.9	-12.4	-68.5	9.5	71	54	31	49	107	
707	343	4/5/2006	56.1	15	-21.9	-21.9	-78	0	42	37	29	24	26	
708	369	4/5/2006	56.1	15	-21.9	-21.9	-78	0	47	39	33	40	20-6"	
709	344	4/5/2006	56.1	15	-21.9	-21.9	-78	0	5	5	6	8	6	Pile Broken, no replacement pile needed, see RFI #179
710	370	4/5/2006	56.1	15	-21.9	-12.4	-68.5	9.5	40	32	54	60	40-6"	
711	324	4/5/2006	56.1	15	-21.9	-11.9	-68	10	49	39	39	61	30-3"	
712	345	4/5/2006	56.1	15	-21.9	-11.65	-67.75	10.25	58	41	40	69	20-3"	
713	371	4/5/2006	56.1	15	-21.9	-12.4	-68.5	9.5	47	44	34	44	91	
714	303	4/5/2006	56.1	15	-21.9	-11.15	-67.25	10.75	87	70	44	46	30-3"	
715	325	4/5/2006	56.1	15	-21.9	-21.9	-78	0	7	7	9	11	10	Pile Broken, no replacement pile needed, see RFI #179
716	346	4/5/2006	56.1	15	-21.9	-10.65	-66.75	11.25	55	51	37	45	20-3"	
717	751	4/5/2006	61.1	35	-21.9	-21.9	-83	0	16	16	21	36	88	
718	752	4/5/2006	61.1	35	-21.9	-21.9	-83	0	11	14	15	25	87	
719	777	4/5/2006	61.1	35	-21.9	-21.9	-83	0	16	19	20	27	61	
720	799	4/5/2006	61.1	35	-21.9	-21.9	-83	0	18	22	30	56	72	
721	778	4/5/2006	61.1	35	-21.9	-21.9	-83	0	17	15	24	56	69-9"	
722	800	4/5/2006	61.1	35	-21.9	-21.9	-83	0	17	19	39	63	27-3"	
723	753	4/5/2006	61.1	35	-21.9	-21.9	-83	0	13	13	12	28	78	

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724	779	4/5/2006	61.1	35	-21.9	-21.9	-83	0	12	15	22	79	49-3"	
725	801	4/5/2006	61.1	35	-21.9	-21.9	-83	0	15	14	26	42	50-6"	
726	754	4/5/2006	61.1	35	-21.9	-21.9	-83	0	18	18	28	90	47-3"	
727	780	4/5/2006	61.1	35	-21.9	-21.9	-83	0	19	19	30	42	153	
728	802	4/5/2006	61.1	35	-21.9	-21.23	-82.33	0.67	36	30	30	42	85-9"	
729	375	4/6/2006	56.1	15	-21.9	-12.9	-69	9	39	35	33	44	79	
730	398	4/6/2006	56.1	15	-21.9	-21.9	-78	0	33	29	25	22	15	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
731	397	4/6/2006	56.1	15	-21.9	-21.9	-78	0	33	31	24	25	23	
732	132	4/6/2006	56.1	35	-21.9	-7.5	-63.6	14.4	15	17	39	71	30-3"	
733	133	4/6/2006	56.1	35	-21.9	-7	-63.1	14.9	9	11	30	53	102	
734	396	4/6/2006	56.1	15	-21.9	-21.9	-78	0	40	38	28	29	22	
735	395	4/6/2006	56.1	15	-21.9	-11.4	-67.5	10.5	44	44	42	64	94	
736	418	4/6/2006	46.77	15	-32.9	-23.9	-70.67	9	46	67	74	77	105	
737	419	4/6/2006	46.77	15	-32.9	-20.9	-67.67	12	38	50	59	81	28-3"	
738	417	4/6/2006	46.77	25	-32.9	-19.4	-66.17	13.5	36	43	72	71	126	
