MONCHAMP MELDRUM LLP

To: San Francisco Board of Supervisors
From: Monchamp Meldrum LLP
Date: February 2, 2026
RE: Proposed 350 Amber Drive Project
File No. **251094** – Appeal of CEQA Exemption from Environmental Review;
Case No. 2024-0004318ENV
File No. **251098** – Appeal of Conditional Use Authorization Approval
Case No. 2024-0004318CUA

Our firm represents the applicant AT&T Wireless (AT&T) regarding the appeals by the Diamond Heights Community Association (DHCA) of the approval of the California Environmental Quality Act (CEQA) exemption and Conditional Use Authorization (CUA) for the above-referenced project at 350 Amber Drive in San Francisco (Project). AT&T submitted its opposition to the CEQA appeal on November 26, 2025 (AT&T CEQA Rebuttal) and its opposition to the CUA appeal on December 3, 2025 (AT&T December 3rd CUA Rebuttal). This memorandum and its attachments provide supplemental substantial evidence to support the City's Project approvals. Additionally, this memorandum addresses DHCA's letter of January 30, 2026 (DHCA January 30th Submittal), which furthers their misinterpretation of federal statutes and case law.

I. Executive Summary

AT&T submits expert opinion to the City on the following issues raised by DHCA:

- Slope Instability-Compression/Settlement of Existing Fills: As detailed in the Geist Engineering Geotechnical Executive Summary dated February 2, 2026 (Exhibit A) and the Salem Engineering Geotechnical Engineering Investigation dated January 19, 2026 (Exhibit B), the Project will not increase the risk of slope instability or the potential for future compression/settlement of existing fills. The Vector Engineering Structural Drawings and Structural Calculations dated January 28, 2026 (Exhibits C and D) reflect the recommendations set forth in the Salem Investigation.

- Fire Risk: As explained in the declaration of expert fire investigator (retired) Thomas W. Oldag (Exhibit E), a fire involving a cell tower is not a frequent or expected occurrence. Mr. Oldag states that the Project site does not present a fire risk because of the site's secure location, rigid engineering standards, compliance with NFPA Standards, the climate in the area, and the absence of any exposed power lines near the proposed tower. Further, the Project will enhance public safety through the deployment of FirstNet in the subject area which puts advanced wireless technologies into the hands of public safety agencies and first responders, including fire fighters.

- Tree Health: As detailed in the Tree Management Experts Arborist Report dated January 28, 2026 (Exhibit F), Certified Arborist Roy Leggitt has provided his expert opinion that the Project poses no threat to the trees adjacent to, or in the vicinity of, the Project site.

- St. Nicholas Antiochian Orthodox Church: As explained in the City Planning Department's December 8, 2025, Memo, the "Church has not been identified as a potential historic resource and there are no identified historical resources in the project's vicinity." Regardless, AT&T has provided expert photosimulations demonstrating the Project would have no discernable visual effects on the Church.

As to DHCA's misinterpretation of federal statutes and case law, as originally set out in AT&T December 3rd CUA Rebuttal, the denial by a permitting entity of an application for a wireless facility amounts to an effective prohibition if the applicant shows that (1) there is a "significant gap" in wireless coverage; and (2) the proposed installation is the "least intrusive means" for closing that gap. AT&T has established its significant coverage gap, demonstrated its efforts at locating a viable location, and shown that the selected site and design are the least intrusive means for closing the gap. To the extent that DHCA opposes the tower on alleged aesthetics, its statements suggesting the tower's negative aesthetic amount to generalized complaints that do not qualify as substantial evidence to support denial of AT&T's application.

II. Project Construction Would Not Increase Risk of Slope Instability or Potential for Future Compression/Settlement of Existing Fills

DHCA makes the unsupported assertion that "infill . . . suggests soil instability" and concludes without evidence that just disturbing the soil during construction might affect the geotechnical area and its groundwaters. Evaluation of geologic conditions is a technical subject, and lay opinion unsupported by factual foundation does not constitute substantial evidence. Although usually not evaluated by the City until building permit review, AT&T has completed a geotechnical engineering investigation, that included soil borings (Exhibit B) and has provided structural drawings and calculations based on that investigation (Exhibits C and D). As explained in the executive summary provided by Geist Engineering (Exhibit A), "[t]he exploration test geotechnical boring B-1 was drilled on December 29 and 30, 2025 to a depth of 86.5 feet below site grade [BSG]. Free groundwater was not encountered" and "[t]he fill soils are conservatively estimated to extend to depths around 85 feet BSG with weathered formational rock material, encountered between 85 feet and the maximum depth explored of 86.5 feet BSG." The lack of groundwater and presence of formational rock material results in a conclusion that:

> From a geotechnical perspective, provided the recommendations included in the Salem report are followed, the proposed tower construction is not anticipated to have a negative impact on existing site improvements. Construction of the proposed tower improvements would not be anticipated to increase surface water drainage over or into the existing western slope area. Also, the tower construction would not result in a potential for increased saturation of the fills. *Therefore, construction of the project would not result in an increased risk for slope instability or an increase the potential for future compression/settlement of the existing fills that could negatively impact the site and surrounding development.*

The geotechnical expert's conclusion is that the Project will <u>not</u> cause any increased risk for geotechnical or alter groundwater.

As stated in the Salem Engineering Geotechnical Engineering Investigation (Exhibit B), "[b]ased upon the data collected during this investigation, and from a geotechnical engineering standpoint, it is our opinion that the site is suitable for the proposed construction of improvements at the site as planned, provided the recommendations contained in this report are incorporated into the project design and construction." The Structural Drawings and Calculations provided by Vector Engineering are incorporated in the recommendations of the Salem report.

Thus, two expects conclude that the site is suitable for the Project and will not result in any slope instability nor will construction cause any geotechnical or groundwater issues.

III. The Project Will Expand and Improve Emergency Communication Capabilities and is Not a Fire Risk

DHCA claims, without any supporting evidence, that cell towers are fire hazards. Contrary to DHCA's assertions, however, the Project will in fact enhance public safety, including fire safety, by providing decreased fire response times, which reduces fire risk. The Project is part of AT&T's commitment to support public safety through its partnership with FirstNet, the federal First Responder Network Authority. Conceived by the *9/11 Commission Report* as necessary for first responder communications, Congress created the federal First Responder Network Authority, which selected AT&T to build and manage FirstNet, the first-ever nationwide first-responder wireless network. The Project will provide new service on Band 14, which is the nationwide high-quality spectrum set aside by the U.S. government for the exclusive transmission of public safety and first responder communications. Deployment of FirstNet in the subject area will improve public safety by putting advanced wireless technologies into the hands of public safety agencies and first responders, including fire fighters.

Also contrary to DHCA's assertions, a fire involving a cell tower is not a frequent or expected occurrence. As explained by expert fire investigator (retired) Thomas W. Oldag (Exhibit E):

> Cell towers are not known to randomly catch fire. The proposed AT&T tower and associated equipment will be constructed of noncombustible materials. The associated powerlines and communication lines will be enclosed within the metal structure. Cell towers require electricity to function. The power lines supplying the site will be underground. Wildland fires [like those cited by DHCA] usually occur due to branches falling onto power lines, or power lines making contact with other nearby facilities. There are no exposed power lines associated with the proposed tower, however.
>
> The National Fire Protection Association (NFPA) has a standard for telecommunications facilities, NFPA 76 – Standard for the Fire Protection of Telecommunications Facilities. This prevention guideline was created to minimize fires in telecommunication facilities. The proposed facility will comply with these standards, which mandates the storage of any combustible materials in approved non-combustible containers near or around the facility.
>
> [In relation to the assertion that] it would supposedly be difficult to combat [a cell tower fire] since the power "from the grid" will take time to shut off [, p]ower provided to a macro cell tower, like all commercial power, is stepped down by transformers and regulated to the end user. There are also fuses and breakers built into the system. In the possible event of a fault (arc), the involved fuse or breaker will turn off the power to that phase (power line). The grid at large is not affected. As an example, in a structure fire, firefighters can fight the fire after securing the utilities, power and gas to <u>that</u> structure; they do not need to shut off the power "on the grid," or to the larger area.

Also, in reviewing the Project's location, expert fire investigator Oldag determined that "[w]ildland fire concerns are very low in the Diamond Heights area" because the "neighborhood's elevation and exposure place it directly in the path of the funneled marine layer and westerly winds, so it runs cooler, windier, and foggier than many other San Francisco neighborhoods." Oldag further determined that the Project site does not present a fire risk because of the site's secure location, rigid engineering standards, compliance with NFPA Standards, the higher humidity in the area, and the absence of any exposed power lines near the proposed tower."

To support its appeal, DHCA proffers correspondence from Susan Foster. In opposing the Project, Foster identifies herself a "Fire and Utility Consultant" and an "Honorary Firefighter," but she provides no evidence that she is a fire expert, and there is no available information to suggest that she has any relevant credentials or is qualified to opine on the supposed fire danger presented by a communications tower. Nor is there any information to suggest that Foster has any training in fire prevention or fire science; she is not an electrical engineer, or any type of engineer. According to her LinkedIn page, Foster is a writer with a BA in Psychology and an MSW degree.[1] From her internet presence, Foster's main occupation appears to be the dissemination of what many believe to be misinformation, as a member of the Children's Health Defense (CHD), regarding the "alleged health hazards presented by cell phone and cell tower radiation."[2] Throughout her advocacy, Foster has attempted to convince regulators to implement moratoriums on cell towers in the US and Canada, with a particular focus on the slowing of the deployment of 5G technology.[3] CHD has been recognized by Media Bias/Fact Check (an independent, U.S.-based website that rates news and information sources for their political bias and factual reliability) as "an anti-vaccine nonprofit pseudoscience organization," and "a strong conspiracy and quackery level advocacy group that frequently promotes unsupported claims," that do "not align with scientific consensus regarding vaccines and other scientific matters."[4] This is the very approach Ms. Foster has taken in her unsubstantiated statements submitted in opposition to the Project. None of her statements are backed by science, expertise, or fact. Foster does not have the technical expertise to comment on the likelihood the Facility will catch fire, and the information provided by Foster does not constitute substantial evidence.

The proposed site in this case meets all FCC safety guidelines for RF emissions and all City requirements for safety and design. Foster's challenge to the cell site is in fact nothing but a disguised challenge based on fear of RF emissions. Federal law sets the appropriate RF emissions safety standards that apply to cell sites, and local attempts at such regulation are disallowed and preempted under federal law.

None of the Southern California wildfires that Foster lists in her letter have any connection to the type of facility proposed for installation at 350 Amber Drive. As explained in fire expert Oldag's declaration, each of those fires involved telecommunications lines installed on wooden utility poles in close proximity to 12,000-volt above-ground electrical distribution lines, and the coming together of those lines in hurricane force winds, causing sparks to fall into dry grass below, in extremely hot, dry, and windy weather conditions. Moreover, the CPUC's reports regarding these fires demonstrate telecommunication facilities were not the source of these

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[1] https://www.linkedin.com/in/susan-foster-5b2a5039
[2] https://childrenshealthdefense.org/authors/susan-foster
[3] *Id.*
[4] https://mediabiasfactcheck.com/childrens-health-defense/

fires.[5] There are no similarities between the conditions and equipment in those wildfires and the steel wireless communications tower proposed in the subject application. The proposed tower will support cell antennas 104 feet above the ground; there are no electrical distribution lines on the proposed tower, or anywhere near it. (see Exhibit E, Declaration of expert fire investigator Oldag)

Moreover, according to the Wireless Infrastructure Association, there were 142,100 cell towers (defined as free-standing structures over 50 feet in height) in the United States as of 2022. A review of reported fire incidents involving cell towers reveals that they are a rare occurrence. Foster cites only one tower fire, on a light pole on a high school football field in Chula Vista, in which an AT&T investigation concluded the wiring connecting the field lights and/or a rodent infestation (and not any associated cell site equipment) were the most likely causes. Merely because there were wireless facilities on the pole that burned and fell does not mean that cell facilities create any independent risk of fire, and no investigation of the fire in Chula Vista has alleged as such.

IV. The Project Would Not Impact the Health of the Trees Adjacent to, or in the Vicinity of the Project Site.

DHCA alleges the Project would disrupt the tree root systems of the surrounding eucalyptus and the "'mixed exotic oak forest' and 'blue gum forest' present at the Project site and its vicinity." As discussed in the Arborist Report (Exhibit F), Certified Arborist Roy Leggitt conducted a site visit on January 20, 2026, to inspect trees adjacent to, and in the vicinity of, the Project site. Only one tree, 25 feet from the Project site, is close enough to be potentially impacted by construction. The structural roots of that tree would be close to the trunk, however, and ultimately would not be impacted. With regard to the remainder of the root system, Certified Arborist Leggitt opined:

> Given the limited development of a root zone beneath pavement, it is likely that 2 to 3 percent of the root zone could be affected. This is a negligible amount of root loss and does not pose any threat to the tree.

The "mixed exotic species" in the adjacent park would not be affected by construction. Further, because the Project site is located within a gap in the tree canopies and would have a flat, non-flammable asphalt surface, there would be no tree-related fire risk associated with the vegetation at the site.

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[5] Malibu Canyon Fire, see CPUC Draft Report on Settlement (9/13/2012); Woolsey Fire, see CPUC Woolsey Fire Investigation Report (10/21/2021); Guejito Fire, see CPUC Guejito Fire Report (9/2/2008).

Contrary to DHCA's speculative assertions, which are not supported with any substantial evidence, Certified Arborist Leggitt has provided his expert opinion that the Project poses no threat to the trees adjacent to, or in the vicinity of, the Project site.

V. The Project Would Not Visually Affect the St. Nicholas Antiochian Orthodox Church

DHCA alleges the Project would impact the St. Nicholas Antiochian Orthodox Church (Church) as a historical resource. As explained in the City Planning Department's December 8, 2025, Memo, the "Church has not been identified as a potential historic resource and there are no identified historical resources in the project's vicinity." Regardless, AT&T has provided additional photosimulations from public vantage points surrounding the Church. As shown in Exhibit G, the Project would not be visible when looking at the Church from Diamond Heights Boulevard or Duncan Street (Shot Points 5 and 7). The Project would be visible from the Church parking lot but would not be a dominant visual feature (Shot Point 6). The Project would have no discernable visual effect on the Church.

VI. The DHCA January 30th Submittal Misinterprets the Standards Applicable Under the Federal Telecommunications Act.

The DHCA January 30th Submittal (Section III, pg. 5-14) rehashes the same erroneous arguments originally raised in DHCA's "Memorandum in Opposition" submitted for the Planning Commission's September 25, 2025 hearing.[6] Specifically, DHCA disputes the standards for effective prohibition and what type of evidence is appropriate for to prove (1) the existence of a coverage gap; and (2) the absence of a less intrusive alternative site for the project. AT&T addressed DHCA's misinterpretation of the law of material inhibition and effective prohibition in the AT&T December 3rd CUA Rebuttal (Sections K.4 and K.6, pg. 15-21).

DHCA misinterprets the law by arguing that the "least intrusive means" test applied by most federal courts, including the Ninth Circuit, to analyze whether an unlawful effective prohibition has occurred, "has gradually been replaced by a different legal standard that turns on whether a regulation 'materially inhibits' wireless coverage." (DHCA January 30th Submittal, pg. 6). DHCA misunderstands the law. A municipality "effectively prohibits" wireless services

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[6] In its January 30th Submittal, DHCA appears confused as to why AT&T addressed federal issues in its CUA Rebuttal. Every DHCA submittal has purported to "fully incorporate[] by reference all the comments and concerns raised to date on the Project or its environmental CEQA clearance." As explained in the AT&T December 3rd CUA Rebuttal, AT&T addressed federal issues because they were raised in the "Memorandum in Opposition" submitted for the Planning Commission's September 25, 2025 hearing. Daniel Schereck, the DHCA Board President, signed onto this Memorandum, along with at least 20 other individuals who signed the CUA appeal petition.

whenever a land use decision “materially inhibits” those services.[7] The Ninth Circuit instructs that the least intrusive means test “is consistent with the FCC’s” material inhibition test.[8] The two-part effective prohibition test remains the law in the Ninth Circuit. *See, e.g., New Cingular Wireless, PCS, LLC v. Kootenai Cnty.*, 2025 U.S. Dist. LEXIS 31713, *34-35 (“the effective prohibition analysis is a two-part test, asking first whether there is a gap in coverage and, second, whether the absence of feasible alternatives to the proposed tower means that denial of an application effectively prohibits all wireless service in the area.” (citations) (D. Id. 2025; *Kootenai Cnty.*)).[9]

DHCA next questions the existence of AT&T’s coverage gap and argues the coverage maps AT&T provided are “unsubstantiated,” because, even though AT&T’s consultant completed independent drive test results to affirm the coverage gap in AT&T’s RF maps, DHCA now wants the “raw drive test data,” to prove the existence of the gap. Though not required for this application, AT&T is willing to make the “raw drive test data” available to the Board upon request. “Coverage Maps and Drive Test Maps provide a reliable method to evaluate whether there is a significant gap in coverage [and are] commonly used by radiofrequency engineers and the wireless industry.”[10] AT&T has proven its significant coverage gap in the Diamond Heights area based on substantial evidence in the form of Court-approved RF maps supported by drive test data.

In-building coverage is the appropriate standard by which to measure a carrier’s gap in coverage. (*See* AT&T December 3rd CUA Rebuttal, pg. 20, n. 56.) Courts have found that “[c]onsumers and carriers have an expectation and a need for reliable in-building wireless service,” and the “absence of [reliable in-building service, e.g.,] constitutes a significant gap in coverage.”[11] Likewise, courts have found that an absence of reliable in-vehicle service constitutes

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[7] *See In the Matter of California Payphone Assoc. Petition for Preemption, Etc.*, Opinion and Order, 12 FCC Rcd. 14191 (FCC rel. July 17, 1997); *Sprint Telephony PCS, L.P, v. Cnty. of San Diego*, 543 F.3d 571, 578 (9th Cir. 2008) (*Sprint Telephony PCS, L.P.*).

[8] *Sprint Telephony PCS, L.P,*, 543 F.3d at 578.

[9] The test for effective prohibition has been the same since 2005, when the Ninth Circuit adopted the least intrusive means test in *MetroPCS, Inc. v. City & Cnty. of San Francisco*, 400 F.3d 715, 734-35 (9th Cir. 2005; *MetroPCS, Inc.*). *See, e.g., Kootenai Cnty.,* 2025 U.S. Dist. LEXIS 31713, *34-35; *New Cingular Wireless PCS, LLC v. County of Ventura*, 2022 U.S. Dist. LEXIS 53923 (C.D. Cal. Feb. 22, 2022); *L.A. SMSA Ltd. P’ship v. City of L.A.,* 2021 U.S. Dist. LEXIS 160046, *9 (C.D. Cal. Aug. 24, 2021; *City of L.A.*); *T-Mobile West Corp. v. City of Huntington Beach*, 2012 U.S. Dist. LEXIS 148170, *12 (C.D. Cal. Oct. 10, 2012; *Huntington Beach*); *T-Mobile USA, Inc. v. City of Anacortes*, 572 F.3d 987, 995-98 (9th Cir. 2009) (*Anacortes*).

[10] *Huntington Beach,* 2012 U.S. Dist. LEXIS 148170, *26.

[11] *Huntington Beach*, 2012 U.S. Dist. LEXIS 148170, *12; *Accord, City of L.A.,* 2021 U.S. Dist. LEXIS 160046, *9 (“Inadequate or unreliable in-building service can be sufficient to show the existence of a significant gap in coverage”).

a significant gap.[12] Applicable law also does not support DHCA's argument that AT&T needs to show "no service at all" or a "state of total absence" of coverage to prove a coverage gap.[13] AT&T has met its burden for proving a significant service coverage in this instance.

DHCA next argues that AT&T "cannot establish that the proposed Project would be the 'less intrusive means' [sic] to provide wireless service coverage" in the area. (DHCA January 30th Submittal, pg. 8). Because AT&T has established its coverage gap, demonstrated its efforts at locating an available and feasible location, including providing the City with a meaningful comparison of alternatives, and explained that the selected site and design are the least intrusive means for closing the gap, the burden now shifts to the City (if it were inclined to deny the application) to show that a specific alternative site is (a) available, (b) technologically feasible, and (c) less intrusive than AT&T's proposed solution.[14] Were the City to make such a showing, AT&T would then have the opportunity to rebut the availability and feasibility of any identified alternatives.[15] Since this is not the case, AT&T has fulfilled all the necessary requirements and the process has been completed.

DHCA lists things it claims AT&T should have looked for in an alternative site, criticizes AT&T's analysis of alternative sites, and asserts AT&T should have considered constructing a distributed antenna system (DAS) instead of the proposed macro facility. But AT&T's analysis of alternatives – including unavailability of properties due to disinterested owners and infeasible locations – is precisely the analysis required by the Ninth Circuit.[16] Nor is DHCA's argument sufficient to rebut AT&T's evidence, or to prove the existence of a less-intrusive alternative. As a 2025 District Court opinion explained:

> Because AT&T made a prima facie showing, the burden of proof shifts to the County to show there are available alternative sites. The County, however, offers no evidence of other alternatives; instead it offers only speculative, nonspecific suggestions regarding where AT&T might have looked for potential alternatives. Although the County is "not compelled to accept"

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[12] *Huntington Beach*, at *15-16; *City of L.A.,* at *25 (courts consider "gaps on commuters and highway traffic in determining their significance").
[13] *MetroPCS, Inc.*, 400 F.3d at 730-35 (In adopting the least intrusive means test, Ninth Circuit explicitly rejected a rule that would require proof of a 'general ban' on wireless services to prove an unlawful effective prohibition).
[14] *Anacortes*, 572 F.3d at 998-99.
[15] *Id.*; *see, e.g., Kootenai Cnty.,* 2025 U.S. Dist. LEXIS 31713, *39.
[16] *See Anacortes*, 572 F.3d at 996-98.

> AT&T's representations, if it rejects them, 'it must show that there are some potentially available and technologically feasible alternatives.'" [17]

And the City would not meet its reciprocal burden under *Anacortes* by dictating a different technology such as DAS.[18] DHCA has not identified even one potentially available and feasible alternative site that would close the AT&T coverage gap.

Finally, DHCA asks the Board to grant its appeal based on "negative aesthetic impacts." (DHCA January 30th Submittal, pg. 12). But such a result based on DHCA's arguments would also be counter to the law. Statements suggesting a negative aesthetic of the proposed tower amount to generalized complaints that do not qualify as substantial evidence that could support denial of AT&T's application. Courts in the Ninth Circuit and across the country agree that such generalized aesthetic concerns do not qualify as substantial evidence in wireless siting determinations.[19]

VII. Conclusion

As discussed in AT&T's filings and this supplemental submittal, DHCA's appeal does not raise substantial evidence that supports a fact-based reason to reverse the Planning Commission's application of the Class 3 CEQA Exemption or its approval of AT&T's CUA. AT&T has provided substantial evidence in the form of expert opinions to support the findings that the Project: (1) will not affect slope stability or upset the fill settlement/compression, (2) does not represent a fire hazard and will enhance public safety, (3) will not affect the health of trees adjacent to or in the vicinity of the Project site, and (4) will not visually affect the St. Nicholas Antiochian Orthodox Church. The Project meets all applicable health and safety standards, is designed to not cause visual impacts, and will provide vastly improved service for wireless

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[17] *See Kootenai Cnty.,* 2025 U.S. Dist. LEXIS 31713, *39 *(citing Cnty. of Ventura, California*, 2022 U.S. Dist. LEXIS 53923 at *3 (*quoting Anacortes*, 572 F.3d at 998)); *See also Cnty. of Ventura,* 2022 U.S. Dist. LEXIS 53923, at *16 (least intrusive analysis does not require "elimination of every theoretical possible alternative") (citation omitted).

[18] A DAS would require a central office and construction of an integrated system of numerous nodes. Not only does DHCA fail to explain where these facilities could be placed (availability) or whether they could address AT&T's significant coverage gap (feasibility), the City is preempted from dictating the technology a wireless provider uses to build its network. *See e.g.*, *New York SMSA L.P. v. Town of Clarkstown*, 612 F.3d 97, 105-106 (2d Cir. 2010) (rejecting town's preference for DAS, court held local governments are preempted from regulating technical and operational aspects of wireless telecommunications technology; *In the Matter of Public Utility Comm'n of Texas Petition for Declaratory Ruling and/or Preemption of Certain Provisions of Texas Public Utility Regulatory Act of 1995*, FCC 97-346, 13 FCC Rcd 3460, at ¶ 74 (FCC ruled it is unlawful for a locality to specify the "means and facilities" by which a service provider may offer services).

[19] *See, e.g., California RSA No. 4 v. Madera Cnty* (E.D. Cal. 2003) 332 F.Supp.2d 1291, 1308-09 ("generalized expressions of concern regarding aesthetics or the effect on property values" fail to meet the substantial evidence threshold under the Act), citing *Omnipoint Corp. v. Zoning Hearing Bd*., 181 F.3d 403, 409 (3d Cir.1999); *Cellular Telephone Co. v. Town of Oyster Bay*, 166 F.3d 490 (2nd Cir. 1999).

customers, public safety organizations, and first responders. AT&T has established its coverage gap, demonstrated its efforts at locating a feasible location, and stated that the selected site and design are the least intrusive means for closing the gap. DHCA has provided no substantial evidence to support its arguments on appeal. AT&T requests the Board deny the appeal and uphold the Project's Class 3 CEQA Exemption and CUA Approval.

Exhibits:

A. Geotechnical Investigation Summary dated February 2, 2026, Geist Engineering and Environmental Group
B. Geotechnical Engineering Investigation dated January 19, 2026, Salem Engineering Group, Inc.
C. Structural Drawings dated January 28, 2026, Vector Engineers
D. Structural Calculations dated January 28, 2026, Vector Engineers
E. Declaration of Thomas W. Oldag, retired fire investigator
F. Arborist Report dated January 28, 2026, Tree Management Experts
G. Photosimulations in relation to the St. Nicholas Antiochian Orthodox Church

Exhibit A

Exhibit A

February 2, 2026

Next Edge Networks (Next Edge)
(Northern CA Sacramento and San Francisco offices)
1355 Windward Concourse, Suite 410
Alpharetta, GA 30005

RE: Updated* Geotechnical Investigation - Proposed 104-ft Concealed Monopole
AT&T ID: CCL05330 / SF Police Academy
AT&T address: 350 Amber Dr, San Francisco, San Francisco County, CA
GE^{2}G Project # 311965

Dear Next Edge,

Geist Engineering and Environmental Group, Inc. (GE^{2}G), appreciates the opportunity have assisted Next Edge by having one geotechnical assessment and findings report completed for the proposed above listed proposed AT&T Mobility, LLC undertaking. Northern California Underground Service Alert (USA # 2025122300287) was completed prior to the field drilling activities. A drilling permit was obtained from the City of San Francisco. Third party utility clearance was also completed at the request of the City of San Francisco Police Department.

*Updated report statements/conclusions: Section 9.7, Section 10.3.5, Section table 10.6.1, and Section 10.10.1.

Executive Summary:
Based on a review of the previous geotechnical report completed in 1999 and summary of previous geotechnical reports included within it, documented distress to the existing Site Parcel building has been attributed to settlement of the underlying fill soils and was not caused by slope instability.

Based on the Salem Engineering Group, Inc. (Salem) observations of the exterior surficial conditions and exterior of the existing building, no visible evidence of previous slope movement/landslides was noted during the Salem November 2025 site observations conducted by an Engineering Geologist. There are no known landslides located at the site, nor is the site in the path of any known or potential landslides.

The monopole tower is planned to be located near the southern edge of an existing paved area, near the top of an existing slope. The top of the slope is approximately 250 feet east (measured horizontally) of the western property line. Based on review of available topographic information, the existing slope is estimated to have a repose of approximately 5 horizontal (H) to 1 vertical (V). The lease site area is relatively flat and level and is located approximately 10 to 12 feet horizontally from the top of the existing slope.

The exploration test geotechnical boring B-1 was drilled on December 29 and 30, 2025 to a depth of 86.5 feet below site grade. Free groundwater was not encountered in B-1 prior to its abandonment.

In general, the materials encountered during drilling included fill soils, comprised predominately of medium dense clayey sand with trace to moderate amounts of gravel fragments throughout the depths explored. The fill soils are conservatively estimated to extend to depths around 85 feet BSG with weathered formational rock material, encountered between 85 feet and the maximum depth explored of 86.5 feet BSG.

It is anticipated that the monopole tower will be supported on cast-in-drilled-hole (CIDH) pile foundations. From a geotechnical perspective, provided the recommendations included in the Salem report are followed, the proposed tower construction is not anticipated to have a negatively impact on existing site improvements. Construction of the proposed tower improvements would not be anticipated to increase surface water drainage over or into the existing western slope area. Also, the tower construction would not result in a potential for increased saturation of the fills. Therefore, construction of the project would not result in an increased risk for slope instability or an increase the potential for future compression/settlement of the existing fills that could negatively impact the site and surrounding development.

Based on mapping and historical seismicity, the project area is located in an area high seismic activity. The site is not within a currently established State of California Earthquake Fault Zone for surface fault rupture hazards nor within an Alquist-Priolo Earthquake Fault (Special Studies) Zone, therefore, a site-specific fault study investigation by an Engineering Geologist is not required. No active faults with the potential for surface fault rupture are known to pass directly beneath the site. Therefore, the potential for surface rupture due to faulting occurring beneath the site during the design the life of the proposed development is considered low.

Based on review of the CGS Earthquake Zones of Required Investigation maps, the subject site is not located within a mapped liquefaction hazard zone. Based on the clayey nature of the materials encountered and lack of shallow groundwater, liquefaction/seismically induced settlements is not a concerned for the proposed construction.

Specific geotechnical, site preparation, structural fill, and other recommendations for the improvement project are presented in the attached report. It is recommended that the foundation designs for the tower be provided to Salem for review. A pile foundation with the listed minimum foundation depths should be designed by the project Structural Engineer based on design loads and maximum lateral forces expected at site.

If you have any inquiries or would like any additional information, please contact me at (510) 610-1453, or sgeist@geistenvironmental.com.

Sincerely,

Stephen Geist, President,
Geist Engineering and Environmental Group, Inc.

Attached:
Completed Geotechnical Engineering Investigation Report by Salem Engineering Group, Inc. for AT&T: CCL05330 SF Police Academy, 350 Amber Dr, San Francisco, San Francisco County, California with recommendations as competed by Dean B. Ledgerwood II, PE 94395/ PG 8725 / CEG 2613 Geotechnical Manager dated January 19, 2026 (Updated report statements/conclusions: Section 9.7, Section 10.3.5, Section table 10.6.1, and Section 10.10.1.)

Reference:
Preliminary Geological Review for Landslide Susceptibility Review by Salem Engineering Group, Inc. for AT&T: CCL05350, with recommendations as competed by Dean B. Ledgerwood II, Professional Engineer (PE) 94395/ Professional Geologist (PG) 8725 / Certified Engineering Geologists (CEG) 2613 Geotechnical Manager dated November 24, 2025

Exhibit B

Exhibit B

GEOTECHNICAL • ENVIRONMENTAL • GEOLOGY • MATERIALS TESTING & INSPECTION • FORENSIC • LABORATORY

SALEM engineering group, inc.

GEOTECHNICAL ENGINEERING INVESTIGATION

PROPOSED AT&T 104' MONOPOLE
SITE ID: CCL05530
SAN FRANCISCO POLICE ACADEMY
350 AMBER DRIVE
SAN FRANCISCO, CALIFORNIA

SALEM PROJECT NO. 5-225-1076
JANUARY 19, 2026

PREPARED FOR:

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January 19, 2026 Project No. 5-225-1076

Mr. Stephen T. Geist
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**SUBJECT: GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED AT&T 104' MONOPOLE
SITE ID: CCL05350
SAN FRANCISCO POLICE ACADEMY
350 AMBER DRIVE
SAN FRANCISCO, CALIFORNIA**

Dear Mr. Geist:

At your request and authorization, SALEM Engineering Group, Inc. (SALEM) has prepared this geotechnical engineering investigation report for the Proposed AT&T 104' Monopole planned at the San Francisco Police Academy site, located at 350 Amber Drive in San Francisco, California.

The accompanying report presents our findings, conclusions, and recommendations regarding the geotechnical aspects of designing and constructing the project as presently proposed. In our opinion, the proposed project is feasible from a geotechnical viewpoint, provided our recommendations are incorporated into the design and construction of the project.

We appreciate the opportunity to assist you with this project. Should you have questions regarding this report or need additional information, please contact the undersigned at (559) 271-9700.

Respectfully Submitted,

Dean B. Ledgerwood II, PE, PG, CEG
Geotechnical Manger
PE 94395/ PG 8725 / CEG 2613

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GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED AT&T 104' MONOPOLE
SITE ID: CCL05350
SAN FRANCISCO POLICE ACADEMY
350 AMBER DRIVE
SAN FRANCISCO, CALIFORNIA

1. PURPOSE AND SCOPE

This report presents the results of our geotechnical engineering investigation for the proposed 104' monopole planned at the San Francisco Police Academy located at 350 Amber Drive in San Francisco, California (see Figure 1, Vicinity Map).

The purpose of our geotechnical engineering investigation was to observe and sample the subsurface conditions encountered at the site, and provide conclusions and recommendations relative to the geotechnical aspects of constructing the project as presently proposed.

The scope of this investigation included a field exploration, laboratory testing, engineering analysis and the preparation of this report. The recommendations presented herein are based on analysis of the data obtained during the investigation and our experience with similar soil and geologic conditions.

If project details vary significantly from those described herein, SALEM should be contacted to determine the necessity for review and possible revision of this report. Earthwork and Pavement Specifications are presented in Appendix C. If text of the report conflict with the specifications in Appendix C, the recommendations in the text of the report have precedence.

2. SITE LOCATION AND DESCRIPTION

The project site is located within the western limits of the developed paved portion of the San Francisco Police Academy at 350 Amber Drive in San Francisco, California. The immediate area of the proposed tower is occupied by asphaltic concrete pavements. The tower location is planned to be about 10 to 12 feet from the crown of an existing graded 5H to 1V descending slope. The slope was noted to be heavily vegetated. It is our understanding that the slope and site was graded in the early to mid 1960s (See Section 3.0 Site History).

The overall site includes an existing two story building, with an approximate plan view area of about 28,000 square feet, occupying the central portion of the property. The building construction appeared to include concrete masonry unit (CMU) wall construction with concrete pilasters supporting roof loads. The exterior walls of the existing building appeared to be in good condition. No cracking of the CMU walls, concrete columns, or concrete stem walls was noted during our site reconnaissance. During our site reconnaissance, Mr. Joel Hornstein (SFPD) indicated that he had no knowledge of any previous distress to the building during the past approximately 20 years that he has been working at the site. However, it should be noted Mr. Hornstein mentioned the interior floor in his office did not appear to be level. Mr.

Hornstein's comment regarding the floor surface appearing out of level corresponds with our understanding of the historic performance of the building summarized in the 1999 report. Our site reconnaissance and this study did not include review of the interior of the building.

The areas surrounding the building included asphaltic concrete pavements, with a parking canopy located east of the building. The pavements were noted to be in poor condition with potholes, alligator cracking, and raveling noted throughout. It is our understanding that no pavement repairs or rehabilitation activities have been performed over at least the past 20 years. The pavement condition was considered appropriate considering the age of the pavements. An existing transformer pad with CMU wall enclosure was noted at the top of the slope, east of the existing building. An asphaltic concrete curb was noted at the western edge of the pavements, at the top of a graded southwest facing slope. SALEM did not observe any signs of distress to the curbline or equipment enclosure.

3. SITE HISTORY

Based on review of available historical aerial imagery from UC Santa Barbara Historical Aerial Imagery Library (https://www.library.ucsb.edu/geospatial/aerial-photography) the surrounding area including the subject site was graded and surrounding area was developed during the early to mid-1960s. Aerial imagery dated July 29, 1946 depicts the area of the SFPD parcel as generally open land, and appears to gently slope to the west/southwesterly direction. Aerial imagery, dated July 10, 1963, indicates large mass grading was occurring on the property, including at and around the proposed tower location. An aerial image, dated May 11, 1965, depicts the tower site and overall building areas of the site as relatively flat. The existing church, located northwest of the site, had been constructed (not previously depicted in the 1963 image). Slope terraces descending to the southwest were noted. A 1993 aerial image published on Google Earth, depicts the tower site and subject property in similar condition to the present day condition.

A previous Geotechnical Investigation Report, prepared by Trans Pacific Geotechnical Consultants, Inc., dated January 18, 1999 was provided to SALEM for review. The previous report was noted to be unsigned and marked Draft. The previous report had been prepared to address proposed remodeling and seismic upgrades to the San Francisco Police Academy building. Based on review of the previous report, the 1999 report indicated that previous geotechnical investigations by Woodward Clyde Sherard and Associates were prepared for the original Diamond Heights Elementary School (January 29, 1965), a second report addressing conditions of walls and floor slab (March 21, 1969), and a third report addressing settlement in the south wing of Diamond Heights Elementary School (June 7, 1976). In addition, the 1999 report included review of a July 15, 1977 report by Harding Lawson Associates addressing additional movements to the Diamond Heights Elementary School building. These reports have not been made available to SALEM to review at this time. According to the 1999 report, previous reports summarize a history of settlement that occurred to the existing building. The Woodward Clyde Sherard (WCS) reports were reported to summarize settlement of the existing building at rate of about 1.5 inches per year. The WCS reports documented 8 inches of vertical deformation at the south end of the building, and horizontal deformation of fill at Christopher Park (downslope of the SFPD site) of about 1 inch. Reportedly, the WCS reports concluded "*that the entire mass of fill placed to develop Crhistopher Park and the school property was moving along the original ravine slopes*". The Harding Lawson Associates (HLA) report prepared in 1977 included an independent investigation of the movements of the building. According to the 1999 report, the HLA report summarized several theories of possible movement, including noting that there as a documented 6 year period between 1967 and 1973 where no settlement occurred. It was summarized that the HLA report had correlated the settlement occurred following periods of higher than normal rainfall. The HLA report also reportedly summarized that the existing fill soils had compaction results ranging between 86 and 98 percent (averaging 92 percent). The HLA report indicated the predicted settlement rate would be around 1.5 to 2 inches per year and a total of 11 inches of settlement within the 2 story wing of the building was measured as of 1977. The 1999 report reported that HLA concluded "*"The site is stable against a large scale landslide and continue to be used safely for a school", however the two story wing was considered to be potentially unsafe during an earthquake and should not be reoccupied*."

According to the 1999 report, "*On March 13, 1979 Harding Lawson Associates issued a final report addressing the settlement monitoring on the site. There was slight lateral movement of the fill but no indications to suggest a potential landslide. Settlement was still occurring within the two story wing.*"

The 1999 report included subsurface exploration extending to depths of about 31.5 feet BSG. The borings reportedly encountered medium stiff to stiff gravelly clay with rock fragments to depths of 18 to 20 feet BSG and sandy lean clay underlain by medium dense wet clayey gravel with rock fragments to 20 feet BSG. These materials were underlain by medium dense clayey gravel and sand to the maximum depths explored of 31.5 feet BSG. The test borings and subsurface soils description did not clearly distinguish between fills and native materials, however, the report later states that fills on the order of 35 to 45 feet thick may be present in the northern portion of the building and 60 to 90 feet thick in the southern portion of the building.

Based on review of the 1999 report and summary of previous reports included in the 1999 report, documented distress to the existing building has been attributed to settlement of the underlying fill soils and was not caused by slope instability.

SALEM has not been provided with any other historic documentation pertaining to the existing construction or previous reports documenting historic cases of instability within the site. A document review request was made to the City of San Franisco Record Department, however, no information had been provided at the time of this report. If available, SALEM should be provided with any available documents for relating to the history of the property and/or ground instability.

4. PROJECT DESCRIPTION

Our understanding of the project is based primarily on our cursory review of project plans provided by Geist Engineering & Environmental Group, Inc. It is our understanding that the project will include construction of a 104' Monopole planned at the San Francisco Police Academy facility (see Figure No. 1). The tower is planned to be located near the southern edge of an existing paved area, near the top of an existing slope (see Figure No.1). The top of the slope is approximately 250 feet east (measured horizontally) of the western property line. Based on review of available topographic information, the existing slope is estimated to have a repose of approximately 5 horizontal (H) to 1 vertical (V). The lease site area is relatively flat and level and is located approximately 10 to 12 feet horizontally from the top of the existing slope. It is anticipated that the monopole tower will be supported on cast-in-drilled-hole (CIDH) pile foundations. Based on our experience with tower projects, the foundation loads are expected to be light to moderate, with foundation design governed by lateral loading.

In addition, the planned construction will include foundations supporting lightly loaded equipment cabinets. At the time of this investigation, foundation loads for the proposed tower structure had not been provided for review. Based on our experience lateral loading typically governs design.

A site grading plan was not available at the time of preparation of this report. We anticipate that cuts and fills during earthwork will be minimal and limited to providing a level equipment pads and positive site drainage. In the event that changes occur in the nature or design of the project, the conclusions and recommendations contained in the report will not be considered valid unless the changes are reviewed and the conclusions of our report are modified.

The site configuration and location of proposed improvements are shown on the Site Plan, Figure 2.

5. FIELD EXPLORATION

Our field exploration consisted of a site surface reconnaissance and a subsurface exploration. The exploratory test boring was drilled on December 29 and 30, 2025, in the areas shown on the Site Plan, Figure 2. Test boring B-1 was advanced with a CME-55 truck-mounted drill rig with 8-inch hollow stem augers, to the maximum depth explored of 86.5 feet below site grade. Upon completion of drilling, the test boring was backfilled with neat cement grout.

The materials encountered in the test boring was visually classified in the field, and the log was recorded by a field engineer and stratification lines were approximated on the basis of observations made at the time of drilling. Visual classification of the materials encountered in the excavation was generally made in accordance with the Unified Soil Classification System (ASTM D2487). The excavation location can be found on the Site Plan, attached at the end of this report.

A soil classification chart and key to sampling is presented on the Unified Soil Classification Chart, in Appendix "A." The Test Boring Log is presented in Appendix "A." The Boring Log includes the soil type, color, moisture content, dry density, and the applicable Unified Soil Classification System symbol. The location of the test boring was determined by measuring from features shown on the Site Plan, provided to us. Hence, accuracy can be implied only to the degree that this method warrants.

Subsurface soil samples were obtained by driving a Modified California sampler (MCS) and a Standard Penetration Test (SPT) sampler. Penetration resistance blow counts were obtained by dropping an automated 140-pound trip hammer through a 32.5-inch free fall to drive the sampler to a maximum depth of 18 inches. The number of blows required to drive the last 12 inches is recorded as Penetration Resistance (blows/foot) on the logs of the boring. In case very high penetration resistance is encountered, the number of blows recorded may be for less than 12 inches.

Soil samples were obtained from the test boring at the depths shown on the log of boring. The MCS samples were recovered and capped at both ends to preserve the samples at their natural moisture content; SPT samples were recovered and placed in a sealed bag to preserve their natural moisture content.

6. LABORATORY TESTING

Laboratory tests were performed on selected soil samples to evaluate their physical characteristics and engineering properties. The laboratory-testing program was formulated with emphasis on the evaluation of natural moisture, density, gradation, consolidation potential, shear strength, expansion index, and Atterberg Limits of the materials encountered.

In addition, chemical tests were performed to evaluate the corrosivity of the soils to buried concrete and metal. Details of the laboratory test program and the results of laboratory test are summarized in Appendix

"B." This information, along with the field observations, was used to prepare the final boring log in Appendix "A."

7. SOIL AND GROUNDWATER CONDITIONS

7.1 Subsurface Conditions

The subsurface conditions encountered appear typical of those found in the geologic region of the site and our understanding of the historic site grading.

In general, the materials encountered during drilling included fill soils, comprised predominately of medium dense clayey sand with trace to moderate amounts of gravel fragments throughout the depths explored. Below 65 feet BSG, the fills were noted to be dense. At depths around 80 to 85 feet BSG, the material encountered appeared to transition to a possible weathered rock material, with more competent rock encountered at 85 feet BSG (identified by relatively high blow counts of greater than 50 blows per foot). For the purpose of this report, the fill soils are conservatively estimated to extend to depths around 85 feet BSG with weathered formational rock material (Colma Formation), encountered between 85 feet and the maximum depth explored of 86.5 feet BSG. It should be noted that isolated layers of soils with noted organic odor were noted around depths of 25, 30, 35, and 45 feet BSG.

Three (3) direct shear tests were performed on relatively undisturbed soil samples obtained during drilling. The direct shear tests conducted on samples from 10 feet, 35 feet, and 60 feet BSG resulted in internal angles of friction of 31 degrees, 40 degrees, and 43 degrees with cohesion values of 760 pounds per square foot, 387 pounds per square foot, and 260 pounds per square foot, respectively. It should be noted that additional samples at intermittent depths were attempted for direct shear testing, however, due to gravel content in the samples collected laboratory testing was not feasible.

Atterberg limits testing performed on samples collected between 5 and 55 feet BSG resulted in plasticity indexes 10, 11, 12, and 13 with liquid limits values of 31, 33, 34, and 36, respectively. The results of the samples tested indicate these soils have low plasticity characteristics.

Soil conditions described in the previous paragraphs are generalized. Therefore, the reader should consult exploratory boring logs included in Appendix A for soil type, color, moisture, consistency, and USCS classification of the materials encountered at specific locations and elevations.

7.2 Groundwater

The test boring was checked for the presence of groundwater during and after the drilling operations. Free groundwater was not encountered at the time of our investigation.

Based on review of the Seismic Zone Hazard Report for the City and County of San Francisco (SZHR 043), the site is in an area marked as bedrock and reported groundwater depths of greater than 50 feet BSG.

It should be recognized that water table elevations may fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use, localized pumping, and climatic conditions as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

7.3 Soil Corrosion Screening

Excessive sulfate in either the soil or native water may result in an adverse reaction between the cement in concrete and the soil. The 2019 Edition of ACI 318 (ACI 318) has established criteria for evaluation of sulfate and chloride levels and how they relate to cement reactivity with soil and/or water. A soil sample was obtained from the project site and was tested for the evaluation of the potential for concrete deterioration or steel corrosion due to attack by soil-borne soluble salts and soluble chloride. The water-soluble sulfate concentration in the saturation extract from the soil samples were detected to be 430, 183, 220, and 330 mg/kg.

ACI 318 Tables 19.3.1.1 and 19.3.2.1 outline exposure categories, classes, and concrete requirements by exposure class. ACI 318 requirements for site concrete based upon soluble sulfate are summarized in Table 7.3 below.

TABLE 7.3
WATER SOLUBLE SULFATE EXPOSURE REQUIREMENTS

Boring/Depth	Dissolved Sulfate (SO_4) in Soil, % by Weight	Exposure Severity	Exposure Class	Maximum w/cm Ratio	Minimum Concrete Compressive Strength	Cementitious Materials Type (ASTM C150)
B-1 at 10-11.5’	0.0430	Negligible	S0	N/A	2,500 psi	No Restriction
B-1 at 30-31.5	0.0183	Negligible	S0	N/A	2,500 psi	No Restriction
B-1 at 51.5-53	0.0220	Negligible	S0	N/A	2,500 psi	No Restriction
B-1 at 30-31.5	0.0330	Negligible	S0	N/A	2,500 psi	No Restriction

The water-soluble chloride concentration detected in saturation extract from the soil sample was 80, 52, 54,a d 57 mg/kg. In addition, testing performed on the same soil sample resulted in a minimum resistivity value of 1,916 ohm-centimeter. Based on the results, these soils would be considered to have a “moderately corrosive” potential to buried metal objects (per National Association of Corrosion Engineers, Corrosion Severity Ratings).

It is recommended that, at a minimum, applicable manufacturer’s recommendations for corrosion protection of buried metal pipe be closely followed. Corrosion is dependent upon a complex variety of conditions, which are beyond the Geotechnical practice. Consequently, a qualified corrosion engineer should be consulted if the owner desires more specific recommendations. It is recommended that, at a minimum, applicable manufacturer’s recommendations for corrosion protection of buried metal pipe be closely followed.

8. GEOLOGIC SETTING

The subject site is located in the San Francisco Bay Region of the Coast Range Geologic Province. The Coast Range Geologic Province borders the coast of California and generally consists of northwesterly /southeasterly trending ridges of granitic, metavolcanic, and metasedimentary rocks. Numerous northwest to southeast trending faults parallel the trend of the Coast Ranges. The Coast Ranges generally consist of an alternating series of parallel mountains and valleys located adjacent to the Pacific Coast. San Francisco Bay is a broad shallow depression within the Coast Ranges that has been subsequently filled with sedimentary deposits.

The bedrock units that form the Coast Ranges have been disrupted by intense folding, faulting, and crushing that occurred when the range was formed by the processes of plate tectonics. During the Jurassic and Cretaceous Periods (about 150 to 80 million years ago), the Pacific Oceanic plate collided with the North American Continental plate. The colliding motion of the two plates caused portions of the Pacific Oceanic Crust and overlying marine sediments to be piled onto the North American continental plate along the West Coast of California. The resulting chaotic jumble of bedrock units scraped off onto the North American Plate is known as the "Franciscan Assemblage," and comprises a large portion of the Coast Range Province. Subsequent development of a series of northwest-trending fault zones has further contributed to the deformation of the Coast Ranges.

Based on review of Preliminary geologic map of the San Francisco South 7.5' quadrangle and part of the Hunters Point 7.5' quadrangle, San Francisco Bay area, California[1], the site is mapped in an area described as "Colma Formation (Qc)". These native materials encountered below the fill soils appear consistent with this material. In addition, the fill soils appear generally consistent with material derived from native formational materials in the region.

9. GEOLOGIC HAZARDS

9.1 Faulting and Seismicity

Based on mapping and historical seismicity, the project area is considered to be located in an area high seismic activity. The site is not within a currently established State of California Earthquake Fault Zone for surface fault rupture hazards nor within an Alquist-Priolo Earthquake Fault (Special Studies) Zone, therefore, a site-specific fault study investigation by an Engineering Geologist is not required. No active faults with the potential for surface fault rupture are known to pass directly beneath the site. Therefore, the potential for surface rupture due to faulting occurring beneath the site during the design the life of the proposed development is considered low.

To determine the distance of known active faults within 100 miles of the site, we used the United States Geological Survey (USGS) web-based application *2008 National Seismic Hazard Maps - Fault Parameters*. Site latitude is 37.74381° North; site longitude is -122.44163° West. The ten (10) active fault closest to the site are summarized below in Table 9.1.

TABLE 9.1
REGIONAL FAULT SUMMARY

Fault Name	Distance to Site (miles)	Maximum Earthquake Magnitude, M_w
N. San Andreas;SAO+SAN+SAP+SAS	4.48	7.9
N. San Andreas;SAO+SAN	7.86	7.8
San Gregorio Connected	8.45	7.5
Hayward-Rodgers Creek;RC+HN+HS	13.55	7.3

[1] Bonilla, M.G., 1998, Preliminary geologic map of the San Francisco South 7.5' quadrangle and part of the Hunters Point 7.5' quadrangle, San Francisco Bay area, California: a digital database, U.S. Geological Survey, Open-File Report OF-98-354, 1:24,000

Monte Vista-Shannon	23.58	6.5
Hayward-Rodgers Creek;RC	23.70	7.1
Mount Diablo Thrust	23.82	6.7
Calaveras;CN+CC+CS	24.14	7.0
Point Reyes	25.53	6.9
Green Valley Connected	26.89	6.8

The faults tabulated above and numerous other faults in the region are sources of potential ground motion. However, earthquakes that might occur on other faults throughout California are also potential generators of significant ground motion and could subject the site to intense ground shaking.

9.2 Surface Fault Rupture

The site is not within a currently established State of California Earthquake Fault Zone for surface fault rupture hazards. The nearest fault to the project site is the North San Andreas fault located approximately 4.48 miles away from the site. Due to the distance from the site to the North San Andreas fault, the potential for fault rupture to occur at the site is very low.

9.3 Ground Shaking

Based on the 2025 CBC, estimated mean shear wave velocity was determined based on the standard penetration resistance (N-vales) derived from test boring B-1, projected to a depth of 100 feet BSG. The mean shear wave velocity was factored in accordance with Chapter 20 of ASCE 7-22. Estimated mean factored shear wave velocities of 1,119 ft/sec (Vs30), 861 ft/sec (VS30/1.3) and 1,455 ft/sec (VS30*1.3) were determined for the site. Based on the estimated shear wave velocities Site Class Designations of C, C/D, and D were selected for the site. Table 10.6.1 includes design seismic coefficients and spectral response parameters, based on the 2025 California Building Code (CBC) for the project foundation design.

Based on Office of Statewide Health Planning and Development (OSHPD) Seismic Design Maps, the estimated design peak ground acceleration adjusted for site class effects (PGA_M) was determined to be 0.73 g (based on both probabilistic and deterministic seismic ground motion).

While listing PGA is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including frequency and duration of motion and soil conditions underlying the site.

9.4 Liquefaction

Soil liquefaction is a state of soil particles suspension caused by a complete loss of strength when the effective stress drops to zero. Liquefaction normally occurs under saturated conditions in soils such as sand in which the strength is purely frictional. Primary factors that trigger liquefaction are: moderate to strong ground shaking (seismic source), relatively clean, loose granular soils (primarily poorly graded sands and silty sands), and saturated soil conditions (shallow groundwater). Due to the increasing overburden pressure with depth, liquefaction of granular soils is generally limited to the upper 50 feet of a soil profile. However, liquefaction has occurred in soils other than clean sand. A seismic hazard, which could potentially cause damage to the proposed development during seismic shaking, is the post-liquefaction settlement of the liquefied sands.

Based on review of the CGS Earthquake Zones of Required Investigation maps, the subject site is not located within a mapped liquefaction hazard zone. Based on the clayey nature of the materials encountered and lack of shallow groundwater, liquefaction/seismically induced settlements is not a concerned for the proposed construction.

9.5 Lateral Spreading

Lateral spreading is a phenomenon in which soils move laterally during seismic shaking and is often associated with liquefaction. The amount of movement depends on the soil strength, duration and intensity of seismic shaking, topography, and free face geometry. Based on the clayey nature of the soils and lack of shallow groundwater, lateral spread is not anticipated to have a negative impact to the planned development.

9.6 Landslides

There are no known landslides located at the site, nor is the site in the path of any known or potential landslides. The western portion of the subject parcel (at least 80 feet west, and downslope of the proposed tower location) is mapped by CGS and City of San Francisco as being in a potential landslide hazard zone. The area of the planned tower is not located within the mapped hazard zone. Therefore, the area of the planned lease area is not considered to be within an area mapped by local or state jurisdiction as having known potential for landslide hazards.

Based on review of the Associated of Bay Area Governments (ABAG) Hazard View Map, the area of the proposed tower lease and entire SF Police Academy parcel is within an area mapped as "flat land" designation for potential Rainfall Induced Landslides. ABAG defines "flat land" as areas unlikely to have a rainfall induced landslide event.

As summarized in the previous geotechnical report reviewed (See Section 3.0 – Site History), previous studies have concluded that slope instability is not a concern for the site. The documented settlement/movement of the existing building has been attributed by other consultants to have occurred due to vertical compression of saturated fill soils. Based on our observations of the exterior surficial conditions and exterior of the existing building, no visible evidence of previous slope movement/landslides was noted during our November 2025 site observations conducted by an Engineering Geologist.

Based on the findings of this report and review of the previous reports, no evidence of previous landslides were found during this investigation. The project will not pose a risk for increased slope instability and the potential for landslides to impact the site is considered low.

9.7 Tsunamis and Seiches

This site is not in an area mapped as in a tsunami hazard zone by California Geological Survey – Tsunami Hazard Area map. Therefore, tsunamis (seismic sea waves) are not considered a significant hazard at the site.

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. No major water-retaining structures are located immediately up gradient from the project site. Flooding from a seismically-induced seiche is considered unlikely.

10. CONCLUSIONS AND RECOMMENDATIONS

10.1 General

10.1.1 Based upon the data collected during this investigation, and from a geotechnical engineering standpoint, it is our opinion that the site is suitable for the proposed construction of improvements at the site as planned, provided the recommendations contained in this report are incorporated into the project design and construction. Conclusions and recommendations provided in this report are based on our review of applicable design literature, analysis of data obtained from our field exploration and laboratory testing program, and our understanding of the proposed development at this time.

10.1.2 From a geotechnical perspective, provided the recommendations included in this report are followed, the proposed tower construction is not anticipated to have a negatively impact on existing site improvements. Construction of the proposed tower improvements would not be anticipated to increase surface water drainage over or into the existing western slope area. Also, the tower construction would not result in a potential for increased saturation of the fills. Therefore, construction of the project would **not** result in an increased risk for slope instability or an increase the potential for future compression/settlement of the existing fills that could negatively impact the site and surrounding development.

10.1.3 The subsurface conditions encountered appear typical of those found in the geologic region of the site. In general, the materials encountered during drilling included fill soils, comprised predominately of medium dense clayey sand with trace to moderate amounts of gravel fragments throughout the depths explored. Below 65 feet BSG, the fills were noted to be dense. At depths around 80 to 85 feet BSG, the material encountered appeared to transition to a possible weathered rock material, with more competent rock encountered at 85 feet BSG (identified by relatively high blow counts of greater than 50 blows per foot). For the purpose of this report, the fill soils are conservatively estimated to extend to depths around 85 feet BSG with weathered formational rock material (Colma Formation), encountered between 85 feet and the maximum depth explored of 86.5 feet BSG. It should be noted that isolated layers of soils with noted organic odor were noted around depths of 25, 30, 35, and 45 feet BSG

10.1.4 Based on the laboratory testing results, the near surface soils are anticipated to have low expansion potential.

10.1.5 Based on the soils encountered during this exploration, CIDH piers should extend to a minimum of 50 feet BSG (5 feet below the fill soils with layers of soils with increased organic content). Provided the recommendations included in this report are followed, the proposed tower may be supported on cast-in-drilled hole pile (CIDH) foundations. Tower foundations constructed in accordance with the recommendations included in this report may be designed considering total differential static settlement of 1 inch total and ½ inch differential in 30 feet.

10.1.6 Based on the chemistry testing performed, the near surface soils have ‘negligible’ potential for sulfate attack on concrete and are considered to be “mildly corrosive” to buried metal objects.

10.1.7 All references to relative compaction and optimum moisture content in this report are based on ASTM D 1557 (latest edition).

10.1.8 SALEM should be retained to review the project plans as they develop further, provide engineering consultation as-needed, and perform geotechnical observation and testing services during construction.

10.2 Surface Drainage

10.2.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the soils can adversely affect the performance of the planned improvements. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change to important engineering properties. Proper drainage should be maintained at all times.

10.2.2 All site drainage should be collected and transferred away from improvements in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundations or retaining walls. Drainage should not be allowed to flow uncontrolled over any descending slope. Proposed structures with roofs should be provided with roof gutters. Discharge from downspouts, roof drains and scuppers are not permitted onto unprotected soils within five feet of any building perimeter or foundation. Planters, if located adjacent to foundations, should be sealed or properly drained to prevent moisture intrusion into the materials providing foundation support. Landscape irrigation within 5 feet of building footings and or equipment slabs should be kept to a minimum to just support vegetative life.

10.2.3 Positive site drainage should be provided away from structures, foundation, pavement, and the tops of slopes to swales or other controlled drainage structures. The lease area should be graded such that water is not allowed to pond within 15 feet of any foundation and final soil grades should slope a minimum of 2 percent away from foundations, slabs, structures, etc. Pavements should be sloped a minimum of 1 percent away from structures/foundations.

10.3 Grading

10.3.1 A representative of our firm should be present during all site clearing and grading operations to test and observe earthwork construction. This testing and observation is an integral part of our service as acceptance of earthwork construction is dependent upon compaction of the material and the stability of the material. The Geotechnical Engineer may reject any material that does not meet compaction and stability requirements. Further recommendations of this report are predicated upon the assumption that earthwork construction will conform to recommendations set forth in this section as well as other portions of this report.

10.3.2 A preconstruction conference should be held at the site prior to the beginning of grading operations with the owner, contractor, civil engineer and geotechnical engineer in attendance.

10.3.3 Site clearing and demolition activities shall include removal of all surface obstructions not intended to be incorporated into final site design. In addition, underground buried structures and/or utility lines encountered during demolition and construction should be properly removed and the resulting excavations backfilled with Engineered Fill. After demolition activities, it is recommended that disturbed soils be compacted as engineered fill.

10.3.4 Excavations or depressions resulting from site clearing operations, or other existing excavations or depressions, should be restored with Engineered Fill in accordance with the recommendations of this report.

10.3.5 If encountered during construction, surface vegetation consisting of grasses and other similar vegetation (if encountered at construction) should be removed by stripping to a sufficient depth to remove organic-rich topsoil. The upper 2 to 4 inches of soils containing, vegetation, roots and other objectionable organic matter encountered at the time of grading should be stripped and removed from the surface. Deeper stripping may be required in localized areas. In addition, the gravel surface material and any existing concrete and asphalt materials required to be removed shall be removed from areas of proposed improvements and stockpiled separately from excavated soil material. The stripped vegetation, asphalt and concrete materials will not be suitable for use as Engineered Fill or within 5 feet of foundations, equipment pads, or within pavement areas. However, stripped topsoil may be stockpiled and reused in landscape or non-structural areas or exported from the site.

10.3.6 Areas of proposed lightly loaded structures such as equipment shelters, equipment mat slabs, or retaining walls, should be prepared by over-excavation to the bottom of foundations or 12 inches below adjacent site grade, whichever is greater. Upon approval, the bottom of excavation should be scarified a minimum of 12 inches, moisture conditioned to at least 1 percent above optimum, and compacted to 92 percent of the maximum density. The over-excavation zone should extend horizontally a minimum of 3 feet beyond foundations.

Equipment slabs on grade should be supported on a minimum of 6 inches of Class 2 aggregate base compacted to 95 percent relative compaction over subgrade soils prepared as recommended above.

10.3.7 An integral part of satisfactory fill placement is the stability of the placed lift of soil. If placed material exhibit excessive instability as determined by a SALEM field representative, the lift will be considered unacceptable and shall be remedied prior to placement of additional fill material. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.

10.3.8 The most effective site preparation alternatives will depend on site conditions prior to grading. We should evaluate site conditions and provide supplemental recommendations immediately prior to grading, if necessary.

10.3.9 We do not anticipate groundwater or seepage to adversely affect construction if conducted during the drier months of the year (typically summer and fall). However, due to the shallow clayey soils, soil moisture conditions could be significantly different during the wet season (typically winter and spring). Grading during this time period will likely encounter wet materials resulting in possible excavation and fill placement difficulties. Project site winterization consisting of placement of aggregate base and protecting exposed soils during construction should be performed. If the construction schedule requires grading operations during the wet season, we can provide additional recommendations as conditions warrant.

10.3.10 Typical remedial measures include: discing and aerating the soil during dry weather; mixing the soil with dryer materials; removing and replacing the soil with an approved fill material or placement of crushed rocks or aggregate base material; or mixing the soil with an approved lime or cement product.

The most common remedial measure of stabilizing the bottom of the excavation due to wet soil condition is to reduce the moisture of the soil to near the optimum moisture content by having the subgrade soils scarified and aerated or mixed with drier soils prior to compacting. However, the drying process may require an extended period of time and delay the construction operation. To expedite the stabilizing process, crushed rock may be utilized for stabilization provided this method is approved by the owner for the cost purpose.

If the use of crushed rock is considered, it is recommended that the upper soft and wet soils be replaced by 6 to 24 inches of ¾-inch to 1-inch crushed rocks. The thickness of the rock layer depends on the severity of the soil instability. The recommended 6 to 24 inches of crushed rock material will provide a stable platform. It is further recommended that lighter compaction equipment be utilized for compacting the crushed rock. All open graded crushed rock/gravel should be fully encapsulated with a geotextile fabric (such as Mirafi 140N) to minimize migration of soil particles into the voids of the crushed rock. Although it is not required, the use of geogrid (e.g. Tensar BX 1100, BX 1200 or TX 160) below the crushed rock will enhance stability and reduce the required thickness of crushed rock necessary for stabilization.

Our firm should be consulted prior to implementing remedial measures to provide appropriate recommendations.

10.4 Soil and Excavation Characteristics

10.4.1 Based on the conditions encountered in the soil boring, the surface soils can be excavated with moderate effort using conventional excavation equipment.

10.4.2 It is the responsibility of the contractor to ensure that all excavations and trenches are properly shored and maintained in accordance with applicable Occupational Safety and Health Administration (OSHA) rules and regulations to maintain safety and maintain the stability of adjacent existing improvements. Temporary excavations are further discussed in a later Section of this report.

10.4.3 The near surface soils identified as part of our investigation are generally considered damp to moist. Earthwork operations conducted during inclement periods of the year are likely to encounter moist potentially unstable soils which may require removal to a stable bottom. Exposed native soils exposed as part of site grading operations shall not be allowed to dry out and should be kept continuously moist prior to placement of subsequent fill.

10.5 Materials for Fill

10.5.1 On-site soils are considered suitable for use as engineered fill at depths of at least 4 inches below concrete slabs and directly below shallow foundations. On-site soils used as engineered fill should not contain deleterious matter, organic material, or rock material larger than 3 inches in maximum dimension.

10.5.2 Import soil intended for use as Imported Engineered Fill soil, should be well-graded, slightly cohesive silty sand or sandy silt. This material should be approved by the Engineer prior to use and should typically possess the soil characteristics summarized below in Table 10.5.2

TABLE 10.5.2
IMPORT ENGINEERED FILL REQUIREMENTS

Percent Passing 3-inch Sieve	100

Percent Passing No.4 Sieve	75-100
Percent Passing No 200 Sieve	15-40
Maximum Plasticity Index	10
Organic Content, Percent by Weight	Less than 3%
Maximum Expansion Index (ASTM D4829)	10

Prior to importing the Contractor should demonstrate to the Owner that the proposed import meets the requirements for import fill specified in this report. In addition, the material should be verified by the Contractor that the soils do not contain any environmental contaminates as regulated by local, state, or federal agencies, as applicable.

10.5.3 The preferred materials specified for Imported Engineered Fill are suitable for most applications with the exception of exposure to erosion. Project site winterization and protection of exposed soils during the construction phase should be the sole responsibility of the Contractor, since they have complete control of the project site.

10.5.4 Environmental characteristics and corrosion potential of import soil materials should also be considered.

10.5.5 Proposed import materials should be sampled, tested, and approved by SALEM prior to its transportation to the site.

10.5.6 On-site soils placed as Engineered Fill should be moisture conditioned to at least 1 percent above optimum moisture content, and compacted to 92 percent relative compaction (ASTM D 1557).

10.5.7 Imported Engineered Fill should be moisture conditioned to slightly above optimum moisture content, and compacted to 92 percent relative compaction (ASTM D1557).

10.5.8 All Engineered Fill should be placed in lifts no thicker than will allow for adequate bonding and compaction (typically a maximum of 6 to 8 inches in loose thickness).

10.5.9 Caltrans Class 2 Aggregate Base shall meet the minimum requirements of Section 26 of the Caltrans Standard Specifications (Current Edition). Prior to importing, the Contractor should provide documentation that the aggregate base meets the requirements for Class 2 aggregate base (i.e. gradation, durability, R-value, sand equivalent, etc.) to the Owner and Salem for review. All aggregate base should be compacted to a minimum of 95 percent relative compaction.

10.5.10 Open graded gravel and rock material (i.e. ¾ inch or ½ inch crushed gravel) should not be used as backfill including utility trenches. If required by local agency or for use in subgrade stabilization, to prevent migration of fines, open graded materials should be fully encapsulated in a geotextile fabric such as Mirafi 140N or equivalent. Open graded rock should be placed in loose lifts no greater than about 6 to 8 inches, and vibrated in-place to a firm non-yielding condition.

10.6 Seismic Design Criteria

10.6.1 For seismic design of the structures, and in accordance with the seismic provisions of the 2025 CBC, our recommended parameters are shown below. These parameters were determined from the USGS Seismic Design Geodatabase obtained via the State of California Office of Statewide Health Planning and Development (OSHPD) Seismic Design Map Tool Website (https://seismicmaps.org/) in accordance with the 2025 CBC. The Site Classes were determined based on the requirements of ASCE 7-22, Chapter 20. The Value given for each Seismic Item below is the most critical value between the given Site Classes.

TABLE 10.6.1 - 2025 CBC SEISMIC DESIGN PARAMETERS

Seismic Item	Symbol	Value	ASCE 7-22 or 2025 CBC Reference
Site Coordinates (Datum = NAD 83)		37.74381 Lat -122.44163 Lon	
Site Class	--	C/CD/D	ASCE 7-22 Table 20.2-1
Soil Profile Name(s)	--	Very Dense /Very Dense to Dense /Dense	ASCE 7-22 Table 20.2-1
Risk Category	--	III	CBC 2025 Table 1604.5
Peak Ground Acceleration (adjusted for Site Class effects)	PGA_M	0.73 g	USGS Seismic Design Geodatabase
Seismic Design Category	SDC	D	ASCE 7 Table 11.6-1 & 2
Mapped Spectral Acceleration (Short period - 0.2 sec)	S_S	1.84 g	USGS Seismic Design Geodatabase
Mapped Spectral Acceleration (1.0 sec. period)	S_1	0.70 g	USGS Seismic Design Geodatabase
MCE Spectral Response Acceleration (Short period - 0.2 sec)	S_{MS}	2.06 g	USGS Seismic Design Geodatabase
MCE Spectral Response Acceleration (1.0 sec. period)	S_{M1}	2.07 g	USGS Seismic Design Geodatabase
Design Spectral Response Acceleration S_{DS}=⅔S_{MS} (short period - 0.2 sec)	S_{DS}	1.37 g	ASCE 7 Equation 11.4-1
Design Spectral Response Acceleration S_{D1}=⅔S_{M1} (1.0 sec. period)	S_{D1}	1.38 g	ASCE 7 Equation 11.4-2
End of Short-Term Transition Period (S_{D1}/S_{DS}), Seconds	T_S	1.06	ASCE 7-22, Section 11.4.5
Beginning of Short-Term Transition Period (0.2[S_{D1}/S_{DS}]), Seconds	T_0	0.213	ASCE 7-22, Section 11.4.5
Long Period Transition Period (seconds)	T_L	12	ASCE 7-22, Figure 22-14

10.6.2 Conformance to the criteria in the above table for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

10.7 Cast in Drilled Hole (CIDH) Pile Foundation for Tower

10.7.1 It is recommended that the foundation designs for the tower be provided to SALEM for review. A pile foundation should be designed by the project Structural Engineer based on design loads and maximum lateral forces expected at site. This report recommends the CIDH piers extend to at least 5 feet below the fill soils with varying organic content encountered between 25 and 45 feet BSG. Therefore, this report recommends a minimum CIDH pier depth of 50 feet BSG.

10.7.2 Cast-in-drilled-hole pile foundations may be designed based on total static settlement of 1 inch and differential static settlement of ½ inch in 30 feet or between piles, whichever is less.

10.7.3 Skin friction within the upper 2 feet BSG should be neglected in design. The downward load capacity of the piers (extending to at least 50 feet BSG), may be designed based on an average allowable skin friction value of 500 pounds per square foot. **End bearing support should not be considered in design.** This value may be increased by 1/3 for short duration temporary wind and seismic loading.

10.7.4 The average allowable uplift resistance of the pier foundations may be assumed to be 300 pounds per square foot, plus the weight of the CIDH pile.

10.7.5 The passive resistance in the upper portion of the piles to a depth of 2 feet or width equal to the CIDH pier diameter, whichever is greater, should be neglected for design. In addition, the upper portion of the pile where soils are within 10 feet horizontally of the face of the descending slope should be neglected in design The allowable passive resistance of the soils below the depths described above may be assumed to be equal to the pressure developed by a fluid with a density of 275 pounds per cubic foot to a maximum of 2,750 pounds per square foot. These values may be increased by one-third for short duration wind and seismic loads. No other increases should be applied to the allowable passive pressure.

10.7.6 If desired, the cast in drilled hole piers may be designed using LPILE and the parameters presented in Table 10.7.6. The lateral loading criteria is based on the assumption that the load application is applied at the ground level, flexible cap connections applied.

TABLE 10.7.6 -LPILE PARAMETERS

Depth, BSG (Feet)	L-Pile Soil Type	Effective Unit Weight (pcf)	Angle of Internal Friction (degrees)	Static Modulus of Subgrade Reaction, K (pci)
*2-25	Sand (Reese)	130	31	90
25-45	Sand (Reese)	130	40	40
45-85	Sand (Reese)	130	43	225

*** The upper portion of the piles to a depth of 2 feet or width equal to the CIDH pier diameter, whichever is greater, should be neglected for design. In addition, the upper portion of the pile where soils are within 10 feet horizontally of the face of the descending slope should be neglected in design**

10.8 CIDH Pier Construction

10.8.1 The project structural engineer should prepare a specification for the construction of the deep foundations as part of the construction documents. The specifications should be consistent with the recommendations included in this report.

10.8.2 Concrete should be placed in the drilled shaft as soon as possible following drilling. Concrete should be placed by tremie pipe method from the bottom of the drilled shaft.

10.8.3 The Contractor should considerer the borings noted in test borings reported in this report to determine the most appropriate means and method for drill hole stabilization. If excessive sidewall collapse occurs, SALEM should be consulted to observe the conditions and determine if any mitigation measures are required prior to placement of reinforcement and concrete.

10.8.4 If Temporary Casing is required, the Temporary casing used for support of drilled pile excavations during construction should be slowly removed from the shaft excavation during placement of concrete while ensuring the casing is not raised above the level of the concrete during shaft construction. The bottom of the casing should be lifted slowly as the concrete is deposited and kept at least two feet below the top of the concrete to avoid sloughing soils from mixing with the concrete.

10.8.5 Casing (where used) should be able to withstand the external pressures of the caving soils. The outside diameter of the casing should not be less than the diameter of the cast-in-drilled hole concrete pile.

10.8.6 Drilled holes for pile foundations should be drilled within 2 degrees of vertical. The rebar cage should be suspended within 2 degrees of vertical in the center of the excavation. Minimum concrete cover, as specified by the project design engineer, should be maintained throughout the length of the excavation. These conditions should be verified and documented by Salem Engineering Group during construction.

10.8.7 Salem Engineering Group should inspect the drilling of the shafts to verify that the materials encountered are consistent with those evaluated during our geotechnical engineering investigation. **This inspection should be conducted during drilling and prior to placement of reinforcing steel and concrete.**

10.8.8 All loose materials should be removed from the drilled shaft excavations prior to placement of reinforcing steel and concrete by use of a clean-out bucket or other acceptable methods to ensure removal of all loose materials.

10.9 Lightly Loaded Shallow Conventional Foundations and Equipment Slabs

10.9.1 It is recommended that the foundation designs for ancillary structures be provided to SALEM for review.

10.9.2 The site is suitable for use of conventional shallow foundations for equipment shelters/pads structures and slab foundations for equipment, bearing in compacted engineered fill prepared in accordance with Section 10.3 of this report.

10.9.3 It is recommended that shallow conventional footings to be utilized for lightly loaded foundations such as the equipment shelter should have a minimum width of 12 inches, and a minimum embedment depth of 12 inches below lowest adjacent pad grade. The face of shallow foundations should be at a sufficient depth to ensure a minimum setback of 5 feet horizontally from the face of descending slopes

10.9.4 Shallow foundations supported on engineered fill as recommended in this report may be designed based on an allowable bearing capacity of 1,500 pounds per square foot. This value may be increased by 1/3 for wind and seismic loading.

10.9.5 Structural mat foundations may be designed for an average allowable bearing pressure of 1,000 psf and a maximum bearing pressure of 1,500 psf. A modulus of subgrade reaction of 150 psi/inch may be used for design.

10.9.6 Total static settlement of 1 inch and differential static settlement of ½ inch in 30 feet should be anticipated for design. The footing excavations should not be allowed to dry out any time prior to pouring concrete.

10.9.7 Resistance to lateral footing displacement can be computed using an estimated allowable friction factor of 0.29 acting between the base of foundations and the supporting subgrade.

10.9.8 Lateral resistance for footings can alternatively be developed using an estimated allowable equivalent fluid passive pressure of 275 pounds per cubic foot acting against the appropriate vertical footing faces. An increase of one-third is permitted for wind and earthquake and seismic loading. The upper 6 inches should be neglected in design.

10.9.9 Minimum reinforcement for continuous footings should consist of four No. 4 steel reinforcing bars; two placed near the top of the footing and two near the bottom. Reinforcement for spread footings should be designed by the project structural engineer.

10.9.10 Underground utilities running parallel to footings should not be constructed in the zone of influence of footings. The zone of influence may be taken to be the area beneath the footing and within a 1:1 plane extending out and down from the bottom edge of the footing.

10.9.11 The foundation subgrade should be sprinkled as necessary to maintain a moist condition without significant shrinkage cracks as would be expected in any concrete placement. Prior to placing rebar reinforcement, foundation excavations should be evaluated by a representative of SALEM for appropriate support characteristics and moisture content. Moisture conditioning may be required for the materials exposed at footing bottom, particularly if foundation excavations are left open for an extended period.

10.10 Temporary Excavations

10.10.1 We anticipate that the majority of the near surface site soils will be classified as Cal-OSHA "Type C" soil when encountered in excavations during site development and construction. Excavation sloping, benching, the use of trench shields, and the placement of trench spoils should conform to the latest applicable Cal-OSHA standards. The contractor should have a Cal-OSHA-approved "competent person" onsite during excavation to evaluate trench conditions and make appropriate recommendations where necessary.

10.10.2 It is the contractor's responsibility to provide sufficient and safe excavation support as well as protecting nearby utilities, structures, and other improvements which may be damaged by earth movements. All onsite excavations must be conducted in such a manner that potential surcharges from existing structures, construction equipment, and vehicle loads are resisted. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation or vehicle load.

10.10.3 Temporary excavations and slope faces should be protected from rainfall and erosion. Surface runoff should be directed away from excavations and slopes.

10.10.4 Open, unbraced excavations in undisturbed soils should be made according to the slopes presented in the following table:

RECOMMENDED EXCAVATION SLOPES

Depth of Excavation (ft)	Slope (Horizontal : Vertical)
0-5	1:1
5-10	1½:1

10.10.5 If, due to space limitation, excavations near existing structures are performed in a vertical position, braced shorings or shields may be used for supporting vertical excavations. Therefore, in order to comply with the local and state safety regulations, a properly designed and installed shoring system would be required to accomplish planned excavations and installation. A Specialty Shoring Contractor should be responsible for the design and installation of such a shoring system during construction.

10.10.6 Braced shorings should be designed for a maximum pressure distribution of 40H, (where H is the depth of the excavation in feet). The foregoing does not include excess hydrostatic pressure or surcharge loading. Fifty percent of any surcharge load, such as construction equipment weight, should be added to the lateral load given herein. Equipment traffic should concurrently be limited to an area at least 3 feet from the shoring face or edge of the slope.

10.10.7 The excavation and shoring recommendations provided herein are based on soil characteristics derived from the boring within the area. Variations in soil conditions will likely be encountered during the excavations. SALEM Engineering Group, Inc. should be afforded the opportunity to provide field review to evaluate the actual conditions and account for field condition variations not otherwise anticipated in the preparation of this recommendation. Slope height, slope inclination, or excavation depth should in no case exceed those specified in local, state, or federal safety regulation, (e.g. OSHA) standards for excavations, 29 CFR part 1926, or Assessor's regulations.

10.11 Underground Utilities

10.11.1 Underground utility trenches should be backfilled with properly compacted material. The material excavated from the trenches should be adequate for use as general backfill above the bedding and pipe zone (see Section 14.2) provided it does not contain deleterious matter, vegetation or rock larger than 3 inches in maximum dimension. Trench backfill should be placed in loose lifts not exceeding 8 inches and compacted to at least 90 percent relative compaction to at least 1 percent above optimum moisture content. The upper 12 inches of trench backfill within asphalt or concrete paved areas shall be moisture conditioned to at or above optimum moisture content and compacted to at least 95 percent relative compaction.

10.11.2 Bedding and pipe zone backfill typically extends from the bottom of the trench excavations to approximately 12 inches above the crown of the pipe. Pipe bedding, haunches and initial fill extending to 1 foot above the pipe should consist of a clean well graded sand with 100 percent passing the #4 sieve, a maximum of 15 percent passing the #200 sieve, and a minimum sand equivalent of 20.

10.11.3 It is suggested that underground utilities crossing beneath new or existing structures be plugged at entry and exit locations to the building or structure to prevent water migration. Trench plugs can consist of on-site clay soils, if available, or sand cement slurry. The trench plugs should extend 2 feet beyond each side of individual perimeter foundations.

10.11.4 The contractor is responsible for removing all water-sensitive soils from the trench regardless of the backfill location and compaction requirements. The contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction.

11. PLAN REVIEW, CONSTRUCTION OBSERVATION AND TESTING

11.1 Plan and Specification Review

11.1.1 SALEM should review the project plans and specifications prior to final design submittal to assess whether our recommendations have been properly implemented and evaluate if additional analysis and/or recommendations are required.

11.2 Construction Observation and Testing Services

11.2.1 The recommendations provided in this report are based on the assumption that we will continue as Geotechnical Engineer of Record throughout the construction phase. It is important to maintain continuity of geotechnical interpretation and confirm that field conditions encountered are similar to those anticipated during design.

If we are not retained for these services, we cannot assume any responsibility for others interpretation of our recommendations, and therefore the future performance of the project.

11.2.2 SALEM should be present at the site during site preparation to observe site clearing, preparation of exposed surfaces after clearing, and placement, treatment and compaction of fill material.

11.2.3 SALEM's observations should be supplemented with periodic compaction tests to establish substantial conformance with these recommendations. Moisture content of footings and slab subgrade should be tested immediately prior to concrete placement. SALEM should observe foundation excavations prior to placement of reinforcing steel or concrete to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report.

12. LIMITATIONS AND CHANGED CONDITIONS

The analyses and recommendations submitted in this report are based upon the data obtained from the test boring drilled at the approximate locations shown on the Site Plan, Figure 2. The report does not reflect variations which may occur between borings. The nature and extent of such variations may not become evident until construction is initiated.

If variations then appear, a re-evaluation of the recommendations of this report will be necessary after performing on-site observations during the excavation period and noting the characteristics of such variations. The findings and recommendations presented in this report are valid as of the present and for the proposed construction.

If site conditions change due to natural processes or human intervention on the property or adjacent to the site, or changes occur in the nature or design of the project, or if there is a substantial time lapse between the submission of this report and the start of the work at the site, the conclusions and recommendations contained in our report will not be considered valid unless the changes are reviewed by SALEM and the conclusions of our report are modified or verified in writing.

The validity of the recommendations contained in this report is also dependent upon an adequate testing and observations program during the construction phase. Our firm assumes no responsibility for construction compliance with the design concepts or recommendations unless we have been retained to perform the on-site testing and review during construction. SALEM has prepared this report for the exclusive use of the owner and project design consultants.

SALEM does not practice in the field of corrosion engineering. It is recommended that a qualified corrosion engineer be consulted regarding protection of buried steel or ductile iron piping and conduit or, at a minimum, that manufacturer's recommendations for corrosion protection be closely followed. Further, a corrosion engineer may be needed to incorporate the necessary precautions to avoid premature corrosion of concrete slabs and foundations in direct contact with native soil. The importation of soil and or aggregate materials to the site should be screened to determine the potential for corrosion to concrete and buried metal piping.

The report has been prepared in accordance with generally accepted geotechnical engineering practices in the area. No other warranties, either express or implied, are made as to the professional advice provided under the terms of our agreement and included in this report.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (559) 271-9700.

Respectfully Submitted,

SALEM ENGINEERING GROUP, INC.

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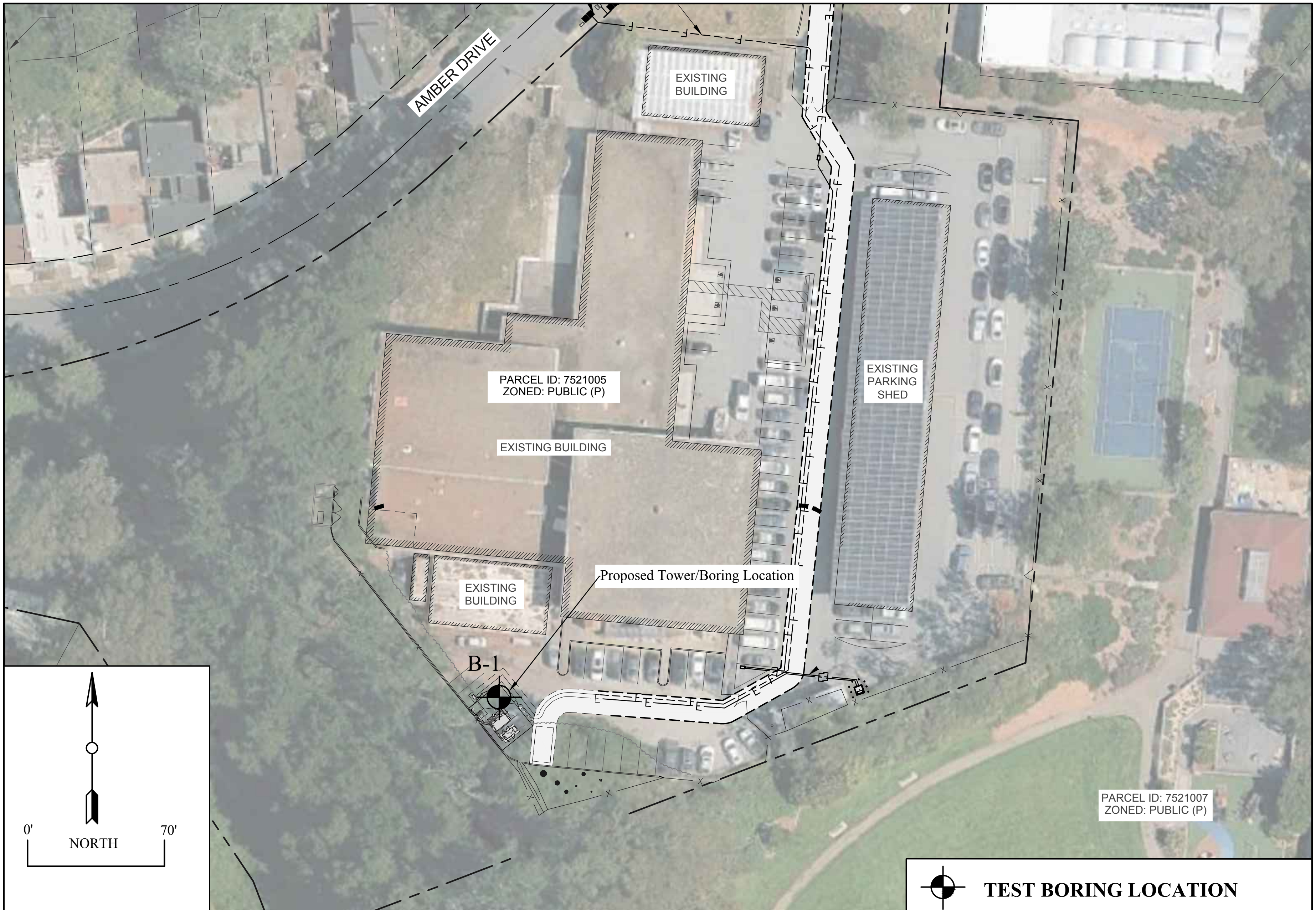
GEOTECHNICAL
STATE OF CALIFORNIA

VICINITY MAP	SCALE: 1" = 2,000'	DATE: Dec. 2025	SALEM engineering group, inc.
GEOTECHNICAL ENGINEERING INVESTIGATION PROPOSED VERIZON 103' MONOPOLE TOWER SAN FRANCISCO POLICE ACADEMY 350 AMBER DRIVE SAN FRANCISCO, CALIFORNIA	DRAWN BY: VT	APPROVED BY: DL	
	PROJECT NO. 5-225-1076	FIGURE NO. 1	



SITE PLAN	SCALE: 1" = 70'	DATE: DEC. 2025
GEOTECHNICAL ENGINEERING INVESTIGATION PROPOSED VERIZON 103' MONOPOLE TOWER SAN FRANCISCO POLICE ACADEMY 350 AMBER DRIVE SAN FRANCISCO, CALIFORNIA	DRAWN BY: CR	APPROVED BY: DL
	PROJECT NO. 5-225-1076	FIGURE NO. 3

SALEM engineering group, inc.

APPENDIX

A

APPENDIX A
FIELD EXPLORATION

Our field exploration consisted of a site surface reconnaissance and a subsurface exploration. The exploratory boring was drilled on December 29 and 30, 2025, in the area shown on the Site Plan, Figure 2.

Sampling in the boring was accomplished using a hydraulic 140-pound hammer with a 30-inch drop. Samples were obtained with a 3-inch outside-diameter (OD), split spoon (California Modified) sampler, and a 2-inch OD, Standard Penetration Test (SPT) sampler driven 18 inches into the soil. Penetration and/or Resistance tests were performed at selected depths. The resistance/N-Value obtained from driving was recorded based on the number of blows required to penetrate the last 12 inches. The driving energy was provided by an auto-trip hammer weighing 140 pounds, falling 4inches. Relatively undisturbed MCS soil samples were obtained while performing this test. Bag samples of the disturbed soil were obtained from the SPT samples and auger cuttings. All samples were returned to our Fresno laboratory for evaluation. The test borings were backfilled with excavated soil upon completion of drilling and sampling.

Subsurface conditions encountered in the exploratory boring were visually examined, classified and logged in general accordance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D2488). This system uses the Unified Soil Classification System (USCS) for soil designations. The log depicts soil and geologic conditions encountered and depths at which samples were obtained. The log also includes our interpretation of the conditions between sampling intervals. Therefore, the log contains both observed and interpreted data. We determined the lines designating the interface between soil materials on the log using visual observations, drill rig penetration rates, excavation characteristics and other factors. The transition between materials may be abrupt or gradual. Where applicable, the field log was revised based on subsequent laboratory testing.

Test Boring: B-1 **Page** 1 **Of:** 3

Project Number: 5-225-1076

Date: 12/29/2025

Client: Geist Engineering & Enviromental Group, Inc.

SALEM engineering group, inc.

Project: AT&T 103' Monopole CCL05350: SF Police Academy

Location: 350 Amber Drive, San Francisco, CA.

Drilled By: Salem Engineering Group, Inc. **Logged By:** RS

Drill Type: CME 55 **Elevation:** 553-ft. AMSL

Auger Type: 8in. Hollow Stem Auger **Initial Depth to Groundwater:** NE

Hammer Type: Automatic Trip - 140lbs./30in. **Final Depth to Groundwater:** NE

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
0		AC	Asphalt Concrete = 2 inches.				
	6/6 4/6 5/6	FILL	Clayey Sand; Loose, reddish brown to light brown, fine to coarse, trace gravel.	9	15.8	--	
5	10/6 10/6 10/6		Dark brown. Medium dense	20	13.7	113.3	Gravel=26% Sand = 45% #200 = 29% PL = 21 LL = 31
10	5/6 8/6 10/6		Light brown, increase sand.	18	13.3	115.5	ϕ = 31° C' = 760
15	6/6 9/6 11/6			20	--	--	No recovery.
20	11/6 16/6 20/6		dark brown, increase in percent sand.	36	9.5	120.3	
25	9/6 9/6 15/6		grey with brown, very moist, slight organic smell.	24	18.1	108.6	Gravel=21% Sand = 31% #200 = 48% PL = 22 LL = 33

Notes:

Figure Number A-1

SALEM engineering group, inc.

Project Number: 5-225-1076
Date: 12/29/2025
Test Boring: B-1

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
30	3/6 4/6 7/6		dark brown to black, trace of roots, increase in percent fines.	11	22.9	--	
520 / 35	11/6 11/6 10/6		Greyish brown, moist, no roots, no organic smell, increase gravel.	21	15.8	114.1	ϕ = 40° C' = 387
515 / 40	4/6 5/6 9/6		brown with some greyish white, slightly moist.	14	24.0	--	
510 / 45	7/6 8/6 7/6		Red to brown.	15	14.1	116.4	Gravel=25% Sand = 39% #200 = 36% PL = 22 LL = 34
			brown to dark grey, some organics,				
505 / 50	13/6 16/6 19/6		light brown to brown, moist, with gravel.	35	13.8	113.5	
	7/6 9/6 12/6		Dark grey, with sand and trace gravel.	21	13.7	--	
500 / 55	9/6 16/6 19/6		Orange,red, grey, green with brown.	35	13.3	113.5	Gravel=28% Sand = 45% #200 = 27% PL = 23 LL = 36
	8/6 12/6 8/6		Grey with reddish brown.	20	12.3	--	
495 / 60	9/6 13/6 12/6		Dark grey, with gravel.	25	16.9	113.8	
490	6/6 7/6 11/6		Light orange brown to dark grey.	18	17.2	--	ϕ = 43° C' =260

Notes:

Figure Number A-1

SALEM engineering group, inc.

Project Number: 5-225-1076

Date: 12/29/2025

Test Boring: B-1

ELEVATION/DEPTH (feet) scale: Depth 65, 70, 75, 80, 85, 90, 95; Elevation 485, 480, 475, 470, 465, 460, 455

SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Soil Description	N-Values blows/ft.	Moisture Content %	Dry Density, PCF	Remarks
8/6 13/6 16/6	FILL	Light brown, slightly moist.	29	10.7	--	Gravel=31% Sand = 42% #200 = 27%
5/6 10/6 50/5		Brown, dark grey.	>50	16.3	--	
		Hard driling, weathered grey rock.		21.9	--	
10/6 14/6 26/6		Dense, reddish light brown, Very moist	40	16.4	--	
7/6 12/6 17/6		Light reddish dark brown, moist.	29	11.0	--	
15/6 15/6 15/6		Dense	30	14.3	--	Gravel=29% Sand = 45% #200 = 26%
9/6 13/6 17/6		Very gravelly, weathered rock fragments.	30	14.1	--	
12/6 16/6 23/6		moist, reddish brown weathered rock, with clay.	39	11.8	--	
9/6 50/1	ROCK	Weathered Rock - Very Low Recovery Appears to be Colima Formation	>50	12.3	--	
50/1			>50	--	--	
		End of boring at 86.5ft. BSG				

Notes:

Figure Number A-1

KEY TO SYMBOLS

Symbol Description

Strata symbols

Asphaltic Concrete

Fill

Fractured Rock

Misc. Symbols

Boring continues

Soil Samplers

Standard penetration test

California sampler

Notes:

Granular Soils
Blows Per Foot (Uncorrected)

	MCS	SPT
Very loose	<5	<4
Loose	5-15	4-10
Medium dense	16-40	11-30
Dense	41-65	31-50
Very dense	>65	>50

Cohesive Soils
Blows Per Foot (Uncorrected)

	MCS	SPT
Very soft	<3	<2
Soft	3-5	2-4
Firm	6-10	5-8
Stiff	11-20	9-15
Very Stiff	21-40	16-30
Hard	>40	>30

MCS = Modified California Sampler
SPT = Standard Penetration Test Sampler

APPENDIX

B

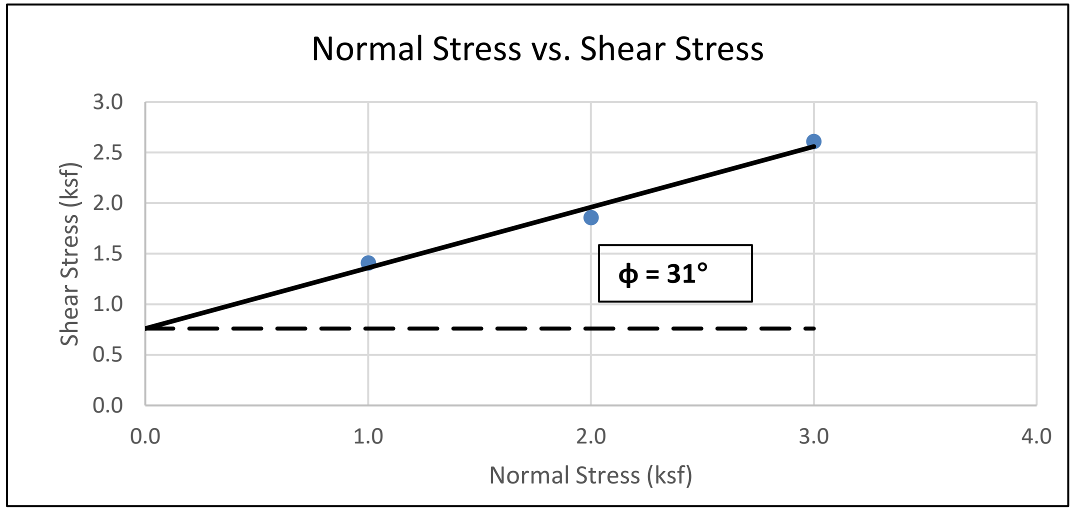
APPENDIX B
LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM), Caltrans, or other suggested procedures. Selected samples were tested for in-situ density and moisture content, Atterberg limits, expansion index, grain size distribution, consolidation, shear strength, corrosivity, and soil resistivity. The results of the laboratory tests are summarized in the following figures.

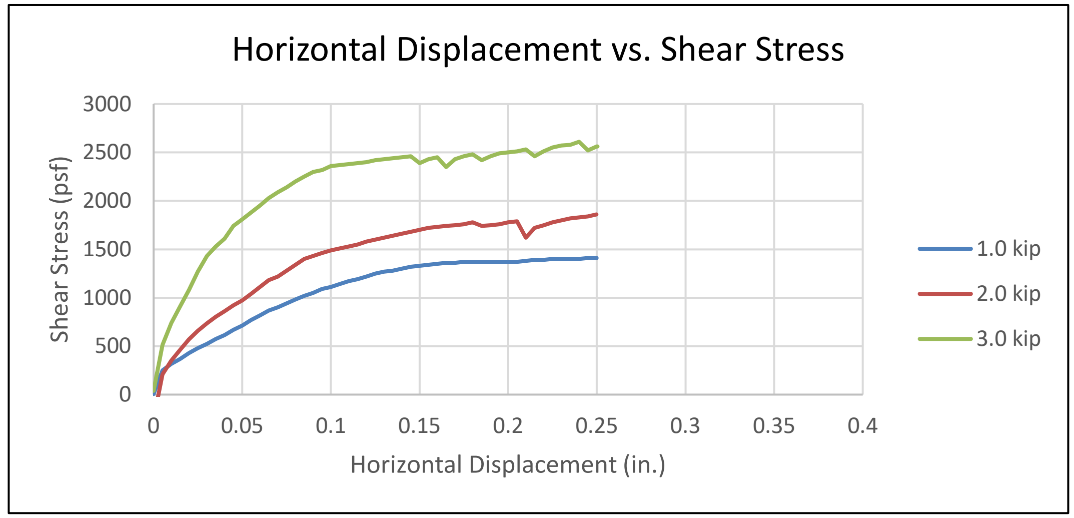
Direct Shear Test (ASTM D3080)

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA
Project Number: 5-225-1076
Client: Geist Engineering and Environmental Group, Inc.
Boring: B-1 @ 10'-11.5'
Soil Type: Clayey Sand with Grave
Sample Type: Undisturbed Ring
Tested By: NL / MC
Reviewed By:
Date of Test: 1/12-13/26
Test Equipment: GeoComp ShearTrac II

	Loading		
	1.0 kip	**2.0 kip**	**3.0 kip**
Normal Stress (ksf)	1.00	2.00	3.00
Shear Rate (in/min)	0.0040	0.0040	0.0040
Peak Shear Stress (ksf)	1.41	1.86	2.61



Initial Height of Sample (in)	1.000	1.000	1.000
Post-Consol. Sample Height (in.)	0.966	0.931	0.928
Post-Shear Sample Height (in.)	0.976	0.919	0.911
Diameter of Sample (in)	2.416	2.416	2.416
Initial (pre-shear) Values			
Moisture Content (%)	13.3		
Dry Density (pcf)	112.9	111.3	115.4
Saturation %	73.2	70.1	78.4
Void Ratio	0.49	0.51	0.46
Consolidated Void Ratio	0.44	0.40	0.35
Final (post-shear) Values			
Final Moisture Content (%)	21.0	20.4	20.9
Dry Density (pcf)	108.4	114.1	118.1
Saturation %	102.5	115.7	135.4
Void Ratio	0.55	0.48	0.42



Peak Shear Strength Values	
Slope	0.60
Friction Angle	31
Cohesion (psf)	760

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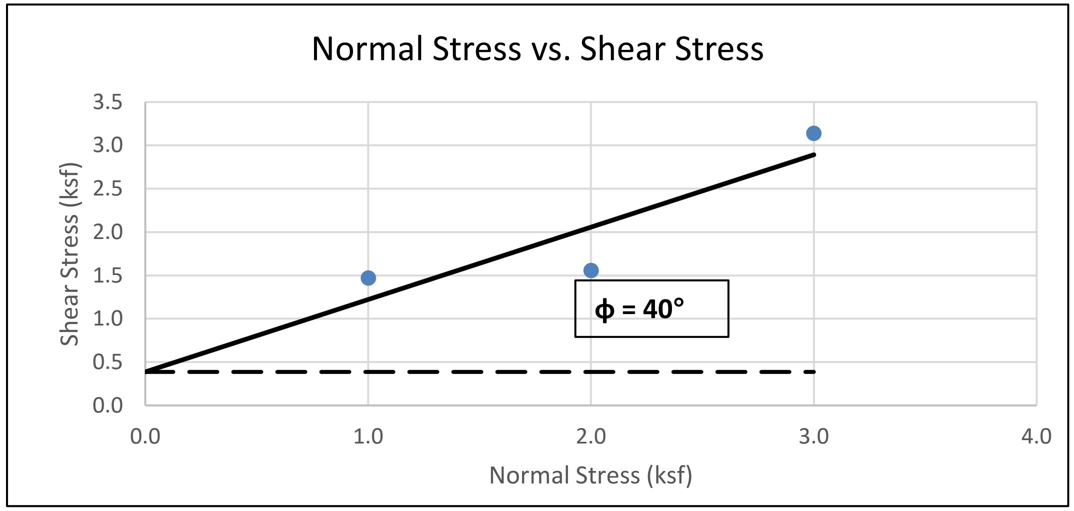
Fresno, CA 93722

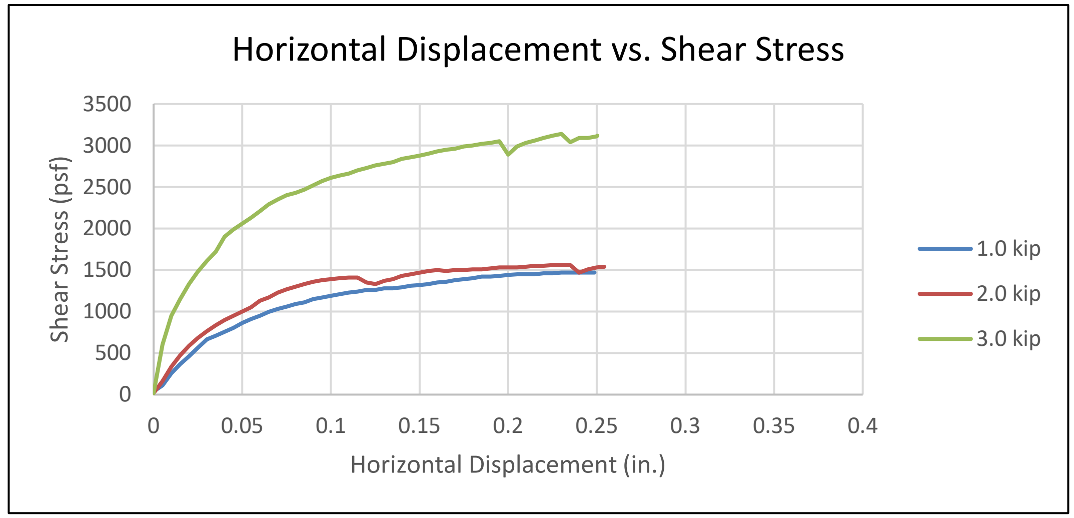
Direct Shear Test (ASTM D3080)

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA
Project Number: 5-225-1076
Client: Geist Engineering and Environmental Group, Inc.
Boring: B-1 @ 35'-36.5'
Soil Type: Clayey Sand with Grave
Sample Type: Undisturbed Ring
Tested By: MC / NL
Reviewed By:
Date of Test: 1/13/26
Test Equipment: GeoComp ShearTrac II

	Loading		
	1.0 kip	**2.0 kip**	**3.0 kip**
Normal Stress (ksf)	1.00	2.00	3.00
Shear Rate (in/min)	0.0040	0.0040	0.0040
Peak Shear Stress (ksf)	1.47	1.56	3.14

Initial Height of Sample (in)	1.000	1.000	1.000
Post-Consol. Sample Height (in.)	0.972	0.924	0.935
Post-Shear Sample Height (in.)	0.972	0.914	0.919
Diameter of Sample (in)	2.416	2.416	2.416
Initial (pre-shear) Values			
Moisture Content (%)	15.8		
Dry Density (pcf)	110.7	105.4	109.5
Saturation %	82.6	71.8	79.8
Void Ratio	0.52	0.59	0.53
Consolidated Void Ratio	0.47	0.47	0.43
Final (post-shear) Values			
Final Moisture Content (%)	23.5	22.9	22.4
Dry Density (pcf)	107.0	109.1	111.2
Saturation %	110.8	113.1	123.2
Void Ratio	0.57	0.55	0.49





Peak Shear Strength Values	
Slope	0.84
Friction Angle	40
Cohesion (psf)	387

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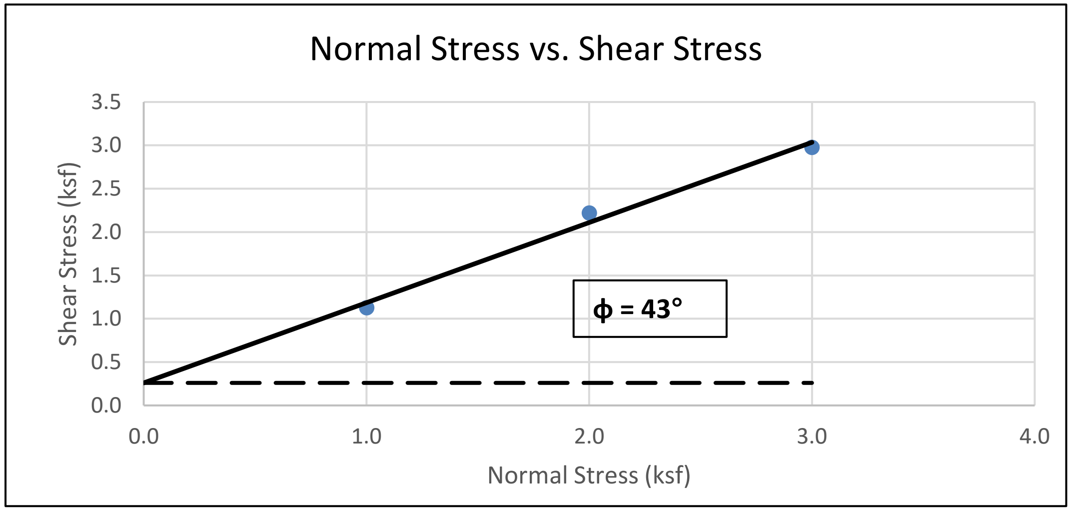
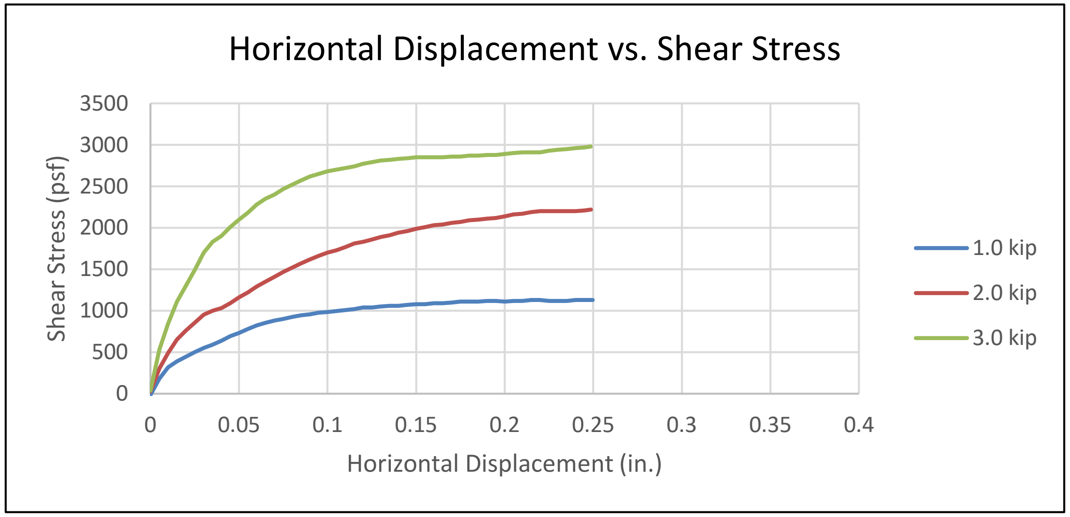
Direct Shear Test (ASTM D3080)

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA
Project Number: 5-225-1076
Client: Geist Engineering and Environmental Group, Inc.
Boring: B-1 @ 60'-61.5'
Soil Type: Clayey Sand with Grave
Sample Type: Undisturbed Ring
Tested By: NL / MC
Reviewed By:
Date of Test: 1/13-14/26
Test Equipment: GeoComp ShearTrac II

	Loading		
	1.0 kip	**2.0 kip**	**3.0 kip**
Normal Stress (ksf)	1.00	2.00	3.00
Shear Rate (in/min)	0.0025	0.0025	0.0025
Peak Shear Stress (ksf)	1.13	2.22	2.98

Initial Height of Sample (in)	1.000	1.000	1.000
Post-Consol. Sample Height (in.)	0.954	0.940	0.915
Post-Shear Sample Height (in.)	0.948	0.933	0.904
Diameter of Sample (in)	2.416	2.416	2.416
Initial (pre-shear) Values			
Moisture Content (%)	16.9		
Dry Density (pcf)	106.8	112.5	112.0
Saturation %	77.9	90.3	89.0
Void Ratio	0.59	0.51	0.52
Consolidated Void Ratio	0.52	0.42	0.39
Final (post-shear) Values			
Final Moisture Content (%)	22.5	20.0	20.6
Dry Density (pcf)	107.9	117.9	119.3
Saturation %	105.6	122.1	135.0
Void Ratio	0.58	0.45	0.41





Peak Shear Strength Values	
Slope	0.93
Friction Angle	43
Cohesion (psf)	260

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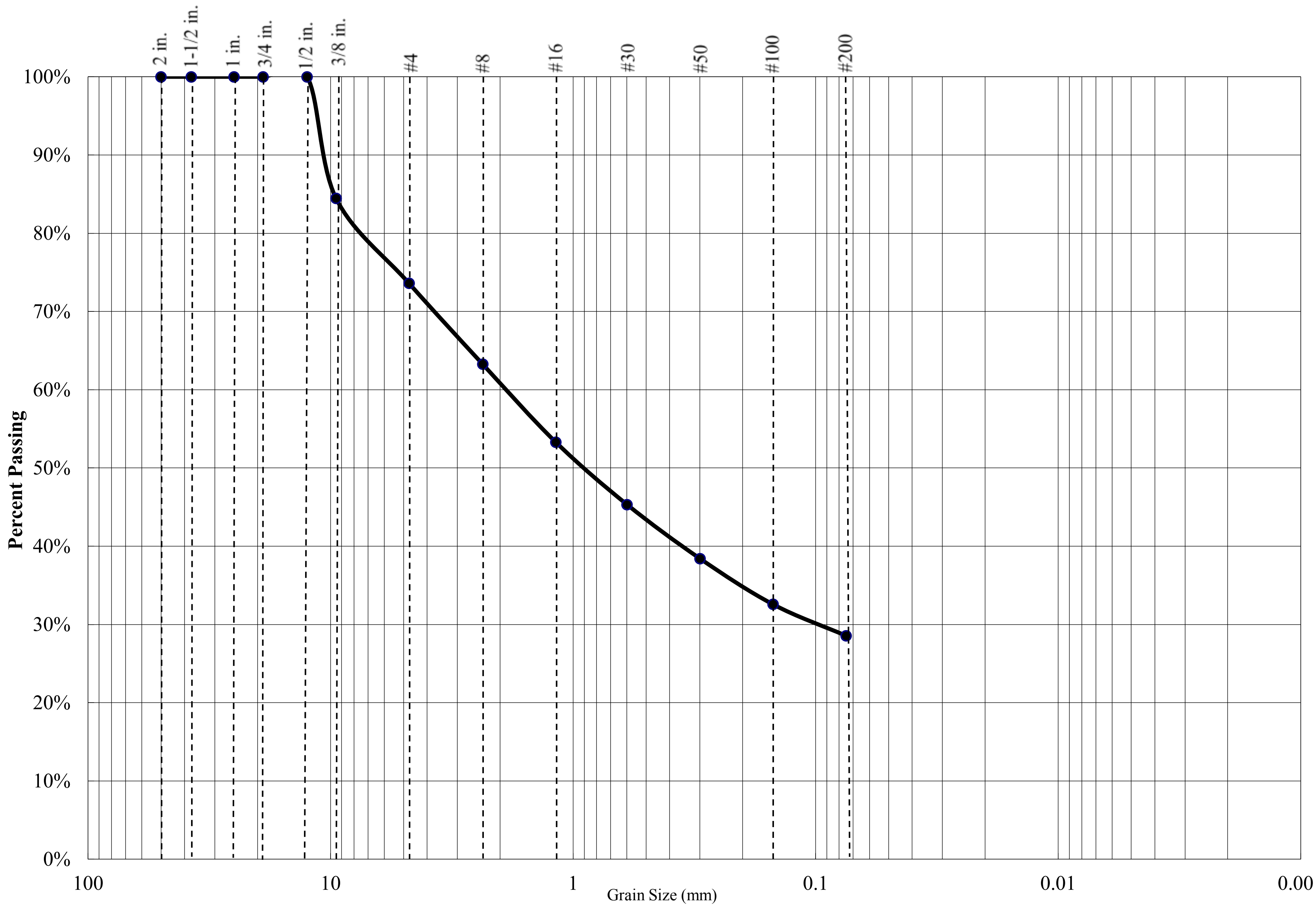
PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
26%	45%	29%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	84.5%
#4	73.6%
#8	63.3%
#16	53.3%
#30	45.3%
#50	38.4%
#100	32.6%
#200	28.6%

Atterberg Limits		
PL=	LL=	PI=

Coefficients					
D_{85}=		D_{60}=		D_{50}=	
D_{30}=		D_{15}=		D_{10}=	
C_u=	N/A	C_c=	N/A		

USCS CLASSIFICATION
Clayey Sand with Gravel (SC)

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA

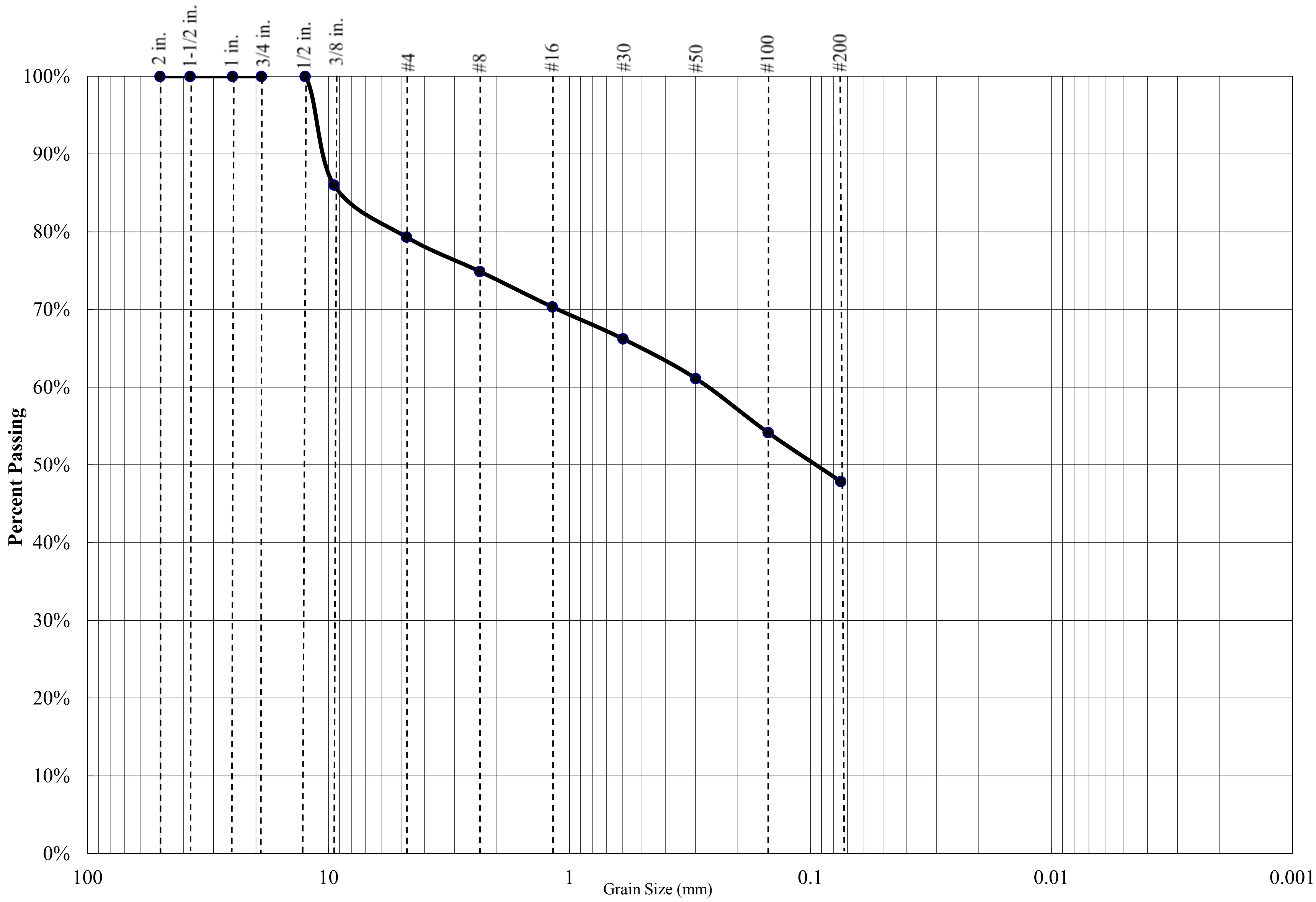
Project Number: 5-225-1076

Boring: B-1 @ 5'-6.5'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
21%	31%	48%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	86.0%
#4	79.3%
#8	74.9%
#16	70.3%
#30	66.2%
#50	61.1%
#100	54.2%
#200	47.9%