739	439	4/6/2006	55.77	25	-32.9	-13.75	-69.52	19.15	69	102	116	165	50-3"	
740	440	4/6/2006	55.77	25	-32.9	-30.9	-86.67	2	20	21	27	46	63	
741	437	4/6/2006	55.77	35	-32.9	-32.9	-88.67	0	13	10	10	9	4-6"	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
742	438	4/6/2006	55.77	35	-32.9	-30.4	-86.17	2.5	16	18	20	45	65-9"	
743	464	4/6/2006	55.77	35	-32.9	-32.9	-88.67	0	22	39	70	84	90	
744	465	4/6/2006	55.77	35	-32.9	-32.9	-88.67	0	22	52	56	90	30-5"	
745	463	4/6/2006	55.77	35	-32.9	-29.9	-85.67	3	21	22	30	37	61	
746	489	4/6/2006	55.77	35	-32.9	-29.9	-85.67	3	19	28	37	51	70-9"	
747	511	4/6/2006	55.77	35	-32.9	-28.9	-84.67	4	25	26	37	50	61	
748	151	4/7/2006	56.1	25	-21.9	-7.4	-63.5	14.5	20	40	58	93	50-6"	
749	152	4/7/2006	56.1	15	-21.9	-7.4	-63.5	14.5	16	30	45	75	100	
750	177	4/7/2006	56.1	15	-21.9	-6.9	-63	15	24	42	47	85	80-6"	
751	200	4/7/2006	56.1	15	-21.9	-11.4	-67.5	10.5	71	52	45	50	55-6"	
752	228	4/7/2006	56.1	15	-21.9	-11.4	-67.5	10.5	80	57	46	59	45-6"	
753	256	4/7/2006	56.1	15	-21.9	-11.15	-67.25	10.75	52	66	50	49	95	
754	278	4/7/2006	56.1	15	-21.9	-10.65	-66.75	11.25	53	57	65	47	37	
755	304	4/7/2006	56.1	15	-21.9	-11.4	-67.5	10.5	67	86	61	47	50	
756	326	4/7/2006	56.1	15	-21.9	-12.15	-68.25	9.75	54	35	31	43	55-9"	
757	347	4/7/2006	56.1	15	-21.9	-14.2	-70.3	7.7	26	39	74	82	90	
758	178	4/7/2006	56.1	15	-21.9	-11.15	-67.25	10.75	68	61	43	46	20-2"	
759	201	4/7/2006	56.1	15	-21.9	-11.4	-67.5	10.5	86	71	57	48	50-6"	
760	229	4/7/2006	56.1	15	-21.9	-6.9	-63	15	7	15	33	71	130	
761	257	4/7/2006	56.1	15	-21.9	-8.15	-64.25	13.75	32	45	67	72	12-2"	
762	279	4/7/2006	56.1	15	-21.9	-10.65	-66.75	11.25	93	67	43	38	65	
763	532	4/7/2006	55.77	35	-32.9	-30.9	-86.67	2	45	54	37	54	64	
764	558	4/7/2006	55.77	35	-32.9	-27.9	-83.67	5	16	15	22	36	69	
765	654	4/7/2006	61.1	35	-21.9	-21.9	-83	0	13	13	11	51	41-6"	
766	655	4/7/2006	61.1	35	-21.9	-21.9	-83	0	10	11	13	57	38-4"	
767	656	4/7/2006	61.1	35	-21.9	-21.9	-83	0	12	11	13	25	87	

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768	657	4/7/2006	61.1	35	-21.9	-21.9	-83	0	12	10	15	22	100	
769	628	4/7/2006	51.77	35	-32.9	-31.9	-83.67	1	13	12	17	35	95	
770	607	4/7/2006	51.77	35	-32.9	-30.9	-82.67	2	15	15	16	27	60-6"	
771	585	4/7/2006	51.77	35	-32.9	-32.9	-84.67	0	19	15	16	42	88	
772	629	4/7/2006	51.77	35	-32.9	-30.9	-82.67	2	12	16	17	54	63-6"	