Atterberg Limits		
PL=	LL=	PI=

Coefficients					
D_{85}=		D_{60}=		D_{50}=	
D_{30}=		D_{15}=		D_{10}=	
C_u=	N/A	C_c=	N/A		

USCS CLASSIFICATION
Clayey Sand with Gravel (SC)

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA

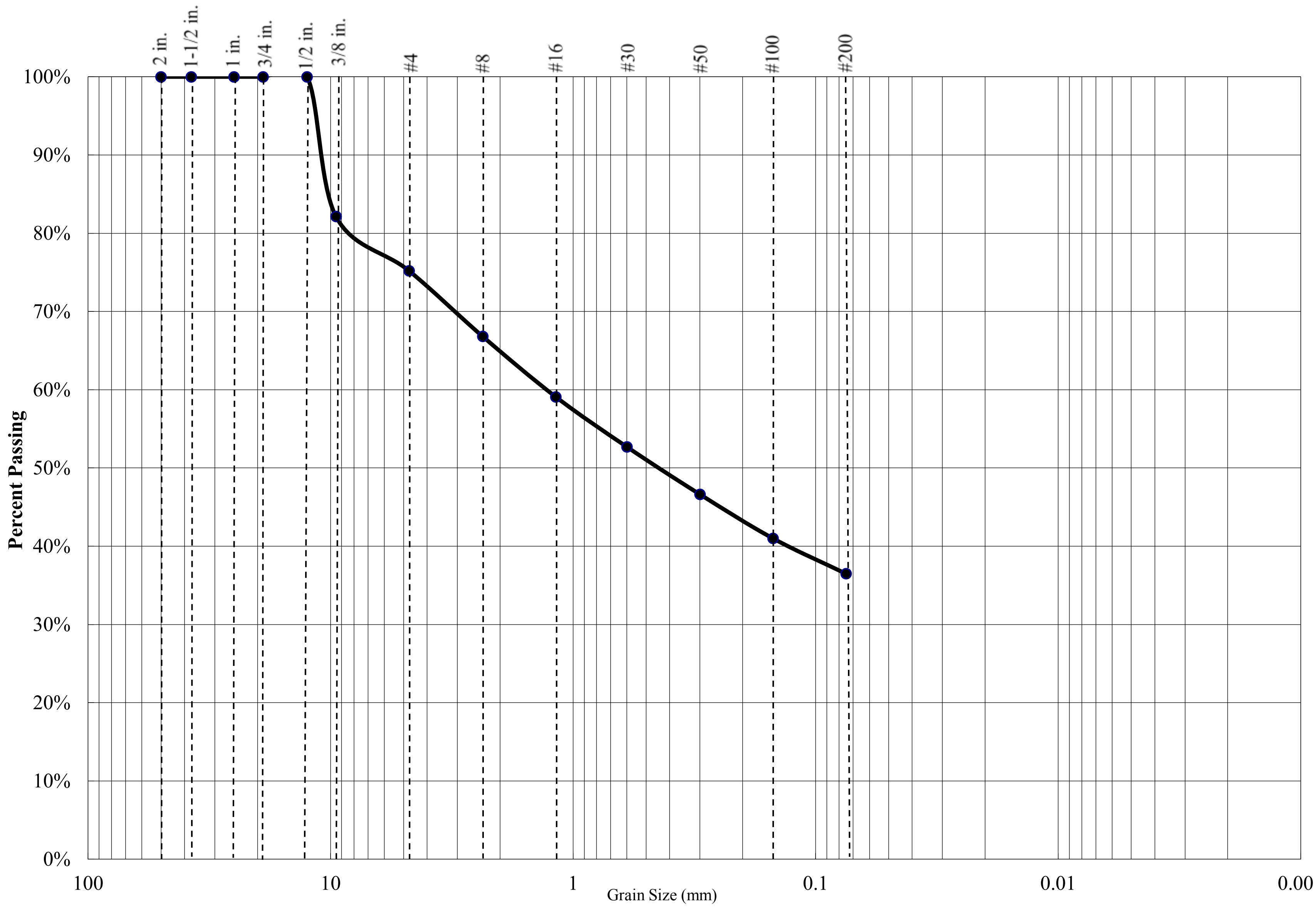
Project Number: 5-225-1076

Boring: B-1 @ 25'-26.5'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
25%	39%	36%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	82.1%
#4	75.2%
#8	66.8%
#16	59.1%
#30	52.7%
#50	46.6%
#100	41.0%
#200	36.5%

Atterberg Limits		
PL=	LL=	PI=

Coefficients					
D_{85}=		D_{60}=		D_{50}=	
D_{30}=		D_{15}=		D_{10}=	
C_u=	N/A	C_c=	N/A		

USCS CLASSIFICATION
0

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA

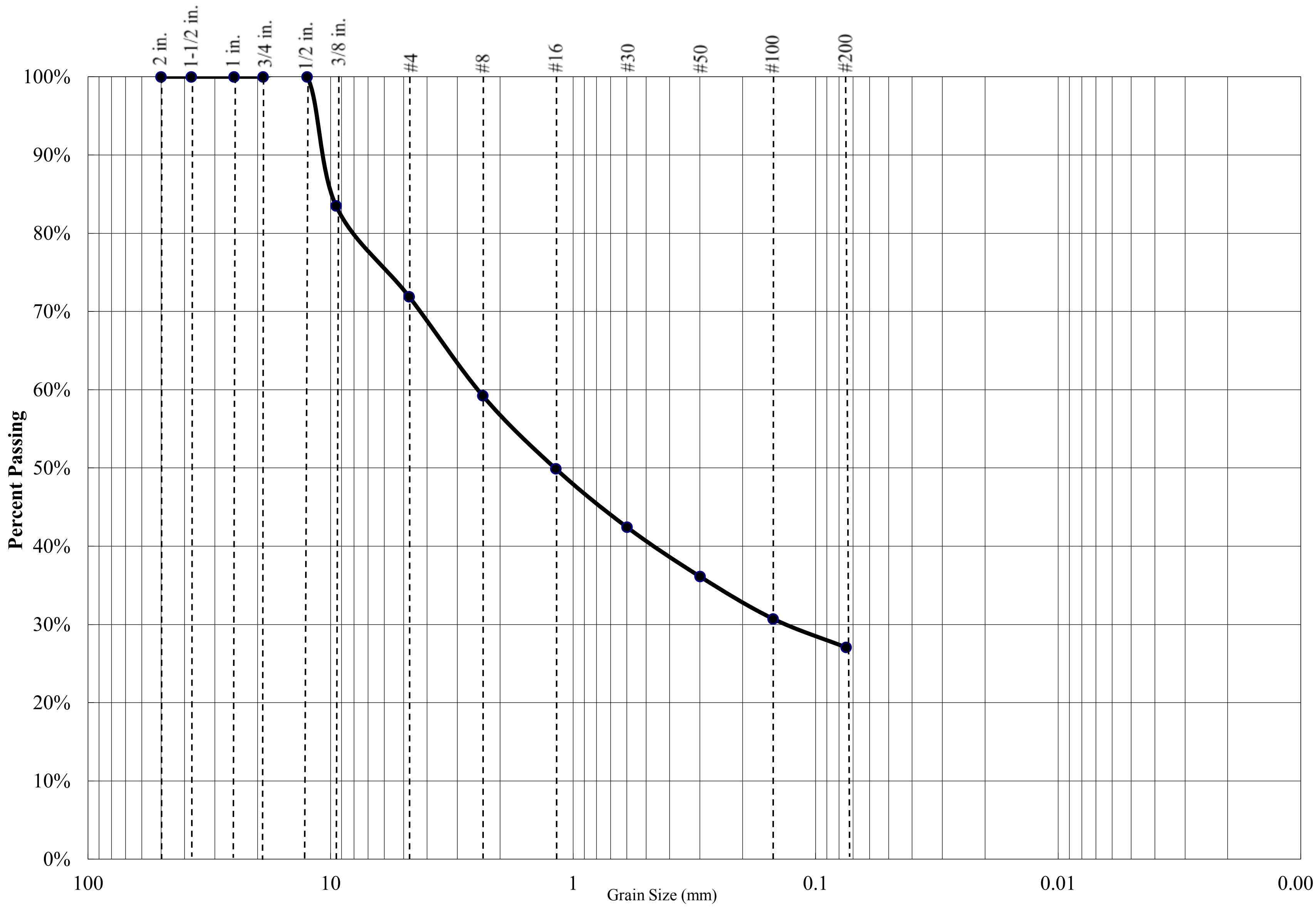
Project Number: 5-225-1076

Boring: B-1 @ 45'-46.5'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
28%	45%	27%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	83.5%
#4	71.9%
#8	59.2%
#16	49.9%
#30	42.4%
#50	36.1%
#100	30.7%
#200	27.1%

Atterberg Limits		
PL=	LL=	PI=

Coefficients					
D_{85}=		**D_{60}=**		**D_{50}=**	
D_{30}=		**D_{15}=**		**D_{10}=**	
C_u=	N/A	**C_c=**	N/A		

USCS CLASSIFICATION
Clayey Sand with Gravel (SC)

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA

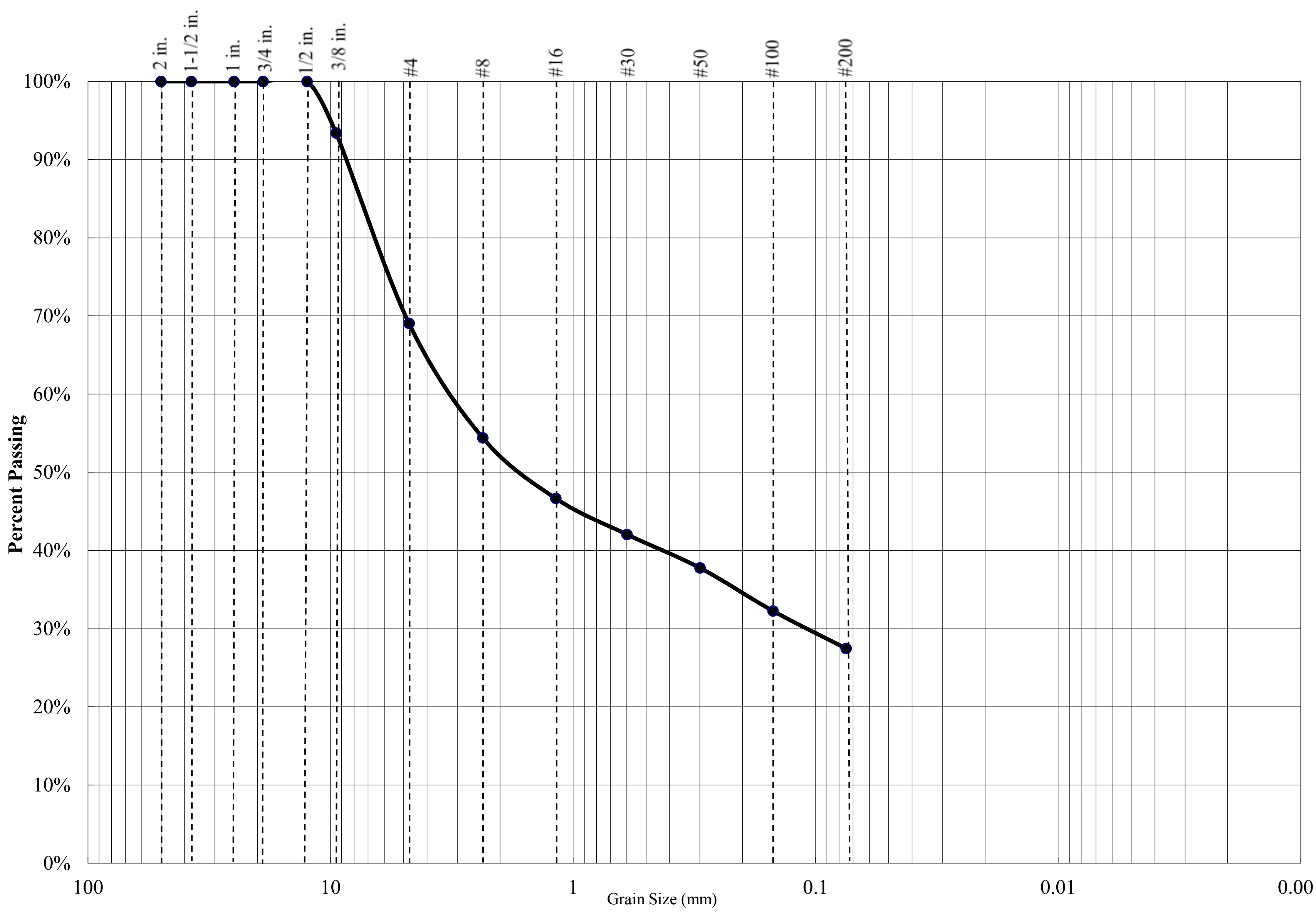
Project Number: 5-225-1076

Boring: B-1 @ 55'-56.5'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
31%	42%	27%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	93.4%
#4	69.0%
#8	54.4%
#16	46.7%
#30	42.1%
#50	37.8%
#100	32.3%
#200	27.5%

Atterberg Limits		
PL=	LL=	PI=

Coefficients				
D_{85}=		D_{60}=		D_{50}=
D_{30}=		D_{15}=		D_{10}=
C_u=	N/A	C_c=	N/A	

USCS CLASSIFICATION
Clayey Sand with Gravel (SC)

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA

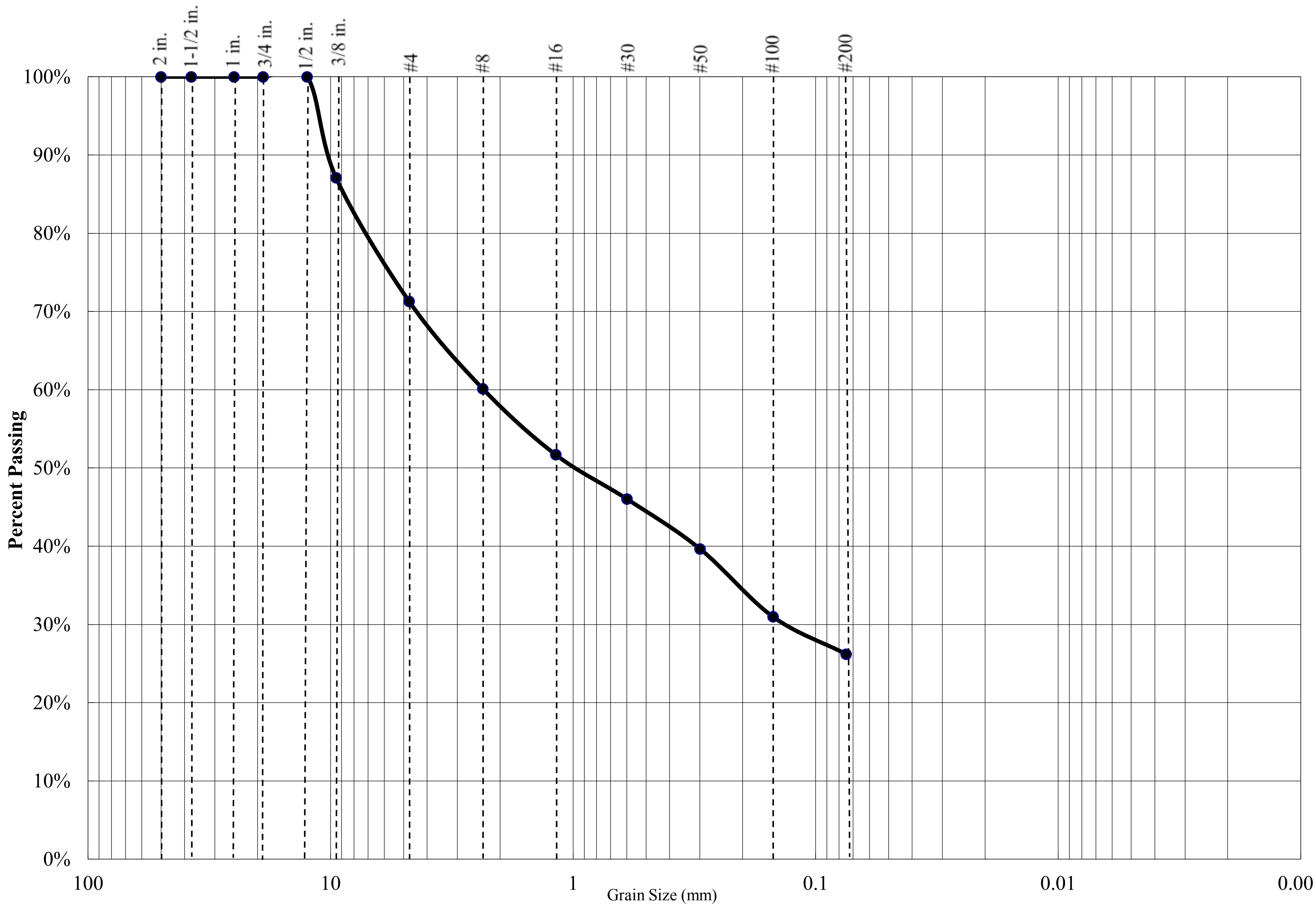
Project Number: 5-225-1076

Boring: B-1 @ 63.5'-65'

SALEM engineering group, inc.

PARTICLE SIZE DISTRIBUTION DIAGRAM

GRADATION TEST - ASTM C136



Percent Gravel	Percent Sand	Percent Silt/Clay
29%	45%	26%

Sieve Size	Percent Passing
3/4 inch	100.0%
1/2 inch	100.0%
3/8 inch	87.1%
#4	71.3%
#8	60.1%
#16	51.7%
#30	46.0%
#50	39.7%
#100	31.0%
#200	26.2%

Atterberg Limits		
PL=	LL=	PI=

Coefficients					
D_{85}=		D_{60}=		D_{50}=	
D_{30}=		D_{15}=		D_{10}=	
C_u=	N/A	C_c=	N/A		

USCS CLASSIFICATION
Clayey Sand with Gravel (SC)

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA

Project Number: 5-225-1076

Boring: B-1 @ 73.5'-75'

SALEM engineering group, inc.

CHEMICAL ANALYSIS

SO_4 - Modified CTM 417 & Cl - Modified CTM 417/422

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA
Project Number: 5-225-1076
Date Sampled: 12/29-30/25 Date Tested: 1/9/26
Sampled By: SEG Tested By: MC
Soil Type: Clayey Sand with Gravel (SC)

Sample Number	Sample Location	Soluble Sulfate SO_4-S	Soluble Chloride Cl	pH
1a.	B-1 @ 10'-11.5'	450 mg/kg	82 mg/kg	7.2
1b.	B-1 @ 10'-11.5'	430 mg/kg	79 mg/kg	7.2
1c.	B-1 @ 10'-11.5'	410 mg/kg	80 mg/kg	7.2
Average:		**430 mg/kg**	**80 mg/kg**	**7.2**

SALEM engineering group, inc.

CHEMICAL ANALYSIS

SO_4 - Modified CTM 417 & Cl - Modified CTM 417/422

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA
Project Number: 5-225-1076
Date Sampled: 12/29-30/25 Date Tested: 1/9/26
Sampled By: SEG Tested By: MC
Soil Type: Clayey Sand with Gravel (SC)

Sample Number	Sample Location	Soluble Sulfate SO_4-S	Soluble Chloride Cl	pH
1a.	B-1 @ 30'-31.5'	190 mg/kg	52 mg/kg	7.3
1b.	B-1 @ 30'-31.5'	180 mg/kg	52 mg/kg	7.3
1c.	B-1 @ 30'-31.5'	180 mg/kg	52 mg/kg	7.3
Average:		**183 mg/kg**	**52 mg/kg**	**7.3**

SALEM engineering group, inc.

CHEMICAL ANALYSIS
SO_4 - Modified CTM 417 & Cl - Modified CTM 417/422

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA
Project Number: 5-225-1076
Date Sampled: 12/29-30/25 Date Tested: 1/9/26
Sampled By: SEG Tested By: MC
Soil Type: Clayey Sand with Gravel (SC)

Sample Number	Sample Location	Soluble Sulfate SO_4-S	Soluble Chloride Cl	pH
1a.	B-1 @ 51.5'-53'	210 mg/kg	54 mg/kg	7.2
1b.	B-1 @ 51.5'-53'	220 mg/kg	55 mg/kg	7.2
1c.	B-1 @ 51.5'-53'	230 mg/kg	54 mg/kg	7.2
Average:		**220 mg/kg**	**54 mg/kg**	**7.2**

SALEM engineering group, inc.

CHEMICAL ANALYSIS

SO_4 - Modified CTM 417 & Cl - Modified CTM 417/422

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA
Project Number: 5-225-1076
Date Sampled: 12/29-30/25 Date Tested: 1/9/26
Sampled By: SEG Tested By: MC
Soil Type: Clayey Sand with Gravel (SC)

Sample Number	Sample Location	Soluble Sulfate SO_4-S	Soluble Chloride Cl	pH
1a.	B-1 @ 61.5'-63'	340 mg/kg	56 mg/kg	7.4
1b.	B-1 @ 61.5'-63'	330 mg/kg	58 mg/kg	7.4
1c.	B-1 @ 61.5'-63'	330 mg/kg	57 mg/kg	7.4
Average:		**333 mg/kg**	**57 mg/kg**	**7.4**

SALEM engineering group, inc.

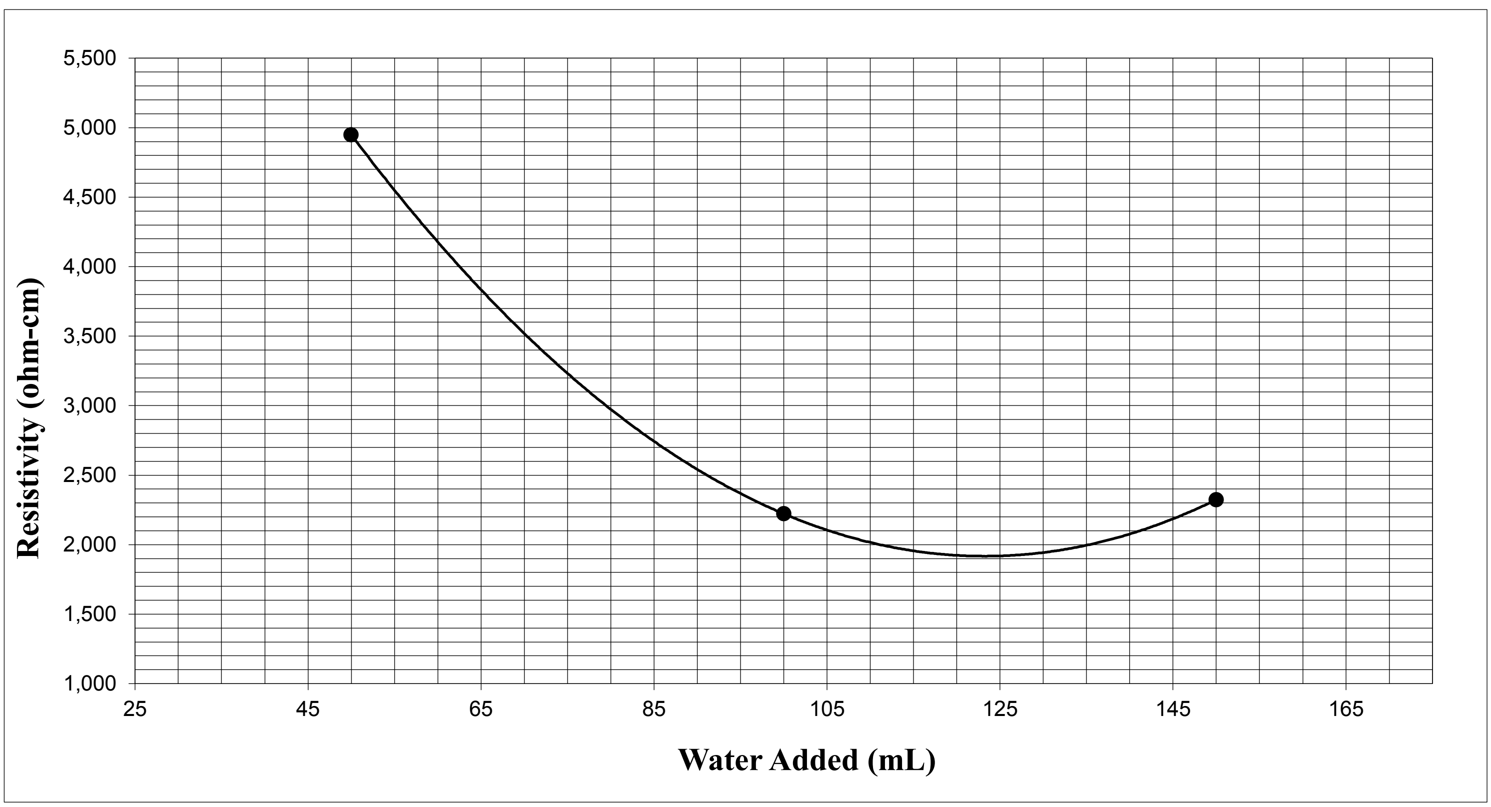
SOIL RESISTIVITY
CTM 643

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA
Project Number: 5-225-1076 Date Sampled: 12/29-30/25 Date Tested: 1/9/26
Sample Location: B-1 @ 10'-11.5' Sampled By: SEG Tested By: FP
Soil Type: Clayey Sand with Gravel (SC)

Chloride Content: 80 mg/Kg Initial Sample Weight: 700 gms
Sulfate Content: 430 mg/Kg Test Box Constant: 1.010 cm
Soil pH: 7.2

Test Data:

Trial #	Water Added (mL)	Meter Dial Reading	Multiplier Setting	Resistance (ohms)	Resistivity (ohm-cm)
1	50	4.9	1,000	4,900	4,949
2	100	2.2	1,000	2,200	2,222
3	150	2.3	1,000	2,300	2,323



Minimum Resistivity:	**1,916** ohm-cm

SALEM engineering group, inc.

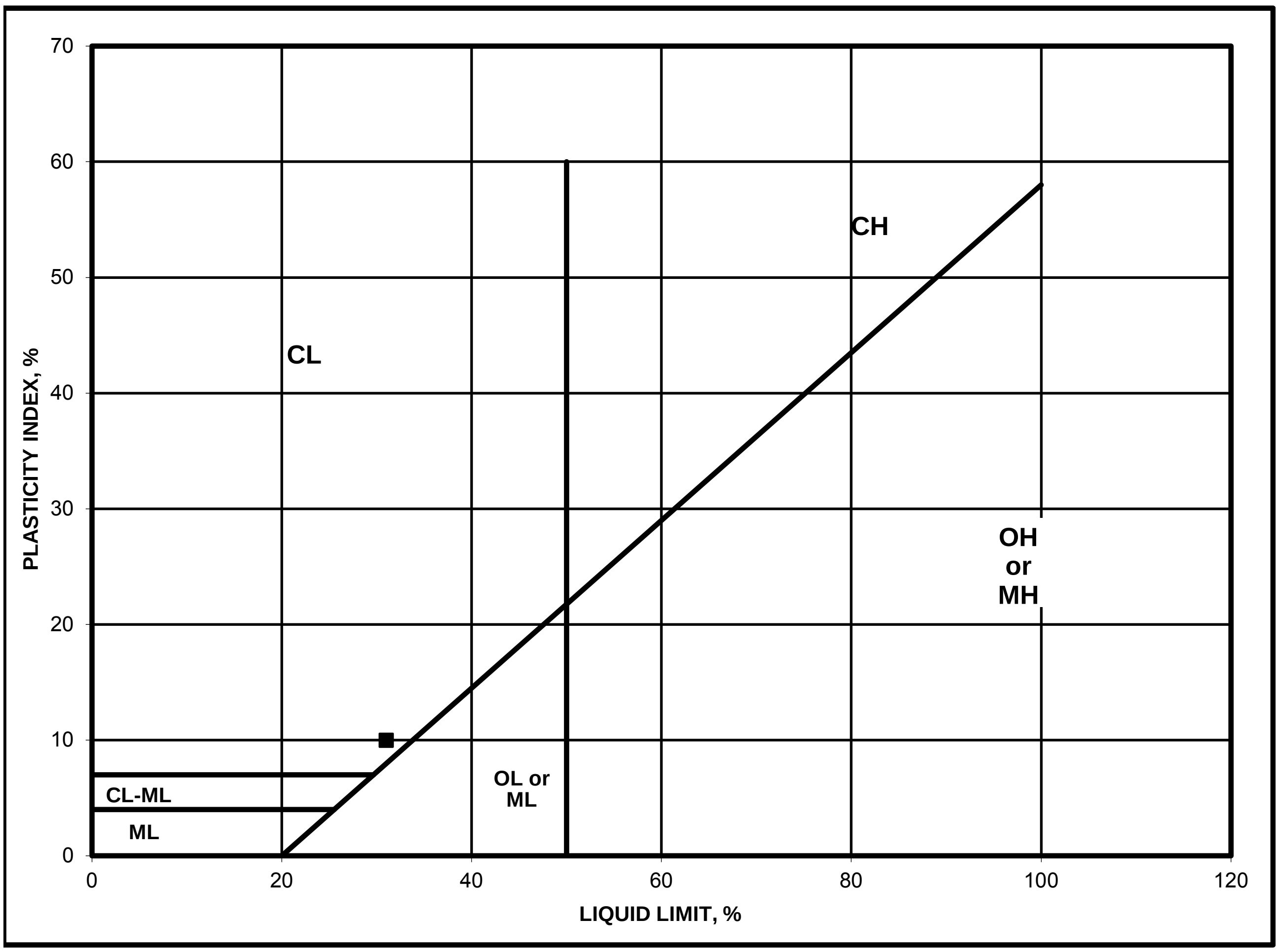
Atterberg Limits Determination
ASTM D4318

Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA
Project Number: 5-225-1076
Date Sampled: 12/29-30/25 Date Tested: 1/12/26
Sampled By: SEG Tested By: MC
Sample Location: B-1 @ 5'-6.5'

Run Number	Plastic Limit 1	Plastic Limit 2	Plastic Limit 3	Liquid Limit 1	Liquid Limit 2	Liquid Limit 3
Weight of Wet Soil & Tare	23.21	23.14	23.15	27.26	28.03	27.73
Weight of Dry Soil & Tare	21.89	21.86	21.85	24.53	25.09	24.77
Weight of Water	1.32	1.28	1.30	2.73	2.94	2.96
Weight of Tare	15.60	15.78	15.70	15.62	15.71	15.64
Weight of Dry Soil	6.29	6.08	6.15	8.91	9.38	9.13
Water Content	21.0	21.1	21.1	30.6	31.3	32.4
Number of Blows				28	24	19

Plastic Limit : 21 **Liquid Limit : 31**

Plasticity Index : **10**
Unified Soil Classification : **CL**



SALEM engineering group, inc.

Atterberg Limits Determination
ASTM D4318

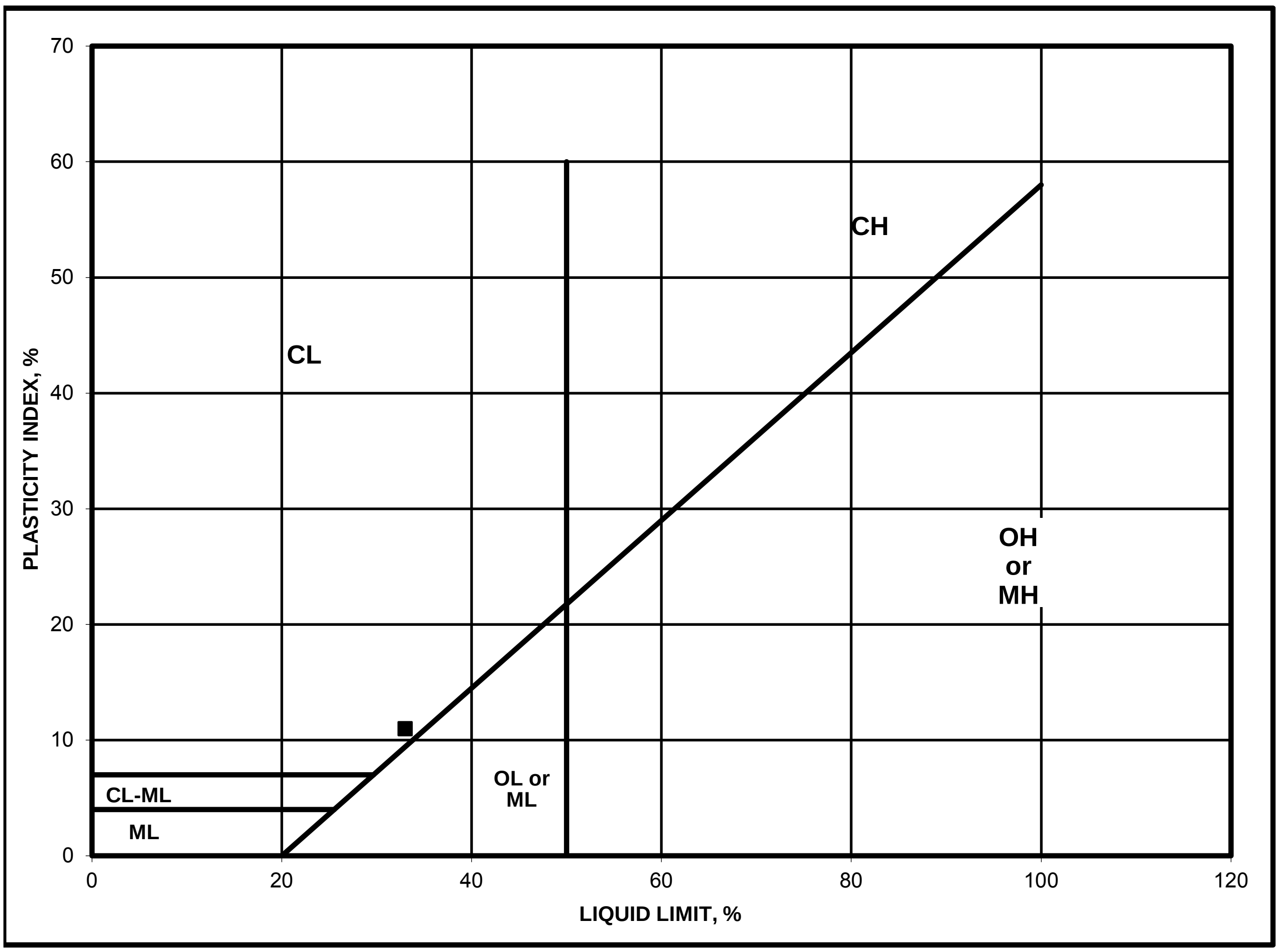
Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA
Project Number: 5-225-1076
Date Sampled: 12/29-30/25 Date Tested: 1/9/26
Sampled By: SEG Tested By: MC
Sample Location: B-1 @ 25'-26.5'

Run Number	Plastic Limit			Liquid Limit		
	1	2	3	1	2	3
Weight of Wet Soil & Tare	22.95	23.03	23.20	29.34	28.80	29.35
Weight of Dry Soil & Tare	21.62	21.67	21.85	26.01	25.50	25.87
Weight of Water	1.33	1.36	1.35	3.33	3.30	3.48
Weight of Tare	15.55	15.44	15.55	15.71	15.57	15.66
Weight of Dry Soil	6.07	6.23	6.30	10.30	9.93	10.21
Water Content	21.9	21.8	21.4	32.3	33.2	34.1
Number of Blows				29	24	18

Plastic Limit : 22 **Liquid Limit : 33**

Plasticity Index : 11

Unified Soil Classification : CL



SALEM engineering group, inc.

Atterberg Limits Determination
ASTM D4318

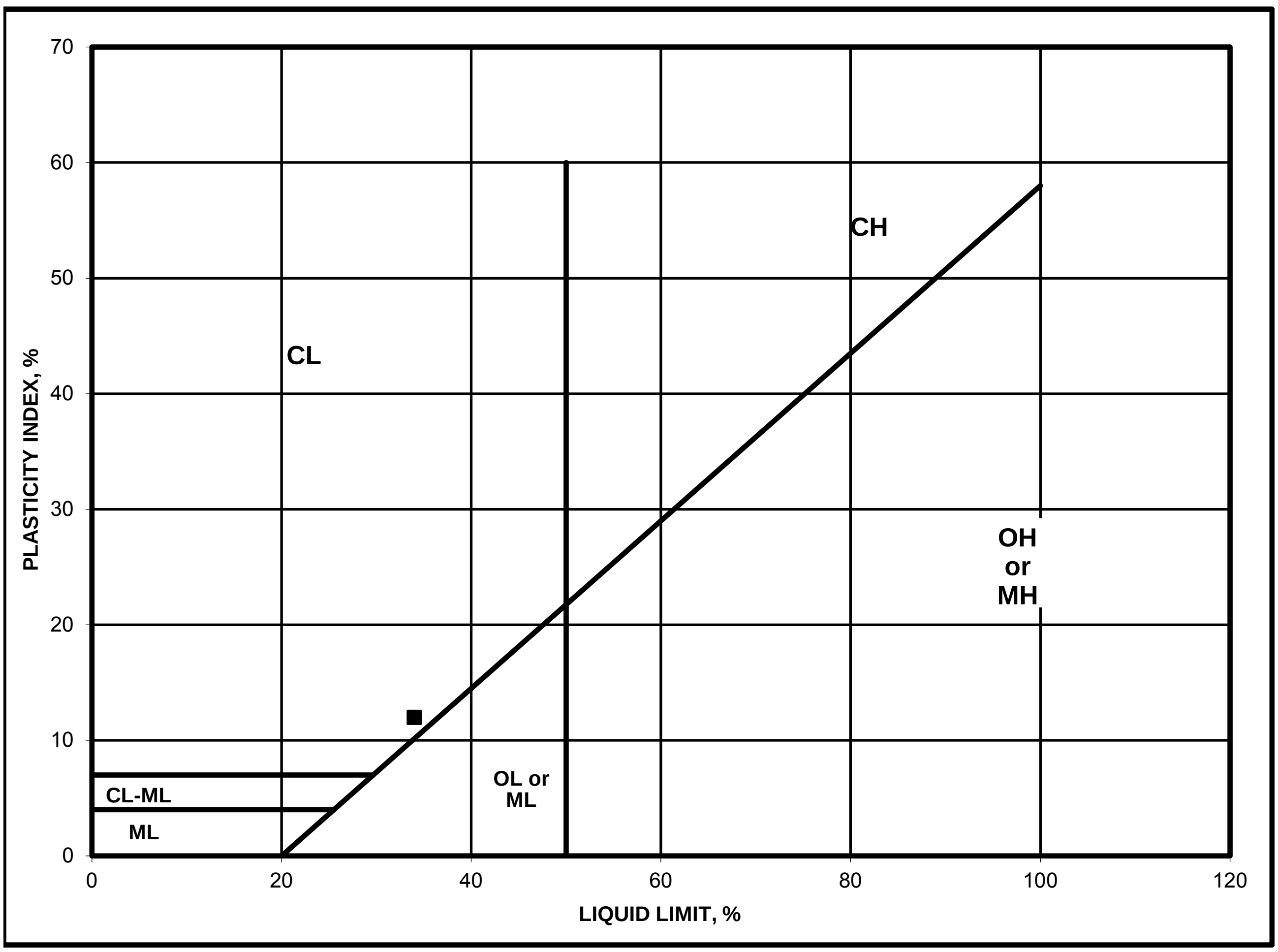
Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA
Project Number: 5-225-1076
Date Sampled: 12/29-30/25 Date Tested: 1/9/26
Sampled By: SEG Tested By: MC
Sample Location: B-1 @ 45'-46.5'

Run Number	Plastic Limit 1	Plastic Limit 2	Plastic Limit 3	Liquid Limit 1	Liquid Limit 2	Liquid Limit 3
Weight of Wet Soil & Tare	29.59	29.38	29.79	34.94	34.30	33.61
Weight of Dry Soil & Tare	28.18	27.96	28.36	31.55	30.89	30.53
Weight of Water	1.41	1.42	1.43	3.39	3.41	3.08
Weight of Tare	21.79	21.51	22.03	21.35	21.01	21.73
Weight of Dry Soil	6.39	6.45	6.33	10.20	9.88	8.80
Water Content	22.1	22.0	22.6	33.2	34.5	35.0
Number of Blows				30	25	19

Plastic Limit : 22 **Liquid Limit : 34**

Plasticity Index : 12

Unified Soil Classification : CL



Atterberg Limits Determination
ASTM D4318

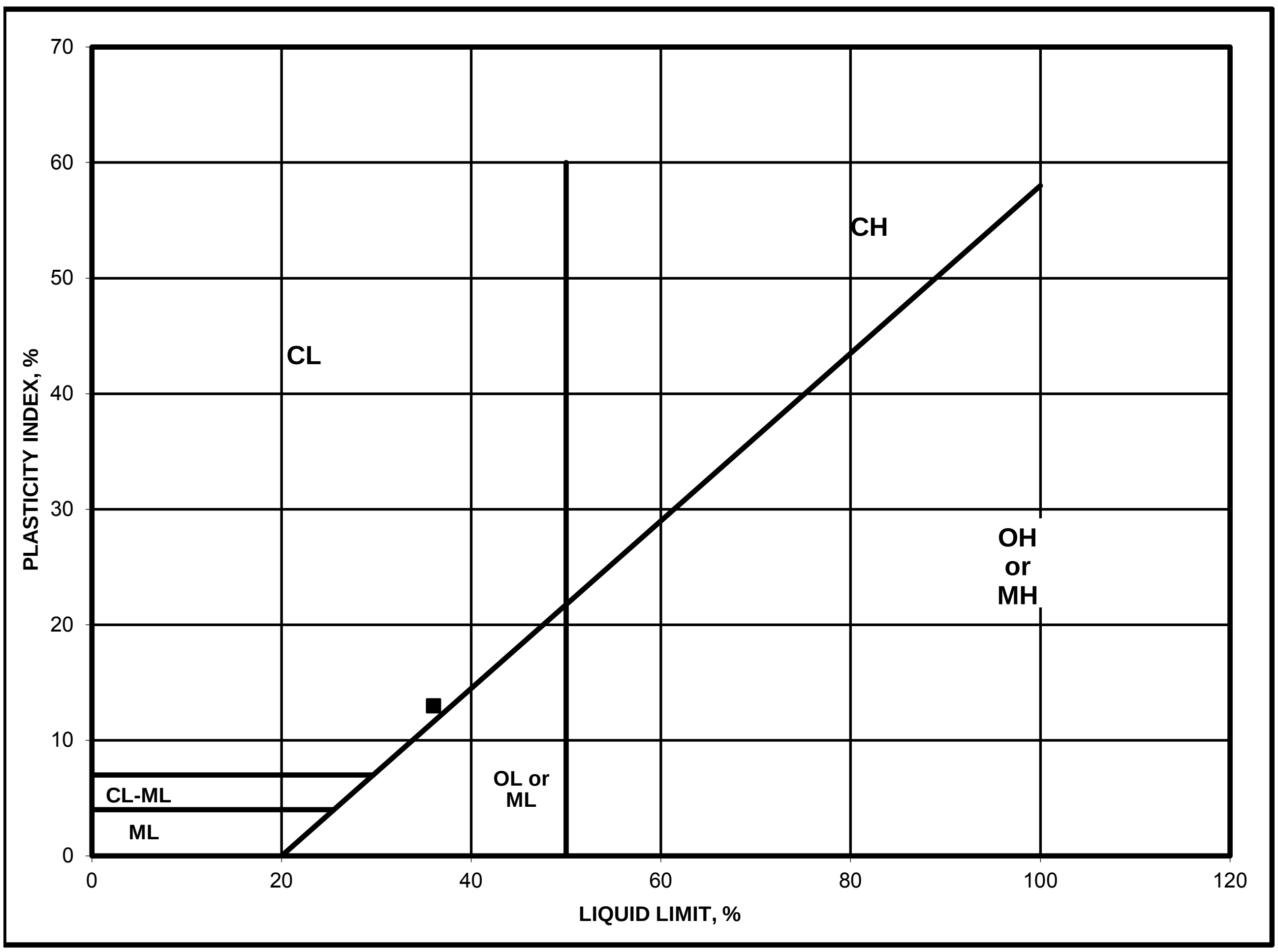
Project Name: AT&T 103' Monopole CCL05350: SF Police Academy - San Francisco, CA
Project Number: 5-225-1076
Date Sampled: 12/29-30/25 Date Tested: 1/9/26
Sampled By: SEG Tested By: MC
Sample Location: B-1 @ 55'-56.5'

	Plastic Limit			Liquid Limit		
Run Number	1	2	3	1	2	3
Weight of Wet Soil & Tare	22.88	22.87	22.98	28.34	28.77	27.44
Weight of Dry Soil & Tare	21.54	21.53	21.59	25.02	25.21	24.27
Weight of Water	1.34	1.34	1.39	3.32	3.56	3.17
Weight of Tare	15.57	15.62	15.41	15.65	15.35	15.68
Weight of Dry Soil	5.97	5.91	6.18	9.37	9.86	8.59
Water Content	22.4	22.7	22.5	35.4	36.1	36.9
Number of Blows				31	26	21

Plastic Limit : 23 **Liquid Limit : 36**

Plasticity Index : 13

Unified Soil Classification : CL



SALEM engineering group, inc.

APPENDIX

C

APPENDIX C
GENERAL EARTHWORK SPECIFICATIONS

When the text of the report conflicts with the general specifications in this appendix, the recommendations in the report have precedence.

1.0 SCOPE OF WORK: These specifications and applicable plans pertain to and include all earthwork associated with the site rough grading, including, but not limited to, the furnishing of all labor, tools and equipment necessary for site clearing and grubbing, stripping, preparation of foundation materials for receiving fill, excavation, processing, placement and compaction of fill and backfill materials to the lines and grades shown on the project grading plans and disposal of excess materials.

2.0 PERFORMANCE: The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications. This work shall be inspected and tested by a representative of SALEM Engineering Group, Incorporated, hereinafter referred to as the Soils Engineer and/or Testing Agency. Attainment of design grades, when achieved, shall be certified by the project Civil Engineer. Both the Soils Engineer and the Civil Engineer are the Owner's representatives. If the Contractor should fail to meet the technical or design requirements embodied in this document and on the applicable plans, he shall make the necessary adjustments until all work is deemed satisfactory as determined by both the Soils Engineer and the Civil Engineer. No deviation from these specifications shall be made except upon written approval of the Soils Engineer, Civil Engineer, or project Architect.

No earthwork shall be performed without the physical presence or approval of the Soils Engineer. The Contractor shall notify the Soils Engineer at least 2 working days prior to the commencement of any aspect of the site earthwork.

The Contractor shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineers harmless from any and all liability, real or alleged, in connection with the performance of work on this project, except for liability arising from the sole negligence of the Owner or the Engineers.

3.0 TECHNICAL REQUIREMENTS: All compacted materials shall be densified to no less that 90 percent of relative compaction (based on ASTM D1557 Test Method (latest edition), or as specified in the technical portion of the Soil Engineer's report. The location and frequency of field density tests shall be determined by the Soils Engineer. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work will be judged by the Soils Engineer.

4.0 SOILS AND FOUNDATION CONDITIONS: The Contractor is presumed to have visited the site and to have familiarized himself with existing site conditions and the contents of the data presented in the Geotechnical Engineering Report. The Contractor shall make his own interpretation of the data contained in the Geotechnical Engineering Report and the Contractor shall not be relieved of liability for any loss sustained as a result of any variance between conditions indicated by or deduced from said report and the actual conditions encountered during the progress of the work.

5.0 DUST CONTROL: The work includes dust control as required for the alleviation or prevention of any dust nuisance on or about the site or the borrow area, or off-site if caused by the Contractor's operation either during the performance of the earthwork or resulting from the conditions in which the Contractor leaves the site. The Contractor shall assume all liability, including court costs of codefendants, for all claims related to dust or wind-blown materials attributable to his work. Site preparation shall consist of site clearing and grubbing and preparation of foundation materials for receiving fill.

6.0 CLEARING AND GRUBBING: The Contractor shall accept the site in this present condition and shall demolish and/or remove from the area of designated project earthwork all structures, both surface and subsurface, trees, brush, roots, debris, organic matter and all other matter determined by the Soils Engineer to be deleterious. Such materials shall become the property of the Contractor and shall be removed from the site.

Tree root systems in proposed improvement areas should be removed to a minimum depth of 3 feet and to such an extent which would permit removal of all roots greater than 1 inch in diameter. Tree roots removed in parking areas may be limited to the upper 1½ feet of the ground surface. Backfill of tree root excavations is not permitted until all exposed surfaces have been inspected and the Soils Engineer is present for the proper control of backfill placement and compaction. Burning in areas which are to receive fill materials shall not be permitted.

7.0 SUBGRADE PREPARATION: Surfaces to receive Engineered Fill and/or building or slab loads shall be prepared as outlined above, scarified to a minimum of 12 inches, moisture-conditioned as necessary, and compacted to 90 percent relative compaction.

Loose soil areas and/or areas of disturbed soil shall be moisture-conditioned as necessary and compacted to 90 percent relative compaction. All ruts, hummocks, or other uneven surface features shall be removed by surface grading prior to placement of any fill materials. All areas which are to receive fill materials shall be approved by the Soils Engineer prior to the placement of any fill material.

8.0 EXCAVATION: All excavation shall be accomplished to the tolerance normally defined by the Civil Engineer as shown on the project grading plans. All over-excavation below the grades specified shall be backfilled at the Contractor's expense and shall be compacted in accordance with the applicable technical requirements.

9.0 FILL AND BACKFILL MATERIAL: No material shall be moved or compacted without the presence or approval of the Soils Engineer. Material from the required site excavation may be utilized for construction site fills, provided prior approval is given by the Soils Engineer. All materials utilized for constructing site fills shall be free from vegetation or other deleterious matter as determined by the Soils Engineer.

10.0 PLACEMENT, SPREADING AND COMPACTION: The placement and spreading of approved fill materials and the processing and compaction of approved fill and native materials shall be the responsibility of the Contractor. Compaction of fill materials by flooding, ponding, or jetting shall not be permitted unless specifically approved by local code, as well as the Soils Engineer. Both cut and fill shall be surface-compacted to the satisfaction of the Soils Engineer prior to final acceptance.

11.0 SEASONAL LIMITS: No fill material shall be placed, spread, or rolled while it is frozen or thawing, or during unfavorable wet weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until the Soils Engineer indicates that the moisture content and density of previously placed fill is as specified.

12.0 DEFINITIONS - The term "pavement" shall include asphaltic concrete surfacing, untreated aggregate base, and aggregate subbase. The term "subgrade" is that portion of the area on which surfacing, base, or subbase is to be placed.

The term "Standard Specifications": hereinafter referred to, is the most recent edition of the Standard Specifications of the State of California, Department of Transportation. The term "relative compaction" refers to the field density expressed as a percentage of the maximum laboratory density as determined by ASTM D1557 Test Method (latest edition).

13.0 PREPARATION OF THE SUBGRADE - The Contractor shall prepare the surface of the various subgrades receiving subsequent pavement courses to the lines, grades, and dimensions given on the plans. The upper 12 inches of the soil subgrade beneath the pavement section shall be compacted to a minimum relative compaction of 90 percent based upon ASTM D1557. The finished subgrades shall be tested and approved by the Soils Engineer prior to the placement of additional pavement courses.

14.0 AGGREGATE BASE - The aggregate base material shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate base material shall conform to the requirements of Section 26 of the Standard Specifications for Class 2 material, ¾-inch or 1½-inches maximum size. The aggregate base material shall be compacted to a minimum relative compaction of 90 percent based upon ASTM D1557. The aggregate base material shall be spread in layers not exceeding 6 inches and each layer of aggregate material course shall be tested and approved by the Soils Engineer prior to the placement of successive layers.

15.0 AGGREGATE SUBBASE - The aggregate subbase shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate subbase material shall conform to the requirements of Section 25 of the Standard Specifications for Class 2 Subbase material, and it shall be spread and compacted in accordance with the Standard Specifications. Each layer of aggregate subbase shall be tested and approved by the Soils Engineer prior to the placement of successive layers.

16.0 ASPHALTIC CONCRETE SURFACING - Asphaltic concrete surfacing shall consist of a mixture of mineral aggregate and paving grade asphalt, mixed at a central mixing plant and spread and compacted on a prepared base in conformity with the lines, grades, and dimensions shown on the plans. The viscosity grade of the asphalt shall be PG 64-10, unless otherwise stipulated or local conditions warrant more stringent grade. The mineral aggregate shall be Type A or B, ½ inch maximum size, medium grading, and shall conform to the requirements set forth in Section 39 of the Standard Specifications. The drying, proportioning, and mixing of the materials shall conform to Section 39. The prime coat, spreading and compacting equipment, and spreading and compacting the mixture shall conform to the applicable chapters of Section 39, with the exception that no surface course shall be placed when the atmospheric temperature is below 50 degrees F. The surfacing shall be rolled with a combination steel-wheel and pneumatic rollers, as described in the Standard Specifications. The surface course shall be placed with an approved self-propelled mechanical spreading and finishing machine.

Exhibit C

Exhibit C

SF POLICE ACADEMY

SITE #: CCL05350

103'-0" MONOPOLE

LOCATION:

350 AMBER DRIVE
SAN FRANCISCO, CA 94131
SAN FRANCISCO COUNTY

DRAWING INDEX

NOTE: FOR ORDERING CONTACT
PAUL MARY – PROJECT MANAGER/
SENIOR ESTIMATOR
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Fax (503) 763-6280
www.steelheadmetals.com

DATE: 1/28/26	DESIGNED: MAR	DRAFTER: MAR

REVISIONS

REV	DATE	DESCRIPTION

AT&T

TITLE SHEET

SF POLICE ACADEMY
SITE #: CCL05350
103'-0" MONOPOLE
350 AMBER DRIVE
SAN FRANCISCO, CA 94131
SAN FRANCISCO COUNTY

REGISTERED PROFESSIONAL ENGINEER
CASEY N. MILLARD
C 90109
CIVIL
STATE OF CALIFORNIA

01/28/2026

U1133.0725.261

T1

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DESIGN CRITERIA

STRUCTURAL DESIGN IS BASED ON THE CALIFORNIA BUILDING CODE, 2025 EDITION (2024 IBC) AND THE TIA-222-I STANDARD

DESIGN LOADS:

- WIND:
  - WIND SPEED = 99 MPH (3-SEC GUST) PER THE ASCE7-22 STANDARD
  - RISK CATEGORY: III
  - EXPOSURE: C
  - Kzt: 1
  - ELEVATION: 560 FT ABOVE SEA LEVEL
- ICE:
  - NONE PER THE TIA-222-I STANDARD

- SEISMIC:
  - IMPORTANCE FACTOR: 1.25
  - RISK CATEGORY: III
  - MAPPED SPECTRAL RESPONSE ACCELERATIONS:
    - S_S = 1.840g, S_1 = 0.700g
  - SITE CLASS: D
  - SPECTRAL RESPONSE COEFFICIENTS:
    - S_{DS} = 1.300g, S_{D1} = 1.380g
  - SEISMIC DESIGN CATEGORY: D
  - BASIC SEISMIC-FORCE-RESISTING-SYSTEM:
    - TELECOM: STEEL POLE
  - SEISMIC BASE SHEAR, V: 6.0 K
  - SEISMIC RESPONSE COEFFICIENT, Cs: 0.359
  - RESPONSE MODIFICATION FACTOR, R: 1.5
  - ANALYSIS PROCEDURE: EQUIVALENT LATERAL FORCE

STRUCTURAL STEEL

1. POLYGONAL MONOPOLE SHAFT STEEL SHALL CONFORM w/ ASTM A572 GR. 65, UNO
2. BASEPLATE STEEL SHALL CONFORM w/ ASTM A572 GR 50, UNO
3. ALL STEEL PIPE SHALL CONFORM w/ ASTM A53 GR B (35 KSI), UNO ACCEPTABLE PIPE MATERIAL ALTERNATIVES INCLUDE: A500 GR B., A106 GR B. AND API 5LX 42KSI.
4. ALL STEEL RECTANGULAR TUBES (HSS) SHALL CONFORM w/ ASTM A500 GR B (46 KSI), UNO
5. REINFORCED PORT STEEL SHALL CONFORM w/ ASTM A572 GR 50 OR EQUIVALENT, UNO
6. ALL OTHER STEEL SHAPES & PLATES SHALL CONFORM w/ ASTM A36, UNO
7. ALL BOLTS FOR STEEL-TO-STEEL CONNECTIONS SHALL CONFORM w/ ASTM F3125 GR A325, UNO
8. ALL U-BOLTS SHALL CONFORM w/ ASTM A36, UNO
9. ALL ANCHOR BOLTS SHALL CONFORM w/ ASTM F1554 GR. 55, UNO
10. ALL WELDING SHALL BE PERFORMED IN ACCORDANCE WITH THE SPECIFICATIONS AND PROCEDURES OF THE AMERICAN WELDING SOCIETY (AWS) BY CERTIFIED WELDERS PER AWS D1.1. WELDS SHALL BE PERFORMED WITH MINIMUM E70XX OR E71XX LOW-HYDROGEN ELECTRODE EXCEPT WHERE HIGHER STRENGTH ELECTRODE IS REQUIRED BY AWS D1.1.
11. ALL STEEL SURFACES SHALL BE GALVANIZED IN ACCORDANCE w/ ASTM A123 AND ASTM F2329 STANDARDS.
12. ALL STRUCTURAL BOLTS SHALL BE TIGHTENED PER AN APPROVED PRETENSIONING METHOD AS DEFINED BY AISC. FOR EASE OF INSPECTION, THE "TURN-OF-NUT" METHOD AS DEFINED BY AISC WITH MATCH-MARKING TECHNIQUES IS RECOMMENDED.
13. ALL BOLT HOLES SHALL BE STANDARD SIZE PER TABLE J3.3 OF AISC UNO WASHERS ARE REQUIRED FOR ANY CONNECTION THAT HAS LARGER THAN STANDARD SIZED BOLT HOLES.
14. ALL HEAVY HEX NUTS SHALL BE ASTM A563 GR C OR DH OR EQUIVALENT.
15. ALL HARDENED WASHERS SHALL BE ASTM F436 OR EQUIVALENT.

BASE DESIGN REACTIONS

- MOMENT, M = 798 K-FT (1.0 WIND)
- SHEAR, V = 9.6 K (1.0 WIND)
- AXIAL, R = 20.0 K (1.2 DEAD)

GENERAL NOTES

1) CONTRACTOR SHALL FIELD VERIFY SITE OR LAYOUT RESTRICTIONS, SITE CONDITIONS, DIMENSIONS, AND ELEVATIONS BEFORE START OF CONSTRUCTION. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF STEELHEAD, INC. PRIOR TO BEGINNING PROJECT. ALL WORK SHALL BE PERFORMED USING ACCEPTED CONSTRUCTION PRACTICES. CONTRACTOR TO VERIFY MATERIALS PROVIDED BY STEELHEAD PRIOR TO INSTALLATION.
2) ALL ENGINEERING PLANS, DRAWINGS, DESIGNS, CALCULATIONS AND SPECIFICATIONS (COLLECTIVELY, "PLANS") ARE DESIGNED TO THE PROPRIETARY MANUFACTURING SPECIFICATIONS OF STEELHEAD METAL AND FAB., LLC ("STEELHEAD") INTENDED AND AUTHORIZED SOLELY FOR USE WITH PRODUCT PRODUCED BY STEELHEAD. UNAUTHORIZED USE IS STRICTLY PROHIBITED. CUSTOMER AGREES TO DEFEND, INDEMNIFY AND HOLD STEELHEAD HARMLESS FROM AND AGAINST ANY AND ALL DEMANDS, CLAIMS, SUITS, PROCEEDINGS, LOSSES, LIABILITIES, DAMAGES, FEES, COSTS AND EXPENSES (INCLUDING, WITHOUT LIMITATION, REASONABLE ATTORNEYS' FEES AND COSTS) ARISING FROM OR RELATING TO ANY UNAUTHORIZED USE OF STEELHEAD'S PLANS BY CUSTOMER.
3) NO FIELD MODIFICATIONS MAY BE MADE TO STRUCTURE WITHOUT THE EXPRESS WRITTEN CONSENT FROM THE ENGINEER OF RECORD. STEELHEAD, INC AND ENGINEER OF RECORD ASSUME NO RESPONSIBILITY FOR THE STRUCTURE IF ALTERATIONS AND/OR ADDITIONS ARE MADE TO THE DESIGN AS SHOWN IN THESE DRAWINGS.
4) THE CONTRACTORS AND ALL SUBCONTRACTORS SHALL COMPLY WITH ALL LOCAL CODES, REGULATIONS, AND ORDINANCES AS WELL AS STATE DEPARTMENT OF INDUSTRIAL REGULATIONS AND DIVISION OF INDUSTRIAL SAFETY (OSHA) REQUIREMENTS.
5) THE CONTRACTOR SHALL SUPERVISE AND DIRECT ALL WORK TO THE BEST OF HIS/HER ABILITY AND SKILL. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, PROCEDURES, AND SEQUENCES, AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
6) THE CONTRACTOR SHALL VERIFY, COORDINATE, AND PROVIDE ALL NECESSARY BLOCKING, BACKING, FRAMING, HANGERS OR OTHER SUPPORTS FOR ALL ITEMS REQUIRING SAME. WHETHER SHOWN OR NOT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY BRACING, SHORING, FORMWORK, ETC., AND SHALL CONFORM TO ALL NATIONAL , STATE, AND LOCAL ORDINANCES AND CODES, IN ORDER TO SAFELY EXECUTE ALL STAGES OF WORK TO COMPLETE THIS PROJECT.
7) IT IS THE INTENT OF THESE DRAWINGS TO SHOW THE COMPLETED INSTALLATION OF THE STRUCTURE SHOWN.
8) CONTRACTOR ASSUMES RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT. INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTY IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES. THIS REQUIREMENT APPLIES CONTINUOUSLY, AND IS NOT LIMITED TO NORMAL WORKING HOURS.
9) IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL EXISTING UTILITIES, SHOWN OR NOT SHOWN. THE CONTRACTOR IS FINANCIALLY RESPONSIBLE FOR REPAIR OR REPLACEMENT OF UTILITIES OR OTHER PROPERTY DAMAGED IN CONJUNCTION WITH THE EXECUTION OF WORK ON THIS PROJECT.

SPECIAL INSPECTIONS, TESTING & STRUCTURAL OBSERVATION

1. STEEL FABRICATION SHALL BE DONE ON THE PREMISES OF A FABRICATOR REGISTERED AND APPROVED AS REQUIRED BY THE BUILDING OFFICIAL TO PERFORM SUCH WORK WITHOUT SPECIAL INSPECTION. ALTERNATIVELY, SPECIAL INSPECTION OF MATERIALS, WELDING, AND FABRICATION PROCEDURES SHALL BE REQUIRED FOR FABRICATION BY AN UNAPPROVED FABRICATOR.
2. NO FIELD WELDING SHALL BE PERMITTED
3. NONDESTRUCTIVE TESTING IS REQUIRED FOR CJP GROOVE WELDS IN MATERIAL 5/16" THICK OR GREATER.
4. THE FOLLOWING SPECIAL INSPECTIONS SHALL BE REQUIRED PER CHAPTER 17 OF THE BUILDING CODE:
   - SPECIAL INSPECTION OF HIGH-STRENGTH BOLTING (WHEN APPLICABLE):
     - PERIODIC SPECIAL INSPECTION IF BOLTS ARE PRETENSIONED WITH MATCH-MARKING TECHNIQUES
     - CONTINUOUS SPECIAL INSPECTION OF ALL OTHER HIGH-STRENGTH BOLTING
   - PERIODIC SPECIAL INSPECTION OF PLACEMENT OF REINFORCING STEEL
   - PERIODIC SPECIAL INSPECTION OF ANCHOR BOLTS PRIOR TO AND DURING CONCRETE PLACEMENT
   - CONTINUOUS SPECIAL INSPECTION OF CONCRETE PLACEMENT
   - CONTINUOUS SPECIAL INSPECTION OF DRILLING OPERATIONS FOR PIER FOUNDATIONS
   - CONTINUOUS SPECIAL INSPECTION TO VERIFY LOCATION, PLUMBNESS, DIAMETER, AND LENGTH OF PIER FOUNDATIONS
   - SAMPLING & TESTING OF CONCRETE PER CHAPTER 17 OF THE BUILDING CODE TO VERIFY STRENGTH AND SLUMP
4. SPECIAL INSPECTION IS NOT REQUIRED FOR WORK OF A MINOR NATURE OR AS WARRANTED BY CONDITIONS IN THE JURISDICTION AS APPROVED BY THE BUILDING OFFICIAL. THUS, SPECIAL INSPECTION ITEMS ABOVE MAY BE WAIVED AS DEEMED APPROPRIATE BY THE BUILDING OFFICIAL.
5. NO STRUCTURAL OBSERVATION IS REQUIRED UNLESS NOTED IN CHAPTER 17 OF THE BUILDING CODE OR BY THE JURISDICTION.

DISCLAIMERS

1. ALL STRUCTURAL COMPONENTS TO BE CONNECTED TOGETHER SHALL BE COMPLETELY FIT UP ON THE GROUND OR OTHERWISE VERIFIED FOR COMPATIBILITY PRIOR TO LIFTING ANY COMPONENT INTO PLACE. REPAIRS REQUIRED DUE TO FIT-UP OR CONNECTION COMPATIBILITY PROBLEMS AFTER PARTIAL ERECTION ARE THE FINANCIAL RESPONSIBILITY OF THE CONTRACTOR.
2. SOME TELECOMMUNICATION STRUCTURES ARE SUSCEPTIBLE TO WIND-INDUCED OSCILLATIONS. OSCILLATIONS MAY OCCUR AT LOW OR MODERATE WIND SPEEDS AND MAY CAUSE STRUCTURAL DAMAGE. TIA PROVIDES NO PRACTICAL ANALYTICAL METHOD TO PREDICT AND PREVENT WIND-INDUCED STRUCTURAL OSCILLATIONS. VECTOR STRUCTURAL ENGINEERING RECOMMENDS FREQUENT MONITORING TO IDENTIFY WIND-INDUCED OSCILLATION AND REGULAR CONDITION ASSESSMENTS TO IDENTIFY FATIGUE CRACKING, LOOSE OR MISSING BOLTS, AND ANY OTHER STRUCTURAL DEFECTS. ANY OSCILLATION OR DEFECTS OBSERVED SHALL BE IMMEDIATELY REPORTED TO VECTOR STRUCTURAL ENGINEERING FOR FURTHER EVALUATION AND POSSIBLE REPAIRS OR MODIFICATIONS WHICH MAY BE REQUIRED AT THE OWNER'S EXPENSE.
3. WHERE EFFECTIVE PROJECTED AREAS (EPA) ARE USED, IT IS THE RESPONSIBILITY OF OTHERS TO VERIFY INSTALLED EQUIPMENT DOES NOT EXCEED LISTED EPA.

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DATE: 1/28/26	DESIGNED: MAR	DRAFTER: MAR

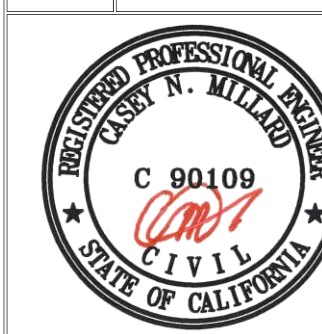
REVISIONS

REV	DATE	DESCRIPTION

AT&T

NOTES & SPECIFICATIONS

SF POLICE ACADEMY
SITE #: CCL05350
103'-0" MONOPOLE
350 AMBER DRIVE
SAN FRANCISCO, CA 94131
SAN FRANCISCO COUNTY



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DESIGN LOADING:
ANTENNA CL @ 100'-0" AGL:
- (3) QUINTEL QD668-2 PANEL ANTENNAS
- (3) ERICSSON AIR6419 B77G PANEL ANTENNAS
- (3) ERICSSON AIR6419 B77D PANEL ANTENNAS
- (3) QUINTEL QD6612-2
- (3) RRU 4490 B5/B12A
- (3) RRU 4478 B14
- (3) RRU 4890 B25/B66
- (3) DC9 SURGE SUPPRESSORS
- (1) SITEPRO1 RMVD12-NPNH MOUNT

ANTENNA CL @ 90'-0" AGL: SAME AS 100'-0" AGL

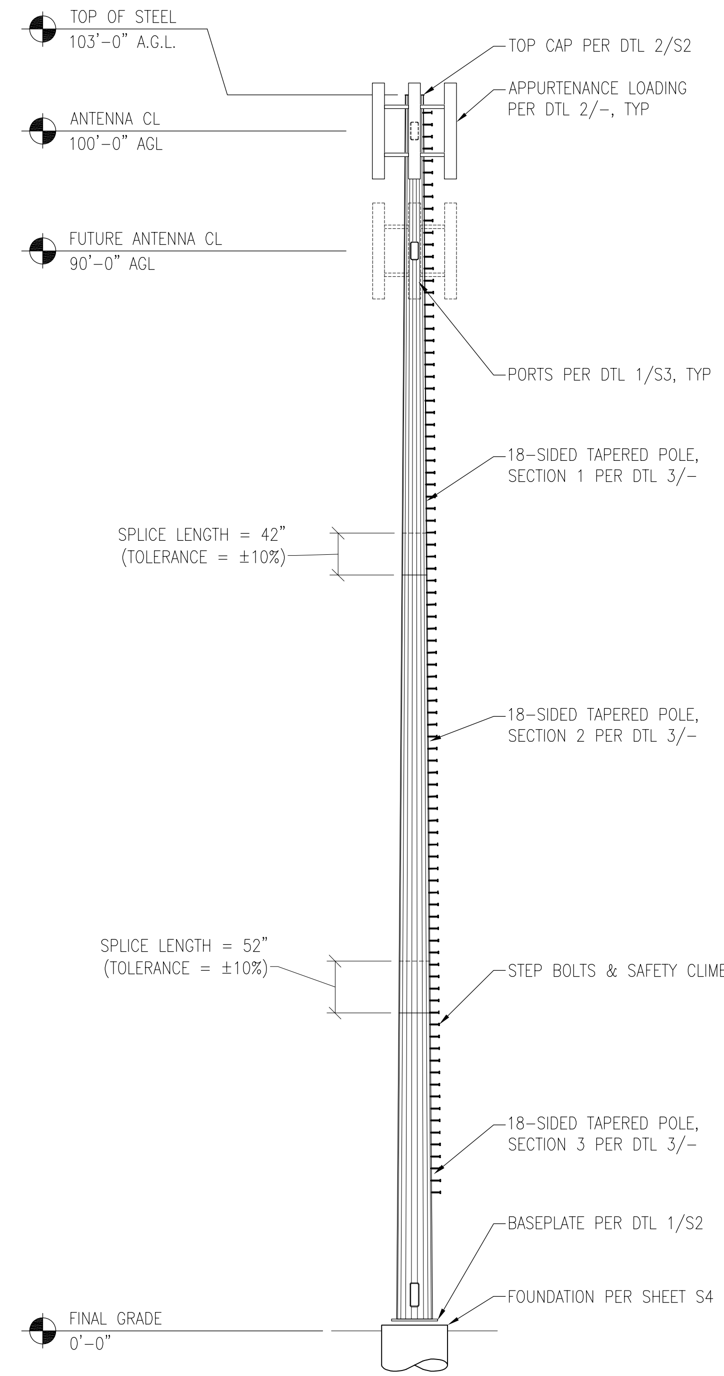
APPURTENANCES (2)
N.T.S.

MONOPOLE SECTION CHART[2]					
SECTION	LENGTH	øTOP[4]	øBOTTOM[4]	THICKNESS	WEIGHT[1,3]
1	40'-0"	18.00"	25.00"	3/16"	1.8 K
2	40'-0"	24.01"	31.01"	3/16"	2.3 K
3	29'-10"	29.88"	35.10"	3/16"	2.6 K

NOTES:
1. SECTION WEIGHT DOES NOT INCLUDE COATINGS, PORTS AND OTHER MINOR ATTACHMENTS.
2. LOWEST SECTION WEIGHT INCLUDES BASEPLATE WEIGHT.
3. DESIGN TAPER = 0.175 in/ft.
4. WEIGHTS LISTED IN THIS CHART ARE RAW STEEL WEIGHTS. FINAL WEIGHTS MAY BE UP TO 22% GREATER DUE TO GALVANIZING AND OTHER MISCELLANEOUS ITEMS.
5. DIAMETER OF POLE SECTIONS AT LAP SPLICES MAY BE ADJUSTED BY UP TO 0.06" TO ACCOUNT FOR THE THICKNESS OF COATINGS.

POLE SECTIONS (3)
N.T.S.

NOTE: ANTENNAS & PORTS ARE SHOWN FOR ILLUSTRATIVE PURPOSES & ARE NOT NECESSARILY SHOWN TO SCALE



ELEVATIONS (1)
N.T.S.

VECTOR ENGINEERS
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Fax (503) 763-6280
www.steelheadmetals.com

DATE: 1/28/26 | DESIGNED: MAR | DRAFTER: MAR

REVISIONS

REV	DATE	DESCRIPTION

AT&T

ELEVATION VIEWS

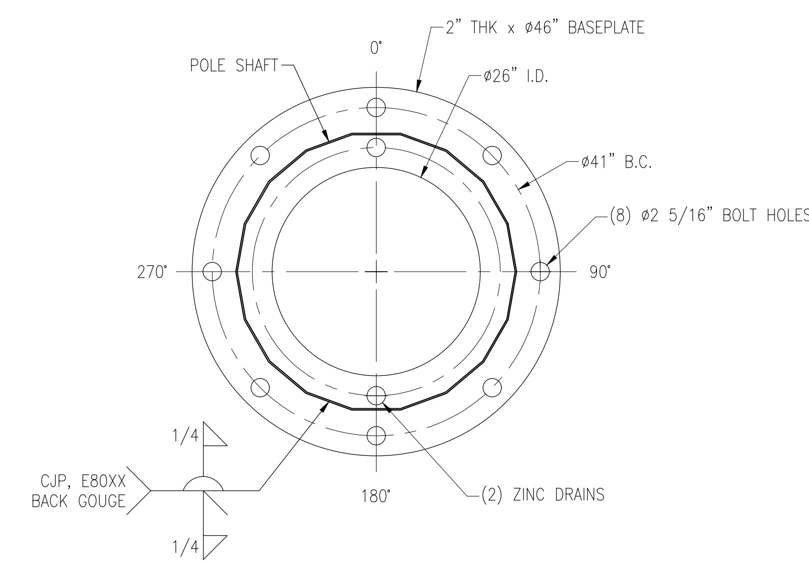
SF POLICE ACADEMY
SITE #: CCL05350
103'-0" MONOPOLE
350 AMBER DRIVE
SAN FRANCISCO, CA 94131
SAN FRANCISCO COUNTY

01/28/2026

U1133.0725.261

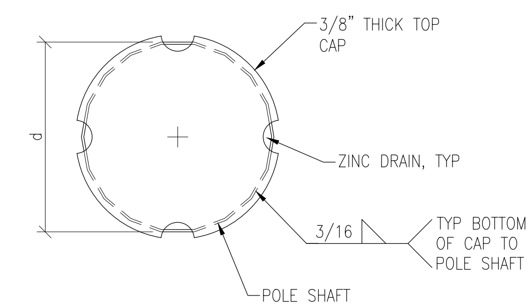
S1

REV 0



BASEPLATE (1)

N.T.S.



TOP CAP (2)

N.T.S.

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DATE: 1/28/26	DESIGNED: MAR	DRAFTER: MAR

REVISIONS

REV	DATE	DESCRIPTION

AT&T

DETAILS

SF POLICE ACADEMY
SITE #: CCL05350
103'-0" MONOPOLE

350 AMBER DRIVE
SAN FRANCISCO, CA 94131
SAN FRANCISCO COUNTY

01/28/2026

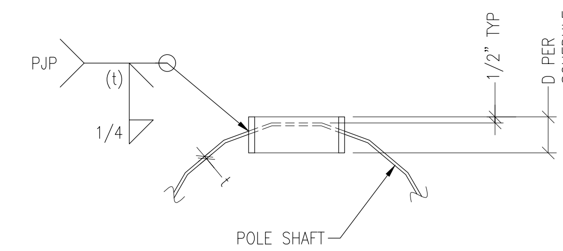
U1133.0725.261

S2

REV 0

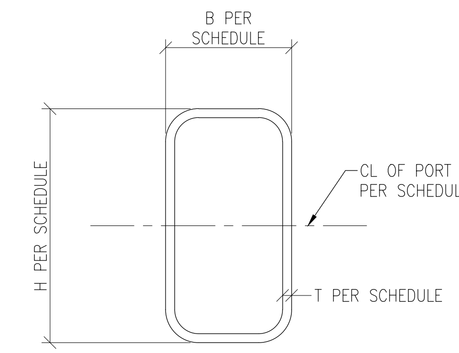
NOTE: SEE SCHEDULE FOR PORT QUANTITY & AZIMUTHS

NOTE: SEE DTL 3/S1 FOR POLE SHAFT THICKNESS, t



SECTION VIEW

NOTE: SEE GENERAL NOTES FOR REINFORCED PORT MATERIAL GRADE.



ELEVATION VIEW

PORT SCHEDULE					
CL ELEV.	PORT SIZE (B x H)	D	T	QTY	AZIMUTH(S)
100'-0"	6"x12"	2"	1/2"	3	120° SEPARATION
90'-0"	6"x12"	2"	1/2"	3	120° SEPARATION
3'-0"	12"x25"	3"	3/4"	2	180° SEPARATION

PORTS

N.T.S.

1

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REVISIONS

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DETAILS

SF POLICE ACADEMY
SITE #: CCL05350
103'-0" MONOPOLE

350 AMBER DRIVE
SAN FRANCISCO, CA 94131
SAN FRANCISCO COUNTY

REGISTERED PROFESSIONAL ENGINEER
CASEY N. MILLARD
C 90109
CIVIL
STATE OF CALIFORNIA

01/28/2026

U1133.0725.261

S3

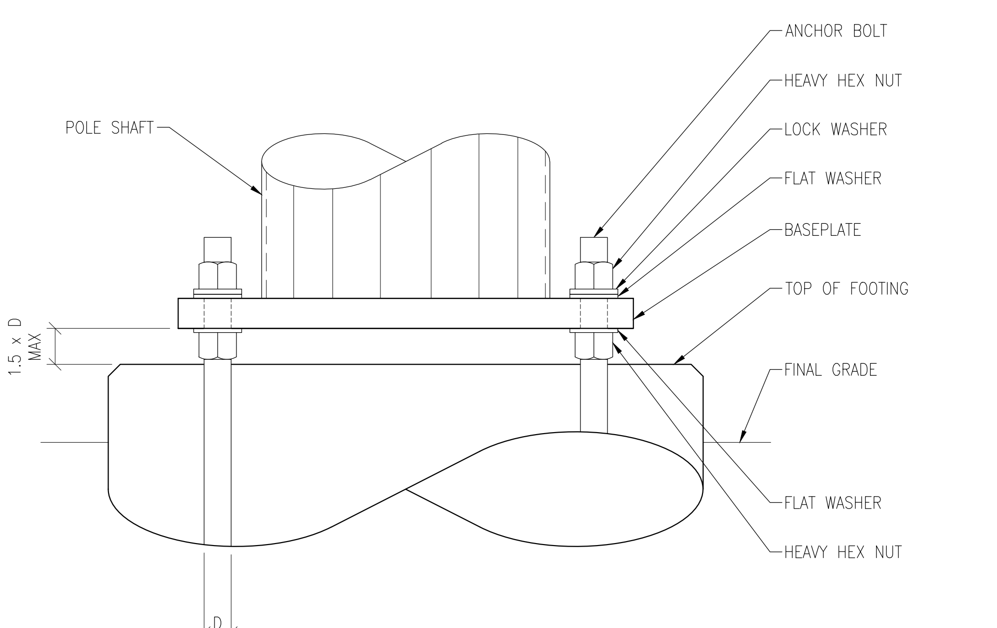
REV 0

FOUNDATION NOTES

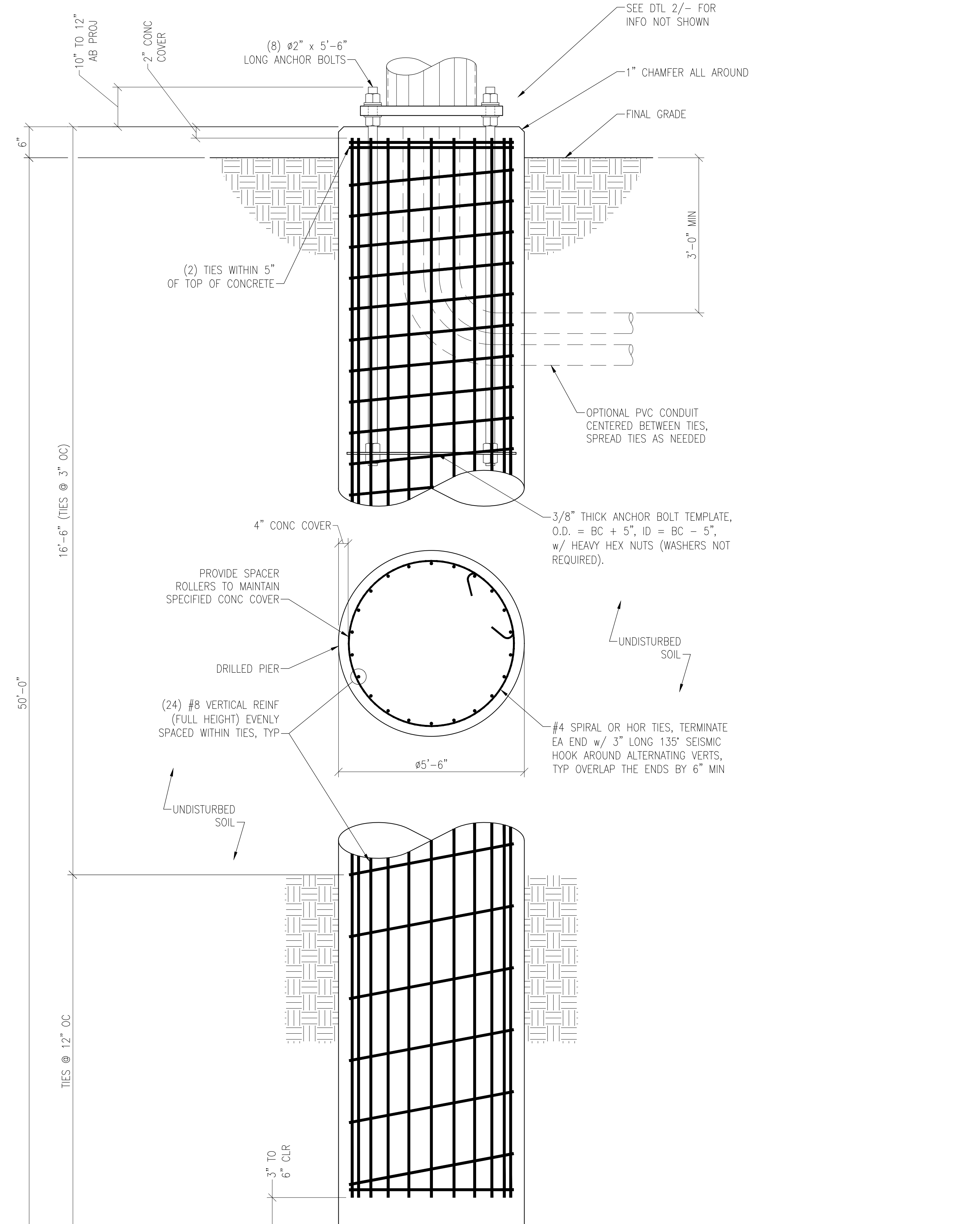
1. FOUNDATION DESIGN IS BASED ON THE FOLLOWING GEOTECHNICAL REPORT:

   SALEM ENGINEERING GROUP, INC
   REPORT: 5-225-1076
   DATE: JANUARY 19, 2026

2. ALL CONCRETE SHALL USE TYPE II PORTLAND CEMENT AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS. CONCRETE SHALL HAVE A MINIMUM OF 6% ENTRAINED AIR (WHERE FROST DEPTH > 0"). CONCRETE SHALL HAVE A MAXIMUM WATER/CEMENT RATIO OF 0.50. CONCRETE SHALL HAVE A SLUMP OF 5" (±1") UNLESS OTHERWISE SPECIFIED IN THE GEOTECHNICAL REPORT. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH "THE BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE," ACI 318-19. FOUNDATION INSTALLATION SHALL BE IN ACCORDANCE WITH ACI 336, "STANDARD SPECIFICATIONS FOR THE CONSTRUCTION OF DRILLED PIERS," LATEST EDITION.
3. REINFORCING STEEL SHALL CONFORM WITH THE REQUIREMENTS OF ASTM A-615, GRADE 60. ALL REINFORCING DETAILS SHALL CONFORM TO "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES," ACI 315, LATEST EDITION, UNLESS DETAILED OTHERWISE ON THIS DRAWING. CONTRACTOR SHALL USE STEEL WIRE TO HOLD REINFORCING BARS TOGETHER. IF WELDING REBAR IS PREFERRED, SUBSTITUTE A706 GR 60 DEFORMED BARS.
4. CONTRACTOR IS RESPONSIBLE FOR CHECKING AREA FOR UNDERGROUND FACILITIES PRIOR TO EXCAVATING ANY MATERIALS.
5. CONTRACTOR SHALL REFER TO SOILS REPORT FOR SITE CONDITIONS AND FURTHER CONSTRUCTION INFORMATION.
6. CONTRACTOR SHALL INSPECT AND REMOVE ALL DEBRIS FROM BOTTOM OF EXCAVATION.
7. CONTRACTOR SHALL VERIFY ANCHOR BOLT LAYOUT PRIOR TO AND IMMEDIATELY AFTER PLACING CONCRETE. ANCHOR BOLT LAYOUT IS CRITICAL FOR STRUCTURE INSTALLATION.
8. CONCRETE SHALL BE CONSOLIDATED USING VIBRATORY METHODS THROUGHOUT DEPTH OF FOUNDATION. VIBRATING LOWER DEPTHS MAY NOT BE ACCOMPLISHED BY TOUCHING REBAR CAGE WITH VIBRATOR.
9. DEPENDING ON SOIL CONDITIONS, CONTRACTOR SHOULD ANTICIPATE THE USE OF A FULL-LENGTH TEMPORARY CASING TO STABILIZE THE EXCAVATION. THE CASING SHALL BE WITHDRAWN DURING THE PLACEMENT OF CONCRETE IN THE EXCAVATED HOLE. CONCRETE SHALL NOT FREE FALL. CONCRETE MAY BE PLACED BELOW WATER USING TREMIE METHODS.
10. CONCRETE SHALL BE PLACED TO THE DEPTH INDICATED, AND THE ABOVE GRADE PORTION SHALL BE FORMED. THE REBAR CAGE, ANCHOR BOLTS, AND CONCRETE SHALL BE PLACED WITHIN 24 HOURS OF COMPLETING THE EXCAVATION. COLD JOINTS ARE NOT ALLOWED, UNO
11. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ADEQUATE CONCRETE COVERAGE OVER REINFORCING BARS. UNLESS OTHERWISE NOTED, CONTRACTOR SHALL USE 3" CONCRETE COVER OVER REBAR. TOP OF FOOTING SHALL BE TROWEL LEVEL AND SMOOTH.
12. INSTALLATION OF FOUNDATION MUST BE OBSERVED BY A REPRESENTATIVE OF THE GEOTECHNICAL ENGINEER FIRM. GEOTECHNICAL ENGINEER TO PROVIDE A NOTICE OF INSPECTION FOR THE BUILDING INSPECTOR FOR REVIEW AND RECORD PURPOSES.
13. CONTRACTOR SHALL REFER TO GEOTECHNICAL REPORT FOR INFORMATION REGARDING INSTALLATION METHOD, REQUIRED INSTALLATION EQUIPMENT, AND ALL OTHER REQUIREMENTS RELATED TO THE INSTALLATION OF THE FOUNDATION.
14. STRUCTURE MAY BE ERECTED 3-DAYS AFTER FOUNDATION IS INSTALLED AND ONCE CONCRETE STRENGTH IS AT LEAST 4000 PSI.



2
N.T.S.



DRILLED PIER FOUNDATION
N.T.S.
1

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DATE: 1/28/26	DESIGNED: MAR	DRAFTER: MAR

REVISIONS

REV	DATE	DESCRIPTION

AT&T

DRILLED PIER FOUNDATION

SF POLICE ACADEMY
SITE #: CCL05350
103'-0" MONOPOLE
350 AMBER DRIVE
SAN FRANCISCO, CA 94131
SAN FRANCISCO COUNTY

REGISTERED PROFESSIONAL ENGINEER
CASEY N. MILLARD
C 90109
CIVIL
STATE OF CALIFORNIA

01/28/2026

U1133.0725.261

S4 REV 0

Exhibit D

Exhibit D

STRUCTURAL CALCULATIONS
for
SF POLICE ACADEMY (SITE#: CCL05350)

at
350 AMBER DRIVE
SAN FRANCISCO, CA 94131
for
AT&T
&
STEELHEAD METAL & FAB LLC

1/28/2026

BY: **CASEY N. MILLARD, P.E.**
PROFESSIONAL ENGINEER

PROJECT #: **U1133.0725.261**

DATE: **January 28, 2026**

DESIGNED BY MAR; CHECKED BY CNM

Note:
The calculations presented in this package are intended for a single use at the location indicated above, for the client listed above. These calculations shall not be reproduced, reused, "card filed", sold to a third party, or altered in any way without the written authorization of Vector Structural Engineering, LLC and Steelhead Metal & Fab LLC.

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JOB NO.: U1133.0725.261

PROJECT: SF POLICE ACADEMY

Design Criteria:

Code: Structural design is based on the California Building Code, 2025 Edition (2024 IBC) and the TIA-222-I standard.

Wind: Basic wind speed = 99 mph (3-second gust) per the ASCE 7-22 standard
Risk Category: III
Wind exposure: C
Kzt: 1

Ice: None per the ASCE 7-22 standard

Seismic: Seismic importance factor, I = 1.25
Risk Category: III
Mapped spectral response accelerations: S_S = 1.84g S_1 = 0.7g
Site class: D
Spectral response coefficients: S_{DS} = 1.3g S_{D1} = 1.38g
Seismic design category: D
Basic seismic-force-resisting-system: Telecom: Steel Pole
Seismic base shear, V = 6 k
Seismic response coefficient, Cs = 0.359
Response modification factor, R = 1.5
Analysis procedure: Equivalent Lateral Force

General Notes:

1. The contractor shall verify dimensions, conditions and elevations before starting work. The engineer shall be notified immediately if any discrepancies are found.
2. The typical notes and details shall apply in all cases unless specifically detailed elsewhere. Where no detail is shown, the construction shall be as shown for other similar work and as required by the building code.
3. These calculations are limited to the structural members shown in these calculations only.
4. The contractor shall be responsible for compliance with local construction safety orders. Approval of shop drawings by the architect or structural engineer shall not be construed as accepting this responsibility.
5. All structural framing members shall be adequately shored and braced during erection and until full lateral and vertical support is provided by adjoining members.

JOB NO.: U1133.0725.261

PROJECT: SF POLICE ACADEMY

Structural Steel:

1 All structural steel code checks based on the AISC, 16th Edition per the TIA-222-I standard
2 All 18-sided, tapered shaft steel to be per ASTM A572 GR. 65, U.N.O.
3 The design length of slip splices is equal to 1.67 times the inside width of the base of the upper section. Slip splice length tolerance is equal to ± 10% of the design slip splice length.
4 All steel pipe to be per ASTM A53 GR. B (35 KSI), U.N.O.
5 All steel rectangular tubes (HSS) to be per ASTM A500 GR. B (46 KSI), U.N.O.
6 All other structural steel shapes & plates shall be per ASTM A36, U.N.O.
7 All anchor bolts shall be per ASTM F1554 GR. 55, U.N.O.
8 All bolts for steel-to-steel connections shall be per ASTM F3125 GR. A325 U.N.O.
9 All bolted connections shall be tightened per the "turn-of-nut" method as defined by AISC.
10 All welding shall be performed by certified welders in accordance with the latest edition of the American Welding Society (AWS) D1.1. Utilize minimum E70XX low-hydrogen electrode U.N.O. or where higher strength electrode is required by AWS D1.1
11 All steel surfaces shall be galvanized in accordance with ASTM A123 and ASTM F2329 standards, thoroughly coated with a zinc-rich primer, or otherwise protected as noted on the structural drawings.

Foundation / Concrete:

1 All concrete mixing, placement, forming, and reinforcing installation shall be performed in accordance with the requirements of “Building Code Requirements for Reinforced Concrete”, ACI 318-19. Foundation installation shall be in accordance with the requirements of "Standard Specifications for the Construction of Drilled Piers", ACI 336, latest edition
2 All concrete shall have a minimum compressive strength of 4000 psi at 28 days.
3 Cement for all concrete shall be Type II with 6% (+/- 1.5%) entrained air. Maximum aggregate size shall be 3/4".

4 Reinforcing steel shall be per ASTM A615 Gr. 60, U.N.O.

6 Foundation design is based on presumptive soil parameters. Vector Structural Engineering, LLC strongly recommends independent soils testing be performed by a licensed geotechnical engineer to verify soil bearing capacities, slope stability, and any other related soil parameters, as required.

JOB NO.: U1133.0725.261

VECTOR ENGINEERS

PROJECT: SF POLICE ACADEMY

ASCE 7-22
Method 1

Seismic Base Shear Calculations:

Seismic Parameters:

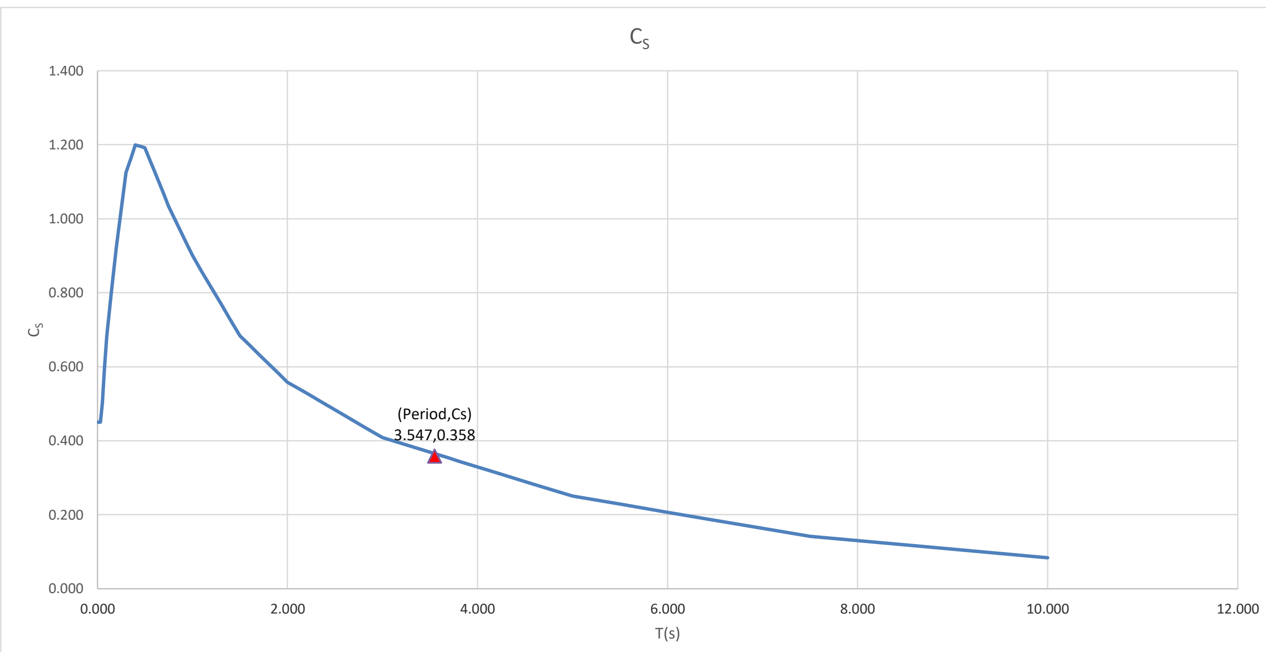
Risk Category=	III		S_s =	1.840	g	S_{DS} =	1.300	g
Seismic Design Category:	D		S_1 =	0.700	g	S_{D1} =	1.380	g
Importance, I =	1.25		S_{MS} =	1.950	g			
Site Class:	D		SM1 =	2.070	g			
R =	1.5		Sa(g) =	0.430				
T_L =	12							

Seismic Base Shear:

Structure Type = Telecom: Steel Pole
Period Type = Monopole Period

h =	102.0	ft	W_u =	5.31	k	f_1 =	0.28	Hz
E =	29000	ksi	W_t =	16.7	k	T=	3.55	sec.
I_{avg} =	1369	in^4	W_L =	11.4	k	k_e=	2.00	
C_s=	0.359							
Seismic Shear, $V_{s(final)}$ =	6.0	k	**ratio =**	0.62				
Wind Shear =	9.6	k						

Wind Controls, Seismic Analysis Still Required



JOB NO.: U1133.0725.261

PROJECT: SF POLICE ACADEMY

Equivalent Lateral Force:

Discrete Appurtenances:

Label	Height AGL, h_z [ft]	Weight, w_z [lb]	$w_z h_z^{ke}$	F_{sz} [lb]
(3) Quintel QD668-2	100.0	167	1665000	96.7
(6) Ericsson Air Stacked	100.0	484	4842000	281.3
(3) Quintel QD6612-2	100.0	363	3627000	210.7
(3) RRU 4490	100.0	210	2100000	122.0
(3) RRU 4478	100.0	180	1800000	104.6
(3) RRU 4890	100.0	209	2085000	121.1
(3) Surge Suppressor	100.0	79	786000	45.7
(1) RMVD-12	100.0	2081	20810000	1209.1
(3) Quintel QD668-2	100.0	167	1665000	96.7
(6) Ericsson Air Stacked	100.0	484	4842000	281.3
(3) Quintel QD6612-2	100.0	363	3627000	210.7
(3) RRU 4490	100.0	210	2100000	122.0
(3) RRU 4478	100.0	180	1800000	104.6
(3) RRU 4890	100.0	209	2085000	121.1
(3) Surge Suppressor	100.0	79	786000	45.7
(1) RMVD-12	100.0	2081	20810000	1209.1

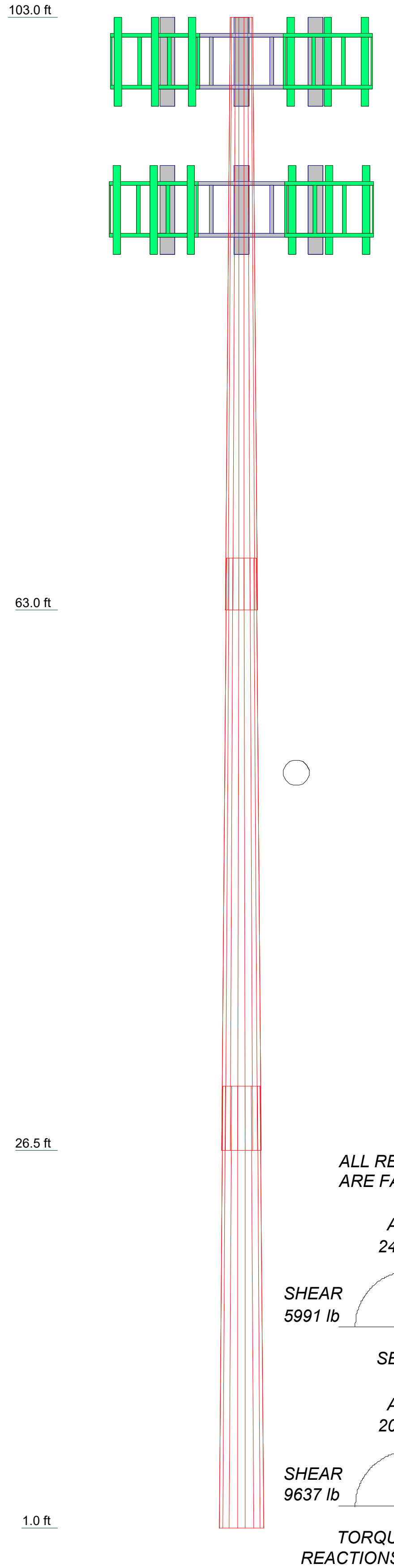
Linear Appurtenances:

Label	z [ft]	w_z [lb]	$w_z h_z^{ke}$	F_{sz} [lb]
Coax	92.9	320.9	2767067	160.8
Coax	78.6	493.7	3047930	177.1
Coax	64.3	493.7	2040350	118.5
Coax	50.0	493.7	1234286	71.7
Coax	35.7	493.7	629738	36.6
Coax	21.4	493.7	226706	13.2
Coax	7.1	493.7	25190	1.5

Tapered Pole:

Label	z [ft] AGL	w_z [lb]	$w_z h_z^{ke}$	F_{sz} [lb]
Tapered 1	96.3	573.2	5319800	309.1
Tapered 1	83.0	573.2	3949102	229.4
Tapered 1	69.7	573.2	2782225	161.6
Tapered 2	59.8	736.4	2636385	153.2
Tapered 2	46.5	736.4	1592313	92.5
Tapered 2	33.2	736.4	810077	47.1
Tapered 3	25.9	650.4	435003	25.3
Tapered 3	15.9	650.4	164779	9.6
Tapered 3	6.0	650.4	23199	1.3

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	40.00	18	0.1875	3.50	18.0000	25.0000	A572-65	1726.4
2	40.00	18	0.1875	4.33	24.0125	31.0125	A572-65	2213.4
3	29.83	18	0.1880		29.8798	35.1000	A572-65	1956.5
								5896.3



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	100	Tapered 1 seismic	96.3
		Coax seismic	92.9
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	100	Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	90
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	100	Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	90
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	100	Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	90
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	100	Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	90
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	100	Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	90
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	100	Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	90
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	100	RMVD12-NPNH-3xx (EPA = 21.51 sqft front, 2081 lb), 3 Sectors	90
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	100	Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	90
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	100	Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	90
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	100	Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	90
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	100	Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	90
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	100	Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	90
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	100	Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	90
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	100	Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	90
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	100	Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	90
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	100	Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	90
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	100	Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	90
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	100	Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	90
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	100	Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	90
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	100	Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	90
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	100	Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	90
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	100	Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	90
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	100	Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	90
RMVD12-NPNH-3xx (EPA = 21.51 sqft front, 2081 lb), 3 Sectors	100	Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	90
(3) Quintel QD668-2 seismic	100	Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	90
(6) Ericsson Air Stacked seismic	100		
(3) Quintel QD6612-2 seismic	100	Tapered 1 seismic	83
(3) RRU 4490 seismic	100	Coax seismic	78.6
(3) RRU 4478 seismic	100	Tapered 1 seismic	69.7
(3) RRU 4890 seismic	100	Coax seismic	64.3
(3) Surge Suppressor seismic	100	Tapered 2 seismic	59.8
(1) RMVD-12 seismic	100	Coax seismic	50
(3) Quintel QD668-2 seismic	100	Tapered 2 seismic	46.5
(6) Ericsson Air Stacked seismic	100	Coax seismic	35.7
(3) Quintel QD6612-2 seismic	100	Tapered 2 seismic	33.2
(3) RRU 4490 seismic	100	Tapered 3 seismic	25.9
(3) RRU 4478 seismic	100	Coax seismic	21.4
(3) RRU 4890 seismic	100	Tapered 3 seismic	15.9
(3) Surge Suppressor seismic	100	Coax seismic	7.1
(1) RMVD-12 seismic	100	Tapered 3 seismic	6

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

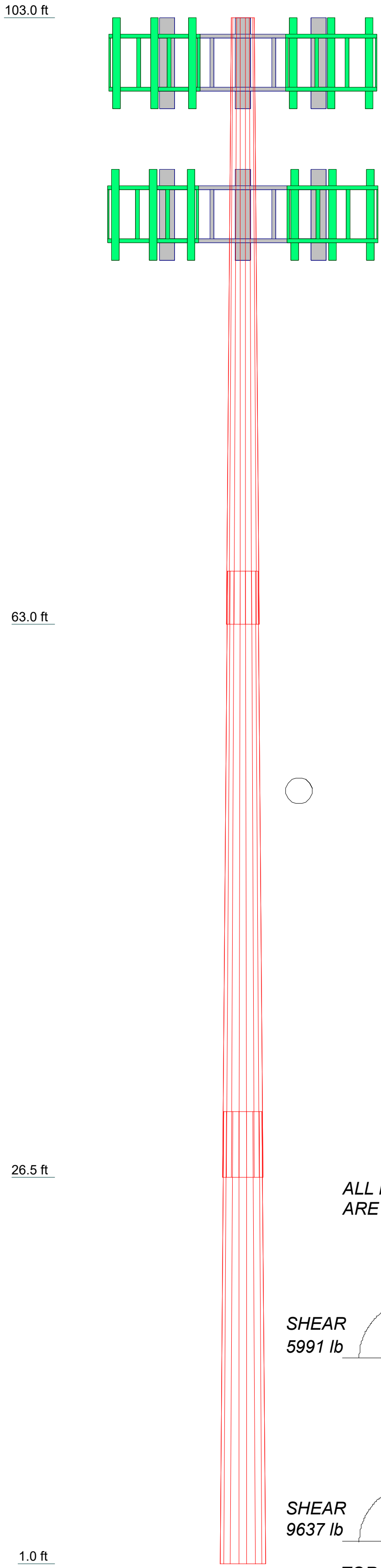
TOWER DESIGN NOTES

1. Tower is located in San Francisco County, California.
2. Tower designed for Exposure C to the TIA-222-I Standard.
3. Tower designed for a 99 mph basic wind in accordance with the TIA-222-I Standard.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 97.6%

Vector Structural Engineering
651 W Galena Park Blvd
Draper, UT 84020
Phone: (801) 990-1775
FAX: (801) 990-1776

Job: **SF Police Academy**		
Project: **U1133.0725.261**		
Client: Steelhead	Drawn by: mririe	App'd:
Code: TIA-222-I	Date: 01/27/26	Scale: NTS
Path:		Dwg No. E-1

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (lb)
1	40.00	18	0.1875	3.50	18.0000	25.0000	A572-65	1726.4
2	40.00	18	0.1875	4.33	24.0125	31.0125	A572-65	2213.4
3	29.83	18	0.1880		29.8798	35.1000	A572-65	1956.5
								5896.3



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in San Francisco County, California.
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3. Tower designed for a 99 mph basic wind in accordance with the TIA-222-I Standard.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 97.6%

ALL REACTIONS ARE FACTORED

AXIAL 24369 lb
SHEAR 5991 lb
MOMENT 615386 lb-ft

SEISMIC

AXIAL 20026 lb
SHEAR 9637 lb
MOMENT 798216 lb-ft

TORQUE 1251 lb-ft
REACTIONS - 99 mph WIND

Vector Structural Engineering 651 W Galena Park Blvd Draper, UT 84020 Phone: (801) 990-1775 FAX: (801) 990-1776	Job: **SF Police Academy**		
	Project: **U1133.0725.261**		
	Client: Steelhead	Drawn by: mririe	App'd:
	Code: TIA-222-I	Date: 01/28/26	Scale: NTS
	Path:		Dwg No. E-1

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-I standard.
The following design criteria apply:

- Tower is located in San Francisco County, California.
- Tower base elevation above sea level: 561.00 ft.
- Basic wind speed of 99 mph is used.
- Risk Category III.
- Exposure Category C.
- Crest Height: 0.00 ft.
- Deflections calculated using a wind speed of 60 mph.
- Fatigue along-wind analysis loads are applied.
- Non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Assume Legs Pinned	√	Calculate Redundant Bracing Forces
	Consider Moments - Horizontals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Consider Moments - Diagonals	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
	Use Moment Magnification	√	Use Clear Spans For KL/r	√	All Leg Panels Have Same Allowable
√	Use Code Stress Ratios	√	Retension Guys To Initial Tension		Offset Girt At Foundation
√	Use Code Safety Factors - Guys	√	Bypass Mast Stability Checks		Consider Feed Line Torque
	Escalate Ice	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Always Use Max Kz	√	Project Wind Area of Appurtenances		Use TIA-222-H Bracing Resist. Exemption
	Kz In Exposure D Hurricane Region		Alternative Appurt. EPA Calculation		Use TIA-222-H Tension Splice Exemption
√	Include Bolts In Member Capacity	√	Autocalc Torque Arm Areas		**Poles**
√	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Include Shear-Torsion Interaction
√	Secondary Horizontal Braces Leg		Sort Capacity Reports By Component		Always Use Sub-Critical Flow
	Use Diamond Inner Bracing (4 Sided)	√	Triangulate Diamond Inner Bracing		Use Top Mounted Sockets
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Pole Without Linear Attachments
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole With Shroud Or No Appurtenances
	Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules		Outside and Inside Corner Radii Are Known
	Use Special Wind Profile				Use Fatigue Analysis Exemption for Gh

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	103.00-63.00	40.00	3.50	18	18.0000	25.0000	0.1875	0.7500	A572-65 (65 ksi)
L2	63.00-26.50	40.00	4.33	18	24.0125	31.0125	0.1875	0.7500	A572-65 (65 ksi)
L3	26.50-1.00	29.83		18	29.8798	35.1000	0.1880	0.7520	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	18.2488	10.6007	424.9328	6.3234	9.1440	46.4712	850.4248	5.3013	2.8380	15.136
	25.3567	14.7665	1148.5693	8.8084	12.7000	90.4385	2298.6500	7.3847	4.0700	21.707
L2	24.9760	14.1789	1016.8207	8.4579	12.1983	83.3572	2034.9793	7.0908	3.8962	20.78
	31.4620	18.3447	2202.1906	10.9429	15.7544	139.7830	4407.2789	9.1741	5.1282	27.35
L3	31.0811	17.7174	1973.3749	10.5406	15.1789	130.0077	3949.3465	8.8604	4.9280	26.213
	35.6125	20.8324	3207.9413	12.3938	17.8308	179.9101	6420.1036	10.4182	5.8467	31.1

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 103.00-63.00				1	1	1			
L2 63.00-26.50				1	1	1			
L3 26.50-1.00				1	1	1			

Monopole Base Plate Data

Base Plate Data	
Base plate is square	
Base plate is grouted	
Anchor bolt grade	F1554-55
Anchor bolt size	2.0000 in
Number of bolts	8
Embedment length	60.0000 in
f'_c	4 ksi
Grout space	3.0000 in
Base plate grade	A572-50
Base plate thickness	2.0000 in
Bolt circle diameter	41.0000 in
Outer diameter	46.0000 in
Inner diameter	26.0000 in
Base plate type	Plain Plate

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 5/8 Coax (Enclosed)	C	No	Yes	Inside Pole	100.00 - 1.00	24	No Ice	0.00	0.72
1 5/8 Coax (Enclosed)	C	No	Yes	Inside Pole	90.00 - 1.00	24	No Ice	0.00	0.72

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight lb
L1	103.00-63.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1105.92
L2	63.00-26.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	1261.44
L3	26.50-1.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	881.28

User Defined Loads - Seismic

Description	Elevation ft	Offset From Centroid ft	Azimuth Angle °	E_v lb	E_{hx} lb	E_{hz} lb	E_h lb
(3) Quintel QD668-2 seismic	100.00	0.00	0.0000	43.30	0.00	0.00	96.70
(6) Ericsson Air Stacked seismic	100.00	0.00	0.0000	125.90	0.00	0.00	281.30
(3) Quintel QD6612-2 seismic	100.00	0.00	0.0000	94.30	0.00	0.00	210.70
(3) RRU 4490 seismic	100.00	0.00	0.0000	54.60	0.00	0.00	122.00
(3) RRU 4478 seismic	100.00	0.00	0.0000	46.80	0.00	0.00	104.60
(3) RRU 4890 seismic	100.00	0.00	0.0000	54.20	0.00	0.00	121.10
(3) Surge Suppressor seismic	100.00	0.00	0.0000	20.40	0.00	0.00	45.70
(1) RMVD-12 seismic	100.00	0.00	0.0000	541.10	0.00	0.00	1209.10
(3) Quintel QD668-2 seismic	100.00	0.00	0.0000	43.30	0.00	0.00	96.70
(6) Ericsson Air Stacked seismic	100.00	0.00	0.0000	125.90	0.00	0.00	281.30
(3) Quintel QD6612-2 seismic	100.00	0.00	0.0000	94.30	0.00	0.00	210.70
(3) RRU 4490 seismic	100.00	0.00	0.0000	54.60	0.00	0.00	122.00
(3) RRU 4478 seismic	100.00	0.00	0.0000	46.80	0.00	0.00	104.60
(3) RRU 4890 seismic	100.00	0.00	0.0000	54.20	0.00	0.00	121.10
(3) Surge Suppressor seismic	100.00	0.00	0.0000	20.40	0.00	0.00	45.70
(1) RMVD-12 seismic	100.00	0.00	0.0000	541.10	0.00	0.00	1209.10
Coax seismic	92.90	0.00	0.0000	83.40	0.00	0.00	160.80
Coax seismic	78.60	0.00	0.0000	128.40	0.00	0.00	177.10
Coax seismic	64.30	0.00	0.0000	128.40	0.00	0.00	118.50
Coax seismic	50.00	0.00	0.0000	128.40	0.00	0.00	71.70
Coax seismic	35.70	0.00	0.0000	128.40	0.00	0.00	36.60
Coax seismic	21.40	0.00	0.0000	128.40	0.00	0.00	13.20
Coax seismic	7.10	0.00	0.0000	128.40	0.00	0.00	1.50
Tapered 1 seismic	96.30	0.00	0.0000	149.00	0.00	0.00	309.10
Tapered 1 seismic	83.00	0.00	0.0000	149.00	0.00	0.00	229.40
Tapered 1 seismic	69.70	0.00	0.0000	149.00	0.00	0.00	161.60
Tapered 2 seismic	59.80	0.00	0.0000	191.50	0.00	0.00	153.20
Tapered 2 seismic	46.50	0.00	0.0000	191.50	0.00	0.00	92.50
Tapered 2 seismic	33.20	0.00	0.0000	191.50	0.00	0.00	47.10
Tapered 3 seismic	25.90	0.00	0.0000	169.10	0.00	0.00	25.30
Tapered 3 seismic	15.90	0.00	0.0000	169.10	0.00	0.00	9.60
Tapered 3 seismic	6.00	0.00	0.0000	169.10	0.00	0.00	1.30

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	A	From Face	2.00 0.00 0.00	0.0000	100.00	No Ice	11.45	8.22	55.50
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	A	From Face	2.00 0.00 0.00	0.0000	100.00	No Ice	4.15	2.80	80.70
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	A	From Face	2.00 0.00 0.00	0.0000	100.00	No Ice	4.15	2.80	80.70
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	A	From Face	2.00 0.00 0.00	0.0000	100.00	No Ice	13.58	8.22	120.90
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	A	From Face	1.00 0.00 0.00	0.0000	100.00	No Ice	2.68	1.22	70.00
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	A	From Face	1.00 0.00 0.00	0.0000	100.00	No Ice	2.02	1.25	60.00
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	A	From Face	1.00 0.00 0.00	0.0000	100.00	No Ice	2.70	1.25	69.50
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb) ****	A	From Face	1.00 0.00 0.00	0.0000	100.00	No Ice	1.21	1.21	26.20
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	B	From Face	2.00 0.00 0.00	0.0000	100.00	No Ice	11.45	8.22	55.50
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	B	From Face	2.00 0.00 0.00	0.0000	100.00	No Ice	4.15	2.80	80.70
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	B	From Face	2.00 0.00 0.00	0.0000	100.00	No Ice	4.15	2.80	80.70
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	B	From Face	2.00 0.00 0.00	0.0000	100.00	No Ice	13.58	8.22	120.90
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	B	From Face	1.00 0.00 0.00	0.0000	100.00	No Ice	2.68	1.22	70.00
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	B	From Face	1.00 0.00 0.00	0.0000	100.00	No Ice	2.02	1.25	60.00
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	B	From Face	1.00 0.00 0.00	0.0000	100.00	No Ice	2.70	1.25	69.50
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb) ****	B	From Face	1.00 0.00 0.00	0.0000	100.00	No Ice	1.21	1.21	26.20
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	C	From Face	2.00 0.00 0.00	0.0000	100.00	No Ice	11.45	8.22	55.50
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	C	From Face	2.00 0.00 0.00	0.0000	100.00	No Ice	4.15	2.80	80.70
Ericsson Air 6419 B77D	C	From Face	2.00	0.0000	100.00	No Ice	4.15	2.80	80.70