773	608	4/7/2006	51.77	35	-32.9	-30.9	-82.67	2	16	16	20	25	94	
774	305	4/8/2006	56.1	15	-21.9	-21.9	-78	0	8	7	10	8	12	Pile Broken, no replacement pile needed, see RFI #182
775	327	4/8/2006	56.1	15	-21.9	-8.4	-64.5	13.5	5	17	43	55	67	
776	348	4/8/2006	56.1	15	-21.9	-12.4	-68.5	9.5	38	26	23	37	69	
777	374	4/8/2006	56.1	15	-21.9	-12.4	-68.5	9.5	32	26	19	44	77	
778	153	4/8/2006	56.1	15	-21.9	-6.9	-63	15	23	25	39	66	99	
779	179	4/8/2006	56.1	15	-21.9	-6.9	-63	15	11	26	34	60	90	
780	202	4/8/2006	56.1	15	-21.9	-11.65	-67.75	10.25	69	47	31	35	40-6"	
781	230	4/8/2006	56.1	15	-21.9	-7.4	-63.5	14.5	8	12	37	67	42-6"	
782	258	4/8/2006	56.1	15	-21.9	-7.65	-63.75	14.25	12	18	35	53	70	
783	280	4/8/2006	56.1	15	-21.9	-6.75	-62.85	15.15	6	7	11	41	80	
784	306	4/8/2006	56.1	15	-21.9	-6.9	-63	15	6	11	30	70	55-6"	
785	328	4/8/2006	56.1	15	-21.9	-11.65	-67.75	10.25	51	26	19	39	42-6"	
786	349	4/8/2006	56.1	15	-21.9	-13.15	-69.25	8.75	19	17	27	52	80	
787	375	4/8/2006	56.1	15	-21.9	-13.4	-69.5	8.5	13	14	32	50	67	
788	159	4/8/2006	56.1	15	-21.9	-6.5	-62.6	15.4	12	32	48	45	98	
789	203	4/8/2006	56.1	15	-21.9	-6.9	-63	15	19	17	32	56	80	
790	204	4/8/2006	56.1	15	-21.9	-11	-67.1	10.9	62	61	54	41	40-6"	
791	232	4/8/2006	56.1	15	-21.9	-7.9	-64	14	18	19	35	57	75	
792	259	4/8/2006	56.1	15	-21.9	-7.9	-64	14	10	20	42	72	77	
793	586	4/8/2006	51.77	35	-32.9	-32.9	-84.67	0	15	18	39	44	35	
794	630	4/8/2006	51.77	35	-32.9	-31.9	-83.67	1	14	16	21	55	63-6"	
795	609	4/8/2006	51.77	35	-32.9	-31.9	-83.67	1	16	14	16	22	84	
796	587	4/8/2006	51.77	35	-32.9	-32.9	-84.67	0	19	25	48	58	20-6"	
797	559	4/8/2006	55.77	35	-32.9	-28.4	-84.17	4.5	20	18	19	50	89	
798	533	4/8/2006	55.77	35	-32.9	-29.4	-85.17	3.5	15	17	29	49	85	
799	512	4/8/2006	55.77	35	-32.9	-29.9	-85.67	3	21	20	26	40	76	
800	490	4/8/2006	55.77	35	-32.9	-14	-69.77	18.9	59	78	117	168	78-4"	
801	560	4/8/2006	55.77	35	-32.9	-16	-71.77	16.9	50	110	129	170	209	
802	534	4/8/2006	55.77	35	-32.9	-16	-71.77	16.9	63	84	110	134	154	
803	513	4/8/2006	55.77	35	-32.9	-14.5	-70.27	18.4	32	76	96	150	100-6"	
804	260	4/10/2006	56.1	15	-21.9	-7.5	-63.6	14.4	7	12	20	34	72	
805	286	4/10/2006	56.1	15	-21.9	-7.75	-63.85	14.15	4	22	44	72	85	
806	329	4/10/2006	56.1	15	-21.9	-13.9	-70	8	18	22	46	67	75	
807	355	4/10/2006	56.1	15	-21.9	-13.9	-70	8	15	22	48	74	74	