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *lb*
(28.3"x16.1"x7.9", 66.1lb) w/ MP			0.00 0.00						
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	C	From Face	2.00 0.00 0.00	0.0000	100.00	No Ice	13.58	8.22	120.90
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	C	From Face	1.00 0.00 0.00	0.0000	100.00	No Ice	2.68	1.22	70.00
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	C	From Face	1.00 0.00 0.00	0.0000	100.00	No Ice	2.02	1.25	60.00
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	C	From Face	1.00 0.00 0.00	0.0000	100.00	No Ice	2.70	1.25	69.50
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	C	From Face	1.00 0.00 0.00	0.0000	100.00	No Ice	1.21	1.21	26.20
RMVD12-NPNH-3xx (EPA = 21.51 sqft front, 2081 lb), 3 Sectors	C	None		0.0000	100.00	No Ice	21.51	20.57	2081.00
****									
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	A	From Face	2.00 0.00 0.00	0.0000	90.00	No Ice	11.45	8.22	55.50
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	A	From Face	2.00 0.00 0.00	0.0000	90.00	No Ice	4.15	2.80	80.70
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	A	From Face	2.00 0.00 0.00	0.0000	90.00	No Ice	4.15	2.80	80.70
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	A	From Face	2.00 0.00 0.00	0.0000	90.00	No Ice	13.58	8.22	120.90
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	A	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice	2.68	1.22	70.00
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	A	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice	2.02	1.25	60.00
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	A	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice	2.70	1.25	69.50
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	A	From Face	1.00 0.00 0.00	0.0000	90.00	No Ice	1.21	1.21	26.20
****									
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	B	From Face	2.00 0.00 0.00	0.0000	90.00	No Ice	11.45	8.22	55.50
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	B	From Face	2.00 0.00 0.00	0.0000	90.00	No Ice	4.15	2.80	80.70
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	B	From Face	2.00 0.00 0.00	0.0000	90.00	No Ice	4.15	2.80	80.70
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	B	From Face	2.00 0.00	0.0000	90.00	No Ice	13.58	8.22	120.90

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	B	From Face	0.00 1.00 0.00	0.0000	90.00	No Ice	2.68	1.22	70.00
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	B	From Face	0.00 1.00 0.00	0.0000	90.00	No Ice	2.02	1.25	60.00
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	B	From Face	0.00 1.00 0.00	0.0000	90.00	No Ice	2.70	1.25	69.50
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	B	From Face	0.00 1.00 0.00 0.00	0.0000	90.00	No Ice	1.21	1.21	26.20
****									
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	C	From Face	2.00 0.00 0.00	0.0000	90.00	No Ice	11.45	8.22	55.50
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	C	From Face	2.00 0.00 0.00	0.0000	90.00	No Ice	4.15	2.80	80.70
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	C	From Face	2.00 0.00 0.00	0.0000	90.00	No Ice	4.15	2.80	80.70
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	C	From Face	2.00 0.00 0.00	0.0000	90.00	No Ice	13.58	8.22	120.90
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	C	From Face	0.00 1.00 0.00	0.0000	90.00	No Ice	2.68	1.22	70.00
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	C	From Face	0.00 1.00 0.00	0.0000	90.00	No Ice	2.02	1.25	60.00
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	C	From Face	0.00 1.00 0.00	0.0000	90.00	No Ice	2.70	1.25	69.50
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	C	From Face	0.00 1.00 0.00 0.00	0.0000	90.00	No Ice	1.21	1.21	26.20
RMVD12-NPNH-3xx (EPA = 21.51 sqft front, 2081 lb), 3 Sectors	C	None		0.0000	90.00	No Ice	21.51	20.57	2081.00

Tower Pressures - No Ice

$G_H = 0.950$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	F a c e	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 103.00-63.00	82.16	1.204	28	72.676	A	0.000	72.676	72.676	100.00	0.000	0.000
					B	0.000	72.676		100.00	0.000	0.000
					C	0.000	72.676		100.00	0.000	0.000
L2 63.00-26.50	44.44	1.062	25	85.833	A	0.000	85.833	85.833	100.00	0.000	0.000
					B	0.000	85.833		100.00	0.000	0.000
					C	0.000	85.833		100.00	0.000	0.000
L3 26.50-1.00	13.46	0.850	20	70.862	A	0.000	70.862	70.862	100.00	0.000	0.000
					B	0.000	70.862		100.00	0.000	0.000
					C	0.000	70.862		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 0.950$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 103.00-63.00	82.16	1.204	9	72.676	A	0.000	72.676	72.676	100.00	0.000	0.000
					B	0.000	72.676		100.00	0.000	0.000
					C	0.000	72.676		100.00	0.000	0.000
L2 63.00-26.50	44.44	1.062	8	85.833	A	0.000	85.833	85.833	100.00	0.000	0.000
					B	0.000	85.833		100.00	0.000	0.000
					C	0.000	85.833		100.00	0.000	0.000
L3 26.50-1.00	13.46	0.850	7	70.862	A	0.000	70.862	70.862	100.00	0.000	0.000
					B	0.000	70.862		100.00	0.000	0.000
					C	0.000	70.862		100.00	0.000	0.000

Tower Pressure - Along-Wind Gust

$G_H = 1.000$

Section Elevation ft	z ft	K_Z	q_{wg} psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 103.00-63.00	82.16	1.000	5	72.676	A	0.000	72.676	72.676	100.00	0.000	0.000
					B	0.000	72.676		100.00	0.000	0.000
					C	0.000	72.676		100.00	0.000	0.000
L2 63.00-26.50	44.44	1.000	5	85.833	A	0.000	85.833	85.833	100.00	0.000	0.000
					B	0.000	85.833		100.00	0.000	0.000
					C	0.000	85.833		100.00	0.000	0.000
L3 26.50-1.00	13.46	1.000	5	70.862	A	0.000	70.862	70.862	100.00	0.000	0.000
					B	0.000	70.862		100.00	0.000	0.000
					C	0.000	70.862		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 103.00-63.00	1105.92	1726.39	A	1	0.73	28	1	1	72.676	1415.20	35.38	C
			B	1	0.73		1	1	72.676			
			C	1	0.73		1	1	72.676			
L2 63.00-26.50	1261.44	2213.42	A	1	0.73	25	1	1	85.833	1469.29	40.25	C
			B	1	0.73		1	1	85.833			
			C	1	0.73		1	1	85.833			
L3 26.50-1.00	881.28	1956.51	A	1	0.73	20	1	1	70.862	975.68	38.26	C
			B	1	0.73		1	1	70.862			
			C	1	0.73		1	1	70.862			
Sum Weight:	3248.64	5896.31						OTM	190834.97 lb-ft	3860.17		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 103.00-63.00	1105.92	1726.39	A	1	0.73	28	1	1	72.676	1415.20	35.38	C
			B	1	0.73		1	1	72.676			
			C	1	0.73		1	1	72.676			
L2 63.00-26.50	1261.44	2213.42	A	1	0.73	25	1	1	85.833	1469.29	40.25	C
			B	1	0.73		1	1	85.833			
			C	1	0.73		1	1	85.833			
L3 26.50-1.00	881.28	1956.51	A	1	0.73	20	1	1	70.862	975.68	38.26	C
			B	1	0.73		1	1	70.862			
			C	1	0.73		1	1	70.862			
Sum Weight:	3248.64	5896.31						OTM	190834.97 lb-ft	3860.17		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 103.00-63.00	1105.92	1726.39	A	1	0.73	28	1	1	72.676	1415.20	35.38	C
			B	1	0.73		1	1	72.676			
			C	1	0.73		1	1	72.676			
L2 63.00-26.50	1261.44	2213.42	A	1	0.73	25	1	1	85.833	1469.29	40.25	C
			B	1	0.73		1	1	85.833			
			C	1	0.73		1	1	85.833			
L3 26.50-1.00	881.28	1956.51	A	1	0.73	20	1	1	70.862	975.68	38.26	C
			B	1	0.73		1	1	70.862			
			C	1	0.73		1	1	70.862			
Sum Weight:	3248.64	5896.31						OTM	190834.97 lb-ft	3860.17		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 103.00-63.00	1105.92	1726.39	A	1	0.73	28	1	1	72.676	1415.20	35.38	C
			B	1	0.73		1	1	72.676			
			C	1	0.73		1	1	72.676			
L2 63.00-26.50	1261.44	2213.42	A	1	0.73	25	1	1	85.833	1469.29	40.25	C
			B	1	0.73		1	1	85.833			
			C	1	0.73		1	1	85.833			
L3 26.50-1.00	881.28	1956.51	A	1	0.73	20	1	1	70.862	975.68	38.26	C
			B	1	0.73		1	1	70.862			
			C	1	0.73		1	1	70.862			
Sum Weight:	3248.64	5896.31						OTM	190834.97 lb-ft	3860.17		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 103.00-63.00	1105.92	1726.39	A	1	0.73	9	1	1	72.676	465.10	11.63	C
			B	1	0.73		1	1	72.676			
			C	1	0.73		1	1	72.676			
L2 63.00-26.50	1261.44	2213.42	A	1	0.73	8	1	1	85.833	482.87	13.23	C
			B	1	0.73		1	1	85.833			
			C	1	0.73		1	1	85.833			
L3 26.50-1.00	881.28	1956.51	A	1	0.73	7	1	1	70.862	320.65	12.57	C
			B	1	0.73		1	1	70.862			
			C	1	0.73		1	1	70.862			
Sum Weight:	3248.64	5896.31						OTM	62717.02 lb-ft	1268.63		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 103.00-63.00	1105.92	1726.39	A	1	0.73	9	1	1	72.676	465.10	11.63	C
			B	1	0.73		1	1	72.676			
			C	1	0.73		1	1	72.676			
L2 63.00-26.50	1261.44	2213.42	A	1	0.73	8	1	1	85.833	482.87	13.23	C
			B	1	0.73		1	1	85.833			
			C	1	0.73		1	1	85.833			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L3 26.50-1.00	881.28	1956.51	A	1	0.73	7	1	1	70.862	320.65	12.57	C
			B	1	0.73		1	1	70.862			
			C	1	0.73		1	1	70.862			
Sum Weight:	3248.64	5896.31						OTM	62717.02 lb-ft	1268.63		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 103.00-63.00	1105.92	1726.39	A	1	0.73	9	1	1	72.676	465.10	11.63	C
			B	1	0.73		1	1	72.676			
			C	1	0.73		1	1	72.676			
L2 63.00-26.50	1261.44	2213.42	A	1	0.73	8	1	1	85.833	482.87	13.23	C
			B	1	0.73		1	1	85.833			
			C	1	0.73		1	1	85.833			
L3 26.50-1.00	881.28	1956.51	A	1	0.73	7	1	1	70.862	320.65	12.57	C
			B	1	0.73		1	1	70.862			
			C	1	0.73		1	1	70.862			
Sum Weight:	3248.64	5896.31						OTM	62717.02 lb-ft	1268.63		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 103.00-63.00	1105.92	1726.39	A	1	0.73	9	1	1	72.676	465.10	11.63	C
			B	1	0.73		1	1	72.676			
			C	1	0.73		1	1	72.676			
L2 63.00-26.50	1261.44	2213.42	A	1	0.73	8	1	1	85.833	482.87	13.23	C
			B	1	0.73		1	1	85.833			
			C	1	0.73		1	1	85.833			
L3 26.50-1.00	881.28	1956.51	A	1	0.73	7	1	1	70.862	320.65	12.57	C
			B	1	0.73		1	1	70.862			
			C	1	0.73		1	1	70.862			
Sum Weight:	3248.64	5896.31						OTM	62717.02 lb-ft	1268.63		

Tower Forces - Along-Wind Gust - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_{wg} psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 103.00-63.00	1105.92	1726.39	A	1	0.864	5	1	1	72.676	314.00	7.85	C
			B	1	0.864		1	1	72.676			
			C	1	0.864		1	1	72.676			
L2 63.00-26.50	1261.44	2213.42	A	1	0.73	5	1	1	85.833	313.29	8.58	C
			B	1	0.73		1	1	85.833			
			C	1	0.73		1	1	85.833			
L3 26.50-1.00	881.28	1956.51	A	1	0.73	5	1	1	70.862	258.65	10.14	C
			B	1	0.73		1	1	70.862			
			C	1	0.73		1	1	70.862			
Sum Weight:	3248.64	5896.31						OTM	42315.33 lb-ft	885.94		

Tower Forces - Along-Wind Gust - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_{wg} psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 103.00-63.00	1105.92	1726.39	A	1	0.864	5	1	1	72.676	314.00	7.85	C
			B	1	0.864		1	1	72.676			
			C	1	0.864		1	1	72.676			
L2 63.00-26.50	1261.44	2213.42	A	1	0.73	5	1	1	85.833	313.29	8.58	C
			B	1	0.73		1	1	85.833			
			C	1	0.73		1	1	85.833			
L3 26.50-1.00	881.28	1956.51	A	1	0.73	5	1	1	70.862	258.65	10.14	C
			B	1	0.73		1	1	70.862			
			C	1	0.73		1	1	70.862			
Sum Weight:	3248.64	5896.31						OTM	42315.33 lb-ft	885.94		

Tower Forces - Along-Wind Gust - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_{wg} psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 103.00-63.00	1105.92	1726.39	A	1	0.864	5	1	1	72.676	314.00	7.85	C
			B	1	0.864		1	1	72.676			
			C	1	0.864		1	1	72.676			
L2 63.00-26.50	1261.44	2213.42	A	1	0.73	5	1	1	85.833	313.29	8.58	C
			B	1	0.73		1	1	85.833			
			C	1	0.73		1	1	85.833			
L3 26.50-1.00	881.28	1956.51	A	1	0.73	5	1	1	70.862	258.65	10.14	C
			B	1	0.73		1	1	70.862			
			C	1	0.73		1	1	70.862			
Sum Weight:	3248.64	5896.31						OTM	42315.33 lb-ft	885.94		

Tower Forces - Along-Wind Gust - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_{wg} psf	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 103.00-63.00	1105.92	1726.39	A	1	0.864	5	1	1	72.676	314.00	7.85	C
			B	1	0.864		1	1	72.676			
			C	1	0.864		1	1	72.676			
L2 63.00-26.50	1261.44	2213.42	A	1	0.73	5	1	1	85.833	313.29	8.58	C
			B	1	0.73		1	1	85.833			
			C	1	0.73		1	1	85.833			
L3 26.50-1.00	881.28	1956.51	A	1	0.73	5	1	1	70.862	258.65	10.14	C
			B	1	0.73		1	1	70.862			
			C	1	0.73		1	1	70.862			
Sum Weight:	3248.64	5896.31						OTM	42315.33 lb-ft	885.94		

Discrete Appurtenance Pressures - No Ice $G_H = 1.000$

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	300.0000	55.50	-2.40	-1.39	100.00	1.254	29	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	300.0000	80.70	-2.40	-1.39	100.00	1.254	29	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	300.0000	80.70	-2.40	-1.39	100.00	1.254	29	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	300.0000	120.90	-2.40	-1.39	100.00	1.254	29	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	300.0000	70.00	-1.53	-0.89	100.00	1.254	29	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	300.0000	60.00	-1.53	-0.89	100.00	1.254	29	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	300.0000	69.50	-1.53	-0.89	100.00	1.254	29	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	300.0000	26.20	-1.53	-0.89	100.00	1.254	29	1.21	1.21
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	60.0000	55.50	2.40	-1.39	100.00	1.254	29	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	60.0000	80.70	2.40	-1.39	100.00	1.254	29	4.15	2.80

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft²	C_AA_C Side ft²
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	60.0000	80.70	2.40	-1.39	100.00	1.254	29	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	60.0000	120.90	2.40	-1.39	100.00	1.254	29	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	60.0000	70.00	1.53	-0.89	100.00	1.254	29	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	60.0000	60.00	1.53	-0.89	100.00	1.254	29	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	60.0000	69.50	1.53	-0.89	100.00	1.254	29	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	60.0000	26.20	1.53	-0.89	100.00	1.254	29	1.21	1.21
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	180.0000	55.50	0.00	2.77	100.00	1.254	29	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	180.0000	80.70	0.00	2.77	100.00	1.254	29	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	180.0000	80.70	0.00	2.77	100.00	1.254	29	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	180.0000	120.90	0.00	2.77	100.00	1.254	29	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	180.0000	70.00	0.00	1.77	100.00	1.254	29	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	180.0000	60.00	0.00	1.77	100.00	1.254	29	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	180.0000	69.50	0.00	1.77	100.00	1.254	29	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	180.0000	26.20	0.00	1.77	100.00	1.254	29	1.21	1.21
RMVD12-NPNH-3xx (EPA = 21.51 sqft front, 2081 lb), 3 Sectors	0.0000	2081.00	0.00	0.00	100.00	1.254	29	21.51	20.57
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	300.0000	55.50	-2.46	-1.42	90.00	1.227	29	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	300.0000	80.70	-2.46	-1.42	90.00	1.227	29	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	300.0000	80.70	-2.46	-1.42	90.00	1.227	29	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	300.0000	120.90	-2.46	-1.42	90.00	1.227	29	13.58	8.22
Ericsson RRU 4490 B5/B12A	300.0000	70.00	-1.60	-0.92	90.00	1.227	29	2.68	1.22

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
(20.6"x15.6"x7", 70 lbs)									
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	300.0000	60.00	-1.60	-0.92	90.00	1.227	29	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	300.0000	69.50	-1.60	-0.92	90.00	1.227	29	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	300.0000	26.20	-1.60	-0.92	90.00	1.227	29	1.21	1.21
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	60.0000	55.50	2.46	-1.42	90.00	1.227	29	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	60.0000	80.70	2.46	-1.42	90.00	1.227	29	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	60.0000	80.70	2.46	-1.42	90.00	1.227	29	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	60.0000	120.90	2.46	-1.42	90.00	1.227	29	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	60.0000	70.00	1.60	-0.92	90.00	1.227	29	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	60.0000	60.00	1.60	-0.92	90.00	1.227	29	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	60.0000	69.50	1.60	-0.92	90.00	1.227	29	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	60.0000	26.20	1.60	-0.92	90.00	1.227	29	1.21	1.21
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	180.0000	55.50	0.00	2.84	90.00	1.227	29	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	180.0000	80.70	0.00	2.84	90.00	1.227	29	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	180.0000	80.70	0.00	2.84	90.00	1.227	29	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	180.0000	120.90	0.00	2.84	90.00	1.227	29	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	180.0000	70.00	0.00	1.84	90.00	1.227	29	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	180.0000	60.00	0.00	1.84	90.00	1.227	29	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	180.0000	69.50	0.00	1.84	90.00	1.227	29	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	180.0000	26.20	0.00	1.84	90.00	1.227	29	1.21	1.21

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
RMVD12-NPNH-3xx (EPA = 21.51 sqft front, 2081 lb), 3 Sectors	0.0000	2081.00	0.00	0.00	90.00	1.227	29	21.51	20.57
	Sum Weight:	7543.00							

Discrete Appurtenance Pressures - Service $G_H = 1.000$

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	300.0000	55.50	-2.40	-1.39	100.00	1.254	10	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	300.0000	80.70	-2.40	-1.39	100.00	1.254	10	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	300.0000	80.70	-2.40	-1.39	100.00	1.254	10	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	300.0000	120.90	-2.40	-1.39	100.00	1.254	10	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	300.0000	70.00	-1.53	-0.89	100.00	1.254	10	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	300.0000	60.00	-1.53	-0.89	100.00	1.254	10	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	300.0000	69.50	-1.53	-0.89	100.00	1.254	10	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	300.0000	26.20	-1.53	-0.89	100.00	1.254	10	1.37	1.37
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	60.0000	55.50	2.40	-1.39	100.00	1.254	10	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	60.0000	80.70	2.40	-1.39	100.00	1.254	10	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	60.0000	80.70	2.40	-1.39	100.00	1.254	10	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	60.0000	120.90	2.40	-1.39	100.00	1.254	10	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	60.0000	70.00	1.53	-0.89	100.00	1.254	10	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	60.0000	60.00	1.53	-0.89	100.00	1.254	10	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	60.0000	69.50	1.53	-0.89	100.00	1.254	10	2.70	1.25
Raycap	60.0000	26.20	1.53	-0.89	100.00	1.254	10	1.37	1.37

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)									
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	180.0000	55.50	0.00	2.77	100.00	1.254	10	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	180.0000	80.70	0.00	2.77	100.00	1.254	10	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	180.0000	80.70	0.00	2.77	100.00	1.254	10	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	180.0000	120.90	0.00	2.77	100.00	1.254	10	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	180.0000	70.00	0.00	1.77	100.00	1.254	10	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	180.0000	60.00	0.00	1.77	100.00	1.254	10	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	180.0000	69.50	0.00	1.77	100.00	1.254	10	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	180.0000	26.20	0.00	1.77	100.00	1.254	10	1.37	1.37
RMVD12-NPNH-3xx (EPA = 21.51 sqft front, 2081 lb), 3 Sectors	0.0000	2081.00	0.00	0.00	100.00	1.254	10	21.51	20.57
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	300.0000	55.50	-2.46	-1.42	90.00	1.227	9	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	300.0000	80.70	-2.46	-1.42	90.00	1.227	9	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	300.0000	80.70	-2.46	-1.42	90.00	1.227	9	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	300.0000	120.90	-2.46	-1.42	90.00	1.227	9	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	300.0000	70.00	-1.60	-0.92	90.00	1.227	9	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	300.0000	60.00	-1.60	-0.92	90.00	1.227	9	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	300.0000	69.50	-1.60	-0.92	90.00	1.227	9	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	300.0000	26.20	-1.60	-0.92	90.00	1.227	9	1.37	1.37
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	60.0000	55.50	2.46	-1.42	90.00	1.227	9	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9",	60.0000	80.70	2.46	-1.42	90.00	1.227	9	4.15	2.80

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
66.1lb) w/ MP									
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	60.0000	80.70	2.46	-1.42	90.00	1.227	9	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	60.0000	120.90	2.46	-1.42	90.00	1.227	9	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	60.0000	70.00	1.60	-0.92	90.00	1.227	9	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	60.0000	60.00	1.60	-0.92	90.00	1.227	9	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	60.0000	69.50	1.60	-0.92	90.00	1.227	9	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	60.0000	26.20	1.60	-0.92	90.00	1.227	9	1.37	1.37
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	180.0000	55.50	0.00	2.84	90.00	1.227	9	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	180.0000	80.70	0.00	2.84	90.00	1.227	9	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	180.0000	80.70	0.00	2.84	90.00	1.227	9	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	180.0000	120.90	0.00	2.84	90.00	1.227	9	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	180.0000	70.00	0.00	1.84	90.00	1.227	9	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	180.0000	60.00	0.00	1.84	90.00	1.227	9	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	180.0000	69.50	0.00	1.84	90.00	1.227	9	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	180.0000	26.20	0.00	1.84	90.00	1.227	9	1.37	1.37
RMVD12-NPNH-3xx (EPA = 21.51 sqft front, 2081 lb), 3 Sectors	0.0000	2081.00	0.00	0.00	90.00	1.227	9	21.51	20.57
	Sum Weight:	7543.00							

Discrete Appurtenance Pressures - Along-Wind Gust $G_H = 1.000$

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_{wg} psf	C_AA_C Front ft^2	C_AA_C Side ft^2
Quintel QD668-2 (72"x18.1"x9.6", 33.6	300.0000	55.50	-2.40	-1.39	100.00	1.000	5	11.45	8.22

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_{wg} psf	C_AA_C Front ft^2	C_AA_C Side ft^2
lbs) w/ MP									
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	300.0000	80.70	-2.40	-1.39	100.00	1.000	5	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	300.0000	80.70	-2.40	-1.39	100.00	1.000	5	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	300.0000	120.90	-2.40	-1.39	100.00	1.000	5	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	300.0000	70.00	-1.53	-0.89	100.00	1.000	5	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	300.0000	60.00	-1.53	-0.89	100.00	1.000	5	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	300.0000	69.50	-1.53	-0.89	100.00	1.000	5	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	300.0000	26.20	-1.53	-0.89	100.00	1.000	5	1.69	1.69
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	60.0000	55.50	2.40	-1.39	100.00	1.000	5	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	60.0000	80.70	2.40	-1.39	100.00	1.000	5	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	60.0000	80.70	2.40	-1.39	100.00	1.000	5	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	60.0000	120.90	2.40	-1.39	100.00	1.000	5	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	60.0000	70.00	1.53	-0.89	100.00	1.000	5	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	60.0000	60.00	1.53	-0.89	100.00	1.000	5	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	60.0000	69.50	1.53	-0.89	100.00	1.000	5	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	60.0000	26.20	1.53	-0.89	100.00	1.000	5	1.69	1.69
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	180.0000	55.50	0.00	2.77	100.00	1.000	5	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	180.0000	80.70	0.00	2.77	100.00	1.000	5	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	180.0000	80.70	0.00	2.77	100.00	1.000	5	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	180.0000	120.90	0.00	2.77	100.00	1.000	5	13.58	8.22
Ericsson RRU 4490	180.0000	70.00	0.00	1.77	100.00	1.000	5	2.68	1.22

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_{wg} psf	C_AA_C Front ft^2	C_AA_C Side ft^2
B5/B12A (20.6"x15.6"x7", 70 lbs)									
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	180.0000	60.00	0.00	1.77	100.00	1.000	5	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	180.0000	69.50	0.00	1.77	100.00	1.000	5	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	180.0000	26.20	0.00	1.77	100.00	1.000	5	1.69	1.69
RMVD12-NPNH-3xx (EPA = 21.51 sqft front, 2081 lb), 3 Sectors	0.0000	2081.00	0.00	0.00	100.00	1.000	5	21.51	20.57
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	300.0000	55.50	-2.46	-1.42	90.00	1.000	5	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	300.0000	80.70	-2.46	-1.42	90.00	1.000	5	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	300.0000	80.70	-2.46	-1.42	90.00	1.000	5	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	300.0000	120.90	-2.46	-1.42	90.00	1.000	5	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	300.0000	70.00	-1.60	-0.92	90.00	1.000	5	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	300.0000	60.00	-1.60	-0.92	90.00	1.000	5	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	300.0000	69.50	-1.60	-0.92	90.00	1.000	5	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	300.0000	26.20	-1.60	-0.92	90.00	1.000	5	1.69	1.69
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	60.0000	55.50	2.46	-1.42	90.00	1.000	5	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	60.0000	80.70	2.46	-1.42	90.00	1.000	5	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	60.0000	80.70	2.46	-1.42	90.00	1.000	5	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	60.0000	120.90	2.46	-1.42	90.00	1.000	5	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	60.0000	70.00	1.60	-0.92	90.00	1.000	5	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	60.0000	60.00	1.60	-0.92	90.00	1.000	5	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	60.0000	69.50	1.60	-0.92	90.00	1.000	5	2.70	1.25

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_{wg} psf	C_AA_C Front ft^2	C_AA_C Side ft^2
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	60.0000	26.20	1.60	-0.92	90.00	1.000	5	1.69	1.69
Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	180.0000	55.50	0.00	2.84	90.00	1.000	5	11.45	8.22
Ericsson Air 6419 B77G (28.3"x16.1"x7.9", 66.1lb) w/ MP	180.0000	80.70	0.00	2.84	90.00	1.000	5	4.15	2.80
Ericsson Air 6419 B77D (28.3"x16.1"x7.9", 66.1lb) w/ MP	180.0000	80.70	0.00	2.84	90.00	1.000	5	4.15	2.80
Quintel QD6612-2 (72"x22"x9.6", 99 lbs) w/ MP	180.0000	120.90	0.00	2.84	90.00	1.000	5	13.58	8.22
Ericsson RRU 4490 B5/B12A (20.6"x15.6"x7", 70 lbs)	180.0000	70.00	0.00	1.84	90.00	1.000	5	2.68	1.22
Ericsson RRU 4478 B14 (18.1"x13.4"x8.26", 60lb)	180.0000	60.00	0.00	1.84	90.00	1.000	5	2.02	1.25
Ericsson RRU 4890 B2/B66 (20.6"x15.7"x7.2", 69.5 lbs)	180.0000	69.50	0.00	1.84	90.00	1.000	5	2.70	1.25
Raycap DC9-48-60-24-8C-EV (11" OD x 31.3" tall, 26.2lb)	180.0000	26.20	0.00	1.84	90.00	1.000	5	1.69	1.69
RMVD12-NPNH-3xx (EPA = 21.51 sqft front, 2081 lb), 3 Sectors	0.0000	2081.00	0.00	0.00	90.00	1.000	5	21.51	20.57
	Sum Weight:	7543.00							

Fatigue and Oscillations Wind Loads

ζ_{s1}	ζ_a	q_{wg} psf	S	f_n Hz	D_h in	V_{cr} mph	λ	q_h psf	F_{vs} plf
0.003000	0.000672	5	0.1667	0.2661	18.6562	2	65.6080	0	0.00

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	5896.31					
Bracing Weight	0.00					
Total Member Self-Weight	5896.31			0.00	0.00	
Total Weight	16687.95			0.00	0.00	
Wind 0 deg - No Ice		0.00	-9637.40	-734205.33	0.00	0.00
Wind 30 deg - No Ice		4818.70	-8346.24	-635840.47	-367102.66	1265.39

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 45 deg - No Ice		6814.67	-6814.67	-519161.57	-519161.57	894.76
Wind 60 deg - No Ice		8346.24	-4818.70	-367102.66	-635840.47	0.00
Wind 90 deg - No Ice		9637.40	0.00	0.00	-734205.33	-1265.39
Wind 120 deg - No Ice		8346.24	4818.70	367102.66	-635840.47	0.00
Wind 135 deg - No Ice		6814.67	6814.67	519161.57	-519161.57	894.76
Wind 150 deg - No Ice		4818.70	8346.24	635840.47	-367102.66	1265.39
Wind 180 deg - No Ice		0.00	9637.40	734205.33	0.00	0.00
Wind 210 deg - No Ice		-4818.70	8346.24	635840.47	367102.66	-1265.39
Wind 225 deg - No Ice		-6814.67	6814.67	519161.57	519161.57	-894.76
Wind 240 deg - No Ice		-8346.24	4818.70	367102.66	635840.47	0.00
Wind 270 deg - No Ice		-9637.40	0.00	0.00	734205.33	1265.39
Wind 300 deg - No Ice		-8346.24	-4818.70	-367102.66	635840.47	0.00
Wind 315 deg - No Ice		-6814.67	-6814.67	-519161.57	519161.57	-894.76
Wind 330 deg - No Ice		-4818.70	-8346.24	-635840.47	367102.66	-1265.39
Total Weight	16687.95			0.00	0.00	
Wind 0 deg - Service		0.00	-3175.82	-242095.07	0.00	0.00
Wind 30 deg - Service		1587.91	-2750.34	-209660.48	-121047.53	415.86
Wind 45 deg - Service		2245.65	-2245.65	-171187.06	-171187.06	294.06
Wind 60 deg - Service		2750.34	-1587.91	-121047.53	-209660.48	0.00
Wind 90 deg - Service		3175.82	0.00	0.00	-242095.07	-415.86
Wind 120 deg - Service		2750.34	1587.91	121047.53	-209660.48	0.00
Wind 135 deg - Service		2245.65	2245.65	171187.06	-171187.06	294.06
Wind 150 deg - Service		1587.91	2750.34	209660.48	-121047.53	415.86
Wind 180 deg - Service		0.00	3175.82	242095.07	0.00	0.00
Wind 210 deg - Service		-1587.91	2750.34	209660.48	121047.53	-415.86
Wind 225 deg - Service		-2245.65	2245.65	171187.06	171187.06	-294.06
Wind 240 deg - Service		-2750.34	1587.91	121047.53	209660.48	0.00
Wind 270 deg - Service		-3175.82	0.00	0.00	242095.07	415.86
Wind 300 deg - Service		-2750.34	-1587.91	-121047.53	209660.48	0.00
Wind 315 deg - Service		-2245.65	-2245.65	-171187.06	171187.06	-294.06
Wind 330 deg - Service		-1587.91	-2750.34	-209660.48	121047.53	-415.86
Wind 0 deg - Along-Wind Gust		0.00	-1896.70	-137326.50	0.00	0.00
Wind 30 deg - Along-Wind Gust		948.35	-1642.59	-118928.23	-68663.25	218.43
Wind 45 deg - Along-Wind Gust		1341.17	-1341.17	-97104.50	-97104.50	154.46
Wind 60 deg - Along-Wind Gust		1642.59	-948.35	-68663.25	-118928.23	0.00
Wind 90 deg - Along-Wind Gust		1896.70	0.00	0.00	-137326.50	-218.43
Wind 120 deg - Along-Wind Gust		1642.59	948.35	68663.25	-118928.23	0.00
Wind 135 deg - Along-Wind Gust		1341.17	1341.17	97104.50	-97104.50	154.46
Wind 150 deg - Along-Wind Gust		948.35	1642.59	118928.23	-68663.25	218.43
Wind 180 deg - Along-Wind Gust		0.00	1896.70	137326.50	0.00	0.00
Wind 210 deg - Along-Wind Gust		-948.35	1642.59	118928.23	68663.25	-218.43
Wind 225 deg - Along-Wind Gust		-1341.17	1341.17	97104.50	97104.50	-154.46
Wind 240 deg - Along-Wind Gust		-1642.59	948.35	68663.25	118928.23	0.00
Wind 270 deg - Along-Wind Gust		-1896.70	0.00	0.00	137326.50	218.43
Wind 300 deg - Along-Wind Gust		-1642.59	-948.35	-68663.25	118928.23	0.00
Wind 315 deg - Along-Wind Gust		-1341.17	-1341.17	-97104.50	97104.50	-154.46

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 330 deg - Along-Wind Gust		-948.35	-1642.59	-118928.23	68663.25	-218.43
Seismic Vertical	4343.80					
Seismic Horizontal 0 deg		0.00	-5990.90	-549823.87	0.00	0.00
Seismic Horizontal 30 deg		2995.45	-5188.27	-476161.44	-274911.93	0.00
Seismic Horizontal 45 deg		4236.21	-4236.21	-388784.19	-388784.19	0.00
Seismic Horizontal 60 deg		5188.27	-2995.45	-274911.93	-476161.44	0.00
Seismic Horizontal 90 deg		5990.90	0.00	0.00	-549823.87	0.00
Seismic Horizontal 120 deg		5188.27	2995.45	274911.93	-476161.44	0.00
Seismic Horizontal 135 deg		4236.21	4236.21	388784.19	-388784.19	0.00
Seismic Horizontal 150 deg		2995.45	5188.27	476161.44	-274911.93	0.00
Seismic Horizontal 180 deg		0.00	5990.90	549823.87	0.00	0.00
Seismic Horizontal 210 deg		-2995.45	5188.27	476161.44	274911.93	0.00
Seismic Horizontal 225 deg		-4236.21	4236.21	388784.19	388784.19	0.00
Seismic Horizontal 240 deg		-5188.27	2995.45	274911.93	476161.44	0.00
Seismic Horizontal 270 deg		-5990.90	0.00	0.00	549823.87	0.00
Seismic Horizontal 300 deg		-5188.27	-2995.45	-274911.93	476161.44	0.00
Seismic Horizontal 315 deg		-4236.21	-4236.21	-388784.19	388784.19	0.00
Seismic Horizontal 330 deg		-2995.45	-5188.27	-476161.44	274911.93	0.00

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 45 deg - No Ice
7	0.9 Dead+1.0 Wind 45 deg - No Ice
8	1.2 Dead+1.0 Wind 60 deg - No Ice
9	0.9 Dead+1.0 Wind 60 deg - No Ice
10	1.2 Dead+1.0 Wind 90 deg - No Ice
11	0.9 Dead+1.0 Wind 90 deg - No Ice
12	1.2 Dead+1.0 Wind 120 deg - No Ice
13	0.9 Dead+1.0 Wind 120 deg - No Ice
14	1.2 Dead+1.0 Wind 135 deg - No Ice
15	0.9 Dead+1.0 Wind 135 deg - No Ice
16	1.2 Dead+1.0 Wind 150 deg - No Ice
17	0.9 Dead+1.0 Wind 150 deg - No Ice
18	1.2 Dead+1.0 Wind 180 deg - No Ice
19	0.9 Dead+1.0 Wind 180 deg - No Ice
20	1.2 Dead+1.0 Wind 210 deg - No Ice
21	0.9 Dead+1.0 Wind 210 deg - No Ice
22	1.2 Dead+1.0 Wind 225 deg - No Ice
23	0.9 Dead+1.0 Wind 225 deg - No Ice
24	1.2 Dead+1.0 Wind 240 deg - No Ice
25	0.9 Dead+1.0 Wind 240 deg - No Ice
26	1.2 Dead+1.0 Wind 270 deg - No Ice
27	0.9 Dead+1.0 Wind 270 deg - No Ice
28	1.2 Dead+1.0 Wind 300 deg - No Ice
29	0.9 Dead+1.0 Wind 300 deg - No Ice
30	1.2 Dead+1.0 Wind 315 deg - No Ice
31	0.9 Dead+1.0 Wind 315 deg - No Ice
32	1.2 Dead+1.0 Wind 330 deg - No Ice

Comb. No.	Description
33	0.9 Dead+1.0 Wind 330 deg - No Ice
34	Dead+Wind 0 deg - Service
35	Dead+Wind 30 deg - Service
36	Dead+Wind 45 deg - Service
37	Dead+Wind 60 deg - Service
38	Dead+Wind 90 deg - Service
39	Dead+Wind 120 deg - Service
40	Dead+Wind 135 deg - Service
41	Dead+Wind 150 deg - Service
42	Dead+Wind 180 deg - Service
43	Dead+Wind 210 deg - Service
44	Dead+Wind 225 deg - Service
45	Dead+Wind 240 deg - Service
46	Dead+Wind 270 deg - Service
47	Dead+Wind 300 deg - Service
48	Dead+Wind 315 deg - Service
49	Dead+Wind 330 deg - Service
50	1.2 Dead+1.0 Ev+1.0 Eh 0 deg
51	0.9 Dead-1.0 Ev+1.0 Eh 0 deg
52	1.2 Dead+1.0 Ev+1.0 Eh 30 deg
53	0.9 Dead-1.0 Ev+1.0 Eh 30 deg
54	1.2 Dead+1.0 Ev+1.0 Eh 45 deg
55	0.9 Dead-1.0 Ev+1.0 Eh 45 deg
56	1.2 Dead+1.0 Ev+1.0 Eh 60 deg
57	0.9 Dead-1.0 Ev+1.0 Eh 60 deg
58	1.2 Dead+1.0 Ev+1.0 Eh 90 deg
59	0.9 Dead-1.0 Ev+1.0 Eh 90 deg
60	1.2 Dead+1.0 Ev+1.0 Eh 120 deg
61	0.9 Dead-1.0 Ev+1.0 Eh 120 deg
62	1.2 Dead+1.0 Ev+1.0 Eh 135 deg
63	0.9 Dead-1.0 Ev+1.0 Eh 135 deg
64	1.2 Dead+1.0 Ev+1.0 Eh 150 deg
65	0.9 Dead-1.0 Ev+1.0 Eh 150 deg
66	1.2 Dead+1.0 Ev+1.0 Eh 180 deg
67	0.9 Dead-1.0 Ev+1.0 Eh 180 deg
68	1.2 Dead+1.0 Ev+1.0 Eh 210 deg
69	0.9 Dead-1.0 Ev+1.0 Eh 210 deg
70	1.2 Dead+1.0 Ev+1.0 Eh 225 deg
71	0.9 Dead-1.0 Ev+1.0 Eh 225 deg
72	1.2 Dead+1.0 Ev+1.0 Eh 240 deg
73	0.9 Dead-1.0 Ev+1.0 Eh 240 deg
74	1.2 Dead+1.0 Ev+1.0 Eh 270 deg
75	0.9 Dead-1.0 Ev+1.0 Eh 270 deg
76	1.2 Dead+1.0 Ev+1.0 Eh 300 deg
77	0.9 Dead-1.0 Ev+1.0 Eh 300 deg
78	1.2 Dead+1.0 Ev+1.0 Eh 315 deg
79	0.9 Dead-1.0 Ev+1.0 Eh 315 deg
80	1.2 Dead+1.0 Ev+1.0 Eh 330 deg
81	0.9 Dead-1.0 Ev+1.0 Eh 330 deg
82	1.0 Fatigue - Along-Wind Gust 0 deg
83	1.0 Fatigue - Along-Wind Gust 30 deg
84	1.0 Fatigue - Along-Wind Gust 45 deg
85	1.0 Fatigue - Along-Wind Gust 60 deg
86	1.0 Fatigue - Along-Wind Gust 90 deg
87	1.0 Fatigue - Along-Wind Gust 120 deg
88	1.0 Fatigue - Along-Wind Gust 135 deg
89	1.0 Fatigue - Along-Wind Gust 150 deg
90	1.0 Fatigue - Along-Wind Gust 180 deg
91	1.0 Fatigue - Along-Wind Gust 210 deg
92	1.0 Fatigue - Along-Wind Gust 225 deg
93	1.0 Fatigue - Along-Wind Gust 240 deg
94	1.0 Fatigue - Along-Wind Gust 270 deg

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Comb. No.	Description
95	1.0 Fatigue - Along-Wind Gust 300 deg
96	1.0 Fatigue - Along-Wind Gust 315 deg
97	1.0 Fatigue - Along-Wind Gust 330 deg

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	103 - 63	Pole	Max Tension	92	17.07	10523.32	-10521.47
			Max. Compression	58	-14368.89	-194959.07	0.00
			Max. Mx	10	-11547.24	-213754.53	-51.94
			Max. My	18	-11547.33	0.00	-213737.96
			Max. Vy	10	7965.85	-213754.53	-51.94
			Max. Vx	18	7965.25	0.00	-213737.96
			Max. Torque	11			1260.13
L2	63 - 26.5	Pole	Max Tension	84	16.17	-28806.06	28806.08
			Max. Compression	58	-19519.42	-427672.53	0.00
			Max. Mx	26	-15801.10	518314.65	-23.00
			Max. My	18	-15801.13	0.00	-518268.56
			Max. Vy	26	-9059.82	518314.65	-23.00
			Max. Vx	18	9059.11	0.00	-518268.56
			Max. Torque	11			1257.56
L3	26.5 - 1	Pole	Max Tension	96	8.80	66848.99	66846.78
			Max. Compression	54	-24365.48	-435143.77	435143.77
			Max. Mx	26	-20017.47	798166.65	-25.48
			Max. My	18	-20017.43	0.00	-798095.42
			Max. Vy	26	-9653.41	798166.65	-25.48
			Max. Vx	2	-9652.64	0.00	798095.42
			Max. Torque	11			1252.57

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	54	24369.33	-4236.07	4236.07
	Max. H_x	26	20025.50	9636.74	0.00
	Max. H_z	2	20025.46	0.00	9635.96
	Max. M_x	2	798095.42	0.00	9635.96
	Max. M_z	10	798166.65	-9636.74	0.00
	Max. Torsion	11	1251.16	-9636.54	0.00
	Min. Vert	82	0.00	0.00	1896.74
	Min. H_x	10	20025.50	-9636.74	0.00
	Min. H_z	18	20025.46	0.00	-9635.96
	Min. M_x	18	-798095.42	0.00	-9635.96
	Min. M_z	26	-798166.65	9636.74	0.00
	Min. Torsion	27	-1251.16	9636.54	0.00

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	16687.95	0.00	0.00	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	20025.46	0.00	-9635.96	-798095.42	0.00	0.00
0.9 Dead+1.0 Wind 0 deg - No Ice	15019.05	0.00	-9635.50	-780451.94	0.00	0.00
1.2 Dead+1.0 Wind 30 deg - No Ice	20025.53	4818.64	-8346.12	-691288.05	-399085.51	1250.24
0.9 Dead+1.0 Wind 30 deg - No Ice	15019.15	4818.67	-8346.17	-676039.41	-390290.47	1251.15
1.2 Dead+1.0 Wind 45 deg - No Ice	20025.53	6814.58	-6814.58	-564436.86	-564410.85	884.05
0.9 Dead+1.0 Wind 45 deg - No Ice	15019.15	6814.62	-6814.62	-551985.63	-551967.29	884.69
1.2 Dead+1.0 Wind 60 deg - No Ice	20025.53	8346.12	-4818.64	-399108.04	-691275.06	-0.01
0.9 Dead+1.0 Wind 60 deg - No Ice	15019.15	8346.17	-4818.67	-390306.35	-676030.25	-0.01
1.2 Dead+1.0 Wind 90 deg - No Ice	20025.50	9636.74	-0.00	25.80	-798166.65	-1250.25
0.9 Dead+1.0 Wind 90 deg - No Ice	15019.11	9636.54	-0.00	18.00	-780542.97	-1251.16
1.2 Dead+1.0 Wind 120 deg - No Ice	20025.53	8346.12	4818.64	399108.04	-691275.06	0.01
0.9 Dead+1.0 Wind 120 deg - No Ice	15019.15	8346.17	4818.67	390306.35	-676030.25	0.01
1.2 Dead+1.0 Wind 135 deg - No Ice	20025.53	6814.58	6814.58	564410.85	-564436.86	884.05
0.9 Dead+1.0 Wind 135 deg - No Ice	15019.15	6814.62	6814.62	551967.29	-551985.63	884.69
1.2 Dead+1.0 Wind 150 deg - No Ice	20025.53	4818.64	8346.12	691262.04	-399130.56	1250.22
0.9 Dead+1.0 Wind 150 deg - No Ice	15019.15	4818.67	8346.17	676021.07	-390322.23	1251.13
1.2 Dead+1.0 Wind 180 deg - No Ice	20025.46	0.00	9635.96	798095.42	0.00	0.00
0.9 Dead+1.0 Wind 180 deg - No Ice	15019.05	0.00	9635.50	780451.94	0.00	0.00
1.2 Dead+1.0 Wind 210 deg - No Ice	20025.53	-4818.64	8346.12	691262.04	399130.56	-1250.22
0.9 Dead+1.0 Wind 210 deg - No Ice	15019.15	-4818.67	8346.17	676021.07	390322.23	-1251.13
1.2 Dead+1.0 Wind 225 deg - No Ice	20025.53	-6814.58	6814.58	564410.85	564436.86	-884.05
0.9 Dead+1.0 Wind 225 deg - No Ice	15019.15	-6814.62	6814.62	551967.29	551985.63	-884.69
1.2 Dead+1.0 Wind 240 deg - No Ice	20025.53	-8346.12	4818.64	399108.04	691275.06	-0.01
0.9 Dead+1.0 Wind 240 deg - No Ice	15019.15	-8346.17	4818.67	390306.35	676030.25	-0.01
1.2 Dead+1.0 Wind 270 deg - No Ice	20025.50	-9636.74	-0.00	25.80	798166.65	1250.25
0.9 Dead+1.0 Wind 270 deg - No Ice	15019.11	-9636.54	-0.00	18.00	780542.97	1251.16
1.2 Dead+1.0 Wind 300 deg - No Ice	20025.53	-8346.12	-4818.64	-399108.04	691275.06	0.01
0.9 Dead+1.0 Wind 300 deg - No Ice	15019.15	-8346.17	-4818.67	-390306.35	676030.25	0.01
1.2 Dead+1.0 Wind 315 deg - No Ice	20025.53	-6814.58	-6814.58	-564436.86	564410.85	-884.05
0.9 Dead+1.0 Wind 315 deg - No Ice	15019.15	-6814.62	-6814.62	-551985.63	551967.29	-884.69

Load Combination	Vertical lb	Shear$_x$ lb	Shear$_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
1.2 Dead+1.0 Wind 330 deg - No Ice	20025.53	-4818.64	-8346.12	-691288.05	399085.51	-1250.24
0.9 Dead+1.0 Wind 330 deg - No Ice	15019.15	-4818.67	-8346.17	-676039.41	390290.47	-1251.15
Dead+Wind 0 deg - Service	16687.94	0.00	-3175.05	-259632.05	0.00	0.00
Dead+Wind 30 deg - Service	16687.94	1587.53	-2749.67	-224849.11	-129814.25	415.34
Dead+Wind 45 deg - Service	16687.94	2245.10	-2245.10	-183588.79	-183586.60	293.69
Dead+Wind 60 deg - Service	16687.94	2749.67	-1587.52	-129816.14	-224848.02	-0.00
Dead+Wind 90 deg - Service	16687.94	3175.05	-0.00	2.18	-259632.05	-415.34
Dead+Wind 120 deg - Service	16687.94	2749.67	1587.52	129816.14	-224848.02	0.00
Dead+Wind 135 deg - Service	16687.94	2245.10	2245.10	183586.60	-183588.79	293.69
Dead+Wind 150 deg - Service	16687.94	1587.52	2749.67	224846.93	-129818.03	415.34
Dead+Wind 180 deg - Service	16687.94	0.00	3175.05	259632.05	0.00	0.00
Dead+Wind 210 deg - Service	16687.94	-1587.52	2749.67	224846.93	129818.03	-415.34
Dead+Wind 225 deg - Service	16687.94	-2245.10	2245.10	183586.60	183588.79	-293.69
Dead+Wind 240 deg - Service	16687.94	-2749.67	1587.52	129816.14	224848.02	-0.00
Dead+Wind 270 deg - Service	16687.94	-3175.05	-0.00	2.18	259632.05	415.34
Dead+Wind 300 deg - Service	16687.94	-2749.67	-1587.52	-129816.14	224848.02	0.00
Dead+Wind 315 deg - Service	16687.94	-2245.10	-2245.10	-183588.79	183586.60	-293.69
Dead+Wind 330 deg - Service	16687.94	-1587.53	-2749.67	-224849.11	129814.25	-415.34
1.2 Dead+1.0 Ev+1.0 Eh 0 deg	24369.26	0.00	-5989.11	-615230.89	0.00	0.00
0.9 Dead-1.0 Ev+1.0 Eh 0 deg	10675.32	0.00	-5990.00	-574880.64	0.00	0.00
1.2 Dead+1.0 Ev+1.0 Eh 30 deg	24369.33	2995.36	-5188.11	-532939.95	-307693.20	0.01
0.9 Dead-1.0 Ev+1.0 Eh 30 deg	10675.35	2995.41	-5188.21	-497920.83	-287474.80	0.00
1.2 Dead+1.0 Ev+1.0 Eh 45 deg	24369.33	4236.07	-4236.07	-435143.77	-435143.77	0.00
0.9 Dead-1.0 Ev+1.0 Eh 45 deg	10675.35	4236.15	-4236.15	-406550.71	-406550.71	0.00
1.2 Dead+1.0 Ev+1.0 Eh 60 deg	24369.33	5188.11	-2995.36	-307693.20	-532939.95	-0.01
0.9 Dead-1.0 Ev+1.0 Eh 60 deg	10675.35	5188.21	-2995.41	-287474.80	-497920.83	-0.00
1.2 Dead+1.0 Ev+1.0 Eh 90 deg	24369.26	5989.11	0.00	0.00	-615230.89	0.00
0.9 Dead-1.0 Ev+1.0 Eh 90 deg	10675.32	5990.00	0.00	0.00	-574880.64	0.00
1.2 Dead+1.0 Ev+1.0 Eh 120 deg	24369.33	5188.11	2995.36	307693.20	-532939.95	0.01
0.9 Dead-1.0 Ev+1.0 Eh 120 deg	10675.35	5188.21	2995.41	287474.80	-497920.83	0.00
1.2 Dead+1.0 Ev+1.0 Eh 135 deg	24369.33	4236.07	4236.07	435143.77	-435143.77	0.00
0.9 Dead-1.0 Ev+1.0 Eh 135 deg	10675.35	4236.15	4236.15	406550.71	-406550.71	0.00
1.2 Dead+1.0 Ev+1.0 Eh 150 deg	24369.33	2995.36	5188.11	532939.95	-307693.20	-0.01
0.9 Dead-1.0 Ev+1.0 Eh 150 deg	10675.35	2995.41	5188.21	497920.83	-287474.80	-0.00
1.2 Dead+1.0 Ev+1.0 Eh 180 deg	24369.26	0.00	5989.11	615230.89	0.00	0.00
0.9 Dead-1.0 Ev+1.0 Eh 180 deg	10675.32	0.00	5990.00	574880.64	0.00	0.00
1.2 Dead+1.0 Ev+1.0 Eh 210 deg	24369.33	-2995.36	5188.11	532939.95	307693.20	0.01
0.9 Dead-1.0 Ev+1.0 Eh 210 deg	10675.35	-2995.41	5188.21	497920.83	287474.80	0.00
1.2 Dead+1.0 Ev+1.0 Eh 225 deg	24369.33	-4236.07	4236.07	435143.77	435143.77	0.00
0.9 Dead-1.0 Ev+1.0 Eh 225 deg	10675.35	-4236.15	4236.15	406550.71	406550.71	0.00
1.2 Dead+1.0 Ev+1.0 Eh 240 deg	24369.33	-5188.11	2995.36	307693.20	532939.95	-0.01
0.9 Dead-1.0 Ev+1.0 Eh 240 deg	10675.35	-5188.21	2995.41	287474.80	497920.83	-0.00
1.2 Dead+1.0 Ev+1.0 Eh 270 deg	24369.26	-5989.11	0.00	0.00	615230.89	0.00
0.9 Dead-1.0 Ev+1.0 Eh 270	10675.32	-5990.00	0.00	0.00	574880.64	0.00

Load Combination	*Vertical* *lb*	*Shear$_x$* *lb*	*Shear$_z$* *lb*	*Overturning Moment, M_x* *lb-ft*	*Overturning Moment, M_z* *lb-ft*	*Torque* *lb-ft*
deg						
1.2 Dead+1.0 Ev+1.0 Eh 300 deg	24369.33	-5188.11	-2995.36	-307693.20	532939.95	0.01
0.9 Dead-1.0 Ev+1.0 Eh 300 deg	10675.35	-5188.21	-2995.41	-287474.80	497920.83	0.00
1.2 Dead+1.0 Ev+1.0 Eh 315 deg	24369.33	-4236.07	-4236.07	-435143.77	435143.77	0.00
0.9 Dead-1.0 Ev+1.0 Eh 315 deg	10675.35	-4236.15	-4236.15	-406550.71	406550.71	0.00
1.2 Dead+1.0 Ev+1.0 Eh 330 deg	24369.33	-2995.36	-5188.11	-532939.95	307693.20	-0.01
0.9 Dead-1.0 Ev+1.0 Eh 330 deg	10675.35	-2995.41	-5188.21	-497920.83	287474.80	-0.00
1.0 Fatigue - Along-Wind Gust 0 deg	0.00	0.00	-1896.74	-137323.17	0.00	0.00
1.0 Fatigue - Along-Wind Gust 30 deg	0.00	948.42	-1642.61	-118924.58	-68665.57	218.37
1.0 Fatigue - Along-Wind Gust 45 deg	0.00	1341.23	-1341.19	-97101.85	-97104.93	154.41
1.0 Fatigue - Along-Wind Gust 60 deg	0.00	1642.63	-948.39	-68662.90	-118926.12	-0.00
1.0 Fatigue - Along-Wind Gust 90 deg	0.00	1896.74	-0.04	-3.08	-137323.17	-218.37
1.0 Fatigue - Along-Wind Gust 120 deg	0.00	1642.63	948.39	68662.90	-118926.12	0.00
1.0 Fatigue - Along-Wind Gust 135 deg	0.00	1341.19	1341.23	97104.93	-97101.85	154.41
1.0 Fatigue - Along-Wind Gust 150 deg	0.00	948.35	1642.65	118927.66	-68660.23	218.37
1.0 Fatigue - Along-Wind Gust 180 deg	0.00	0.00	1896.74	137323.17	0.00	0.00
1.0 Fatigue - Along-Wind Gust 210 deg	0.00	-948.35	1642.65	118927.66	68660.23	-218.37
1.0 Fatigue - Along-Wind Gust 225 deg	0.00	-1341.19	1341.23	97104.93	97101.85	-154.41
1.0 Fatigue - Along-Wind Gust 240 deg	0.00	-1642.63	948.39	68662.90	118926.12	-0.00
1.0 Fatigue - Along-Wind Gust 270 deg	0.00	-1896.74	-0.04	-3.08	137323.17	218.37
1.0 Fatigue - Along-Wind Gust 300 deg	0.00	-1642.63	-948.39	-68662.90	118926.12	0.00
1.0 Fatigue - Along-Wind Gust 315 deg	0.00	-1341.23	-1341.19	-97101.85	97104.93	-154.41
1.0 Fatigue - Along-Wind Gust 330 deg	0.00	-948.42	-1642.61	-118924.58	68665.57	-218.37