808	399	4/10/2006	56.1	15	-21.9	-21.9	-78	0	36	32	23	21	21	
809	421	4/10/2006	56.1	15	-21.9	-21.9	-78	0	47	38	30	30	24	
810	420	4/10/2006	56.1	15	-21.9	-12.65	-68.75	9.25	34	28	48	70	86	
811	400	4/10/2006	56.1	15	-21.9	-12.65	-68.75	9.25	32	28	36	54	88	

TABLE 1
Indicator and Production Pile Summary
301 Mission Street
San Francisco, California

Treadwell & Rollo Pile No.	Project Pile Number[1]	Date Driven	Furnished Length (feet)[2]	Predrill Depth (feet)	Design Pile Cutoff Elevation (feet)[3]	Actual Top of Pile Elevation (feet)[3,4]	Approximate Tip Elevation (feet)[3]	Approximate Cut-off Length (feet)	Final Driving (Blows/foot for final 5 feet)					Remarks
812	401	4/10/2006	56.1	15	-21.9	-13.4	-69.5	8.5	19	25	49	63	82	
813	422	4/10/2006	56.1	15	-21.9	-12.65	-68.75	9.25	28	23	32	56	87	
814	423	4/10/2006	56.1	15	-21.9	-13.15	-69.25	8.75	17	18	33	73	82	
815	828	4/10/2006	61.1	35	-21.9	-21.9	-83	0	14	14	23	48	55	
816	829	4/10/2006	61.1	35	-21.9	-21.9	-83	0	12	13	26	39	49-6"	
817	803	4/10/2006	61.1	35	-21.9	-21.9	-83	0	12	14	21	51	24-4"	
818	781	4/10/2006	61.1	35	-21.9	-21.9	-83	0	11	11	15	50	30-6"	
819	755	4/10/2006	61.1	35	-21.9	-21.9	-83	0	13	15	20	50	40-6"	
820	733	4/10/2006	61.1	35	-21.9	-21.9	-83	0	17	17	20	28	37-6"	
821	705	4/10/2006	61.1	35	-21.9	-21.9	-83	0	12	15	19	79	70-6"	
822	677	4/10/2006	61.1	35	-21.9	-21.9	-83	0	18	19	21	34	70-6"	
823	678	4/10/2006	61.1	35	-21.9	-21.9	-83	0	17	15	17	34	50-6"	
824	706	4/10/2006	61.1	35	-21.9	-21.9	-83	0	21	20	19	25	130	
825	734	4/10/2006	61.1	35	-21.9	-12.9	-74	9	43	55	74	71	85	
826	756	4/10/2006	61.1	35	-21.9	-21.9	-83	0	15	14	28	56	100-9"	
827	782	4/10/2006	61.1	35	-21.9	-21.9	-83	0	15	15	14	21	83-10"	
828	804	4/13/2006	61.1	30	-21.9	-21.9	-83	0	14	15	22	61	17-3"	
829	805	4/13/2006	61.1	30	-21.9	-21.9	-83	0	15	17	30	66	25-3"	
830	783	4/13/2006	61.1	30	-21.9	-21.9	-83	0	15	16	18	37	32-6"	
831	757	4/13/2006	61.1	30	-21.9	-21.9	-83	0	23	20	18	27	65	
832	735	4/13/2006	61.1	30	-21.9	-11.9	-73	10	34	47	56	66	55-10"	
833	707	4/13/2006	61.1	25	-21.9	-9.9	-71	12	18	24	41	57	85	
834	679	4/13/2006	61.1	25	-21.9	-10.4	-71.5	11.5	26	45	53	58	82	
835	561	4/13/2006	55.77	30	-32.9	-32.9	-88.67	0	37	10	6	8	6	Pile Broken, no replacement pile needed, see RFI #203
836	535	4/13/2006	55.77	30	-32.9	-29.9	-85.67	3	22	26	30	42	70	