Solution Summary

	Sum of Applied Forces			*Sum of Reactions*			
Load Comb.	*PX* *lb*	*PY* *lb*	*PZ* *lb*	*PX* *lb*	*PY* *lb*	*PZ* *lb*	*% Error*
1	0.00	-16687.95	0.00	0.00	16687.95	0.00	0.000%
2	0.00	-20025.54	-9637.40	0.00	20025.46	9635.96	0.006%
3	0.00	-15019.16	-9637.40	0.00	15019.05	9635.50	0.011%
4	4818.70	-20025.54	-8346.24	-4818.64	20025.53	8346.12	0.001%
5	4818.70	-15019.16	-8346.24	-4818.67	15019.15	8346.17	0.000%
6	6814.67	-20025.54	-6814.67	-6814.58	20025.53	6814.58	0.001%
7	6814.67	-15019.16	-6814.67	-6814.62	15019.15	6814.62	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
8	8346.24	-20025.54	-4818.70	-8346.12	20025.53	4818.64	0.001%
9	8346.24	-15019.16	-4818.70	-8346.17	15019.15	4818.67	0.000%
10	9637.40	-20025.54	0.00	-9636.74	20025.50	0.00	0.003%
11	9637.40	-15019.16	0.00	-9636.54	15019.11	0.00	0.005%
12	8346.24	-20025.54	4818.70	-8346.12	20025.53	-4818.64	0.001%
13	8346.24	-15019.16	4818.70	-8346.17	15019.15	-4818.67	0.000%
14	6814.67	-20025.54	6814.67	-6814.58	20025.53	-6814.58	0.001%
15	6814.67	-15019.16	6814.67	-6814.62	15019.15	-6814.62	0.000%
16	4818.70	-20025.54	8346.24	-4818.64	20025.53	-8346.12	0.001%
17	4818.70	-15019.16	8346.24	-4818.67	15019.15	-8346.17	0.000%
18	0.00	-20025.54	9637.40	0.00	20025.46	-9635.96	0.006%
19	0.00	-15019.16	9637.40	0.00	15019.05	-9635.50	0.011%
20	-4818.70	-20025.54	8346.24	4818.64	20025.53	-8346.12	0.001%
21	-4818.70	-15019.16	8346.24	4818.67	15019.15	-8346.17	0.000%
22	-6814.67	-20025.54	6814.67	6814.58	20025.53	-6814.58	0.001%
23	-6814.67	-15019.16	6814.67	6814.62	15019.15	-6814.62	0.000%
24	-8346.24	-20025.54	4818.70	8346.12	20025.53	-4818.64	0.001%
25	-8346.24	-15019.16	4818.70	8346.17	15019.15	-4818.67	0.000%
26	-9637.40	-20025.54	0.00	9636.74	20025.50	0.00	0.003%
27	-9637.40	-15019.16	0.00	9636.54	15019.11	0.00	0.005%
28	-8346.24	-20025.54	-4818.70	8346.12	20025.53	4818.64	0.001%
29	-8346.24	-15019.16	-4818.70	8346.17	15019.15	4818.67	0.000%
30	-6814.67	-20025.54	-6814.67	6814.58	20025.53	6814.58	0.001%
31	-6814.67	-15019.16	-6814.67	6814.62	15019.15	6814.62	0.000%
32	-4818.70	-20025.54	-8346.24	4818.64	20025.53	8346.12	0.001%
33	-4818.70	-15019.16	-8346.24	4818.67	15019.15	8346.17	0.000%
34	0.00	-16687.95	-3175.82	0.00	16687.94	3175.05	0.005%
35	1587.91	-16687.95	-2750.34	-1587.53	16687.94	2749.67	0.005%
36	2245.65	-16687.95	-2245.65	-2245.10	16687.94	2245.10	0.005%
37	2750.34	-16687.95	-1587.91	-2749.67	16687.94	1587.52	0.005%
38	3175.82	-16687.95	0.00	-3175.05	16687.94	0.00	0.005%
39	2750.34	-16687.95	1587.91	-2749.67	16687.94	-1587.52	0.005%
40	2245.65	-16687.95	2245.65	-2245.10	16687.94	-2245.10	0.005%
41	1587.91	-16687.95	2750.34	-1587.52	16687.94	-2749.67	0.005%
42	0.00	-16687.95	3175.82	0.00	16687.94	-3175.05	0.005%
43	-1587.91	-16687.95	2750.34	1587.52	16687.94	-2749.67	0.005%
44	-2245.65	-16687.95	2245.65	2245.10	16687.94	-2245.10	0.005%
45	-2750.34	-16687.95	1587.91	2749.67	16687.94	-1587.52	0.005%
46	-3175.82	-16687.95	0.00	3175.05	16687.94	0.00	0.005%
47	-2750.34	-16687.95	-1587.91	2749.67	16687.94	1587.52	0.005%
48	-2245.65	-16687.95	-2245.65	2245.10	16687.94	2245.10	0.005%
49	-1587.91	-16687.95	-2750.34	1587.53	16687.94	2749.67	0.005%
50	0.00	-24369.34	-5990.90	0.00	24369.26	5989.11	0.007%
51	0.00	-10675.36	-5990.90	0.00	10675.32	5990.00	0.007%
52	2995.45	-24369.34	-5188.27	-2995.36	24369.33	5188.11	0.001%
53	2995.45	-10675.36	-5188.27	-2995.41	10675.35	5188.21	0.001%
54	4236.21	-24369.34	-4236.21	-4236.07	24369.33	4236.07	0.001%
55	4236.21	-10675.36	-4236.21	-4236.15	10675.35	4236.15	0.001%
56	5188.27	-24369.34	-2995.45	-5188.11	24369.33	2995.36	0.001%
57	5188.27	-10675.36	-2995.45	-5188.21	10675.35	2995.41	0.001%
58	5990.90	-24369.34	0.00	-5989.11	24369.26	0.00	0.007%
59	5990.90	-10675.36	0.00	-5990.00	10675.32	0.00	0.007%
60	5188.27	-24369.34	2995.45	-5188.11	24369.33	-2995.36	0.001%
61	5188.27	-10675.36	2995.45	-5188.21	10675.35	-2995.41	0.001%
62	4236.21	-24369.34	4236.21	-4236.07	24369.33	-4236.07	0.001%
63	4236.21	-10675.36	4236.21	-4236.15	10675.35	-4236.15	0.001%
64	2995.45	-24369.34	5188.27	-2995.36	24369.33	-5188.11	0.001%
65	2995.45	-10675.36	5188.27	-2995.41	10675.35	-5188.21	0.001%
66	0.00	-24369.34	5990.90	0.00	24369.26	-5989.11	0.007%
67	0.00	-10675.36	5990.90	0.00	10675.32	-5990.00	0.007%
68	-2995.45	-24369.34	5188.27	2995.36	24369.33	-5188.11	0.001%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
69	-2995.45	-10675.36	5188.27	2995.41	10675.35	-5188.21	0.001%
70	-4236.21	-24369.34	4236.21	4236.07	24369.33	-4236.07	0.001%
71	-4236.21	-10675.36	4236.21	4236.15	10675.35	-4236.15	0.001%
72	-5188.27	-24369.34	2995.45	5188.11	24369.33	-2995.36	0.001%
73	-5188.27	-10675.36	2995.45	5188.21	10675.35	-2995.41	0.001%
74	-5990.90	-24369.34	0.00	5989.11	24369.26	0.00	0.007%
75	-5990.90	-10675.36	0.00	5990.00	10675.32	0.00	0.007%
76	-5188.27	-24369.34	-2995.45	5188.11	24369.33	2995.36	0.001%
77	-5188.27	-10675.36	-2995.45	5188.21	10675.35	2995.41	0.001%
78	-4236.21	-24369.34	-4236.21	4236.07	24369.33	4236.07	0.001%
79	-4236.21	-10675.36	-4236.21	4236.15	10675.35	4236.15	0.001%
80	-2995.45	-24369.34	-5188.27	2995.36	24369.33	5188.11	0.001%
81	-2995.45	-10675.36	-5188.27	2995.41	10675.35	5188.21	0.001%
82	0.00	0.00	-1896.70	0.00	0.00	1896.74	0.002%
83	948.35	0.00	-1642.59	-948.42	0.00	1642.61	0.004%
84	1341.17	0.00	-1341.17	-1341.23	0.00	1341.19	0.004%
85	1642.59	0.00	-948.35	-1642.63	0.00	948.39	0.003%
86	1896.70	0.00	0.00	-1896.74	0.00	0.04	0.003%
87	1642.59	0.00	948.35	-1642.63	0.00	-948.39	0.003%
88	1341.17	0.00	1341.17	-1341.19	0.00	-1341.23	0.004%
89	948.35	0.00	1642.59	-948.35	0.00	-1642.65	0.003%
90	0.00	0.00	1896.70	0.00	0.00	-1896.74	0.002%
91	-948.35	0.00	1642.59	948.35	0.00	-1642.65	0.003%
92	-1341.17	0.00	1341.17	1341.19	0.00	-1341.23	0.004%
93	-1642.59	0.00	948.35	1642.63	0.00	-948.39	0.003%
94	-1896.70	0.00	0.00	1896.74	0.00	0.04	0.003%
95	-1642.59	0.00	-948.35	1642.63	0.00	948.39	0.003%
96	-1341.17	0.00	-1341.17	1341.23	0.00	1341.19	0.004%
97	-948.35	0.00	-1642.59	948.42	0.00	1642.61	0.004%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	16	0.00008784	0.00007651
3	Yes	15	0.00011380	0.00013056
4	Yes	19	0.00000001	0.00012852
5	Yes	19	0.00000001	0.00008615
6	Yes	19	0.00000001	0.00013737
7	Yes	19	0.00000001	0.00009157
8	Yes	19	0.00000001	0.00011949
9	Yes	19	0.00000001	0.00007967
10	Yes	17	0.00000001	0.00007739
11	Yes	16	0.00005243	0.00012442
12	Yes	19	0.00000001	0.00011949
13	Yes	19	0.00000001	0.00007967
14	Yes	19	0.00000001	0.00013737
15	Yes	19	0.00000001	0.00009157
16	Yes	19	0.00000001	0.00011216
17	Yes	19	0.00000001	0.00007449
18	Yes	16	0.00008784	0.00007651
19	Yes	15	0.00011380	0.00013056
20	Yes	19	0.00000001	0.00011216
21	Yes	19	0.00000001	0.00007449
22	Yes	19	0.00000001	0.00013737

23	Yes	19	0.00000001	0.00009157
24	Yes	19	0.00000001	0.00011949
25	Yes	19	0.00000001	0.00007967
26	Yes	17	0.00000001	0.00007739
27	Yes	16	0.00005243	0.00012442
28	Yes	19	0.00000001	0.00011949
29	Yes	19	0.00000001	0.00007967
30	Yes	19	0.00000001	0.00013737
31	Yes	19	0.00000001	0.00009157
32	Yes	19	0.00000001	0.00012852
33	Yes	19	0.00000001	0.00008615
34	Yes	15	0.00014132	0.00005548
35	Yes	15	0.00014105	0.00008801
36	Yes	15	0.00014097	0.00007203
37	Yes	15	0.00014105	0.00006555
38	Yes	15	0.00014132	0.00006364
39	Yes	15	0.00014105	0.00006555
40	Yes	15	0.00014097	0.00007203
41	Yes	15	0.00014105	0.00005305
42	Yes	15	0.00014132	0.00005548
43	Yes	15	0.00014105	0.00005305
44	Yes	15	0.00014097	0.00007203
45	Yes	15	0.00014105	0.00006555
46	Yes	15	0.00014132	0.00006364
47	Yes	15	0.00014105	0.00006555
48	Yes	15	0.00014097	0.00007203
49	Yes	15	0.00014105	0.00008801
50	Yes	16	0.00013723	0.00007889
51	Yes	15	0.00006618	0.00009106
52	Yes	19	0.00000001	0.00009636
53	Yes	18	0.00000001	0.00006831
54	Yes	19	0.00000001	0.00011060
55	Yes	18	0.00000001	0.00007828
56	Yes	19	0.00000001	0.00009636
57	Yes	18	0.00000001	0.00006831
58	Yes	16	0.00013723	0.00007889
59	Yes	15	0.00006618	0.00009106
60	Yes	19	0.00000001	0.00009636
61	Yes	18	0.00000001	0.00006831
62	Yes	19	0.00000001	0.00011060
63	Yes	18	0.00000001	0.00007828
64	Yes	19	0.00000001	0.00009636
65	Yes	18	0.00000001	0.00006831
66	Yes	16	0.00013723	0.00007889
67	Yes	15	0.00006618	0.00009106
68	Yes	19	0.00000001	0.00009636
69	Yes	18	0.00000001	0.00006831
70	Yes	19	0.00000001	0.00011060
71	Yes	18	0.00000001	0.00007828
72	Yes	19	0.00000001	0.00009636
73	Yes	18	0.00000001	0.00006831
74	Yes	16	0.00013723	0.00007889
75	Yes	15	0.00006618	0.00009106
76	Yes	19	0.00000001	0.00009636
77	Yes	18	0.00000001	0.00006831
78	Yes	19	0.00000001	0.00011060
79	Yes	18	0.00000001	0.00007828
80	Yes	19	0.00000001	0.00009636
81	Yes	18	0.00000001	0.00006831
82	Yes	6	0.00000001	0.00000001
83	Yes	6	0.00000001	0.00000001
84	Yes	6	0.00000001	0.00000001
85	Yes	6	0.00000001	0.00000001
86	Yes	6	0.00000001	0.00000001

87	Yes	6	0.00000001	0.00000001
88	Yes	6	0.00000001	0.00000001
89	Yes	6	0.00000001	0.00000001
90	Yes	6	0.00000001	0.00000001
91	Yes	6	0.00000001	0.00000001
92	Yes	6	0.00000001	0.00000001
93	Yes	6	0.00000001	0.00000001
94	Yes	6	0.00000001	0.00000001
95	Yes	6	0.00000001	0.00000001
96	Yes	6	0.00000001	0.00000001
97	Yes	6	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	*Elevation ft*	*Horz. Deflection in*	*Gov. Load Comb.*	*Tilt °*	*Twist °*
L1	103 - 63	22.692	42	1.7531	0.0111
L2	66.5 - 26.5	10.104	42	1.4125	0.0052
L3	30.83 - 1	2.173	42	0.6560	0.0017

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	*Appurtenance*	*Gov. Load Comb.*	*Deflection in*	*Tilt °*	*Twist °*	*Radius of Curvature ft*
100.00	Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	42	21.591	1.7346	0.0106	24046
96.30	Tapered 1 seismic	42	20.238	1.7111	0.0099	17944
92.90	Coax seismic	42	19.002	1.6884	0.0094	11903
90.00	Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	42	17.957	1.6677	0.0089	9248
83.00	Tapered 1 seismic	42	15.484	1.6107	0.0077	6011
78.60	Coax seismic	42	13.977	1.5681	0.0070	4926
69.70	Tapered 1 seismic	42	11.083	1.4600	0.0056	3611
64.30	Coax seismic	42	9.451	1.3768	0.0049	3179
59.80	Tapered 2 seismic	42	8.175	1.2968	0.0044	2956
50.00	Coax seismic	42	5.688	1.0965	0.0033	2572
46.50	Tapered 2 seismic	42	4.905	1.0188	0.0029	2458
35.70	Coax seismic	42	2.879	0.7691	0.0020	2162
33.20	Tapered 2 seismic	42	2.500	0.7108	0.0018	2115
25.90	Tapered 3 seismic	42	1.594	0.5436	0.0013	2456
21.40	Coax seismic	42	1.170	0.4429	0.0011	2998
15.90	Tapered 3 seismic	40	0.760	0.3218	0.0007	4105
7.10	Coax seismic	40	0.274	0.1311	0.0003	10026
6.00	Tapered 3 seismic	40	0.223	0.1074	0.0002	12231

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	103 - 63	69.930	26	5.4116	0.0336
L2	66.5 - 26.5	31.125	26	4.3578	0.0157
L3	30.83 - 1	6.688	26	2.0203	0.0050

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	26	66.537	5.3541	0.0320	7886
96.30	Tapered 1 seismic	26	62.364	5.2814	0.0301	5884
92.90	Coax seismic	26	58.554	5.2112	0.0283	3903
90.00	Quintel QD668-2 (72"x18.1"x9.6", 33.6 lbs) w/ MP	26	55.332	5.1472	0.0268	3031
83.00	Tapered 1 seismic	26	47.709	4.9710	0.0232	1969
78.60	Coax seismic	26	43.065	4.8390	0.0211	1613
69.70	Tapered 1 seismic	26	34.145	4.5047	0.0170	1180
64.30	Coax seismic	26	29.115	4.2474	0.0148	1038
59.80	Tapered 2 seismic	26	25.182	4.0000	0.0131	965
50.00	Coax seismic	26	17.518	3.3808	0.0099	838
46.50	Tapered 2 seismic	26	15.106	3.1405	0.0088	800
35.70	Coax seismic	26	8.864	2.3694	0.0061	703
33.20	Tapered 2 seismic	26	7.695	2.1896	0.0055	687
25.90	Tapered 3 seismic	26	4.905	1.6738	0.0040	798
21.40	Coax seismic	4	3.600	1.3635	0.0032	973
15.90	Tapered 3 seismic	14	2.338	0.9904	0.0023	1332
7.10	Coax seismic	14	0.843	0.4034	0.0009	3253
6.00	Tapered 3 seismic	14	0.685	0.3305	0.0007	3968

Base Plate Design Data

Plate Thickness in	Number of Anchor Bolts	Anchor Bolt Size in	Actual / Allowable / Ratio Bolt Tension lb	Actual / Allowable / Ratio Bolt Compression lb	Actual / Allowable / Ratio Plate Stress ksi	Actual / Allowable / Ratio Stiffener Stress ksi	Controlling Condition	Ratio
2.0000	8	2.0000	114309.89	119314.27	25.536		Bolt T	0.81 ✔
			140524.88	233271.30	45.000			
			0.81	0.51	0.57			

Fatigue Design Data

Detail Component Item No.	KI ft	KF	Δf Along-Wind ksi	Δf Vortex Shedding ksi	$\phi_{fa}\Delta F_{TH}$ ksi	Ratio

Detail Component Item No.	KI ft	KF	Δf Along-Wind ksi	Δf Vortex Shedding ksi	$\phi_{fa}\Delta F_{TH}$ ksi	Ratio
5-8	0.31	1.9786	9.160	0.000	9.383	0.9762

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	103 - 101.079	TP25x18x0.1875	40.00	0.00	0.0	10.8007	-141.45	631843.00	0.000
	101.079 - 99.1579					11.0008	-6401.02	643547.00	0.010
	99.1579 - 97.2368					11.2009	-6551.77	655251.00	0.010
	97.2368 - 95.3158					11.4010	-6828.13	666956.00	0.010
	95.3158 - 93.3947					11.6010	-6983.80	678660.00	0.010
	93.3947 - 91.4737					11.8011	-7211.98	690364.00	0.010
	91.4737 - 89.5526					12.0012	-11883.70	702068.00	0.017
	89.5526 - 87.6316					12.2012	-12046.80	713772.00	0.017
	87.6316 - 85.7105					12.4013	-12212.20	725477.00	0.017
	85.7105 - 83.7895					12.6014	-12379.70	737181.00	0.017
	83.7895 - 81.8684					12.8015	-12680.60	748885.00	0.017
	81.8684 - 79.9474					13.0015	-12852.80	760589.00	0.017
	79.9474 - 78.0263					13.2016	-10476.90	772293.00	0.014
	78.0263 - 76.1053					13.4017	-10649.30	783998.00	0.014
	76.1053 - 74.1842					13.6017	-10824.10	795702.00	0.014
	74.1842 - 72.2632					13.8018	-11001.30	807406.00	0.014
	72.2632 - 70.3421					14.0019	-11181.00	819110.00	0.014
	70.3421 - 68.4211					14.2020	-11362.90	830814.00	0.014
	68.4211 - 66.5					14.4020	-11547.20	842518.00	0.014
	66.5 - 63					14.7665	-6112.65	863843.00	0.007
L2	66.5 - 63	TP31.0125x24.0125x0.1875	40.00	0.00	0.0	14.5434	-5967.23	850787.00	0.007
	63 - 61.2128					14.7295	-12270.80	861676.00	0.014
	61.2128 - 59.4256					14.9156	-12464.00	872565.00	0.014

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	59.4256 - 57.6383					15.1018	-12659.20	883453.00	0.014
	57.6383 - 55.8511					15.2879	-12856.20	894342.00	0.014
	55.8511 - 54.0639					15.4740	-13055.10	905231.00	0.014
	54.0639 - 52.2767					15.6602	-13255.80	916120.00	0.014
	52.2767 - 50.4894					15.8463	-13458.30	927009.00	0.015
	50.4894 - 48.7022					16.0324	-13662.60	937898.00	0.015
	48.7022 - 46.915					16.2186	-13868.70	948786.00	0.015
	46.915 - 45.1278					16.4047	-14076.60	959675.00	0.015
	45.1278 - 43.3406					16.5908	-14286.20	970564.00	0.015
	43.3406 - 41.5533					16.7770	-14497.50	981453.00	0.015
	41.5533 - 39.7661					16.9631	-14710.60	992342.00	0.015
	39.7661 - 37.9789					17.1492	-14925.30	1003230.00	0.015
	37.9789 - 36.1917					17.3354	-15141.80	1014120.00	0.015
	36.1917 - 34.4044					17.5215	-15359.90	1025010.00	0.015
	34.4044 - 32.6172					17.7076	-15579.70	1035900.00	0.015
	32.6172 - 30.83					17.8938	-15801.10	1046790.00	0.015
	30.83 - 26.5					18.3447	-8400.75	1073170.00	0.008
L3	30.83 - 26.5	TP35.1x29.8798x0.188	29.83	0.00	0.0	18.1696	-8233.47	1062920.00	0.008
	26.5 - 25.1579					18.3097	-16809.20	1071120.00	0.016
	25.1579 - 23.8158					18.4499	-16980.20	1079320.00	0.016
	23.8158 - 22.4737					18.5900	-17152.00	1087520.00	0.016
	22.4737 - 21.1316					18.7302	-17324.70	1095720.00	0.016
	21.1316 - 19.7895					18.8703	-17498.30	1103910.00	0.016
	19.7895 - 18.4474					19.0105	-17672.70	1112110.00	0.016
	18.4474 - 17.1053					19.1506	-17848.00	1120310.00	0.016
	17.1053 - 15.7632					19.2908	-18024.10	1128510.00	0.016
	15.7632 - 14.4211					19.4309	-18201.10	1136710.00	0.016
	14.4211 - 13.0789					19.5711	-18379.00	1144910.00	0.016
	13.0789 - 11.7368					19.7112	-18557.70	1153110.00	0.016
	11.7368 - 10.3947					19.8514	-18737.20	1161300.00	0.016
	10.3947 - 9.05263					19.9915	-18917.60	1169500.00	0.016
	9.05263 -					20.1317	-19098.80	1177700.00	0.016

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
	7.71053								
	7.71053 - 6.36842					20.2718	-19280.90	1182650.00	0.016
	6.36842 - 5.02632					20.4120	-19463.80	1186070.00	0.016
	5.02632 - 3.68421					20.5521	-19647.50	1189430.00	0.017
	3.68421 - 2.34211					20.6923	-19832.10	1192730.00	0.017
	2.34211 - 1					20.8324	-20017.50	1195960.00	0.017

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	103 - 101.079	TP25x18x0.1875	72.45	297438.33	0.000	0.00	297438.33	0.000
	101.079 - 99.1579		4176.57	307224.17	0.014	0.00	307224.17	0.000
	99.1579 - 97.2368		13648.42	317112.50	0.043	0.00	317112.50	0.000
	97.2368 - 95.3158		23456.08	327101.67	0.072	0.00	327101.67	0.000
	95.3158 - 93.3947		33582.17	337189.17	0.100	0.00	337189.17	0.000
	93.3947 - 91.4737		43962.75	347371.67	0.127	0.00	347371.67	0.000
	91.4737 - 89.5526		54602.50	357645.83	0.153	0.00	357645.83	0.000
	89.5526 - 87.6316		65781.33	368009.17	0.179	0.00	368009.17	0.000
	87.6316 - 85.7105		76961.92	378460.00	0.203	0.00	378460.00	0.000
	85.7105 - 83.7895		88140.83	388994.17	0.227	0.00	388994.17	0.000
	83.7895 - 81.8684		99588.33	399610.00	0.249	0.00	399610.00	0.000
	81.8684 - 79.9474		111217.50	410303.33	0.271	0.00	410303.33	0.000
	79.9474 - 78.0263		124390.83	421072.50	0.295	0.00	421072.50	0.000
	78.0263 - 76.1053		138960.83	431914.17	0.322	0.00	431914.17	0.000
	76.1053 - 74.1842		153663.33	442825.83	0.347	0.00	442825.83	0.000
	74.1842 - 72.2632		168495.83	453805.00	0.371	0.00	453805.00	0.000
	72.2632 - 70.3421		183458.33	464847.50	0.395	0.00	464847.50	0.000
	70.3421 - 68.4211		198549.17	475952.50	0.417	0.00	475952.50	0.000
	68.4211 - 66.5		213768.33	487115.83	0.439	0.00	487115.83	0.000
	66.5 - 63		123758.33	507595.83	0.244	0.00	507595.83	0.000
L2	66.5 - 63	TP31.0125x24.0125x0.1875	118126.67	495035.83	0.239	0.00	495035.83	0.000
	63 - 61.2128		256432.50	505506.67	0.507	0.00	505506.67	0.000
	61.2128 -		271081.67	516022.50	0.525	0.00	516022.50	0.000

Section No.	*Elevation* *ft*	*Size*	M_{ux} *lb-ft*	ϕM_{nx} *lb-ft*	*Ratio* $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} *lb-ft*	ϕM_{ny} *lb-ft*	*Ratio* $\frac{M_{uy}}{\phi M_{ny}}$
	59.4256							
	59.4256 - 57.6383		285832.50	526580.00	0.543	0.00	526580.00	0.000
	57.6383 - 55.8511		300681.67	537177.50	0.560	0.00	537177.50	0.000
	55.8511 - 54.0639		315629.17	547813.33	0.576	0.00	547813.33	0.000
	54.0639 - 52.2767		330674.17	558484.17	0.592	0.00	558484.17	0.000
	52.2767 - 50.4894		345814.17	569187.50	0.608	0.00	569187.50	0.000
	50.4894 - 48.7022		361048.33	579922.50	0.623	0.00	579922.50	0.000
	48.7022 - 46.915		376376.67	590686.67	0.637	0.00	590686.67	0.000
	46.915 - 45.1278		391796.67	601476.67	0.651	0.00	601476.67	0.000
	45.1278 - 43.3406		407307.50	612290.83	0.665	0.00	612290.83	0.000
	43.3406 - 41.5533		422908.33	623126.67	0.679	0.00	623126.67	0.000
	41.5533 - 39.7661		438598.33	633982.50	0.692	0.00	633982.50	0.000
	39.7661 - 37.9789		454376.67	644855.83	0.705	0.00	644855.83	0.000
	37.9789 - 36.1917		470241.67	655744.17	0.717	0.00	655744.17	0.000
	36.1917 - 34.4044		486192.50	666645.83	0.729	0.00	666645.83	0.000
	34.4044 - 32.6172		502227.50	677558.33	0.741	0.00	677558.33	0.000
	32.6172 - 30.83		518346.67	688478.33	0.753	0.00	688478.33	0.000
	30.83 - 26.5		283780.83	714957.50	0.397	0.00	714957.50	0.000
L3	30.83 - 26.5	TP35.1x29.8798x0.188	274079.17	704610.00	0.389	0.00	704610.00	0.000
	26.5 - 25.1579		570233.33	712862.50	0.800	0.00	712862.50	0.000
	25.1579 - 23.8158		582637.50	721115.00	0.808	0.00	721115.00	0.000
	23.8158 - 22.4737		595074.17	729369.17	0.816	0.00	729369.17	0.000
	22.4737 - 21.1316		607541.67	737621.67	0.824	0.00	737621.67	0.000
	21.1316 - 19.7895		620040.83	745873.33	0.831	0.00	745873.33	0.000
	19.7895 - 18.4474		632570.83	754122.50	0.839	0.00	754122.50	0.000
	18.4474 - 17.1053		645131.67	762367.50	0.846	0.00	762367.50	0.000
	17.1053 - 15.7632		657723.33	770609.17	0.854	0.00	770609.17	0.000
	15.7632 - 14.4211		670345.83	778845.00	0.861	0.00	778845.00	0.000
	14.4211 - 13.0789		682998.33	787074.17	0.868	0.00	787074.17	0.000
	13.0789 - 11.7368		695680.83	795296.67	0.875	0.00	795296.67	0.000
	11.7368 - 10.3947		708394.17	803510.00	0.882	0.00	803510.00	0.000
	10.3947 - 9.05263		721136.67	811715.00	0.888	0.00	811715.00	0.000

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	9.05263 - 7.71053		733910.00	819910.00	0.895	0.00	819910.00	0.000
	7.71053 - 6.36842		746711.67	828093.33	0.902	0.00	828093.33	0.000
	6.36842 - 5.02632		759544.17	836266.67	0.908	0.00	836266.67	0.000
	5.02632 - 3.68421		772405.00	844425.00	0.915	0.00	844425.00	0.000
	3.68421 - 2.34211		785295.83	852566.67	0.921	0.00	852566.67	0.000
	2.34211 - 1		798215.83	860700.00	0.927	0.00	860700.00	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	103 - 101.079	TP25x18x0.1875	75.60	189553.00	0.000	0.00	301270.00	0.000
	101.079 - 99.1579		4927.31	193064.00	0.026	0.00	312534.17	0.000
	99.1579 - 97.2368		4939.24	196575.00	0.025	0.00	324005.83	0.000
	97.2368 - 95.3158		5270.37	200087.00	0.026	0.00	335684.17	0.000
	95.3158 - 93.3947		5280.12	203598.00	0.026	0.00	347569.17	0.000
	93.3947 - 91.4737		5455.78	207109.00	0.026	0.00	359660.83	0.000
	91.4737 - 89.5526		5825.82	210620.00	0.028	0.00	371960.00	0.000
	89.5526 - 87.6316		5828.42	214132.00	0.027	0.00	384465.00	0.000
	87.6316 - 85.7105		5829.36	217643.00	0.027	0.00	397176.67	0.000
	85.7105 - 83.7895		5828.71	221154.00	0.026	0.00	410095.83	0.000
	83.7895 - 81.8684		6066.65	224665.00	0.027	0.00	423220.83	0.000
	81.8684 - 79.9474		6062.89	228177.00	0.027	0.00	436553.33	0.000
	79.9474 - 78.0263		7559.92	231688.00	0.033	1259.08	450092.50	0.003
	78.0263 - 76.1053		7629.38	235199.00	0.032	1258.87	463838.33	0.003
	76.1053 - 74.1842		7698.24	238711.00	0.032	1258.65	477790.83	0.003
	74.1842 - 72.2632		7766.53	242222.00	0.032	1258.41	491950.00	0.003
	72.2632 - 70.3421		7834.30	245733.00	0.032	1258.16	506315.83	0.002
	70.3421 - 68.4211		7901.58	249244.00	0.032	1257.89	520889.17	0.002
	68.4211 - 66.5		7968.39	252756.00	0.032	1257.61	535668.33	0.002
	66.5 - 63		4191.47	259153.00	0.016	643.20	563126.67	0.001
L2	66.5 - 63	TP31.0125x24.0125x0.1875	3932.11	255236.00	0.015	614.13	546234.17	0.001
	63 - 61.2128		8183.01	258503.00	0.032	1257.05	560305.83	0.002

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
	61.2128 - 59.4256		8239.99	261769.00	0.031	1256.73	574555.83	0.002
	59.4256 - 57.6383		8296.21	265036.00	0.031	1256.42	588985.00	0.002
	57.6383 - 55.8511		8351.72	268303.00	0.031	1256.12	603593.33	0.002
	55.8511 - 54.0639		8406.52	271569.00	0.031	1255.80	618380.83	0.002
	54.0639 - 52.2767		8460.62	274836.00	0.031	1255.49	633347.50	0.002
	52.2767 - 50.4894		8514.05	278103.00	0.031	1255.18	648492.50	0.002
	50.4894 - 48.7022		8566.82	281369.00	0.030	1254.88	663816.67	0.002
	48.7022 - 46.915		8618.94	284636.00	0.030	1254.56	679319.17	0.002
	46.915 - 45.1278		8670.43	287903.00	0.030	1254.27	695001.67	0.002
	45.1278 - 43.3406		8721.29	291169.00	0.030	1253.98	710862.50	0.002
	43.3406 - 41.5533		8771.54	294436.00	0.030	1253.70	726902.50	0.002
	41.5533 - 39.7661		8821.19	297702.00	0.030	1253.42	743120.83	0.002
	39.7661 - 37.9789		8870.25	300969.00	0.029	1253.16	759519.17	0.002
	37.9789 - 36.1917		8918.74	304236.00	0.029	1252.90	776095.83	0.002
	36.1917 - 34.4044		8966.65	307502.00	0.029	1252.65	792851.67	0.002
	34.4044 - 32.6172		9014.01	310769.00	0.029	1252.41	809785.83	0.002
	32.6172 - 30.83		9060.81	314036.00	0.029	1252.18	826899.17	0.002
	30.83 - 26.5		4741.36	321950.00	0.015	636.79	869100.00	0.001
L3	30.83 - 26.5	TP35.1x29.8798x0.188	4489.34	318876.00	0.014	615.16	850316.67	0.001
	26.5 - 25.1579		9246.37	321336.00	0.029	1251.73	863491.67	0.001
	25.1579 - 23.8158		9270.00	323795.00	0.029	1251.58	876758.33	0.001
	23.8158 - 22.4737		9293.50	326255.00	0.028	1251.43	890125.00	0.001
	22.4737 - 21.1316		9316.88	328715.00	0.028	1251.29	903600.00	0.001
	21.1316 - 19.7895		9340.12	331174.00	0.028	1251.17	917175.00	0.001
	19.7895 - 18.4474		9363.25	333634.00	0.028	1251.04	930850.00	0.001
	18.4474 - 17.1053		9386.25	336093.00	0.028	1250.93	944625.00	0.001
	17.1053 - 15.7632		9409.14	338553.00	0.028	1250.83	958500.00	0.001
	15.7632 - 14.4211		9431.92	341013.00	0.028	1250.73	972475.00	0.001
	14.4211 - 13.0789		9454.58	343472.00	0.028	1250.64	986558.33	0.001
	13.0789 - 11.7368		9477.14	345932.00	0.027	1250.57	1000733.33	0.001
	11.7368 - 10.3947		9499.59	348392.00	0.027	1250.49	1015016.67	0.001
	10.3947 -		9521.94	350851.00	0.027	1250.43	1029400.00	0.001

Section No.	*Elevation* *ft*	*Size*	*Actual* V_u *lb*	ϕV_n *lb*	*Ratio* $\frac{V_u}{\phi V_n}$	*Actual* T_u *lb-ft*	ϕT_n *lb-ft*	*Ratio* $\frac{T_u}{\phi T_n}$
	9.05263							
	9.05263 - 7.71053		9544.18	353311.00	0.027	1250.38	1043883.33	0.001
	7.71053 - 6.36842		9566.33	355770.00	0.027	1250.33	1058466.67	0.001
	6.36842 - 5.02632		9588.38	358230.00	0.027	1250.30	1073150.00	0.001
	5.02632 - 3.68421		9610.33	360690.00	0.027	1250.27	1087941.67	0.001
	3.68421 - 2.34211		9632.18	363149.00	0.027	1250.26	1102833.33	0.001
	2.34211 - 1		9653.95	365609.00	0.026	1250.24	1117816.67	0.001

Pole Interaction Design Data

Section No.	*Elevation* *ft*	*Ratio* $\frac{P_u}{\phi P_n}$	*Ratio* $\frac{M_{ux}}{\phi M_{nx}}$	*Ratio* $\frac{M_{uy}}{\phi M_{ny}}$	*Ratio* $\frac{V_u}{\phi V_n}$	*Ratio* $\frac{T_u}{\phi T_n}$	*Comb. Stress Ratio*	*Allow. Stress Ratio*	*Criteria*
L1	103 - 101.079	0.000	0.000	0.000	0.000	0.000	0.000 ✔	1.000	✔
	101.079 - 99.1579	0.010	0.014	0.000	0.026	0.000	0.024 ✔	1.000	✔
	99.1579 - 97.2368	0.010	0.043	0.000	0.025	0.000	0.054 ✔	1.000	✔
	97.2368 - 95.3158	0.010	0.072	0.000	0.026	0.000	0.083 ✔	1.000	✔
	95.3158 - 93.3947	0.010	0.100	0.000	0.026	0.000	0.111 ✔	1.000	✔
	93.3947 - 91.4737	0.010	0.127	0.000	0.026	0.000	0.138 ✔	1.000	✔
	91.4737 - 89.5526	0.017	0.153	0.000	0.028	0.000	0.170 ✔	1.000	✔
	89.5526 - 87.6316	0.017	0.179	0.000	0.027	0.000	0.196 ✔	1.000	✔
	87.6316 - 85.7105	0.017	0.203	0.000	0.027	0.000	0.221 ✔	1.000	✔
	85.7105 - 83.7895	0.017	0.227	0.000	0.026	0.000	0.244 ✔	1.000	✔
	83.7895 - 81.8684	0.017	0.249	0.000	0.027	0.000	0.267 ✔	1.000	✔
	81.8684 - 79.9474	0.017	0.271	0.000	0.027	0.000	0.289 ✔	1.000	✔
	79.9474 - 78.0263	0.014	0.295	0.000	0.033	0.003	0.310 ✔	1.000	✔
	78.0263 - 76.1053	0.014	0.322	0.000	0.032	0.003	0.337 ✔	1.000	✔
	76.1053 - 74.1842	0.014	0.347	0.000	0.032	0.003	0.362 ✔	1.000	✔
	74.1842 - 72.2632	0.014	0.371	0.000	0.032	0.003	0.386 ✔	1.000	✔
	72.2632 - 70.3421	0.014	0.395	0.000	0.032	0.002	0.409 ✔	1.000	✔

Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	70.3421 - 68.4211	0.014	0.417	0.000	0.032	0.002	0.432 ✔	1.000	✔
	68.4211 - 66.5	0.014	0.439	0.000	0.032	0.002	0.454 ✔	1.000	✔
	66.5 - 63	0.007	0.244	0.000	0.016	0.001	0.251 ✔	1.000	✔
L2	66.5 - 63	0.007	0.239	0.000	0.015	0.001	0.246 ✔	1.000	✔
	63 - 61.2128	0.014	0.507	0.000	0.032	0.002	0.523 ✔	1.000	✔
	61.2128 - 59.4256	0.014	0.525	0.000	0.031	0.002	0.541 ✔	1.000	✔
	59.4256 - 57.6383	0.014	0.543	0.000	0.031	0.002	0.558 ✔	1.000	✔
	57.6383 - 55.8511	0.014	0.560	0.000	0.031	0.002	0.575 ✔	1.000	✔
	55.8511 - 54.0639	0.014	0.576	0.000	0.031	0.002	0.592 ✔	1.000	✔
	54.0639 - 52.2767	0.014	0.592	0.000	0.031	0.002	0.608 ✔	1.000	✔
	52.2767 - 50.4894	0.015	0.608	0.000	0.031	0.002	0.623 ✔	1.000	✔
	50.4894 - 48.7022	0.015	0.623	0.000	0.030	0.002	0.638 ✔	1.000	✔
	48.7022 - 46.915	0.015	0.637	0.000	0.030	0.002	0.653 ✔	1.000	✔
	46.915 - 45.1278	0.015	0.651	0.000	0.030	0.002	0.667 ✔	1.000	✔
	45.1278 - 43.3406	0.015	0.665	0.000	0.030	0.002	0.681 ✔	1.000	✔
	43.3406 - 41.5533	0.015	0.679	0.000	0.030	0.002	0.694 ✔	1.000	✔
	41.5533 - 39.7661	0.015	0.692	0.000	0.030	0.002	0.708 ✔	1.000	✔
	39.7661 - 37.9789	0.015	0.705	0.000	0.029	0.002	0.720 ✔	1.000	✔
	37.9789 - 36.1917	0.015	0.717	0.000	0.029	0.002	0.733 ✔	1.000	✔
	36.1917 - 34.4044	0.015	0.729	0.000	0.029	0.002	0.745 ✔	1.000	✔
	34.4044 - 32.6172	0.015	0.741	0.000	0.029	0.002	0.757 ✔	1.000	✔
	32.6172 - 30.83	0.015	0.753	0.000	0.029	0.002	0.769 ✔	1.000	✔
	30.83 - 26.5	0.008	0.397	0.000	0.015	0.001	0.405 ✔	1.000	✔
L3	30.83 - 26.5	0.008	0.389	0.000	0.014	0.001	0.397 ✔	1.000	✔
	26.5 - 25.1579	0.016	0.800	0.000	0.029	0.001	0.817 ✔	1.000	✔
	25.1579 - 23.8158	0.016	0.808	0.000	0.029	0.001	0.825 ✔	1.000	✔

Section No.	*Elevation* *ft*	*Ratio* $\frac{P_u}{\phi P_n}$	*Ratio* $\frac{M_{ux}}{\phi M_{nx}}$	*Ratio* $\frac{M_{uy}}{\phi M_{ny}}$	*Ratio* $\frac{V_u}{\phi V_n}$	*Ratio* $\frac{T_u}{\phi T_n}$	*Comb. Stress Ratio*	*Allow. Stress Ratio*	*Criteria*
	23.8158 - 22.4737	0.016	0.816	0.000	0.028	0.001	0.833 ✓	1.000	✓
	22.4737 - 21.1316	0.016	0.824	0.000	0.028	0.001	0.840 ✓	1.000	✓
	21.1316 - 19.7895	0.016	0.831	0.000	0.028	0.001	0.848 ✓	1.000	✓
	19.7895 - 18.4474	0.016	0.839	0.000	0.028	0.001	0.856 ✓	1.000	✓
	18.4474 - 17.1053	0.016	0.846	0.000	0.028	0.001	0.863 ✓	1.000	✓
	17.1053 - 15.7632	0.016	0.854	0.000	0.028	0.001	0.870 ✓	1.000	✓
	15.7632 - 14.4211	0.016	0.861	0.000	0.028	0.001	0.878 ✓	1.000	✓
	14.4211 - 13.0789	0.016	0.868	0.000	0.028	0.001	0.885 ✓	1.000	✓
	13.0789 - 11.7368	0.016	0.875	0.000	0.027	0.001	0.892 ✓	1.000	✓
	11.7368 - 10.3947	0.016	0.882	0.000	0.027	0.001	0.899 ✓	1.000	✓
	10.3947 - 9.05263	0.016	0.888	0.000	0.027	0.001	0.905 ✓	1.000	✓
	9.05263 - 7.71053	0.016	0.895	0.000	0.027	0.001	0.912 ✓	1.000	✓
	7.71053 - 6.36842	0.016	0.902	0.000	0.027	0.001	0.919 ✓	1.000	✓
	6.36842 - 5.02632	0.016	0.908	0.000	0.027	0.001	0.925 ✓	1.000	✓
	5.02632 - 3.68421	0.017	0.915	0.000	0.027	0.001	0.932 ✓	1.000	✓
	3.68421 - 2.34211	0.017	0.921	0.000	0.027	0.001	0.938 ✓	1.000	✓
	2.34211 - 1	0.017	0.927	0.000	0.026	0.001	0.945 ✓	1.000	✓

Section Capacity Table

Section No.	*Elevation ft*	*Component Type*	*Size*	*Critical Element*	*P lb*	*øP_{allow} lb*	*% Capacity*	*Pass Fail*
L1	103 - 63	Pole	TP25x18x0.1875	1	-11547.20	842518.00	45.4	Pass
L2	63 - 26.5	Pole	TP31.0125x24.0125x0.1875	2	-15801.10	1046790.00	76.9	Pass
L3	26.5 - 1	Pole	TP35.1x29.8798x0.188	3	-20017.50	1195960.00	94.5	Pass
							Summary	
						Pole (L3)	94.5	Pass
						Base Plate	81.3	Pass
						Fatigue	97.6	Pass
						RATING =	**97.6**	**Pass**

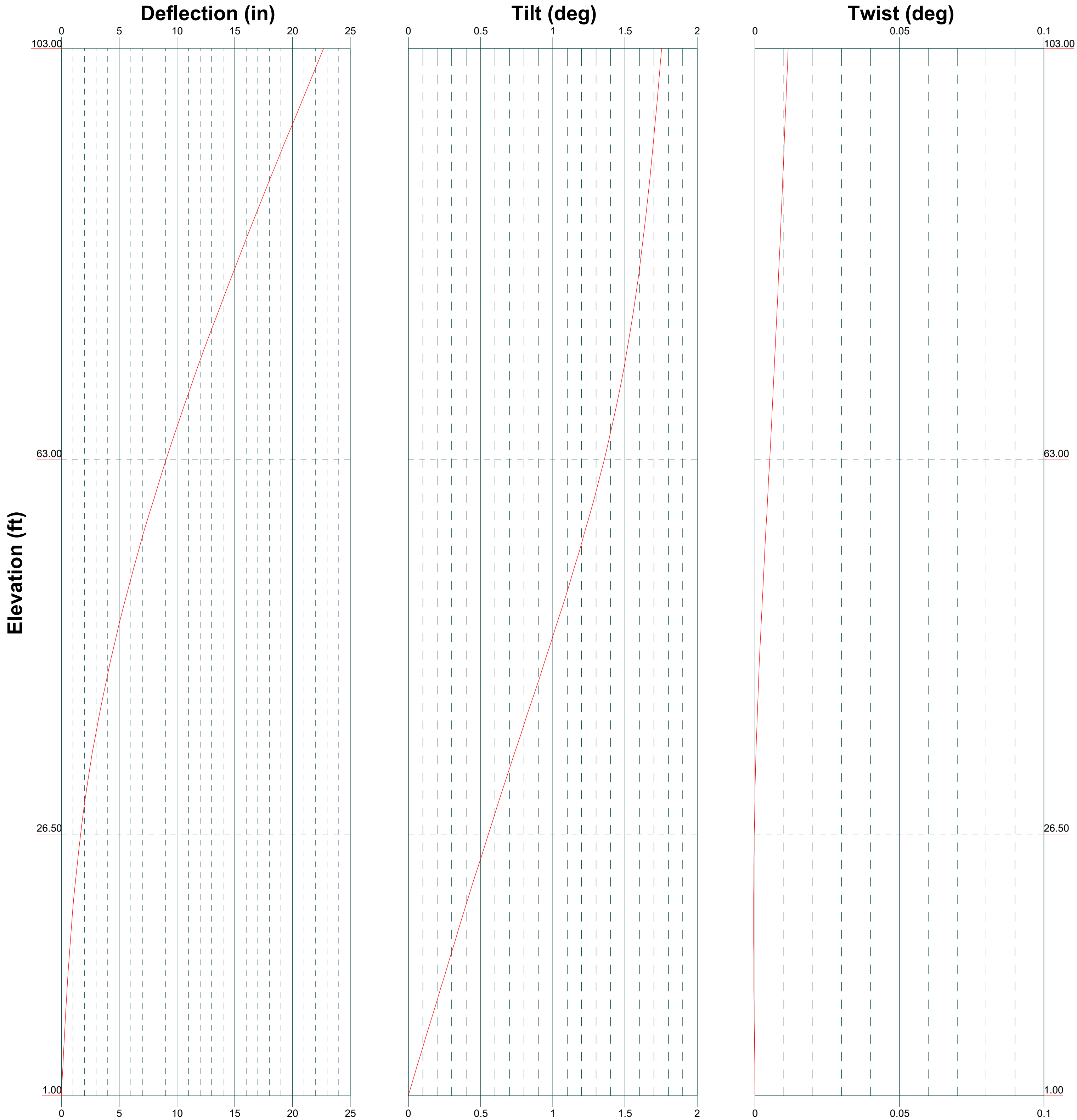
TIA-222-I - 99 mph Exposure C

Maximum Values

Vx Vz Mx Mz

Vector Structural Engineering	Job: **SF Police Academy**		
651 W Galena Park Blvd	Project: ***U1133.0725.261***		
Draper, UT 84020	Client: Steelhead	Drawn by: mririe	App'd:
Phone: (801) 990-1775	Code: TIA-222-I	Date: 01/27/26	Scale: NTS
FAX: (801) 990-1776	Path:		Dwg No. E-4

TIA-222-I - Service - 60 mph



Vector Structural Engineering 651 W Galena Park Blvd, Draper, UT 84020, Phone: (801) 990-1775, FAX: (801) 990-1776	Job: ***SF Police Academy***		
	Project: ***U1133.0725.261***		
	Client: Steelhead	Drawn by: mririe	App'd:
	Code: TIA-222-I	Date: 01/27/26	Scale: NTS
	Path:		Dwg No. E-5

JOB NO.: U1133.0725.261
SUBJECT: Appurtenance Mounting Systems (TIA-222-I Chapter 16)

PROJECT: SF POLICE ACADEMY

Three-Sided Friction Collars:

Structure Type:	Monopole		

Monopole Inputs:

Tubular Pole Yield Strength, F_y:	65	ksi	
Tubular Pole Shaft Thickness, t:	0.1875	in	
Tubular Pole Shaft Diameter, D:	20.28	in	(worst case)

Collar Mount & Threaded Rod Inputs:

Collar Mount Bearing Type:	Horizontal		
Width Between Collar Outside Bearing Points on Tubular Pole Shaft, B_p:	4.00	in	
Height of Collar, hv:	9.6	in	
Horizontal Width Between Attachments of Threaded Rods at Weldment, wt:	16.2	in	
Vertical Levels of Threaded Rods:	3		
Threaded Rod Grade:	A307		
Threaded Rod Diameter:	0.625	in	

Loading:

Applied moment about horizontal axis of weldment, Mh:	23.27	k-in	

Threaded Rod Checks:
Collars utilizing three vertical levels of threaded rods:

Vertical Location of Top Threaded Rod, s_1:	7.3	in	(TIA-222-I §16.5.1)
Vertical Location of Middle Threaded Rod, s_2:	5	in	(TIA-222-I §16.5.1)
Vertical Location of Bottom Threaded Rod, s_3:	2.5	in	(TIA-222-I §16.5.1)
Centroid of Threaded Rod Group, y:	6.5	in	(TIA-222-I §16.5.1)
Weldment Bearing Ratio, ß:	0.247104		
Tension offset, δ:	6.2	in	(TIA-222-I §16.5.1)
Tensile Force in Top Threaded Rod, T_1:	13.4	k	(TIA-222-I §16.5.1)
Tensile Force in Middle Threaded Rod, T_2:	7.8	k	(TIA-222-I §16.5.1)
Tensile Force in Bottom Threaded Rod, T_3:	2.6	k	(TIA-222-I §16.5.1)
Threaded Rod Capacity:	31.1	k	(AISC 360 Eq. J3-1)
Check Threaded Rod:	43%		

Result: **(3) Ø0.625 in. A307 threaded rods are adequate to resist the proposed loading.**

Notes:

Monopole Localized Plastification Checks:
Horizontally Oriented Compression Zone:

Local Plastification of Tubular Pole shaft, R_n:	14.96	k	(TIA-222-I §16.5.1)
Pole Shaft Capacity, ϕR_n:	13.46	k	(TIA-222-I §16.5.1)
Demand on Pole Shaft:	2.43	k	
Local Plastification Check:	18%		

Result: **Pole shaft is adequate.**

Notes:

VECTOR ENGINEERS

JOB NO.: U1133.0725.261
SUBJECT: Appurtenance Mounting Systems (TIA-222-I Chapter 16)

PROJECT: SF POLICE ACADEMY

Location: Monopole
On a: pole structure at 100 ft A.G.L.

Wind per: TIA-222-I
Seismic per: TIA-222-I

Appurtenances	Quintel QD668-2	Ericsson Air 6419 B77G + B77D	Quintel QD6612-2	RRU 4490 B5/B12A	RRU 4478 B14	RRU 4890 B2/B66	Raycap					Worst Case Loading Per Mount Pipe
Antenna Mount Pipe Location:	1	2	3									
Unit Weight (lbs)	55.5	161.4	120.9	70.0	60.0	69.5	26.2					161.4
Quantity	1	1	1	1	1	1	1					
Height (Y) (in)	72	56.6	72	20.6	18.1	20.6	31.3					
Width/Diameter (X) (in)	18.1	16.1	22	15.6	13.4	15.7	11					
Depth (Z) (in)	9.6	7.9	9.6	7	8.26	7.2						
Shape:	Flat	Flat	Flat	Flat	Flat	Flat	Round					
Wind Force per Unit:												
$(EPA)_N$ (ft^2)	11.45	7.88	13.58	2.68	2.02	2.70	1.21					
$(EPA)_T$ (ft^2)	6.80	4.36	6.80	1.22	1.25	1.25	1.21					
Factored (LRFD): (1.0W)												
Normal Force (K_a*q_z*G_h*$(EPA)_N$)	301.9	207.6	357.8	70.6	53.3	71.0	32.0					357.8
Tangential Force (K_a*q_z*G_h*$(EPA)_T$)	179.2	115.0	179.2	32.2	32.8	33.0	32.0					179.2
Seismic Force per Unit:												
Factored (LRFD): (1.0E)												
Lateral (lbs)	54.1	157.4	117.9	68.3	58.5	67.8	25.5					157.4
Vertical (lbs)	14.4	42.0	31.4	18.2	15.6	18.1	6.8					42.0

Dead Load, D:

Weight of Structure:	W_S =	1229	lb	(1.05 x Material Weight from RISA Model)
Weight of Appurtenances:	W_A =	564	lb	
Total Weight:	W_p =	1793	lb	

Wind Load, W: (TIA-222-I, Section 2.6: Wind and Ice Loads)

Basic Wind Speed:	V =	99	mph	(ASCE 7 Online Hazard Tool Lookup - ASCE 7-22)
Exposure Category:		C		(TIA-222-I §2.6.5.1.2)
Topographic Feature:		Flat		(TIA-222-I §2.6.6.2)
Crest Height:	H =	N/A	ft	(TIA-222-I §2.6.6)
Gust Effect Factor:	G_h =	1		(TIA-222-I §16.6)
Shielding Factor:	K_a =	0.9		(TIA-222-I §16.6)
Velocity Pressure Coefficient:	K_z =	1.25		(TIA-222-I §2.6.5.2)
Topographic Factor:	K_{zt} =	1.00		(TIA-222-I §2.6.6.2.1)
Rooftop Wind Speed-Up Factor:	Ks =	1.00		(TIA-222-I §2.6.7)
Ground Elevation Factor:	K_e =	0.98		(TIA-222-I §2.6.8)
Directionality Factor:	K_d =	0.95		(TIA-222-I §16.6)
Velocity Pressure:	q_z =	29.3	psf	(TIA-222-I §2.6.11.6)
Open Structure Wind Pressure:		35.1	psf	(qz x CF x Gh) (TIA-222-I §2.6.11.1)
Total Factored X-Direction Wind (Appurt. & Structure):	F_{WX} =	1094	lb	
Total Factored Z-Direction Wind (Appurt. & Structure):	F_{WZ} =	603	lb	

JOB NO.: U1133.0725.261
SUBJECT: Appurtenance Mounting Systems (TIA-222-I Chapter 16)

VECTOR ENGINEERS

PROJECT: SF POLICE ACADEMY

Seismic Load, E: (ASCE 7, Section 13.3: Seismic Demands on Non-Structural Components)

Risk Category / Structure Class:		III		
Seismic Design Category:		D		
Component Importance Factor:	I_p =	1.25		(TIA-222-I §2.7.8)
Site Class:		0		
Mapped Spectral Response Acc. Parameter (Short Periods):	S_s =	1.840		(ASCE 7 §11.4.1)
Mapped Spectral Response Acc. Parameter (1 s Period):	S_1 =	0.700		(ASCE 7 §11.4.1)
Design Spectral Response Acc. Parameter (Short Periods):	S_{DS} =	1.300		(ASCE 7 §11.4.4)
Design Spectral Response Acc. Parameter (1 s Period):	S_{D1} =	1.380		(ASCE 7 §11.4.4)
Component Response Modification Factor:	R_p =	2.0		(TIA-222-I §16.7)
Component Amplification Factor:	a_p =	1.2		(TIA-222-I §2.7.9)
Overstrength Factor (req'd for anchorage to concrete):	Ω_o =	1.5		(TIA-222-I §2.7.10)
Lateral Seismic Design Force Weight Multiplier:	F_p/W =	0.975		(TIA-222-I §2.7.8)
Vertical Seismic Design Force Weight Multiplier:	F_v/W =	0.260		(TIA-222-I §2.7.8)
Unfactored X-Direction Seismic Design Force:	F_p,x =	1748	lb	(TIA-222-I §2.7.8)
Unfactored Z-Direction Seismic Design Force:	F_p,z =	1748	lb	(TIA-222-I §2.7.8)
Unfactored Vertical Seismic Design Force:	F_v =	466	lb	(TIA-222-I §2.7.8)
Total Factored (LRFD) X-Dir Seismic Design Force:	$1.0{*}F_p,x$ =	1748	lb	**Seismic Controls**
Total Factored (LRFD) Z-Dir Seismic Design Force:	$1.0{*}F_p,z$ =	1748	lb	**Seismic Controls**
Total Factored (LRFD) Vertical Seismic Design Force:	$1.0{*}F_v$ =	466	lb	

Ice Load, Di & Wi: (TIA-222-H, Section 2.6.10: Design Ice Thickness)

Does Ice Need to be Considered?:		No		
Design Ice Thickness:	t_i =	0	in	(ASCE 7 Online Hazard Tool Lookup - ASCE 7-22)

Live Loads, L:

Maintenance Load at Mount Pipe:	L_M =	500	lbs	(TIA-222-I, Section 16.3) - Apply at worst-case mount pipe
Maintenance Load at Center of Horizontal Beam:	L_V =	250	lbs	(TIA-222-I, Section 16.3) - Apply for beam supported at each end
Area Load:		N/A	psf	
Affected Area:		N/A	ft^2	

Snow Loads, S,:

Design Roof Snow Load:	S =	N/A	psf	(ASCE 7, Chapter 7)

Summary:

Vertical Loads Controlled By:	**"1.2 Dead + 1.5 LM" Load Combo**
X-Direction Horizontal Loads Controlled By:	**Seismic Load Combos**
Z-Direction Horizontal Loads Controlled By:	**Seismic Load Combos**

Demand Classification: M375R(175)-3[6] (Classification per TIA-5053-A)
Mount Manufacturer Classification: M1300R(1300)-4[6] (Classification per TIA-5053-A) (See attached manufacturer report)
Result: Mount is adequate to support the proposed design loading

JOB NO.: U1133.0725.261

PROJECT: SF Police Academy

DESIGN APPROACH: LRFD

Port Fatigue Checks Description: Upper Ports

Elevation AGL (ft): 90
Max axial load (k): 0.0
Max moment demand (k-ft): 7.9
Pole Dia (in): 20.275
Pole Thickness (in): 0.1875
Port Projection (in): 0.5

Location	$\phi_{fa}\Delta F_{TH}$ (ksi)	Ag (in^2)	I (in^4)	y (in)	Δf (ksi)	Check
Top, Pole	7	10.8	454.1	10.1	0.2	3%
Center, Pole & Port	16	13.4	562.9	10.6	0.1	1%
Bottom, Pole	7	10.8	454.1	10.1	0.2	3%

Result: Okay, adequate

Note: Using ultimate reactions *(1.0 Gh * 5 psf fatigue wind pressure)/(0.95 ultimate Gh * 29 psf ultimate wind pressure)

Port Fatigue Checks Description: Lower Ports

Elevation AGL (ft): 3
Max axial load (k): 0.0
Max moment demand (k-ft): 137.3
Pole Dia (in): 34.75
Pole Thickness (in): 0.1875
Port Projection (in): 0.5

Location	$\phi_{fa}\Delta F_{TH}$ (ksi)	Ag (in^2)	I (in^4)	y (in)	Δf (ksi)	Check
Top, Pole	7	20.4	3040	17.4	0.0	1%
Center, Pole & Port	16	24.7	4132	17.9	0.0	0%
Bottom, Pole	7	20.4	3040	17.4	0.0	1%

Result: Okay, adequate

Note: Conservativley using overturning moment from fatigue loads at base of monopole.

JOB NO.: U1133.0725.261

PROJECT: SF Police Academy

Anchor Fatigue Checks

Description: Foundation Anchors

Uplift (k):	0	
Overturning Moment (k-ft)	137.3	tnxTower Along-Wind Gust Tower Force Section
Number of anchors, n:	8	
Bolt Circle (in)	41.0	
Anchor correction factor, nc:	1.05	TIA-222-I Annex Q5.0
Max Anchor Tension (k):	21.1	
Anchor Dia. (in):	2	
Net Tensile A (in^2):	2.50	AISC Part 1, Table 7-17
Δf (ksi):	8.4	
$\phi_{fa}\Delta F_{TH}$ (ksi):	10	
Check	84%	

$$P_u = \left[\frac{(n_c)(\pi)(M_u)}{n(D_{BC})} + \frac{R_u}{n}\right]$$

Result: Okay, adequate

Note:

U-Bolt Fatigue Checks

Description: Site Pro 1 SP219 - Antenna mount pipe to cross arm

q_{wg} (psf):	5.0	
V (mph):	44.2	
Gh:	1	
Max EPA @ Antenna Mount Pipe (ft^2):	16.6	
U-bolt ends resisting:	8	
Tension per U-Bolt end, Fa (lb):	10.4	
U-Bolt Dia (in):	0.5	
Net Tensile A (in^2):	0.14	AISC Part 1, Table 7-17
Δf (ksi):	0.1	
$\phi_{fa}\Delta F_{TH}$ (ksi):	7	
Check	1%	

Result: Okay, adequate

Note:

JOB NO.: U1133.0725.261

PROJECT: SF Police Academy

U-Bolt Fatigue Checks Description: RMVD12 Dual T-arm Kit - Cross arm to standoff

q_{wg} (psf):	5.2	
V (mph):	44.9	
Gh:	1	
Max EPA per sector (ft^2):	41.5	
U-bolt ends resisting:	8	
Tension per U-Bolt end, Fa (lb):	26.8	
U-Bolt Dia (in):	0.625	
Net Tensile A (in^2):	0.23	AISC Part 1, Table 7-17
Δf (ksi):	0.1	
$\phi_{fa}\Delta F_{TH}$ (ksi):	7	
Check	2%	

Result: Okay, adequate

Note:

Bolt Fatigue Checks Description: RMVD12 Dual T-arm Kit - Cross arm to standoff

q_{wg} (psf):	5.2	
V (mph):	44.9	
Gh:	1	
Max EPA per sector (ft^2):	41.5	
Bolts:	8	
Tension per Bolt, Fa (lb):	26.8	
Bolt Dia (in):	0.5	
Net Tensile A (in^2):	0.14	AISC Part 1, Table 7-17
Δf (ksi):	0.2	
$\phi_{fa}\Delta F_{TH}$ (ksi):	7	
Check	3%	

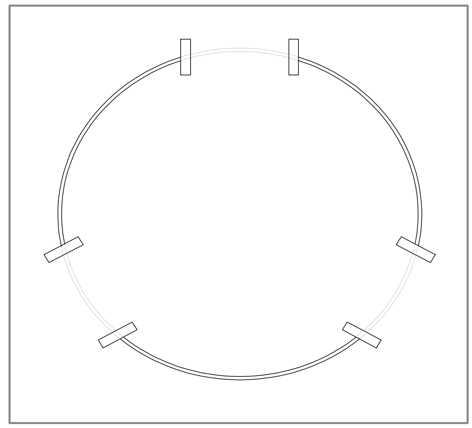
Result: Okay, adequate

Note:

JOB NO.: U1133.0725.261

PROJECT: SF POLICE ACADEMY

Port Design:



Label: Ports at 100 ft A.G.L.

Geometry Input

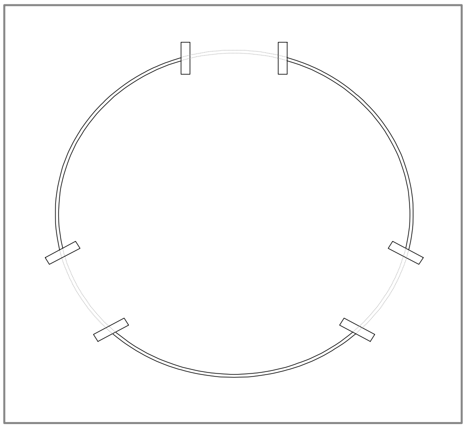
Elevation of Port, AGL	100.00	ft
Pole Diameter	18.525	in
Pole Thickness	0.1875	in
Pole Yield Strength	65	ksi
Pole Unit Tensile Strength	11.0	k/in
Weld Filler Strength:	70	ksi
Required Fillet Weld:	3/8	in
Reinforcing Rim Yield Strength	50	ksi
# of Ports	3	

	Port 1	Port 2	Port 3
Azimuth (°)	0	120	240
Height (in)	12	12	12
Width (in)	6	6	6
Depth (in)	2	2	2
Thickness (in)	0.5	0.5	0.5
Projection (in)	0.5	0.5	0.5
Reinforcing Area (in^2)	2	2	2
Pole Area Removed (in^2)	1.15	1.15	1.15
Dist. From Center to Reinf. (in)	8.7625	8.7625	8.7625
Area Check	**74.5%**	**74.5%**	**74.5%**
MOI Check	**78.0%**	**78.0%**	**78.0%**
Individual Port Weights (lbs)	10	10	10
Reduction in Pole Weight (lbs)	12		
Total Port Weight (lbs)	19		

JOB NO.: U1133.0725.261

PROJECT: SF POLICE ACADEMY

Port Design:



Label: Ports at 90 ft A.G.L.

Geometry Input

Elevation of Port, AGL	90.00	ft
Pole Diameter	20.275	in
Pole Thickness	0.1875	in
Pole Yield Strength	65	ksi
Pole Unit Tensile Strength	11.0	k/in
Weld Filler Strength:	70	ksi
Required Fillet Weld:	3/8	in
Reinforcing Rim Yield Strength	50	ksi
# of Ports	3	

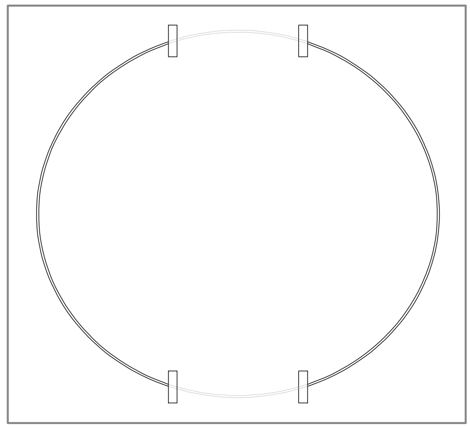
	Port 1	Port 2	Port 3
Azimuth (°)	0	120	240
Height (in)	12	12	12
Width (in)	6	6	6
Depth (in)	2	2	2
Thickness (in)	0.5	0.5	0.5
Projection (in)	0.5	0.5	0.5
Reinforcing Area (in^2)	2	2	2
Pole Area Removed (in^2)	1.14	1.14	1.14
Dist. From Center to Reinf. (in)	9.6375	9.6375	9.6375
Area Check	**74.3%**	**74.3%**	**74.3%**
MOI Check	**77.4%**	**77.4%**	**77.4%**
Individual Port Weights (lbs)	10	10	10
Reduction in Pole Weight (lbs)	12		
Total Port Weight (lbs)	19		

JOB NO.: U1133.0725.261

PROJECT: SF POLICE ACADEMY

Port Design:

Label: Ports at 3 ft A.G.L.



Geometry Input

Elevation of Port, AGL	3.00	ft
Pole Diameter	34.75	in
Pole Thickness	0.1875	in
Pole Yield Strength	65	ksi
Pole Unit Tensile Strength	11.0	k/in
Weld Filler Strength:	70	ksi
Required Fillet Weld:	3/8	in
Reinforcing Rim Yield Strength	50	ksi
# of Ports	2	

	Port 1	Port 2
Azimuth (°)	0	180
Height (in)	25	25
Width (in)	12	12
Depth (in)	3	3
Thickness (in)	0.75	0.75
Projection (in)	0.5	0.5
Reinforcing Area (in^2)	4.5	4.5
Pole Area Removed (in^2)	2.30	2.30
Dist. From Center to Reinf. (in)	16.375	16.375
Area Check	**66.4%**	**66.4%**
MOI Check	**70.1%**	**70.1%**
Individual Port Weights (lbs)	47	47
Reduction in Pole Weight (lbs)	33	
Total Port Weight (lbs)	62	

JOB NO.: U1133.0725.261

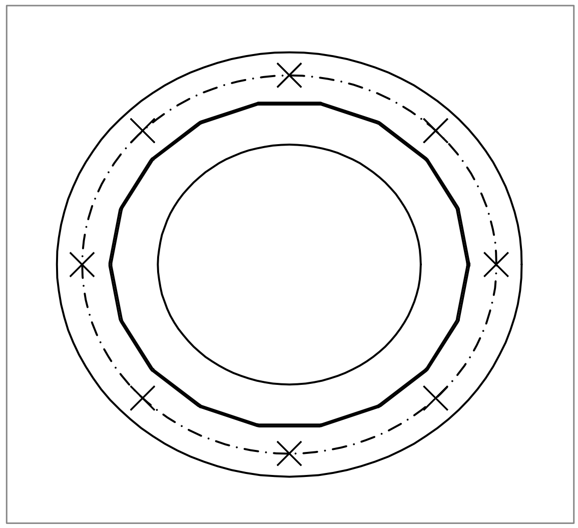
PROJECT: SF POLICE ACADEMY

Monopole Baseplate & Anchorage Design per TIA-222-H Annex Q & TIA-222-H Section 4.9.9

Basic Input & Geometry

Quantity	Symbol	Value	Units
Number of sides		18	
Flat O.D.	D_T	35.10	in
Pole wall thickness	t_T	0.1875	in
Pole yield strength	F_{yp}	65	ksi
Bend Radius		0.75	in
Base plate fillet weld size		0.25	in
Anchor diameter	d	2	in
Number of anchors	n	8	
Anchor grade		F1554-55	
Base plate thickness	t_{TP}	2	in
Base plate yield strength	F_{yf}	50	ksi
Anchor hole diameter		2.3125	in
Slotted to outside edge?		Yes	
Flat washer diameter		3.75	
Zinc drain hole diameter		2.3125	
Zinc drain circle		31	in
Bolt circle diameter	D_{BC}	41	in
Plate O.D.	D_{OD}	46	in
Plate I.D.		26	in

Base Plate Illustration



LRFD Loads

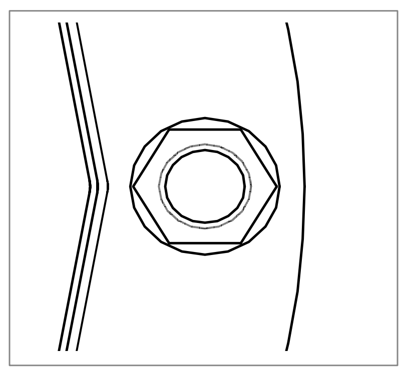
		Wind		Seismic	
Axial down	$R_{u,c}$	20.03	k	21.33	k
Axial up	$R_{u,t}$	0	k	0.00	k
Shear	V_u	9.64	k	5.35	k
Moment	M_u	798.22	k-ft	524.17	k-ft
Member mom. capacity	ΦM_n	871	k-ft		

Checks

Plate stress ratio	**66.4%**	OK	
Anchor unity check	**80.5%**	OK	
Min. number of sides	18	OK	6 minimum
Min. number of anchors	8	OK	8 minimum
Max. anchor rod to pole distance	2.83"	OK	12" maximum
Min. anchor diameter	2"	OK	0.75" minimum
Max. anchor rod spacing	16.1"	NG	12" maximum
Min. anchor rod spacing	15.69"	OK	6" minimum
Min. base plate thickness	2"	OK	1.75" minimum
Min. inside diameter	26"	OK	10.53" minimum
Max. inside diameter	26"	OK	30.75" maximum

Note: when number of anchors is less than minimum and when maximum anchor rod spacing is exceeded, adjustments are made to the effective plate width calculations as if requirements of TIA-222-H Annex Q were met.

Fit Check



Check:	Dist.	Result
Washer vs weld	0.4125	OK
Washer vs OD	0.4688	OK
Washer covers hole	0.5625	OK

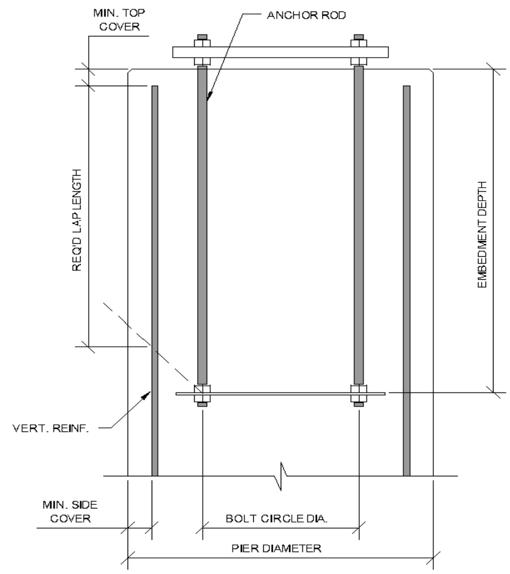
JOB NO.: U1133.0725.261

PROJECT: SF POLICE ACADEMY

Anchorage Embedment Design

(per ACI 318-19)

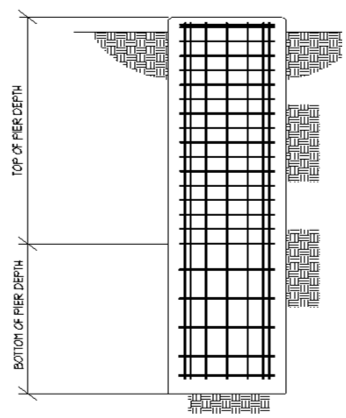
Vertical Bar Size:	#8	
# of Vertical Bars:	24	
Concrete Compressive Strength [psi]:	4000	
Pier Diameter [ft]:	5.5	
Pier Depth [ft]:	50	
Top of Pier Elevation [in]:	6	
Concrete Volume [yd^3]:	44.4	
Side Concrete Cover [in]:	4	
Top Concrete Cover [in]:	2	
Horizontal Tie Size:	#4	
Bolt Circle Diameter [in]:	41	
# of Anchor Rods:	8	
Anchor Rod Diameter [in]:	2.00	
ψ_t (bar location factor):	1.0	Table 25.4.2.4
ψ_e (epoxy coating factor):	1.0	Table 25.4.2.4
ψ_s (bar size factor):	1.0	Table 25.4.2.4
λ (concrete type factor):	1.0	Table 25.4.2.4
Vertical Bar Diameter [in]:	1.0	
Horizontal Tie Diameter [in]:	0.500	
Buffer [in]:	0.88	
Req'd Lap Length [in]:	37.0	in (Section 25.4.2.2)
Min. Req'd Embedment Depth [in]:	**46.5**	



Transverse Reinforcement Design

See IBC Sections 1810.3.9.4.1 and 1810.3.9.4.2

Seismic Design Category:	D
Apply Seismic Detailing?	Yes
Site Class:	D
Type of Transverse Reinforcement:	Spiral
Transverse f_{yt} [ksi]:	60
Seismic Hooks Required?	Yes
Tie Size OK?	Yes
Spacing at Top of Pier [in]:	3
Spacing at Bottom of Pier [in]:	12
Total Pier Length [ft]:	50.5
Top Pier Length [ft]:	16.5
Bottom Pier Length [ft]:	34



JOB NO.: U1133.0725.261

Project: SF POLICE ACADEMY

Drilled Pier Design:

Applied Loads:

Max. shear, V:	12.8	k
Max. moment, M:	1,064.3	k-ft
Max. down, P_{down}:	26.7	k
Max. uplift, P_{uplift}:	0.0	k

Design methodology:	LRFD
Maximum foundation rating:	100%

Pier Properties:

Pier shape	Round	
Pier diameter, b:	5.5	ft
Min. pier diameter, bmin (opt'l):	0.0	ft
b:	5.5	
Top of pier elevation:	0.5	ft
Pier depth, d:	50	ft
Min. pier depth, d_{min} (opt'l):	50.0	ft

Volume of concrete:	1200	ft^3
Volume of concrete:	44.4	yd^3
Weight of concrete:	180.0	k

Soil Properties & Analysis:

Allow. bearing pressure:	0	psf	F.S.: 1
Gross or net?	Net		
1/3 increase for short term loads?	No		
Skin friction (down):	500	psf	F.S.: 2
Skin friction (uplift):	300	psf	F.S.: 2
Top length to ignore:	2	ft	
1/3 increase for short term loads?	Yes		
Combine skin friction & end bearing?	Yes		
Bearing capacity:	1,105.8	k	
Uplift capacity:	825.5	k	

Results:

Bearing capacity OK.
Uplift capacity OK.

Lateral analysis in LPile

JOB NO.: U1133.0725.261

PROJECT: SF Police Academy

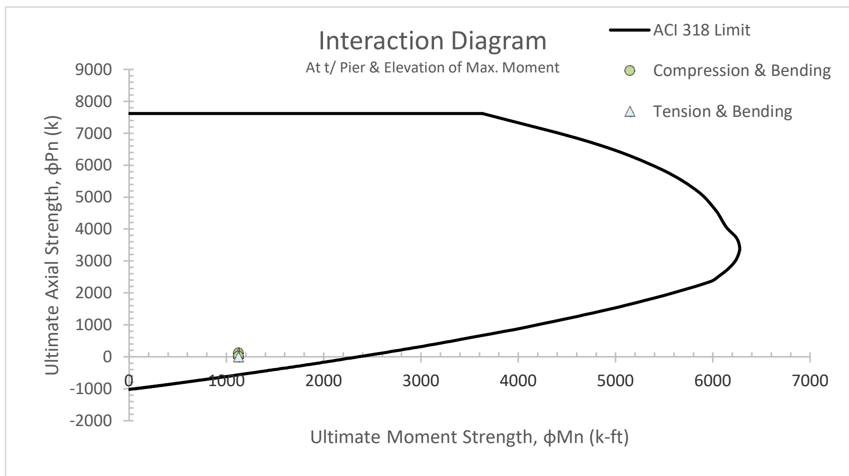
Drilled Pier Reinforcement:

Design Requirements:

Max. Moment, M (k-ft):	798.2	Max. Down, P_{down} (k):	20.0	Required Foundation UC Limit:	100%
Max. Shear, V (k):	9.6	Max. Uplift, P_{up} (k):	0.0	Mu, M+V*H+Pmax*E (k-ft):	1124.3
Height of V (ft):	33.833	Eccentricity for P (in):	0	(Uplift is negative for comparison w/ Interaction Diagram)	
		Concrete Self-weight (k):	116.6	(0.145 pcf)	

Pier Properties:

Code Reference:	ACI 318-19	
Pier Diameter (ft):	5.5	
Top of Pier Elevation (in):	6	
Pier Depth (ft):	50	
Vertical Bar Size:	#8	
Bar Diameter (in):	1	
Bar Area (in^2):	0.79	
Seismic Design Category:	D	
# of Vertical Bars:	24	
Vert. Yield Strength (psi):	60000	
Horizontal Reinf. Type:	Spiral	
Horizontal Reinf. Size:	#4	
Horizontal Reinf. Diameter (in):	0.5	
Side Concrete Cover (in):	4	
Vert. Edge Distance (in):	4.5	
Conc. Comp. Strength, f'c (psi):	4000	
Angle Between Bars, δ (radians):	0.262	
Area of Steel (in^2):	19.0	
Gross Column Area (in^2):	3421.2	
Min. Reinforcement Ratio:	0.50%	(IBC Sections 1810.3.9.4.1 and 1810.3.9.4.2)
β_1:	0.85	Table 22.2.2.4.3
Concrete Yield Strain, ε_{cu} (in/in):	0.003	Section 22.2.2.1
P_o (k):	12705	Eqn. 22.4.2.2
ϕ:	0.75	Table 21.2.2
Pn Factor:	0.80	Table 22.4.2.1
ϕP_u (pure compression, k):	7623	
Es (ksi):	29000	
Steel Yield Strain, ε_{ty} (in/in):	0.002069	Section 21.2.2.1
Number of verticals in top row:	1	



Axial & Bending Checks:

Steel/Concrete Ratio: 0.55% **> Min. Reinf. Ratio**

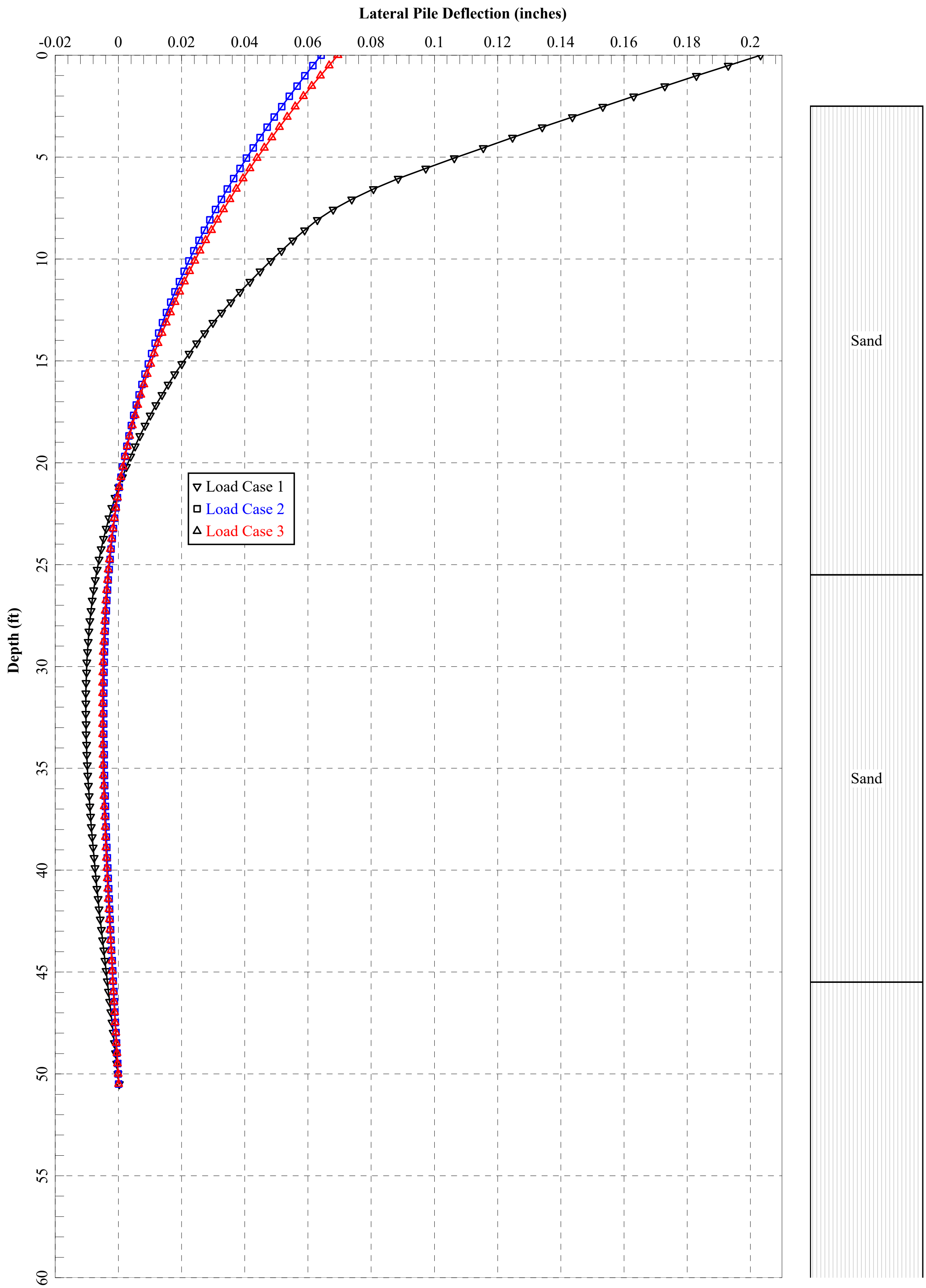
Compression & Bending

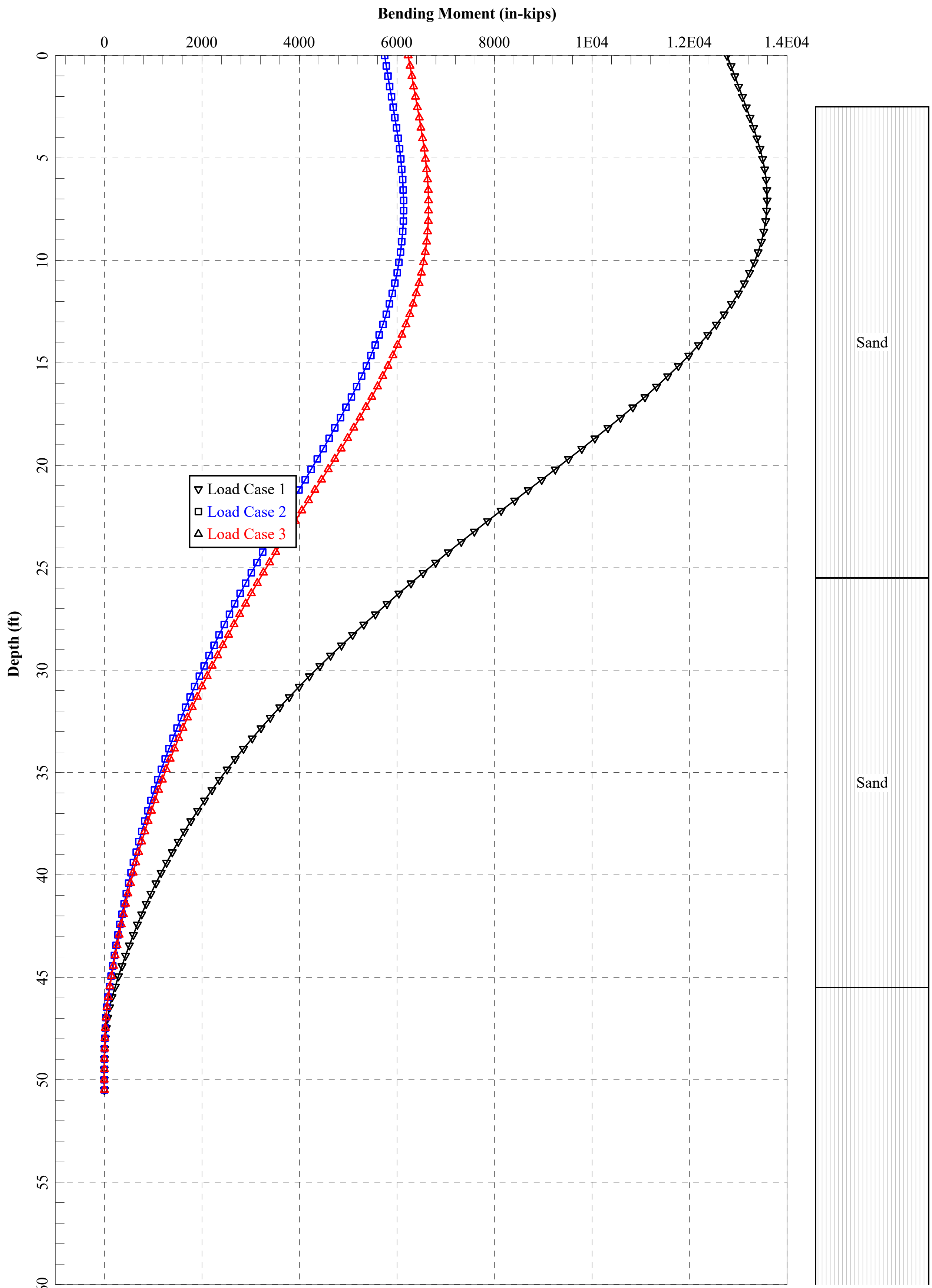
	@ t/ Pier	@ Max. M		
ϕPn (k):	15.0	119.9		
ϕMn (k-ft):	2390.0	2604.1		
UC:	47.0%	43.4%	**OK, Adequate**	$(Pu^2+Mu^2)^{0.5}/(\phi Pn^2+\phi Mn^2)^{0.5}$

Tension & Bending

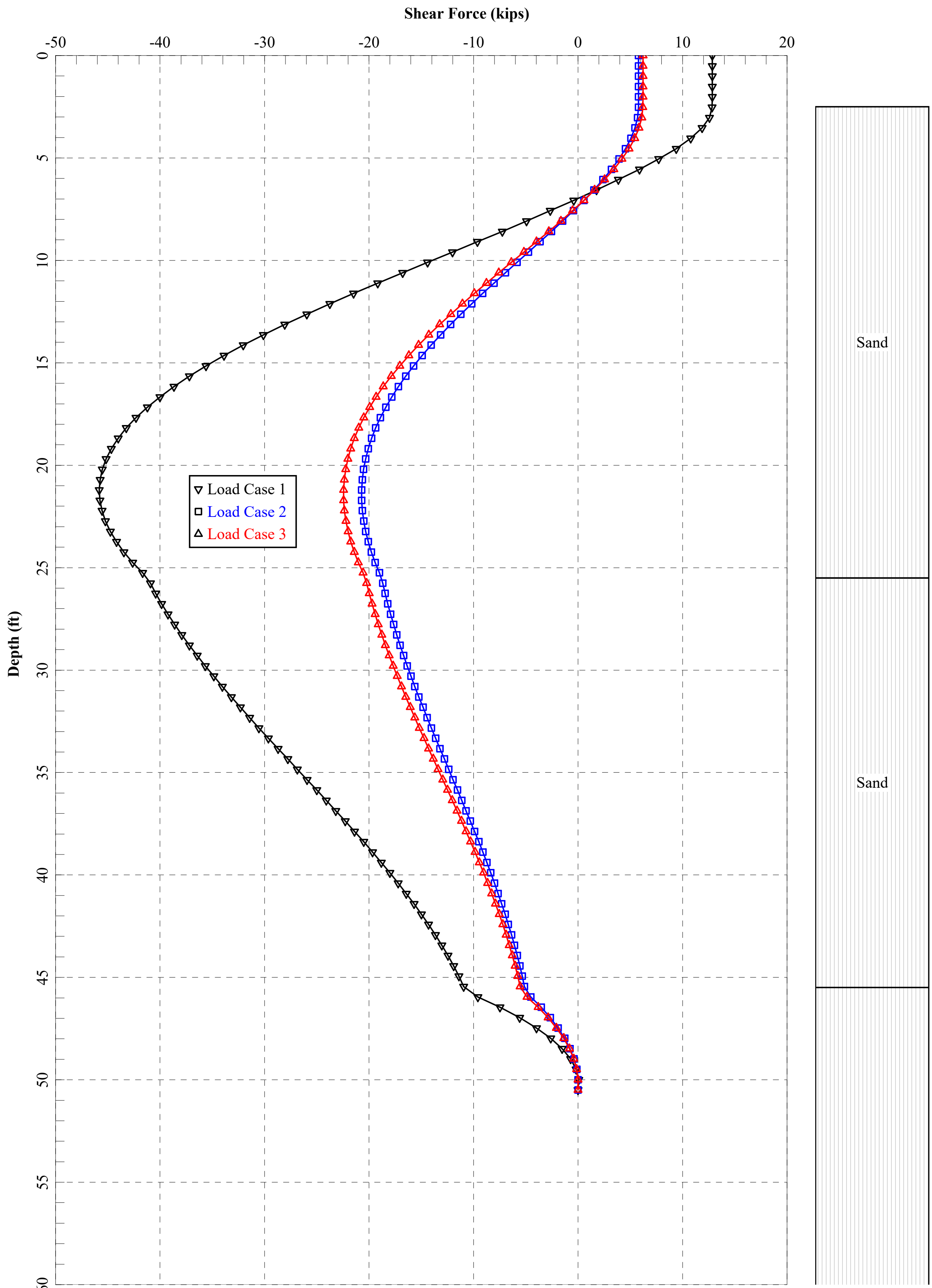
	@ t/ Pier	@ Max. M		
ϕPn (k):	0.0	104.9		
ϕMn (k-ft):	2359.0	2573.6		
UC:	47.7%	43.8%	**OK, Adequate**	$(Pu^2+Mu^2)^{0.5}/(\phi Pn^2+\phi Mn^2)^{0.5}$

LOAD CASE 1: LRFD LOADS/0.75; DEFLECTION LIMIT ~ 6"
LOAD CASE 2: ASD LOADS; DEFLECTION LIMIT = 1"
LOAD CASE 3: SERVICE LOADS * 2.0 F.S.; DEFLECTION LIMIT = 3/4"





Bending Moment (in-kips)
0
2000
4000
6000
8000
1E04
1.2E04
1.4E04
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
Load Case 1
Load Case 2
Load Case 3
Sand
Sand


Shear Force (kips)
-50
-40
-30
-20
-10
0
10
20
Depth (ft)
0
5
10
15
20
25
30
35
40
45
50
55
60
Load Case 1
Load Case 2
Load Case 3
Sand
Sand

```
==============================================================================

                     LPile for Windows, Version 2019-11.001

                 Analysis of Individual Piles and Drilled Shafts
                Subjected to Lateral Loading Using the p-y Method
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==============================================================================

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------------------------------------------------------------------------------
                             Files Used for Analysis
------------------------------------------------------------------------------

Path to file locations:
\\VSEFILES.vector.local\Projects\2026 Projects\U1133 Steelhead Metal & Fab LLC\U1133-0725-261
SF Police Academy (CA, monopole rev I)\ENG\

Name of input data file:
lpileInputFile.lp11

Name of output report file:
lpileInputFile.lp11

Name of plot output file:
lpileInputFile.lp11

Name of runtime message file:
lpileInputFile.lp11


------------------------------------------------------------------------------
                            Date and Time of Analysis
------------------------------------------------------------------------------

               Date:  January 28, 2026           Time:  14:33:52


------------------------------------------------------------------------------
```

```
                                  Problem Title
------------------------------------------------------------------------------

Project Name: SF Police Academy


Job Number: U1133.0725.261


Client: Steelhead Metal & Fab LLC


Engineer: Draper


Description:




------------------------------------------------------------------------------
                          Program Options and Settings
------------------------------------------------------------------------------

Computational Options:
 - Use unfactored loads in computations (conventional analysis)
Engineering Units Used for Data Input and Computations:
 - US Customary System Units (pounds, feet, inches)

Analysis Control Options:
 - Maximum number of iterations allowed                =         500
 - Deflection tolerance for convergence                =   1.0000E-05 in
 - Maximum allowable deflection                        =     100.0000 in
 - Number of pile increments                           =         100

Loading Type and Number of Cycles of Loading:
 - Static loading specified

 - Use of p-y modification factors for p-y curves not selected
 - Analysis uses layering correction (Method of Georgiadis)
 - No distributed lateral loads are entered
 - Loading by lateral soil movements acting on pile not selected
 - Input of shear resistance at the pile tip not selected
 - Input of moment resistance at the pile tip not selected
 - Computation of pile-head foundation stiffness matrix not selected
 - Push-over analysis of pile not selected
 - Buckling analysis of pile not selected

Output Options:
 - Output files use decimal points to denote decimal symbols.
 - Values of pile-head deflection, bending moment, shear force, and
   soil reaction are printed for full length of pile.
 - Printing Increment (nodal spacing of output points) = 1
 - No p-y curves to be computed and reported for user-specified depths
 - Print using wide report formats
```

Pile Structural Properties and Geometry

Number of pile sections defined = 1
Total length of pile = 50.500 ft
Depth of ground surface below top of pile = 2.5000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	66.0000
2	50.500	66.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is a round drilled shaft, bored pile, or CIDH pile
Length of section = 50.500000 ft
Shaft Diameter = 66.000000 in
Shear capacity of section = 0.0000 lbs

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 3 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 2.500000 ft
Distance from top of pile to bottom of layer = 25.500000 ft
Effective unit weight at top of layer = 130.000000 pcf
Effective unit weight at bottom of layer = 130.000000 pcf
Friction angle at top of layer = 31.000000 deg.
Friction angle at bottom of layer = 31.000000 deg.
Subgrade k at top of layer = 90.000000 pci
Subgrade k at bottom of layer = 90.000000 pci

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 25.500000 ft
Distance from top of pile to bottom of layer = 45.500000 ft
Effective unit weight at top of layer = 130.000000 pcf
Effective unit weight at bottom of layer = 130.000000 pcf
Friction angle at top of layer = 40.000000 deg.
Friction angle at bottom of layer = 40.000000 deg.
Subgrade k at top of layer = 40.000000 pci
Subgrade k at bottom of layer = 40.000000 pci

Layer 3 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 45.500000 ft
Distance from top of pile to bottom of layer = 85.500000 ft
Effective unit weight at top of layer = 130.000000 pcf
Effective unit weight at bottom of layer = 130.000000 pcf
Friction angle at top of layer = 43.000000 deg.
Friction angle at bottom of layer = 43.000000 deg.
Subgrade k at top of layer = 225.000000 pci
Subgrade k at bottom of layer = 225.000000 pci

(Depth of the lowest soil layer extends 35.000 ft below the pile tip)

Summary of Input Soil Properties

Layer Num.	Soil Type Name (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Angle of Friction deg.	kpy pci
1	Sand	2.5000	130.0000	31.0000	90.0000
	(Reese, et al.)	25.5000	130.0000	31.0000	90.0000
2	Sand	25.5000	130.0000	40.0000	40.0000
	(Reese, et al.)	45.5000	130.0000	40.0000	40.0000
3	Sand	45.5000	130.0000	43.0000	225.0000
	(Reese, et al.)	85.5000	130.0000	43.0000	225.0000

Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 3

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length
1	1	V = 12849. lbs	M = 12771456. in-lbs	26701.	No
2	1	V = 5782. lbs	M = 5747155. in-lbs	16688.	No
3	1	V = 6210. lbs	M = 6231168. in-lbs	28916.	No

V = shear force applied normal to pile axis
M = bending moment applied to pile head
y = lateral deflection normal to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applied to pile head
Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).
Thrust force is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

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Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	50.500000 ft
Shaft Diameter	=	66.000000 in
Concrete Cover Thickness (to edge of long. rebar)	=	4.500000 in
Number of Reinforcing Bars	=	24 bars
Yield Stress of Reinforcing Bars	=	60000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Shaft	=	3421. sq. in.
Total Area of Reinforcing Steel	=	18.960000 sq. in.
Area Ratio of Steel Reinforcement	=	0.55 percent
Edge-to-Edge Bar Spacing	=	6.309467 in
Maximum Concrete Aggregate Size	=	0.750000 in
Ratio of Bar Spacing to Aggregate Size	=	8.41
Offset of Center of Rebar Cage from Center of Pile	=	0.0000 in

Axial Structural Capacities:

Nom. Axial Structural Capacity = 0.85 Fc Ac + Fy As	=	12705.197 kips
Tensile Load for Cracking of Concrete	=	-1478.457 kips
Nominal Axial Tensile Capacity	=	-1137.600 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
1	1.000000	0.790000	28.000000	0.00000
2	1.000000	0.790000	27.045923	7.246933
3	1.000000	0.790000	24.248711	14.000000
4	1.000000	0.790000	19.798990	19.798990
5	1.000000	0.790000	14.000000	24.248711
6	1.000000	0.790000	7.246933	27.045923
7	1.000000	0.790000	0.00000	28.000000
8	1.000000	0.790000	-7.246933	27.045923
9	1.000000	0.790000	-14.000000	24.248711
10	1.000000	0.790000	-19.798990	19.798990
11	1.000000	0.790000	-24.248711	14.000000
12	1.000000	0.790000	-27.045923	7.246933
13	1.000000	0.790000	-28.000000	0.00000
14	1.000000	0.790000	-27.045923	-7.246933
15	1.000000	0.790000	-24.248711	-14.000000
16	1.000000	0.790000	-19.798990	-19.798990
17	1.000000	0.790000	-14.000000	-24.248711
18	1.000000	0.790000	-7.246933	-27.045923
19	1.000000	0.790000	0.00000	-28.000000
20	1.000000	0.790000	7.246933	-27.045923
21	1.000000	0.790000	14.000000	-24.248711
22	1.000000	0.790000	19.798990	-19.798990
23	1.000000	0.790000	24.248711	-14.000000
24	1.000000	0.790000	27.045923	-7.246933

NOTE: The positions of the above rebars were computed by LPile

Minimum spacing between any two bars not equal to zero = 6.309 inches between bars 15 and 16.

Ratio of bar spacing to maximum aggregate size = 8.41

Concrete Properties:

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Compressive Strength of Concrete                       =       4000. psi
Modulus of Elasticity of Concrete                      =    3604997. psi
Modulus of Rupture of Concrete                         =  -474.341649 psi
Compression Strain at Peak Stress                      =    0.001886
Tensile Strain at Fracture of Concrete                 =   -0.0001154
Maximum Coarse Aggregate Size                          =    0.750000 in
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Number of Axial Thrust Force Values Determined from Pile-head Loadings = 3

Number	Axial Thrust Force kips
1	16.688
2	26.701
3	28.916

Definitions of Run Messages and Notes:

C = concrete in section has cracked in tension.
Y = stress in reinforcing steel has reached yield stress.
T = ACI 318 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in concrete more than 0.003. See ACI 318, Section 10.3.4.
Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
Position of neutral axis is measured from edge of compression side of pile.
Compressive stresses and strains are positive in sign.
Tensile stresses and strains are negative in sign.

Axial Thrust Force =   16.688 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in2	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in	Max Conc Stress ksi	Max Steel Stress ksi	Run Msg
4.16667E-07	1719.	4125032485.	35.6818172	0.00001487	-0.00001263	0.0622282	0.3793178	
8.33333E-07	3430.	4115416357.	34.3449369	0.00002862	-0.00002638	0.1193160	0.7263276	
0.00000125	5132.	4105746779.	33.8993292	0.00004237	-0.00004013	0.1759871	1.0733382	
0.00000167	6827.	4096063804.	33.6765381	0.00005613	-0.00005387	0.2322415	1.4203493	
0.00000208	8513.	4086375466.	33.5428734	0.00006988	-0.00006762	0.2880790	1.7673611	
0.00000250	10192.	4076684446.	33.4537721	0.00008363	-0.00008137	0.3434998	2.1143735	
0.00000292	11862.	4066991894.	33.3901355	0.00009739	-0.00009511	0.3985039	2.4613865	
0.00000333	13524.	4057298384.	33.3424145	0.0001111	-0.0001089	0.4530912	2.8084001	
0.00000375	13524.	3606487452.	14.8037683	0.00005551	-0.0001920	0.2268846	-5.1010527	C
0.00000417	13524.	3245838707.	14.6530710	0.00006105	-0.0002139	0.2491068	-5.6860456	C
0.00000458	13524.	2950762461.	14.5303800	0.00006660	-0.0002359	0.2712747	-6.2709578	C
0.00000500	13524.	2704865589.	14.4286950	0.00007214	-0.0002579	0.2933884	-6.8557892	C
0.00000542	13524.	2496799005.	14.3431698	0.00007769	-0.0002798	0.3154476	-7.4405396	C
0.00000583	13524.	2318456219.	14.2703428	0.00008324	-0.0003018	0.3374523	-8.0252087	C
0.00000625	13524.	2163892471.	14.2076757	0.00008880	-0.0003237	0.3594025	-8.6097963	C
0.00000667	13524.	2028649192.	14.1511954	0.00009434	-0.0003457	0.3812425	-9.1947022	C
0.00000708	13524.	1909316886.	14.1008978	0.00009988	-0.0003676	0.4030036	-9.7797031	C
0.00000750	13524.	1803243726.	14.0565822	0.0001054	-0.0003896	0.4247109	-10.3646183	C
0.00000792	13524.	1708336162.	14.0173052	0.0001110	-0.0004115	0.4463643	-10.9494478	C
0.00000833	13524.	1622919353.	13.9823119	0.0001165	-0.0004335	0.4679638	-11.5341913	C
0.00000875	13524.	1545637480.	13.9509913	0.0001221	-0.0004554	0.4895092	-12.1188484	C
0.00000917	13524.	1475381230.	13.9228435	0.0001276	-0.0004774	0.5110006	-12.7034191	C
0.00000958	13524.	1411234220.	13.8974555	0.0001332	-0.0004993	0.5324378	-13.2879030	C
0.00001000	13524.	1352432795.	13.8744832	0.0001387	-0.0005213	0.5538207	-13.8722998	C
0.00001042	13524.	1298335483.	13.8536376	0.0001443	-0.0005432	0.5751493	-14.4566098	C
0.00001083	13524.	1248399503.	13.8346739	0.0001499	-0.0005651	0.5964235	-15.0408319	C
0.00001125	13524.	1202162484.	13.8173838	0.0001554	-0.0005871	0.6176432	-15.6249662	C
0.00001167	13524.	1159228110.	13.8015888	0.0001610	-0.0006090	0.6388084	-16.2090126	C
0.00001208	13524.	1119254727.	13.7871350	0.0001666	-0.0006309	0.6599189	-16.7929708	C
0.00001250	13524.	1081946236.	13.7738888	0.0001722	-0.0006528	0.6809747	-17.3768405	C
0.00001292	13524.	1047044744.	13.7617340	0.0001778	-0.0006747	0.7019757	-17.9606214	C
0.00001333	13524.	1014324596.	13.7505691	0.0001833	-0.0006967	0.7229219	-18.5443134	C
0.00001375	13524.	983587487.	13.7403047	0.0001889	-0.0007186	0.7438131	-19.1279161	C
0.00001417	13524.	954658443.	13.7308619	0.0001945	-0.0007405			

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0.7646492   -19.7114293 C
   0.00001458        13524.    927382488.    13.7221709     0.0002001    -0.0007624
0.7854303   -20.2948528 C
   0.00001500        13524.    901621863.    13.7141697     0.0002057    -0.0007843
0.8061561   -20.8781862 C
   0.00001542        13524.    877253705.    13.7068029     0.0002113    -0.0008062
0.8268267   -21.4614294 C
   0.00001583        13524.    854168081.    13.7000209     0.0002169    -0.0008281
0.8474420   -22.0445821 C
   0.00001625        13524.    832266335.    13.6937794     0.0002225    -0.0008500
0.8680017   -22.6276440 C
   0.00001708        13524.    791667977.    13.6827618     0.0002337    -0.0008938
0.9089547   -23.7934944 C
   0.00001792        13524.    754846211.    13.6734741     0.0002450    -0.0009375
0.9496849   -24.9589784 C
   0.00001875        13524.    721297490.    13.6656897     0.0002562    -0.0009813
0.9901918   -26.1240938 C
   0.00001958        13524.    690603980.    13.6592205     0.0002675    -0.0010250
1.0304746   -27.2888386 C
   0.00002042        13524.    662416063.    13.6539091     0.0002788    -0.0010687
1.0705327   -28.4532105 C
   0.00002125        13524.    636438962.    13.6496230     0.0002901    -0.0011124
1.1103654   -29.6172073 C
   0.00002208        13524.    612422398.    13.6462495     0.0003014    -0.0011561
1.1499720   -30.7808269 C
   0.00002292        13524.    590152492.    13.6436925     0.0003127    -0.0011998
1.1893518   -31.9440668 C
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1.2285042   -33.1069249 C
   0.00002458        13524.    550142154.    13.6407088     0.0003353    -0.0012872
1.2674283   -34.2693988 C
   0.00002542        13524.    532104706.    13.6401487     0.0003467    -0.0013308
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   0.00002625        13709.    522247437.    13.6401350     0.0003581    -0.0013744
1.3445893   -36.5931847 C
   0.00002708        14129.    521677795.    13.6406204     0.0003694    -0.0014181
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   0.00002792        14548.    521130674.    13.6415631     0.0003808    -0.0014617
1.4208291   -38.9154053 C
   0.00002875        14967.    520604056.    13.6429263     0.0003922    -0.0015053
1.4586016   -40.0759226 C
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1.5334485   -42.3957589 C
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   0.00004208        21628.    513937748.    13.7032715     0.0005767    -0.0022008
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   0.00004292        22042.    513590385.    13.7087218     0.0005883    -0.0022442
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   0.00004375        22451.    513156128.    13.7135273     0.0006000    -0.0022875
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   0.00004458        22813.    511687650.    13.7094288     0.0006112    -0.0023313
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   0.00004542        23118.    509014651.    13.6946995     0.0006220    -0.0023755
2.1601161   -60.0000000 CY
   0.00004625        23403.    506019015.    13.6770606     0.0006326    -0.0024199
2.1896851   -60.0000000 CY
   0.00004708        23685.    503036428.    13.6594660     0.0006431    -0.0024644
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   0.00004792        23928.    499370421.    13.6353289     0.0006534    -0.0025091
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2.3006341   -60.0000000 CY
   0.00005292        25143.    475141884.    13.4618801     0.0007124    -0.0027801
2.4043073   -60.0000000 CY
   0.00005625        25711.    457076478.    13.3145631     0.0007489    -0.0029636
2.4979504   -60.0000000 CY
   0.00005958        26272.    440923708.    13.1849890     0.0007856    -0.0031469
2.5889510   -60.0000000 CY
   0.00006292        26722.    424727753.    13.0481550     0.0008209    -0.0033316
2.6738854   -60.0000000 CY
   0.00006625        27079.    408732478.    12.9078912     0.0008551    -0.0035174
2.7534873   -60.0000000 CY
   0.00006958        27431.    394214767.    12.7759290     0.0008890    -0.0037035
2.8298056   -60.0000000 CY
   0.00007292        27781.    380992497.    12.6549023     0.0009228    -0.0038897
2.9035306   -60.0000000 CY
   0.00007625        28067.    368097666.    12.5314440     0.0009555    -0.0040770
2.9727253   -60.0000000 CY
   0.00007958        28273.    355266360.    12.4014741     0.0009870    -0.0042655
3.0368757   -60.0000000 CY
   0.00008292        28478.    343455164.    12.2830774     0.0010185    -0.0044540
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3.1590038   -60.0000000 CY
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3.2159925   -60.0000000 CY
   0.00009292        29078.    312948989.    11.9650689     0.0011118    -0.0050207
3.2711523   -60.0000000 CY
   0.00009625        29276.    304161106.    11.8738930     0.0011429    -0.0052096
3.3244662   -60.0000000 CY
   0.00009958        29423.    295462322.    11.7770971     0.0011728    -0.0053997
3.3737978   -60.0000000 CY
    0.0001029        29531.    286941121.    11.6773632     0.0012018    -0.0055907
3.4197294   -60.0000000 CY
    0.0001063        29638.    278948397.    11.5846711     0.0012309    -0.0057816
3.4640411   -60.0000000 CY
    0.0001096        29742.    271413549.    11.4932589     0.0012595    -0.0059730
3.5058810   -60.0000000 CY
    0.0001129        29844.    264304204.    11.4047456     0.0012878    -0.0061647
3.5456179   -60.0000000 CY
    0.0001163        29946.    257597349.    11.3220174     0.0013162    -0.0063563
3.5838020   -60.0000000 CY
    0.0001196        30046.    251259278.    11.2445983     0.0013447    -0.0065478
3.6204194   -60.0000000 CY
    0.0001229        30147.    245259917.    11.1720643     0.0013732    -0.0067393
3.6554559   -60.0000000 CY
    0.0001263        30246.    239572366.    11.1040365     0.0014019    -0.0069306
3.6888972   -60.0000000 CY
    0.0001296        30345.    234172490.    11.0401749     0.0014306    -0.0071219
3.7207285   -60.0000000 CY
    0.0001329        30443.    229038577.    10.9801742     0.0014594    -0.0073131
3.7509348   -60.0000000 CY
    0.0001363        30541.    224151034.    10.9237589     0.0014884    -0.0075041
3.7795009   -60.0000000 CY
    0.0001396        30614.    219324125.    10.8610507     0.0015160    -0.0076965
3.8051550   -60.0000000 CY
    0.0001429        30675.    214638137.    10.7949259     0.0015428    -0.0078897
3.8284280   -60.0000000 CY
    0.0001462        30721.    210061524.    10.7274636     0.0015689    -0.0080836
3.8496984   -60.0000000 CY
    0.0001496        30767.    205686102.    10.6635175     0.0015951    -0.0082774
3.8696201   -60.0000000 CY
    0.0001529        30813.    201498674.    10.6028632     0.0016214    -0.0084711
3.8881806   -60.0000000 CY
    0.0001562        30857.    197487167.    10.5452954     0.0016477    -0.0086648
3.9053676   -60.0000000 CY
    0.0001596        30902.    193640518.    10.4906261     0.0016741    -0.0088584
3.9211681   -60.0000000 CY
    0.0001629        30946.    189948568.    10.4386828     0.0017006    -0.0090519
3.9355693   -60.0000000 CY
    0.0001662        30989.    186401970.    10.3893072     0.0017272    -0.0092453
3.9485579   -60.0000000 CY
    0.0001696        31032.    182992115.    10.3423534     0.0017539    -0.0094386
3.9601206   -60.0000000 CY
    0.0001729        31075.    179711052.    10.2976870     0.0017806    -0.0096319
3.9702435   -60.0000000 CY
    0.0001762        31117.    176551436.    10.2551840     0.0018075    -0.0098250
3.9789127   -60.0000000 CY
    0.0001796        31158.    173501492.    10.2126789     0.0018340    -0.0100185
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3.9860218   -60.0000000 CY
    0.0001829        31197.    170552495.    10.1689451     0.0018601    -0.0102124
3.9915759   -60.0000000 CY
    0.0002029        31421.    154844937.     9.9462062     0.0020183    -0.0113742
3.9946619   -60.0000000 CY
    0.0002229        31611.    141808168.     9.7722217     0.0021784    -0.0125341
3.9935590   -60.0000000 CY
    0.0002429        31709.    130536292.     9.6072805     0.0023338    -0.0136987
3.9854818   -60.0000000 CY
    0.0002629        31773.    120846802.     9.4513875     0.0024849    -0.0148676
3.9999153   -60.0000000 CY
    0.0002829        31826.    112491953.     9.3210165     0.0026371    -0.0160354
3.9910022   -60.0000000 CY
    0.0003029        31875.    105225432.     9.2139453     0.0027911    -0.0172014
3.9983934   -60.0000000 CY
    0.0003229        31917.     98840451.     9.1273708     0.0029474    -0.0183651
3.9861289   -60.0000000 CY
    0.0003429        31957.     93191453.     9.0551020     0.0031051    -0.0195274
3.9992451   -60.0000000 CYT
    0.0003629        31992.     88152577.     8.9963473     0.0032649    -0.0206876
3.9807916   -60.0000000 CYT
    0.0003829        32024.     83632759.     8.9474130     0.0034261    -0.0218464
3.9881033   -60.0000000 CYT
    0.0004029        32054.     79555865.     8.9053816     0.0035881    -0.0230044
3.9992011   -60.0000000 CYT
    0.0004229        32080.     75853530.     8.8635553     0.0037485    -0.0241640
3.9849628   -60.0000000 CYT
    0.0004429        32101.     72477473.     8.8269306     0.0039096    -0.0253229
3.9678478   -60.0000000 CYT