837	514	4/13/2006	55.77	30	-32.9	-21.9	-77.67	11	76	66	86	71	101	
838	681	4/14/2006	61.1	30	-21.9	-21.9	-83	0	11	13	12	34	34-9"	
839	709	4/14/2006	61.1	25	-21.9	-21.9	-83	0	13	14	14	35	56-9"	
840	737	4/14/2006	61.1	25	-21.9	-21.9	-83	0	13	17	25	70	13-3"	
841	682	4/14/2006	61.1	30	-21.9	-21.9	-83	0	17	19	17	30	78	
842	710	4/14/2006	61.1	30	-21.9	-21.9	-83	0	23	17	19	37	75	
843	738	4/14/2006	61.1	30	-21.9	-21.9	-83	0	13	14	20	63	38-6"	
844	683	4/14/2006	61.1	30	-21.9	-21.9	-83	0	21	18	22	65	70-9"	
845	711	4/14/2006	61.1	30	-21.9	-21.9	-83	0	18	17	20	44	66-6"	
846	739	4/14/2006	61.1	30	-21.9	-9.9	-71	12	26	43	57	72	102	
847	761	4/14/2006	61.1	30	-21.9	-21.9	-83	0	13	12	20	41	65	
848	760	4/14/2006	61.1	30	-21.9	-21.9	-83	0	17	17	22	33	93	
849	491	4/15/2006	55.77	30	-32.9	-15.9	-71.67	17	67	81	102	85	100	
850	492	4/15/2006	55.77	30	-32.9	-30.9	-86.67	2	7	7	6	3	3	Pile Broken, no replacement pile needed, see RFI #203
851	466	4/15/2006	55.77	30	-32.9	-13	-68.77	19.9	26	54	68	77	106	
852	441	4/15/2006	65.1	30	-21.9	-3	-68.1	18.9	38	42	61	110	130	
853	381	4/15/2006	56.1	30	-21.9	-21.9	-78	0	31	25	23	18	19	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
854	424	4/15/2006	56.1	30	-21.9	-14.9	-71	7	16	32	49	72	78	
855	467	4/17/2006	65.1	30	-21.9	-3	-68.1	18.9	27	34	36	75	90	

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Indicator and Production Pile Summary
301 Mission Street
San Francisco, California

Treadwell & Rollo Pile No.	Project Pile Number[1]	Date Driven	Furnished Length (feet)[2]	Predrill Depth (feet)	Design Pile Cutoff Elevation (feet)[3]	Actual Top of Pile Elevation (feet)[3,4]	Approximate Tip Elevation (feet)[3]	Approximate Cut-off Length (feet)	Final Driving (Blows/foot for final 5 feet)					Remarks
856	493	4/17/2006	65.1	30	-21.9	-18.2	-83.3	3.7	30	30	41	85	105	
857	442	4/17/2006	61.1	30	-21.9	-3.5	-64.6	18.4	30	26	46	90	98	
858	468	4/17/2006	61.1	25	-21.9	-3.9	-65	18	28	28	52	91	89	
859	494	4/17/2006	61.1	35	-21.9	-5.7	-66.8	16.2	32	55	67	78	93	
860	443	4/17/2006	61.1	30	-21.9	-3	-64.1	18.9	24	22	31	71	95	
861	469	4/17/2006	61.1	30	-21.9	-4	-65.1	17.9	29	43	68	75	64-6"	
862	495	4/17/2006	61.1	30	-21.9	-4	-65.1	17.9	20	29	53	81	94	
863	444	4/17/2006	61.1	30	-21.9	-5	-66.1	16.9	18	34	68	72	92	
864	470	4/17/2006	61.1	30	-21.9	-4.3	-65.4	17.6	11	23	51	73	103	
865	496	4/17/2006	61.1	30	-21.9	-21.9	-83	0	12	11	16	15	10-6"	
866	135-R	4/17/2006	56.1	25	-21.9	-6.9	-63	15	11	18	33	73	95	Replacement pile for pile #135 broken during driving on 3/22/06
867	450	4/17/2006	65.1	30	-21.9	-4.3	-69.4	17.6	24	37	61	73	98	
868	476	4/17/2006	65.1	30	-21.9	-20.9	-86	1	18	18	20	44	60	
869	515	4/18/2006	65.1	0	-21.9	-4.2	-69.3	17.7	20	37	62	77	95	
870	536	4/18/2006	65.1	0	-21.9	-21.9	-87	0	15	15	10	6	12	Final blowcount < 21 b/ft, capacity is 260 kips - see restrike of pile #393 (3/31/06)
871	562	4/18/2006	65.1	25	-21.9	-21.9	-87	0	19	29	50	65	12-3"	
872	588	4/18/2006	61.1	25	-21.9	-21.9	-83	0	15	15	14	17	7-4"	
873	516	4/18/2006	65.1	0	-21.9	-4.5	-69.6	17.4	20	42	70	62	82	
874	537	4/18/2006	65.1	0	-21.9	-4	-69.1	17.9	18	33	68	81	100	
875	563	4/18/2006	65.1	0	-21.9	-5	-70.1	16.9	41	68	65	74	85	
876	589	4/18/2006	61.1	0	-21.9	-4	-65.1	17.9	62	58	73	67	64	
877	517	4/18/2006	65.1	0	-21.9	-3	-68.1	18.9	21	20	28	86	122	
878	538	4/18/2006	65.1	0	-21.9	-6.5	-71.6	15.4	42	64	67	73	86	
879	564	4/18/2006	65.1	0	-21.9	-4	-69.1	17.9	34	44	68	81	85	
880	590	4/18/2006	61.1	0	-21.9	-10	-71.1	11.9	57	53	57	68	73	
881	518	4/18/2006	65.1	25	-21.9	-4.5	-69.6	17.4	16	39	54	73	85	
882	539	4/18/2006	65.1	0	-21.9	-3.2	-68.3	18.7	19	21	46	76	90	
883	610	4/19/2006	61.1	0	-21.9	-21.9	-83	0	18	16	15	20	49	
884	631	4/19/2006	61.1	20	-21.9	-9.9	-71	12	33	52	58	63	73	
885	680	4/19/2006	61.1	20	-21.9	-21.9	-83	0	19	15	18	32	61	
886	611	4/19/2006	61.1	0	-21.9	-8	-69.1	13.9	27	42	45	72	83	
887	632	4/19/2006	61.1	0	-21.9	-7	-68.1	14.9	18	35	49	70	103	
888	658	4/19/2006	61.1	0	-21.9	-7.2	-68.3	14.7	18	29	47	74	110	
889	612	4/19/2006	61.1	0	-21.9	-7	-68.1	14.9	21	35	51	86	88	
890	633	4/19/2006	61.1	0	-21.9	-6	-67.1	15.9	18	41	67	94	62-6"	
891	519	4/19/2006	65.1	0	-21.9	-5.5	-70.6	16.4	36	51	58	77	92	
892	565	4/19/2006	65.1	0	-21.9	-7	-72.1	14.9	64	57	70	72	68	
893	591	4/19/2006	61.1	0	-21.9	-7	-68.1	14.9	22	36	45	77	109	
894	613	4/19/2006	61.1	0	-21.9	-5.7	-66.8	16.2	13	29	47	73	125	
895	634	4/19/2006	61.1	0	-21.9	-7	-68.1	14.9	22	37	52	75	86	
896	660	4/19/2006	61.1	0	-21.9	-8	-69.1	13.9	36	48	65	82	110	
897	708	4/20/2006	61.1	0	-21.9	-14.5	-75.6	7.4	86	68	57	52	15-4"	
898	736	4/20/2006	61.1	0	-21.9	-10.5	-71.6	11.4	29	46	56	75	100	
899	877-R	4/20/2006	65.1	30	-21.9	-17.9	-83	4	14	14	19	42	68	Replacement pile for pile #877 broken during driving on 3/28/06

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900	758	4/20/2006	61.1	0	-21.9	-21.9	-83	0	19	18	22	56	39-4"	
901	784	4/21/2006	61.1	0	-21.9	-21.9	-83	0	21	17	20	34	92	
902	806	4/21/2006	61.1	0	-21.9	-21.9	-83	0	16	15	18	39	74	
903	759	4/21/2006	61.1	0	-21.9	-12	-73.1	9.9	43	54	66	56	73	
904	785	4/21/2006	61.1	0	-21.9	-12	-73.1	9.9	32	33	48	57	69	
905	807	4/21/2006	61.1	0	-21.9	-12	-73.1	9.9	28	34	42	55	76	
906	830	4/21/2006	61.1	15	-21.9	-21.9	-83	0	15	16	20	61	75	
907	786	4/21/2006	61.1	0	-21.9	-10	-71.1	11.9	19	22	44	58	90	
908	808	4/21/2006	61.1	0	-21.9	-21.9	-83	0	22	20	25	57	105	
909	787	4/21/2006	61.1	0	-21.9	-21.9	-83	0	20	20	27	57	76	
910	809	4/21/2006	61.1	0	-21.9	-11.5	-72.6	10.4	27	41	58	57	65	
911	767	4/21/2006	61.1	3	-21.9	-11	-72.1	10.9	21	38	52	58	69	
912	545	4/21/2006	65.1	0	-21.9	-21.9	-87	0	18	18	38	51	60	
913	571	4/21/2006	61.1	0	-21.9	-8	-69.1	13.9	24	24	46	73	88	
914	614	4/21/2006	61.1	0	-21.9	-21.9	-83	0	21	18	17	10	30	
915	640	4/22/2006	61.6	0	-21.9	-9	-70.6	12.9	42	51	60	73	75	
916	684	4/22/2006	61.1	0	-21.9	-9	-70.1	12.9	37	52	51	77	83	
917	712	4/22/2006	61.1	0	-21.9	-9	-70.1	12.9	20	37	55	72	78	
918	740	4/22/2006	61.1	0	-21.9	-9	-70.1	12.9	14	17	40	59	70	
919	546	4/22/2006	65.1	30	-21.9	-21.9	-87	0	15	19	30	47	60	
920	685	4/22/2006	61.1	30	-21.9	-8	-69.1	13.9	22	25	48	58	83	
921	713	4/22/2006	61.1	30	-21.9	-8	-69.1	13.9	26	24	48	87	60-6"	
922	741	4/22/2006	61.1	30	-21.9	-9	-70.1	12.9	18	21	40	65	96	

1. Pile Location as designated on drawing titled "Martin Ron Pile Numbering Diagram as tranmitted electroncally to us by WEBCOR Building on 11 November 2005.
2. Casted pile length
3. All Elevations refer to San Francisco City datum (SFCD).
4. Recorded visually, accuracy may vary by +/- 6 inches
5. DNO denotes Did Not Observe

Total number of piles requiring cutoff:	381	40%
Number of piles requiring more than 5 feet of cutoff:	238	25%
Number of piles requiring more than 12 feet of cutoff:	80	8%
Number of piles requiring more than 15 feet of cutoff:	34	4%
Number of piles that broke during installation:	9	1%
Number of replacement piles driven:	2	0.2%