Axial Thrust Force =     26.701 kips

    Bending       Bending       Bending      Depth to      Max Comp      Max Tens       Max
Conc      Max Steel  Run
   Curvature      Moment       Stiffness      N Axis       Strain        Strain
Stress        Stress    Msg
    rad/in.       in-kip        kip-in2         in          in/in         in/in          ksi
         ksi
------------- ------------- ------------- ------------- ------------- -------------
------------- ------------- ---
  4.16667E-07         1719.   4124782891.    37.2909811    0.00001554   -0.00001196
0.0650492     0.3987619
  8.33333E-07         3429.   4115290261.    35.1519071    0.00002929   -0.00002571
0.1221248     0.7458294
   0.00000125         5132.   4105662141.    34.4389202    0.00004305   -0.00003945
0.1787836     1.0928984
   0.00000167         6827.   4095999922.    34.0824484    0.00005680   -0.00005320
0.2350256     1.4399683
   0.00000208         8513.   4086324047.    33.8685821    0.00007056   -0.00006694
0.2908508     1.7870393
   0.00000250        10192.   4076641334.    33.7260179    0.00008432   -0.00008068
0.3462592     2.1341113
   0.00000292        11862.   4066954714.    33.6241979    0.00009807   -0.00009443
0.4012507     2.4811842
   0.00000333        13524.   4057265651.    33.5478431     0.0001118    -0.0001082
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0.4558254     2.8282582
   0.00000375        13524.   3606458356.    15.6823973    0.00005881    -0.0001887
0.2404444    -5.0055018 C
   0.00000417        13524.   3245812521.    15.4604923    0.00006442    -0.0002106
0.2629110    -5.5884822 C
   0.00000458        13524.   2950738655.    15.2721953    0.00007000    -0.0002325
0.2851841    -6.1723582 C
   0.00000500        13524.   2704843767.    15.1158245    0.00007558    -0.0002544
0.3074017    -6.7561554 C
   0.00000542        13524.   2496778862.    14.9840138    0.00008116    -0.0002763
0.3295637    -7.3398737 C
   0.00000583        13524.   2318437515.    14.8715012    0.00008675    -0.0002982
0.3516701    -7.9235127 C
   0.00000625        13524.   2163875014.    14.7703297    0.00009231    -0.0003202
0.3736173    -8.5078152 C
   0.00000667        13524.   2028632825.    14.6812093    0.00009787    -0.0003421
0.3954823    -9.0922329 C
   0.00000708        13524.   1909301483.    14.6029736     0.0001034    -0.0003641
0.4172926    -9.6765683 C
   0.00000750        13524.   1803229178.    14.5338096     0.0001090    -0.0003860
0.4390480   -10.2608214 C
   0.00000792        13524.   1708322379.    14.4722859     0.0001146    -0.0004079
0.4607486   -10.8449918 C
   0.00000833        13524.   1622906260.    14.4172572     0.0001201    -0.0004299
0.4823941   -11.4290795 C
   0.00000875        13524.   1545625010.    14.3677965     0.0001257    -0.0004518
0.5039847   -12.0130841 C
   0.00000917        13524.   1475369328.    14.3231455     0.0001313    -0.0004737
0.5255201   -12.5970055 C
   0.00000958        13524.   1411222835.    14.2826775     0.0001369    -0.0004956
0.5470004   -13.1808433 C
   0.00001000        13524.   1352421884.    14.2458705     0.0001425    -0.0005175
0.5684254   -13.7645975 C
   0.00001042        13524.   1298325008.    14.2122858     0.0001480    -0.0005395
0.5897950   -14.3482678 C
   0.00001083        13524.   1248389431.    14.1810715     0.0001536    -0.0005614
0.6110889   -14.9320050 C
   0.00001125        13524.   1202152785.    14.1512656     0.0001592    -0.0005833
0.6322765   -15.5160371 C
   0.00001167        13524.   1159218757.    14.1238498     0.0001648    -0.0006052
0.6534095   -16.0999808 C
   0.00001208        13524.   1119245697.    14.0985774     0.0001704    -0.0006271
0.6744878   -16.6838360 C
   0.00001250        13524.   1081937507.    14.0752350     0.0001759    -0.0006491
0.6955113   -17.2676023 C
   0.00001292        13524.   1047036297.    14.0536363     0.0001815    -0.0006710
0.7164799   -17.8512795 C
   0.00001333        13524.   1014316413.    14.0336185     0.0001871    -0.0006929
0.7373936   -18.4348675 C
   0.00001375        13524.    983579552.    14.0150386     0.0001927    -0.0007148
0.7582523   -19.0183658 C
   0.00001417        13524.    954650741.    13.9977704     0.0001983    -0.0007367
0.7790558   -19.6017747 C
   0.00001458        13524.    927375006.    13.9817019     0.0002039    -0.0007586
0.7998042   -20.1850930 C
   0.00001500        13524.    901614589.    13.9667339     0.0002095    -0.0007805
0.8204974   -20.7683210 C
   0.00001542        13524.    877246627.    13.9527777     0.0002151    -0.0008024
0.8411352   -21.3514584 C
   0.00001583        13524.    854161190.    13.9397539     0.0002207    -0.0008243
0.8617176   -21.9345049 C
   0.00001625        13524.    832259621.    13.9275914     0.0002263    -0.0008462
0.8822444   -22.5174602 C
   0.00001708        13524.    791661590.    13.9056005     0.0002376    -0.0008899
0.9231313   -23.6830962 C
   0.00001792        13524.    754840121.    13.8863631     0.0002488    -0.0009337
0.9637952   -24.8483646 C
   0.00001875        13524.    721291671.    13.8695161     0.0002601    -0.0009774
1.0042354   -26.0132631 C
   0.00001958        13524.    690598409.    13.8547582     0.0002713    -0.0010212
1.0444512   -27.1777899 C
   0.00002042        13524.    662410718.    13.8418373     0.0002826    -0.0010649
1.0844421   -28.3419417 C
   0.00002125        13524.    636433828.    13.8305409     0.0002939    -0.0011086
1.1242073   -29.5057170 C
   0.00002208        13524.    612417457.    13.8206886     0.0003052    -0.0011523
1.1637460   -30.6691134 C
   0.00002292        13524.    590147731.    13.8121264     0.0003165    -0.0011960
1.2030577   -31.8321287 C
   0.00002375        13524.    569440793.    13.8047217     0.0003279    -0.0012396
1.2421416   -32.9947606 C
   0.00002458        13524.    550137715.    13.7983602     0.0003392    -0.0012833
1.2809971   -34.1570066 C
   0.00002542        13524.    532100413.    13.7929424     0.0003506    -0.0013269
1.3196233   -35.3188646 C
   0.00002625        13903.    529627454.    13.7883816     0.0003619    -0.0013706
1.3580196   -36.4803321 C
   0.00002708        14322.    528824720.    13.7846017     0.0003733    -0.0014142
1.3961853   -37.6414066 C
   0.00002792        14742.    528058385.    13.7815359     0.0003847    -0.0014578
1.4341196   -38.8020857 C
   0.00002875        15161.    527325227.    13.7791249     0.0003961    -0.0015014
1.4718218   -39.9623670 C
   0.00002958        15579.    526622381.    13.7773165     0.0004076    -0.0015449
1.5092912   -41.1222480 C
   0.00003042        15998.    525947299.    13.7760638     0.0004190    -0.0015885
1.5465269   -42.2817262 C
   0.00003125        16416.    525297702.    13.7753253     0.0004305    -0.0016320
1.5835284   -43.4407989 C
   0.00003208        16833.    524671549.    13.7750636     0.0004419    -0.0016756
1.6202947   -44.5994636 C
   0.00003292        17251.    524067003.    13.7752454     0.0004534    -0.0017191
1.6568251   -45.7577177 C
   0.00003375        17668.    523482411.    13.7758404     0.0004649    -0.0017626
1.6931188   -46.9155586 C
   0.00003458        18084.    522916275.    13.7768214     0.0004764    -0.0018061
1.7291751   -48.0729836 C
   0.00003542        18501.    522367240.    13.7781639     0.0004880    -0.0018495
1.7649932   -49.2299899 C
   0.00003625        18916.    521834074.    13.7798454     0.0004995    -0.0018930
1.8005722   -50.3865749 C
   0.00003708        19332.    521315655.    13.7818458     0.0005111    -0.0019364
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1.8359114   -51.5427358 C
   0.00003792        19747.    520810961.    13.7841465     0.0005226    -0.0019799
1.8710099   -52.6984697 C
   0.00003875        20162.    520319055.    13.7867306     0.0005342    -0.0020233
1.9058670   -53.8537739 C
   0.00003958        20577.    519839078.    13.7895829     0.0005458    -0.0020667
1.9404817   -55.0086454 C
   0.00004042        20991.    519370244.    13.7926892     0.0005575    -0.0021100
1.9748533   -56.1630814 C
   0.00004125        21405.    518911829.    13.7960364     0.0005691    -0.0021534
2.0089809   -57.3170789 C
   0.00004208        21819.    518463164.    13.7996129     0.0005807    -0.0021968
2.0428637   -58.4706350 C
   0.00004292        22232.    518023633.    13.8034076     0.0005924    -0.0022401
2.0765007   -59.6237465 C
   0.00004375        22643.    517545766.    13.8070100     0.0006041    -0.0022834
2.1098401   -60.0000000 CY
   0.00004458        23011.    516143269.    13.8026891     0.0006154    -0.0023271
2.1418844   -60.0000000 CY
   0.00004542        23321.    513487206.    13.7873346     0.0006262    -0.0023713
2.1721978   -60.0000000 CY
   0.00004625        23606.    510408002.    13.7681946     0.0006368    -0.0024157
2.2016913   -60.0000000 CY
   0.00004708        23890.    507398481.    13.7496547     0.0006474    -0.0024601
2.2309345   -60.0000000 CY
   0.00004792        24140.    503784403.    13.7253421     0.0006577    -0.0025048
2.2590778   -60.0000000 CY
   0.00004875        24347.    499434146.    13.6939010     0.0006676    -0.0025499
2.2859182   -60.0000000 CY
   0.00004958        24555.    495224755.    13.6636882     0.0006775    -0.0025950
2.3125736   -60.0000000 CY
   0.00005292        25359.    479224774.    13.5493335     0.0007170    -0.0027755
2.4166798   -60.0000000 CY
   0.00005625        25931.    460995621.    13.3994477     0.0007537    -0.0029588
2.5103339   -60.0000000 CY
   0.00005958        26492.    444617173.    13.2655677     0.0007904    -0.0031421
2.6010192   -60.0000000 CY
   0.00006292        26950.    428348740.    13.1265693     0.0008259    -0.0033266
2.6859058   -60.0000000 CY
   0.00006625        27306.    412166394.    12.9826866     0.0008601    -0.0035124
2.7651915   -60.0000000 CY
   0.00006958        27660.    397507794.    12.8529349     0.0008944    -0.0036981
2.8420652   -60.0000000 CY
   0.00007292        28010.    384130442.    12.7287466     0.0009281    -0.0038844
2.9154543   -60.0000000 CY
   0.00007625        28304.    371194459.    12.6041706     0.0009611    -0.0040714
2.9846096   -60.0000000 CY
   0.00007958        28509.    358229939.    12.4714149     0.0009925    -0.0042600
3.0484246   -60.0000000 CY
   0.00008292        28714.    346296204.    12.3504616     0.0010241    -0.0044484
3.1103559   -60.0000000 CY
   0.00008625        28917.    335273575.    12.2399550     0.0010557    -0.0046368
3.1703864   -60.0000000 CY
   0.00008958        29117.    325030328.    12.1324650     0.0010869    -0.0048256
3.2274508   -60.0000000 CY
   0.00009292        29315.    315500604.    12.0312730     0.0011179    -0.0050146
3.2822463   -60.0000000 CY
   0.00009625        29512.    306621352.    11.9380855     0.0011490    -0.0052035
3.3351920   -60.0000000 CY
   0.00009958        29667.    297906817.    11.8411953     0.0011792    -0.0053933
3.3844634   -60.0000000 CY
    0.0001029        29774.    289304016.    11.7395897     0.0012082    -0.0055843
3.4300284   -60.0000000 CY
    0.0001063        29881.    281234788.    11.6451477     0.0012373    -0.0057752
3.4739702   -60.0000000 CY
    0.0001096        29988.    273650353.    11.5572234     0.0012665    -0.0059660
3.5162744   -60.0000000 CY
    0.0001129        30090.    266475772.    11.4677555     0.0012949    -0.0061576
3.5557313   -60.0000000 CY
    0.0001163        30191.    259704500.    11.3834541     0.0013233    -0.0063492
3.5935154   -60.0000000 CY
    0.0001196        30291.    253305580.    11.3045545     0.0013518    -0.0065407
3.6297289   -60.0000000 CY
    0.0001229        30391.    247248646.    11.2306251     0.0013804    -0.0067321
3.6643574   -60.0000000 CY
    0.0001263        30490.    241506537.    11.1612803     0.0014091    -0.0069234
3.6973866   -60.0000000 CY
    0.0001296        30589.    236054887.    11.0961744     0.0014379    -0.0071146
3.7288014   -60.0000000 CY
    0.0001329        30687.    230871770.    11.0349966     0.0014667    -0.0073058
3.7585868   -60.0000000 CY
    0.0001363        30784.    225937408.    10.9774667     0.0014957    -0.0074968
3.7867275   -60.0000000 CY
    0.0001396        30862.    221097929.    10.9175660     0.0015239    -0.0076886
3.8124692   -60.0000000 CY
    0.0001429        30927.    216401707.    10.8545255     0.0015513    -0.0078812
3.8358281   -60.0000000 CY
    0.0001462        30973.    211783352.    10.7859103     0.0015774    -0.0080751
3.8566436   -60.0000000 CY
    0.0001496        31019.    207368015.    10.7208672     0.0016037    -0.0082688
3.8761060   -60.0000000 CY
    0.0001529        31064.    203142395.    10.6591681     0.0016300    -0.0084625
3.8942027   -60.0000000 CY
    0.0001562        31108.    199094310.    10.6006044     0.0016563    -0.0086562
3.9109212   -60.0000000 CY
    0.0001596        31153.    195212594.    10.5449852     0.0016828    -0.0088497
3.9262485   -60.0000000 CY
    0.0001629        31196.    191486995.    10.4921354     0.0017093    -0.0090432
3.9401715   -60.0000000 CY
    0.0001662        31240.    187908080.    10.4418941     0.0017360    -0.0092365
3.9526769   -60.0000000 CY
    0.0001696        31283.    184467161.    10.3941132     0.0017627    -0.0094298
3.9637511   -60.0000000 CY
    0.0001729        31325.    181156215.    10.3486562     0.0017895    -0.0096230
3.9733801   -60.0000000 CY
    0.0001762        31367.    177967828.    10.3053970     0.0018163    -0.0098162
3.9815499   -60.0000000 CY
    0.0001796        31408.    174895134.    10.2642192     0.0018433    -0.0100092
3.9882460   -60.0000000 CY
    0.0001829        31449.    171930173.    10.2243378     0.0018702    -0.0102023
3.9934325   -60.0000000 CY
    0.0002029        31671.    156078510.     9.9977136     0.0020287    -0.0113638
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3.9961585   -60.0000000 CY
    0.0002229        31862.    142931738.     9.8214299     0.0021894    -0.0125231
  3.9952906   -60.0000000 CY
    0.0002429        31962.    131576944.     9.6553772     0.0023455    -0.0136870
3.9883136   -60.0000000 CY
    0.0002629        32027.    121815947.     9.5052540     0.0024991    -0.0148534
3.9982815   -60.0000000 CY
    0.0002829        32080.    113388750.     9.3724109     0.0026516    -0.0160209
3.9936894   -60.0000000 CY
    0.0003029        32127.    106058793.     9.2634841     0.0028061    -0.0171864
3.9936887   -60.0000000 CY
    0.0003229        32169.     99620007.     9.1748021     0.0029627    -0.0183498
3.9896905   -60.0000000 CY
    0.0003429        32208.     93923344.     9.1007620     0.0031208    -0.0195117
3.9998818   -60.0000000 CYT
    0.0003629        32242.     88841282.     9.0407705     0.0032810    -0.0206715
3.9757370   -60.0000000 CYT
    0.0003829        32274.     84283952.     8.9903453     0.0034426    -0.0218299
3.9916018   -60.0000000 CYT
    0.0004029        32303.     80173605.     8.9479762     0.0036053    -0.0229872
3.9998987   -60.0000000 CYT
    0.0004229        32329.     76443222.     8.9141385     0.0037699    -0.0241426
3.9782557   -60.0000000 CYT
    0.0004429        32329.     72991412.     8.9650505     0.0039708    -0.0252617
3.9869021    60.0000000 CYT


Axial Thrust Force =     28.916 kips

    Bending       Bending       Bending      Depth to      Max Comp      Max Tens      Max
Conc      Max Steel  Run
   Curvature      Moment       Stiffness      N Axis        Strain        Strain
Stress        Stress    Msg
    rad/in.       in-kip        kip-in2         in           in/in         in/in          ksi
          ksi
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------------- ------------- ---
  4.16667E-07         1719.   4124712412.    37.6469593    0.00001569   -0.00001181
0.0656731     0.4030633
  8.33333E-07         3429.   4115254564.    35.3304217    0.00002944   -0.00002556
0.1227460     0.7501435
   0.00000125         5132.   4105638170.    34.5582857    0.00004320   -0.00003930
0.1794021     1.0972254
   0.00000167         6827.   4095981828.    34.1722416    0.00005695   -0.00005305
0.2356414     1.4443083
   0.00000208         8513.   4086309480.    33.9406333    0.00007071   -0.00006679
0.2914638     1.7913924
   0.00000250        10192.   4076629121.    33.7862424    0.00008447   -0.00008053
0.3468695     2.1384776
   0.00000292        11862.   4066944181.    33.6759757    0.00009822   -0.00009428
0.4018582     2.4855638
   0.00000333        13524.   4057256378.    33.5932867     0.0001120    -0.0001080
0.4564301     2.8326510
   0.00000375        13524.   3606450114.    15.8687102    0.00005951    -0.0001880
0.2433166    -4.9852403 C
   0.00000417        13524.   3245805102.    15.6307502    0.00006513    -0.0002099
0.2658186    -5.5679093 C
   0.00000458        13524.   2950731911.    15.4328163    0.00007073    -0.0002318
0.2881924    -6.1510090 C
   0.00000500        13524.   2704837585.    15.2631801    0.00007632    -0.0002537
0.3104034    -6.7347889 C
   0.00000542        13524.   2496773156.    15.1201451    0.00008190    -0.0002756
0.3325588    -7.3184897 C
   0.00000583        13524.   2318432216.    14.9980121    0.00008749    -0.0002975
0.3546586    -7.9021113 C
   0.00000625        13524.   2163870068.    14.8926017    0.00009308    -0.0003194
0.3767026    -8.4856534 C
   0.00000667        13524.   2028628189.    14.7981070    0.00009865    -0.0003413
0.3986192    -9.0696326 C
   0.00000708        13524.   1909297119.    14.7130907     0.0001042    -0.0003633
0.4204227    -9.6539484 C
   0.00000750        13524.   1803225057.    14.6378997     0.0001098    -0.0003852
0.4421713   -10.2381818 C
   0.00000792        13524.   1708318475.    14.5709836     0.0001154    -0.0004071
0.4638650   -10.8223325 C
   0.00000833        13524.   1622902551.    14.5111021     0.0001209    -0.0004291
0.4855038   -11.4064003 C
   0.00000875        13524.   1545621477.    14.4572511     0.0001265    -0.0004510
0.5070875   -11.9903850 C
   0.00000917        13524.   1475365956.    14.4086091     0.0001321    -0.0004729
0.5286161   -12.5742864 C
   0.00000958        13524.   1411219610.    14.3644974     0.0001377    -0.0004948
0.5500895   -13.1581042 C
   0.00001000        13524.   1352418793.    14.3243505     0.0001432    -0.0005168
0.5715076   -13.7418383 C
   0.00001042        13524.   1298322041.    14.2876934     0.0001488    -0.0005387
0.5928703   -14.3254884 C
   0.00001083        13524.   1248386578.    14.2541240     0.0001544    -0.0005606
0.6141776   -14.9090543 C
   0.00001125        13524.   1202150038.    14.2233001     0.0001600    -0.0005825
0.6354294   -15.4925358 C
   0.00001167        13524.   1159216108.    14.1949282     0.0001656    -0.0006044
0.6566256   -16.0759326 C
   0.00001208        13524.   1119243139.    14.1675416     0.0001712    -0.0006263
0.6777095   -16.6596698 C
   0.00001250        13524.   1081935034.    14.1419636     0.0001768    -0.0006482
0.6987258   -17.2434132 C
   0.00001292        13524.   1047033904.    14.1182738     0.0001824    -0.0006701
0.7196873   -17.8270674 C
   0.00001333        13524.   1014314094.    14.0962958     0.0001880    -0.0006920
0.7405938   -18.4106322 C
   0.00001375        13524.    983577304.    14.0758747     0.0001935    -0.0007140
0.7614453   -18.9941074 C
   0.00001417        13524.    954648560.    14.0568737     0.0001991    -0.0007359
0.7822417   -19.5774927 C
   0.00001458        13524.    927372886.    14.0391717     0.0002047    -0.0007578
0.8029829   -20.1607877 C
   0.00001500        13524.    901612528.    14.0226611     0.0002103    -0.0007797
0.8236687   -20.7439928 C
   0.00001542        13524.    877244622.    14.0072458     0.0002159    -0.0008016
0.8442992   -21.3271067 C
   0.00001583        13524.    854159237.    13.9928400     0.0002216    -0.0008234
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0.8648743   -21.9101296 C
   0.00001625        13524.    832257719.    13.9793665     0.0002272    -0.0008453
0.8853939   -22.4930613 C
   0.00001708        13524.    791659781.    13.9549459     0.0002384    -0.0008891
0.9262662   -23.6586497 C
   0.00001792        13524.    754838396.    13.9335054     0.0002496    -0.0009329
0.9669154   -24.8238703 C
   0.00001875        13524.    721290023.    13.9146518     0.0002609    -0.0009766
1.0073408   -25.9887206 C
   0.00001958        13524.    690596830.    13.8980585     0.0002722    -0.0010203
1.0475419   -27.1531984 C
   0.00002042        13524.    662409205.    13.8834527     0.0002835    -0.0010640
1.0875178   -28.3173020 C
   0.00002125        13524.    636432373.    13.8706041     0.0002948    -0.0011077
1.1272680   -29.4810281 C
   0.00002208        13524.    612416057.    13.8593173     0.0003061    -0.0011514
1.1667917   -30.6443750 C
   0.00002292        13524.    590146382.    13.8494254     0.0003174    -0.0011951
1.2060883   -31.8073405 C
   0.00002375        13524.    569439492.    13.8407849     0.0003287    -0.0012388
1.2451571   -32.9699221 C
   0.00002458        13524.    550136458.    13.8332718     0.0003401    -0.0012824
1.2839973   -34.1321176 C
   0.00002542        13526.    532157215.    13.8267784     0.0003514    -0.0013261
1.3226082   -35.2939247 C
   0.00002625        13946.    531259510.    13.8212108     0.0003628    -0.0013697
1.3609891   -36.4553409 C
   0.00002708        14365.    530405224.    13.8164865     0.0003742    -0.0014133
1.3991394   -37.6163637 C
   0.00002792        14784.    529590408.    13.8125331     0.0003856    -0.0014569
1.4370582   -38.7769909 C
   0.00002875        15203.    528811570.    13.8092865     0.0003970    -0.0015005
1.4747448   -39.9372198 C
   0.00002958        15622.    528065611.    13.8066899     0.0004084    -0.0015441
1.5121985   -41.0970481 C
   0.00003042        16040.    527349770.    13.8046927     0.0004199    -0.0015876
1.5494185   -42.2564730 C
   0.00003125        16458.    526661581.    13.8032499     0.0004314    -0.0016311
1.5864041   -43.4154922 C
   0.00003208        16876.    525998833.    13.8023208     0.0004428    -0.0016747
1.6231545   -44.5741031 C
   0.00003292        17293.    525359538.    13.8018694     0.0004543    -0.0017182
1.6596690   -45.7323029 C
   0.00003375        17710.    524741905.    13.8018629     0.0004658    -0.0017617
1.6959467   -46.8900891 C
   0.00003458        18127.    524144314.    13.8022719     0.0004773    -0.0018052
1.7319869   -48.0474589 C
   0.00003542        18543.    523565296.    13.8030695     0.0004889    -0.0018486
1.7677887   -49.2044097 C
   0.00003625        18959.    523003519.    13.8042317     0.0005004    -0.0018921
1.8033515   -50.3609388 C
   0.00003708        19374.    522457769.    13.8057365     0.0005120    -0.0019355
1.8386743   -51.5170433 C
   0.00003792        19790.    521926938.    13.8075638     0.0005235    -0.0019790
1.8737564   -52.6727204 C
   0.00003875        20205.    521410011.    13.8096953     0.0005351    -0.0020224
1.9085969   -53.8279674 C
   0.00003958        20619.    520906062.    13.8121143     0.0005467    -0.0020658
1.9431950   -54.9827813 C
   0.00004042        21033.    520414237.    13.8148055     0.0005583    -0.0021092
1.9775499   -56.1371592 C
   0.00004125        21447.    519933753.    13.8177549     0.0005700    -0.0021525
2.0116607   -57.2910981 C
   0.00004208        21861.    519463886.    13.8209497     0.0005816    -0.0021959
2.0455266   -58.4445952 C
   0.00004292        22274.    519003971.    13.8243778     0.0005933    -0.0022392
2.0791467   -59.5976473 C
   0.00004375        22685.    518508073.    13.8276413     0.0006050    -0.0022825
2.1124708   -60.0000000 CY
   0.00004458        23055.    517128605.    13.8233447     0.0006163    -0.0023262
2.1445455   -60.0000000 CY
   0.00004542        23366.    514476314.    13.8078524     0.0006271    -0.0023704
2.1748684   -60.0000000 CY
   0.00004625        23651.    511378627.    13.7883799     0.0006377    -0.0024148
2.2043451   -60.0000000 CY
   0.00004708        23935.    508363163.    13.7696311     0.0006483    -0.0024592
2.2335864   -60.0000000 CY
   0.00004792        24186.    504760607.    13.7452804     0.0006586    -0.0025039
2.2617499   -60.0000000 CY
   0.00004875        24394.    500393231.    13.7135296     0.0006685    -0.0025490
2.2885738   -60.0000000 CY
   0.00004958        24602.    496167215.    13.6830168     0.0006784    -0.0025941
2.3152125   -60.0000000 CY
   0.00005292        25407.    480123356.    13.5677400     0.0007180    -0.0027745
2.4192777   -60.0000000 CY
   0.00005625        25980.    461862418.    13.4182535     0.0007548    -0.0029577
2.5130706   -60.0000000 CY
   0.00005958        26540.    445434031.    13.2834200     0.0007915    -0.0031410
2.6036859   -60.0000000 CY
   0.00006292        27001.    429149609.    13.1439435     0.0008270    -0.0033255
2.6885617   -60.0000000 CY
   0.00006625        27356.    412925885.    12.9992592     0.0008612    -0.0035113
2.7677773   -60.0000000 CY
   0.00006958        27711.    398236095.    12.8699997     0.0008955    -0.0036970
2.8447732   -60.0000000 CY
   0.00007292        28060.    384824447.    12.7451110     0.0009293    -0.0038832
2.9180879   -60.0000000 CY
   0.00007625        28356.    371879398.    12.6202891     0.0009623    -0.0040702
2.9872341   -60.0000000 CY
   0.00007958        28561.    358885413.    12.4869162     0.0009938    -0.0042587
3.0509748   -60.0000000 CY
   0.00008292        28766.    346924572.    12.3653966     0.0010253    -0.0044472
3.1128311   -60.0000000 CY
   0.00008625        28969.    335876924.    12.2543685     0.0010569    -0.0046356
3.1727858   -60.0000000 CY
   0.00008958        29170.    325616378.    12.1476220     0.0010882    -0.0048243
3.2299796   -60.0000000 CY
   0.00009292        29368.    316064936.    12.0459498     0.0011193    -0.0050132
3.2846942   -60.0000000 CY
   0.00009625        29565.    307165474.    11.9523165     0.0011504    -0.0052021
3.3375582   -60.0000000 CY
   0.00009958        29720.    298447484.    11.8554075     0.0011806    -0.0053919
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3.3868158   -60.0000000 CY
    0.0001029        29828.    289826633.    11.7533872     0.0012096    -0.0055829
  3.4322994   -60.0000000 CY
    0.0001063        29935.    281740483.    11.6585574     0.0012387    -0.0057738
3.4761593   -60.0000000 CY
    0.0001096        30041.    274140149.    11.5702698     0.0012679    -0.0059646
3.5183807   -60.0000000 CY
    0.0001129        30144.    266956053.    11.4817311     0.0012965    -0.0061560
3.5579590   -60.0000000 CY
    0.0001163        30245.    260170532.    11.3970811     0.0013249    -0.0063476
3.5956543   -60.0000000 CY
    0.0001196        30345.    253758152.    11.3178534     0.0013534    -0.0065391
3.6317781   -60.0000000 CY
    0.0001229        30445.    247688483.    11.2436147     0.0013820    -0.0067305
3.6663161   -60.0000000 CY
    0.0001263        30544.    241934306.    11.1739781     0.0014107    -0.0069218
3.6992538   -60.0000000 CY
    0.0001296        30643.    236471202.    11.1085965     0.0014395    -0.0071130
3.7305761   -60.0000000 CY
    0.0001329        30741.    231277202.    11.0471578     0.0014684    -0.0073041
3.7602681   -60.0000000 CY
    0.0001363        30838.    226332483.    10.9893809     0.0014973    -0.0074952
3.7883142   -60.0000000 CY
    0.0001396        30916.    221488048.    10.9294480     0.0015256    -0.0076869
3.8139892   -60.0000000 CY
    0.0001429        30983.    216791762.    10.8677557     0.0015532    -0.0078793
3.8374488   -60.0000000 CY
    0.0001462        31029.    212164157.    10.7988849     0.0015793    -0.0080732
3.8581631   -60.0000000 CY
    0.0001496        31074.    207739991.    10.7335986     0.0016056    -0.0082669
3.8775234   -60.0000000 CY
    0.0001529        31119.    203505923.    10.6716678     0.0016319    -0.0084606
3.8955170   -60.0000000 CY
    0.0001562        31164.    199449746.    10.6128834     0.0016583    -0.0086542
3.9121313   -60.0000000 CY
    0.0001596        31208.    195560272.    10.5570537     0.0016847    -0.0088478
3.9273534   -60.0000000 CY
    0.0001629        31252.    191827229.    10.5040030     0.0017113    -0.0090412
3.9411702   -60.0000000 CY
    0.0001662        31295.    188241165.    10.4535698     0.0017379    -0.0092346
3.9535681   -60.0000000 CY
    0.0001696        31338.    184793374.    10.4056056     0.0017646    -0.0094279
3.9645337   -60.0000000 CY
    0.0001729        31380.    181475817.    10.3599733     0.0017914    -0.0096211
3.9740529   -60.0000000 CY
    0.0001762        31422.    178281066.    10.3165466     0.0018183    -0.0098142
3.9821116   -60.0000000 CY
    0.0001796        31463.    175202239.    10.2752085     0.0018453    -0.0100072
3.9886954   -60.0000000 CY
    0.0001829        31504.    172232960.    10.2358509     0.0018723    -0.0102002
3.9937895   -60.0000000 CY
    0.0002029        31726.    156351288.    10.0091612     0.0020310    -0.0113615
3.9964577   -60.0000000 CY
    0.0002229        31917.    143180193.     9.8323699     0.0021918    -0.0125207
3.9956388   -60.0000000 CY
    0.0002429        32018.    131807080.     9.6660745     0.0023481    -0.0136844
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3.9889017   -60.0000000 CY
    0.0002629        32084.    122030058.     9.5173041     0.0025023    -0.0148502
  3.9972882   -60.0000000 CY
    0.0002829        32136.    113587052.     9.3838601     0.0026549    -0.0160176
3.9942232   -60.0000000 CY
    0.0003029        32183.    106243076.     9.2745188     0.0028094    -0.0171831
3.9926407   -60.0000000 CY
    0.0003229        32225.     99792386.     9.1853704     0.0029661    -0.0183464
3.9904122   -60.0000000 CY
    0.0003429        32263.     94085177.     9.1109390     0.0031243    -0.0195082
3.9999485   -60.0000000 CYT
    0.0003629        32297.     88993576.     9.0506693     0.0032846    -0.0206679
3.9746107   -60.0000000 CYT
    0.0003829        32329.     84427945.     8.9999146     0.0034462    -0.0218263
3.9922988   -60.0000000 CYT
    0.0004029        32358.     80310102.     8.9572650     0.0036090    -0.0229835
3.9999628   -60.0000000 CYT
    0.0004229        32384.     76572786.     8.9232468     0.0037738    -0.0241387
3.9770480   -60.0000000 CYT
    0.0004429        32384.     73115125.     8.9741310     0.0039748    -0.0252577
3.9878600    60.0000000 CYT
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Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain
1	16.688	31930.461	0.00300000
2	26.701	32178.143	0.00300000
3	28.916	32232.927	0.00300000

Note that the values of moment capacity in the table above are not
factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether
the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.70).

The above values should be multiplied by the appropriate strength reduction
factor to compute ultimate moment capacity according to ACI 318, Section
9.3.2.2 or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding
bending stiffnesses computed for common resistance factor values used for
reinforced concrete sections.

Axial Load No.	Resist. Factor for Moment	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	31930.	10.847200	20755.	514689336.

2	0.65	32178.	17.355650	20916.	519455603.
3	0.65	32233.	18.795400	20951.	520511610.
1	0.75	31930.	11.681600	23948.	498965830.
2	0.75	32178.	18.690700	24134.	503872157.
3	0.75	32233.	20.241200	24175.	504929252.
1	0.90	31930.	12.516000	28737.	329644256.
2	0.90	32178.	20.025750	28960.	333071644.
3	0.90	32233.	21.687000	29010.	333816303.

Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	2.5000	0.00	N.A.	No	0.00	1855163.
2	25.5000	16.3916	Yes	No	1855163.	9264060.
3	45.5000	33.0786	Yes	No	1.11E+07	N.A.

Notes: The F0 integral of Layer n+1 equals the sum of the F0 and F1 integrals for Layer n. Layering correction equivalent depths are computed only for soil types with both shallow-depth and deep-depth expressions for peak lateral load transfer. These soil types are soft and stiff clays, non-liquefied sands, and cemented c-phi soil.

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Shear force at pile head = 12849.0 lbs

Applied moment at pile head = 12771456.0 in-lbs

Axial thrust load on pile head = 26701.0 lbs

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.2032	1.28E+07	12849.	-0.00170	0.00	4.06E+12	0.00	0.00	0.00
0.5050	0.1930	1.28E+07	12849.	-0.00168	0.00	4.06E+12	0.00	0.00	0.00
1.0100	0.1829	1.29E+07	12849.	-0.00166	0.00	4.06E+12	0.00	0.00	0.00
1.5150	0.1729	1.30E+07	12849.	-0.00164	0.00	4.06E+12	0.00	0.00	0.00
2.0200	0.1630	1.31E+07	12849.	-0.00162	0.00	4.06E+12	0.00	0.00	0.00
2.5250	0.1533	1.32E+07	12836.	-0.00160	0.00	4.06E+12	-4.1389	163.6200	0.00
3.0300	0.1437	1.32E+07	12575.	-0.00158	0.00	4.06E+12	-82.2297	3469.	0.00
3.5350	0.1341	1.33E+07	11871.	-0.00156	0.00	4.06E+12	-149.9463	6774.	0.00
4.0400	0.1248	1.34E+07	10788.	-0.00154	0.00	4.06E+12	-207.4860	10079.	0.00
4.5450	0.1155	1.34E+07	9387.	-0.00152	0.00	4.06E+12	-255.0471	13384.	0.00
5.0500	0.1063	1.35E+07	7727.	-0.00150	0.00	4.06E+12	-292.8296	16689.	0.00
5.5550	0.09730	1.35E+07	5867.	-0.00147	0.00	1.75E+12	-321.0340	19994.	0.00
6.0600	0.08856	1.36E+07	3862.	-0.00137	0.00	5.32E+11	-340.4826	23299.	0.00
6.5650	0.08075	1.36E+07	1756.	-0.00121	0.00	5.32E+11	-354.5071	26605.	0.00
7.0700	0.07388	1.36E+07	-422.5539	-0.00106	0.00	5.32E+11	-364.6480	29910.	0.00
7.5750	0.06795	1.36E+07	-2656.	-9.01E-04	0.00	5.32E+11	-372.4426	33215.	0.00
8.0800	0.06296	1.36E+07	-4934.	-7.46E-04	0.00	5.32E+11	-379.4228	36520.	0.00
8.5850	0.05890	1.35E+07	-7257.	-6.40E-04	0.00	1.40E+12	-387.1115	39825.	0.00
9.0900	0.05521	1.35E+07	-9620.	-6.00E-04	0.00	4.06E+12	-392.9086	43130.	0.00
9.5950	0.05163	1.34E+07	-12009.	-5.80E-04	0.00	4.06E+12	-395.6046	46435.	0.00
10.1000	0.04817	1.33E+07	-14406.	-5.60E-04	0.00	4.06E+12	-395.3942	49740.	0.00
10.6050	0.04484	1.32E+07	-16793.	-5.41E-04	0.00	4.06E+12	-392.4694	53046.	0.00
11.1100	0.04162	1.31E+07	-19155.	-5.21E-04	0.00	4.06E+12	-387.0194	56351.	0.00
11.6150	0.03852	1.30E+07	-21477.	-5.01E-04	0.00	4.06E+12	-379.2304	59656.	0.00
12.1200	0.03554	1.29E+07	-23745.	-4.82E-04	0.00	4.06E+12	-369.2847	62961.	0.00
12.6250	0.03268	1.27E+07	-25947.	-4.63E-04	0.00	4.06E+12	-357.3610	66266.	0.00
13.1300	0.02993	1.25E+07	-28071.	-4.44E-04	0.00	4.06E+12	-343.6337	69571.	0.00
13.6350	0.02730	1.24E+07	-30107.	-4.26E-04	0.00	4.06E+12	-328.2728	72876.	0.00
14.1400	0.02477	1.22E+07	-32045.	-4.07E-04	0.00	4.06E+12	-311.4434		

76181.	0.00						
14.6450	0.02236	1.20E+07	-33877.	-3.89E-04	0.00	4.07E+12	-293.3057
79487.	0.00						
15.1500	0.02006	1.18E+07	-35596.	-3.72E-04	0.00	4.07E+12	-274.0148
82792.	0.00						
15.6550	0.01786	1.16E+07	-37195.	-3.54E-04	0.00	4.07E+12	-253.7203
86097.	0.00						
16.1600	0.01576	1.13E+07	-38669.	-3.37E-04	0.00	4.07E+12	-232.5661
89402.	0.00						
16.6650	0.01377	1.11E+07	-40012.	-3.20E-04	0.00	4.07E+12	-210.6909
92707.	0.00						
17.1700	0.01188	1.08E+07	-41220.	-3.04E-04	0.00	4.07E+12	-188.2270
96012.	0.00						
17.6750	0.01009	1.06E+07	-42292.	-2.88E-04	0.00	4.07E+12	-165.3011
99317.	0.00						
18.1800	0.00839	1.03E+07	-43223.	-2.73E-04	0.00	4.08E+12	-142.0339
102622.	0.00						
18.6850	0.00678	1.01E+07	-44012.	-2.57E-04	0.00	4.08E+12	-118.5400
105928.	0.00						
19.1900	0.00527	9792579.	-44659.	-2.43E-04	0.00	4.08E+12	-94.9280
109233.	0.00						
19.6950	0.00384	9520239.	-45163.	-2.28E-04	0.00	4.08E+12	-71.3007
112538.	0.00						
20.2000	0.00250	9245278.	-45524.	-2.14E-04	0.00	4.08E+12	-47.7549
115843.	0.00						
20.7050	0.00124	8968562.	-45742.	-2.01E-04	0.00	4.08E+12	-24.3814
119148.	0.00						
21.2100	6.26E-05	8690947.	-45820.	-1.88E-04	0.00	4.09E+12	-1.2655
122453.	0.00						
21.7150	-0.00104	8413285.	-45759.	-1.75E-04	0.00	4.09E+12	21.5134
125758.	0.00						
22.2200	-0.00206	8136410.	-45560.	-1.63E-04	0.00	4.09E+12	43.8813
129063.	0.00						
22.7250	-0.00301	7861145.	-45228.	-1.51E-04	0.00	4.09E+12	65.7694
132369.	0.00						
23.2300	-0.00389	7588293.	-44765.	-1.40E-04	0.00	4.09E+12	87.1140
135674.	0.00						
23.7350	-0.00470	7318638.	-44174.	-1.29E-04	0.00	4.09E+12	107.8564
138979.	0.00						
24.2400	-0.00545	7052943.	-43460.	-1.18E-04	0.00	4.09E+12	127.9425
142284.	0.00						
24.7450	-0.00613	6791944.	-42626.	-1.08E-04	0.00	4.10E+12	147.3228
145589.	0.00						
25.2500	-0.00675	6536354.	-41676.	-9.78E-05	0.00	4.10E+12	165.9521
148894.	0.00						
25.7550	-0.00732	6286857.	-40926.	-8.83E-05	0.00	4.10E+12	81.6838
67644.	0.00						
26.2600	-0.00782	6040358.	-40408.	-7.92E-05	0.00	4.10E+12	89.2418
69113.	0.00						
26.7650	-0.00828	5797135.	-39846.	-7.05E-05	0.00	4.10E+12	96.4155
70582.	0.00						
27.2700	-0.00868	5557451.	-39241.	-6.21E-05	0.00	4.10E+12	103.1917
72051.	0.00						
27.7750	-0.00903	5321555.	-38596.	-5.41E-05	0.00	4.10E+12	109.5589
73520.	0.00						
28.2800	-0.00933	5089682.	-37914.	-4.64E-05	0.00	4.11E+12	115.5072

74989.	0.00						
28.7850	-0.00959	4862049.	-37198.	-3.90E-05	0.00	4.11E+12	121.0284
76458.	0.00						
29.2900	-0.00981	4638860.	-36449.	-3.20E-05	0.00	4.11E+12	126.1158
77927.	0.00						
29.7950	-0.00998	4420301.	-35670.	-2.53E-05	0.00	4.11E+12	130.7639
79396.	0.00						
30.3000	-0.01011	4206543.	-34865.	-1.90E-05	0.00	4.11E+12	134.9689
80865.	0.00						
30.8050	-0.01021	3997740.	-34036.	-1.29E-05	0.00	4.11E+12	138.7281
82334.	0.00						
31.3100	-0.01027	3794032.	-33185.	-7.19E-06	0.00	4.11E+12	142.0401
83803.	0.00						
31.8150	-0.01030	3595538.	-32316.	-1.75E-06	0.00	4.11E+12	144.9047
85271.	0.00						
32.3200	-0.01029	3402365.	-31430.	3.41E-06	0.00	4.12E+12	147.3228
86740.	0.00						
32.8250	-0.01026	3214602.	-30532.	8.28E-06	0.00	4.12E+12	149.2963
88209.	0.00						
33.3300	-0.01019	3032320.	-29622.	1.29E-05	0.00	4.12E+12	150.8280
89678.	0.00						
33.8350	-0.01010	2855577.	-28705.	1.72E-05	0.00	4.12E+12	151.9216
91147.	0.00						
34.3400	-0.00998	2684412.	-27782.	2.13E-05	0.00	4.12E+12	152.5815
92616.	0.00						
34.8450	-0.00984	2518849.	-26857.	2.51E-05	0.00	4.12E+12	152.8130
94085.	0.00						
35.3500	-0.00968	2358898.	-25931.	2.87E-05	0.00	4.12E+12	152.6220
95554.	0.00						
35.8550	-0.00949	2204552.	-25008.	3.21E-05	0.00	4.12E+12	152.0152
97023.	0.00						
36.3600	-0.00929	2055787.	-24090.	3.52E-05	0.00	4.12E+12	150.9996
98492.	0.00						
36.8650	-0.00907	1912567.	-23179.	3.81E-05	0.00	4.12E+12	149.5829
99961.	0.00						
37.3700	-0.00883	1774840.	-22278.	4.08E-05	0.00	4.12E+12	147.7733
101430.	0.00						
37.8750	-0.00857	1642539.	-21390.	4.33E-05	0.00	4.12E+12	145.5792
102899.	0.00						
38.3800	-0.00830	1515584.	-20515.	4.56E-05	0.00	4.12E+12	143.0095
104368.	0.00						
38.8850	-0.00802	1393881.	-19657.	4.78E-05	0.00	4.12E+12	140.0733
105837.	0.00						
39.3900	-0.00772	1277321.	-18819.	4.97E-05	0.00	4.12E+12	136.7800
107306.	0.00						
39.8950	-0.00742	1165783.	-18001.	5.15E-05	0.00	4.12E+12	133.1392
108775.	0.00						
40.4000	-0.00710	1059135.	-17206.	5.32E-05	0.00	4.12E+12	129.1606
110244.	0.00						
40.9050	-0.00677	957230.	-16436.	5.47E-05	0.00	4.12E+12	124.8543
111712.	0.00						
41.4100	-0.00644	859910.	-15694.	5.60E-05	0.00	4.12E+12	120.2303
113181.	0.00						
41.9150	-0.00609	767005.	-14980.	5.72E-05	0.00	4.12E+12	115.2988
114650.	0.00						
42.4200	-0.00574	678334.	-14297.	5.82E-05	0.00	4.12E+12	110.0701

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
								116119.	0.00
42.9250	-0.00539	593705.	-13647.	5.92E-05	0.00	4.12E+12	104.5546	117588.	0.00
43.4300	-0.00503	512915.	-13031.	6.00E-05	0.00	4.12E+12	98.7626	119057.	0.00
43.9350	-0.00466	435752.	-12451.	6.07E-05	0.00	4.12E+12	92.7046	120526.	0.00
44.4400	-0.00429	361994.	-11908.	6.13E-05	0.00	4.12E+12	86.3912	121995.	0.00
44.9450	-0.00392	291408.	-11404.	6.18E-05	0.00	4.12E+12	79.8328	123464.	0.00
45.4500	-0.00354	223753.	-10941.	6.21E-05	0.00	4.12E+12	73.0402	124933.	0.00
45.9550	-0.00317	158781.	-9595.	6.24E-05	0.00	4.12E+12	371.3846	711011.	0.00
46.4600	-0.00279	107448.	-7467.	6.26E-05	0.00	4.12E+12	330.7207	719274.	0.00
46.9650	-0.00241	68260.	-5590.	6.27E-05	0.00	4.12E+12	288.9086	727536.	0.00
47.4700	-0.00203	39681.	-3969.	6.28E-05	0.00	4.12E+12	245.9866	735799.	0.00
47.9750	-0.00165	20136.	-2612.	6.29E-05	0.00	4.12E+12	201.9836	744062.	0.00
48.4800	-0.00126	8009.	-1524.	6.29E-05	0.00	4.12E+12	156.9196	752325.	0.00
48.9850	-8.83E-04	1644.	-712.8763	6.29E-05	0.00	4.12E+12	110.8075	760588.	0.00
49.4900	-5.02E-04	-651.9010	-184.2570	6.29E-05	0.00	4.12E+12	63.6543	768850.	0.00
49.9950	-1.21E-04	-609.8678	55.4665	6.29E-05	0.00	4.12E+12	15.4624	777113.	0.00
50.5000	2.61E-04	0.00	0.00	6.29E-05	0.00	4.12E+12	-33.7682	392688.	0.00

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 1:

```
Pile-head deflection            =     0.20322977 inches
Computed slope at pile head     =    -0.00169626 radians
Maximum bending moment          =      13591988. inch-lbs
Maximum shear force             =        -45820. lbs
Depth of maximum bending moment =     7.07000000 feet below pile head
Depth of maximum shear force    =    21.21000000 feet below pile head
Number of iterations            =            490
Number of zero deflection points =             2
```

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 2

Pile-head conditions are Shear and Moment (Loading Type 1)

```
Shear force at pile head                              =       5782.0 lbs
Applied moment at pile head                           =    5747155.0 in-lbs
Axial thrust load on pile head                        =      16688.0 lbs
```

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.06416	5747155.	5782.	-4.33E-04	0.00	4.10E+12	0.00	0.00	0.00
0.5050	0.06156	5782237.	5782.	-4.25E-04	0.00	4.10E+12	0.00	0.00	0.00
1.0100	0.05901	5817319.	5782.	-4.16E-04	0.00	4.10E+12	0.00	0.00	0.00
1.5150	0.05652	5852399.	5782.	-4.08E-04	0.00	4.10E+12	0.00	0.00	0.00
2.0200	0.05407	5887479.	5782.	-3.99E-04	0.00	4.10E+12	0.00	0.00	0.00
2.5250	0.05168	5922558.	5778.	-3.90E-04	0.00	4.10E+12	-1.3954	163.6200	0.00
3.0300	0.04934	5957585.	5688.	-3.81E-04	0.00	4.10E+12	-28.2434	3469.	0.00
3.5350	0.04706	5991573.	5443.	-3.73E-04	0.00	4.10E+12	-52.6004	6774.	0.00
4.0400	0.04483	6023629.	5058.	-3.64E-04	0.00	4.10E+12	-74.5543	10079.	0.00
4.5450	0.04265	6052946.	4546.	-3.55E-04	0.00	4.10E+12	-94.1934	13384.	0.00
5.0500	0.04053	6078804.	3923.	-3.46E-04	0.00	4.10E+12	-111.6068	16689.	0.00
5.5550	0.03846	6100561.	3200.	-3.37E-04	0.00	4.10E+12	-126.8840	19994.	0.00
6.0600	0.03644	6117659.	2391.	-3.28E-04	0.00	4.10E+12	-140.1147	23299.	0.00
6.5650	0.03448	6129609.	1508.	-3.19E-04	0.00	4.10E+12	-151.3892	26605.	0.00
7.0700	0.03258	6135999.	562.0352	-3.10E-04	0.00	4.10E+12	-160.7975	29910.	0.00
7.5750	0.03073	6136484.	-435.5241	-3.01E-04	0.00	4.10E+12	-168.4300	33215.	0.00
8.0800	0.02894	6130782.	-1474.	-2.92E-04	0.00	4.10E+12	-174.3764	36520.	0.00
8.5850	0.02720	6118675.	-2544.	-2.83E-04	0.00	4.10E+12	-178.7265	39825.	0.00
9.0900	0.02551	6100004.	-3636.	-2.73E-04	0.00	4.10E+12	-181.5693	43130.	0.00

9.5950	0.02388	6074664.	-4740.	-2.64E-04	0.00	4.10E+12	-182.9932	46435.	0.00
10.1000	0.02231	6042603.	-5850.	-2.56E-04	0.00	4.10E+12	-183.0858	49740.	0.00
10.6050	0.02078	6003818.	-6956.	-2.47E-04	0.00	4.10E+12	-181.9335	53046.	0.00
11.1100	0.01932	5958350.	-8051.	-2.38E-04	0.00	4.10E+12	-179.6217	56351.	0.00
11.6150	0.01790	5906286.	-9129.	-2.29E-04	0.00	4.10E+12	-176.2342	59656.	0.00
12.1200	0.01654	5847748.	-10184.	-2.20E-04	0.00	4.10E+12	-171.8536	62961.	0.00
12.6250	0.01523	5782898.	-11210.	-2.12E-04	0.00	4.10E+12	-166.5605	66266.	0.00
13.1300	0.01397	5711931.	-12200.	-2.03E-04	0.00	4.10E+12	-160.4340	69571.	0.00
13.6350	0.01277	5635071.	-13152.	-1.95E-04	0.00	4.10E+12	-153.5511	72876.	0.00
14.1400	0.01161	5552572.	-14059.	-1.87E-04	0.00	4.10E+12	-145.9866	76181.	0.00
14.6450	0.01051	5464710.	-14919.	-1.78E-04	0.00	4.10E+12	-137.8135	79487.	0.00
15.1500	0.00945	5371787.	-15728.	-1.70E-04	0.00	4.10E+12	-129.1021	82792.	0.00
15.6550	0.00844	5274122.	-16483.	-1.63E-04	0.00	4.10E+12	-119.9206	86097.	0.00
16.1600	0.00748	5172052.	-17180.	-1.55E-04	0.00	4.11E+12	-110.3346	89402.	0.00
16.6650	0.00656	5065929.	-17819.	-1.47E-04	0.00	4.11E+12	-100.4071	92707.	0.00
17.1700	0.00569	4956119.	-18396.	-1.40E-04	0.00	4.11E+12	-90.1989	96012.	0.00
17.6750	0.00487	4842995.	-18911.	-1.33E-04	0.00	4.11E+12	-79.7678	99317.	0.00
18.1800	0.00408	4726941.	-19363.	-1.26E-04	0.00	4.11E+12	-69.1691	102622.	0.00
18.6850	0.00334	4608346.	-19749.	-1.19E-04	0.00	4.11E+12	-58.4554	105928.	0.00
19.1900	0.00265	4487604.	-20071.	-1.12E-04	0.00	4.11E+12	-47.6768	109233.	0.00
19.6950	0.00199	4365111.	-20327.	-1.06E-04	0.00	4.11E+12	-36.8804	112538.	0.00
20.2000	0.00137	4241262.	-20518.	-9.92E-05	0.00	4.11E+12	-26.1109	115843.	0.00
20.7050	7.84E-04	4116454.	-20644.	-9.30E-05	0.00	4.11E+12	-15.4101	119148.	0.00
21.2100	2.38E-04	3991079.	-20705.	-8.71E-05	0.00	4.11E+12	-4.8175	122453.	0.00
21.7150	-2.71E-04	3865527.	-20703.	-8.13E-05	0.00	4.11E+12	5.6302	125758.	0.00
22.2200	-7.47E-04	3740181.	-20637.	-7.57E-05	0.00	4.11E+12	15.8987	129063.	0.00
22.7250	-0.00119	3615418.	-20510.	-7.02E-05	0.00	4.11E+12	25.9560	132369.	0.00
23.2300	-0.00160	3491608.	-20323.	-6.50E-05	0.00	4.11E+12	35.7728	135674.	0.00
23.7350	-0.00198	3369111.	-20078.	-6.00E-05	0.00	4.12E+12	45.3216	138979.	0.00
24.2400	-0.00232	3248278.	-19775.	-5.51E-05	0.00	4.12E+12	54.5772	142284.	0.00
24.7450	-0.00264	3129449.	-19417.	-5.04E-05	0.00	4.12E+12	63.5166	145589.	0.00
25.2500	-0.00294	3012952.	-19006.	-4.59E-05	0.00	4.12E+12	72.1182	148894.	0.00
25.7550	-0.00320	2899103.	-18679.	-4.15E-05	0.00	4.12E+12	35.7168	67644.	0.00
26.2600	-0.00344	2786565.	-18452.	-3.73E-05	0.00	4.12E+12	39.2143	69113.	0.00
26.7650	-0.00365	2675466.	-18205.	-3.33E-05	0.00	4.12E+12	42.5381	70582.	0.00
27.2700	-0.00384	2565930.	-17937.	-2.95E-05	0.00	4.12E+12	45.6819	72051.	0.00
27.7750	-0.00401	2458071.	-17652.	-2.58E-05	0.00	4.12E+12	48.6402	73520.	0.00
28.2800	-0.00415	2351997.	-17348.	-2.22E-05	0.00	4.12E+12	51.4083	74989.	0.00
28.7850	-0.00428	2247811.	-17029.	-1.88E-05	0.00	4.12E+12	53.9823	76458.	0.00
29.2900	-0.00438	2145608.	-16695.	-1.56E-05	0.00	4.12E+12	56.3589	77927.	0.00
29.7950	-0.00447	2045473.	-16347.	-1.25E-05	0.00	4.12E+12	58.5354	79396.	0.00
30.3000	-0.00453	1947488.	-15986.	-9.60E-06	0.00	4.12E+12	60.5101	80865.	0.00
30.8050	-0.00458	1851725.	-15614.	-6.80E-06	0.00	4.12E+12	62.2814	82334.	0.00
31.3100	-0.00462	1758249.	-15232.	-4.15E-06	0.00	4.12E+12	63.8487	83803.	0.00
31.8150	-0.00463	1667117.	-14841.	-1.63E-06	0.00	4.13E+12	65.2117	85271.	0.00
32.3200	-0.00464	1578380.	-14442.	7.49E-07	0.00	4.13E+12	66.3706	86740.	0.00
32.8250	-0.00463	1492079.	-14037.	3.00E-06	0.00	4.13E+12	67.3263	88209.	0.00
33.3300	-0.00460	1408252.	-13627.	5.14E-06	0.00	4.13E+12	68.0797	89678.	0.00
33.8350	-0.00456	1326924.	-13212.	7.14E-06	0.00	4.13E+12	68.6325	91147.	0.00
34.3400	-0.00451	1248116.	-12795.	9.04E-06	0.00	4.13E+12	68.9867	92616.	0.00
34.8450	-0.00445	1171842.	-12377.	1.08E-05	0.00	4.13E+12	69.1445	94085.	0.00
35.3500	-0.00438	1098106.	-11958.	1.25E-05	0.00	4.13E+12	69.1085	95554.	0.00
35.8550	-0.00430	1026909.	-11540.	1.40E-05	0.00	4.13E+12	68.8817	97023.	0.00
36.3600	-0.00421	958240.	-11124.	1.55E-05	0.00	4.13E+12	68.4674	98492.	0.00
36.8650	-0.00411	892086.	-10711.	1.69E-05	0.00	4.13E+12	67.8688	99961.	0.00
37.3700	-0.00401	828425.	-10302.	1.81E-05	0.00	4.13E+12	67.0897	101430.	0.00

37.8750	-0.00389	767227.	-9898.	1.93E-05	0.00	4.13E+12	66.1339	102899.	0.00
38.3800	-0.00377	708457.	-9501.	2.04E-05	0.00	4.13E+12	65.0054	104368.	0.00
38.8850	-0.00365	652075.	-9111.	2.14E-05	0.00	4.13E+12	63.7085	105837.	0.00
39.3900	-0.00352	598032.	-8729.	2.23E-05	0.00	4.13E+12	62.2474	107306.	0.00
39.8950	-0.00338	546275.	-8357.	2.31E-05	0.00	4.13E+12	60.6264	108775.	0.00
40.4000	-0.00323	496744.	-7995.	2.39E-05	0.00	4.13E+12	58.8502	110244.	0.00
40.9050	-0.00309	449375.	-7644.	2.46E-05	0.00	4.13E+12	56.9234	111712.	0.00
41.4100	-0.00294	404095.	-7305.	2.52E-05	0.00	4.13E+12	54.8505	113181.	0.00
41.9150	-0.00278	360830.	-6980.	2.58E-05	0.00	4.13E+12	52.6363	114650.	0.00
42.4200	-0.00262	319498.	-6668.	2.63E-05	0.00	4.13E+12	50.2856	116119.	0.00
42.9250	-0.00246	280013.	-6370.	2.67E-05	0.00	4.13E+12	47.8032	117588.	0.00
43.4300	-0.00230	242283.	-6089.	2.71E-05	0.00	4.13E+12	45.1939	119057.	0.00
43.9350	-0.00213	206213.	-5823.	2.74E-05	0.00	4.13E+12	42.4625	120526.	0.00
44.4400	-0.00197	171702.	-5574.	2.77E-05	0.00	4.13E+12	39.6141	121995.	0.00
44.9450	-0.00180	138646.	-5343.	2.79E-05	0.00	4.13E+12	36.6534	123464.	0.00
45.4500	-0.00163	106936.	-5130.	2.81E-05	0.00	4.13E+12	33.5854	124933.	0.00
45.9550	-0.00146	76459.	-4510.	2.83E-05	0.00	4.13E+12	171.0859	711011.	0.00
46.4600	-0.00129	52265.	-3529.	2.84E-05	0.00	4.13E+12	152.7067	719274.	0.00
46.9650	-0.00111	33679.	-2661.	2.84E-05	0.00	4.13E+12	133.8037	727536.	0.00
47.4700	-9.42E-04	20007.	-1909.	2.85E-05	0.00	4.13E+12	114.3951	735799.	0.00
47.9750	-7.70E-04	10535.	-1276.	2.85E-05	0.00	4.13E+12	94.4946	744062.	0.00
48.4800	-5.97E-04	4534.	-765.2392	2.85E-05	0.00	4.13E+12	74.1119	752325.	0.00
48.9850	-4.24E-04	1255.	-379.3223	2.85E-05	0.00	4.13E+12	53.2534	760588.	0.00
49.4900	-2.52E-04	-68.8050	-121.2392	2.85E-05	0.00	4.13E+12	31.9226	768850.	0.00
49.9950	-7.89E-05	-220.2404	6.1525	2.85E-05	0.00	4.13E+12	10.1209	777113.	0.00
50.5000	9.38E-05	0.00	0.00	2.85E-05	0.00	4.13E+12	-12.1514	392688.	0.00

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 2:

```
Pile-head deflection            =     0.06416126 inches
Computed slope at pile head     =    -0.00043335 radians
Maximum bending moment          =       6136484. inch-lbs
Maximum shear force             =        -20705. lbs
Depth of maximum bending moment =     7.57500000 feet below pile head
Depth of maximum shear force    =    21.21000000 feet below pile head
Number of iterations            =              6
Number of zero deflection points =             2
```

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 3

Pile-head conditions are Shear and Moment (Loading Type 1)

```
Shear force at pile head                          =       6210.0 lbs
Applied moment at pile head                       =    6231168.0 in-lbs
Axial thrust load on pile head                    =      28916.0 lbs
```

Depth X feet	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness in-lb^2	Soil Res. p lb/inch	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.06948	6231168.	6210.	-4.70E-04	0.00	4.10E+12	0.00	0.00	0.00
0.5050	0.06666	6268882.	6210.	-4.60E-04	0.00	4.10E+12	0.00	0.00	0.00
1.0100	0.06390	6306595.	6210.	-4.51E-04	0.00	4.10E+12	0.00	0.00	0.00
1.5150	0.06120	6344305.	6210.	-4.42E-04	0.00	4.10E+12	0.00	0.00	0.00
2.0200	0.05855	6382015.	6210.	-4.32E-04	0.00	4.10E+12	0.00	0.00	0.00
2.5250	0.05596	6419722.	6205.	-4.23E-04	0.00	4.10E+12	-1.5108	163.6200	0.00
3.0300	0.05342	6457372.	6108.	-4.13E-04	0.00	4.10E+12	-30.5793	3469.	0.00
3.5350	0.05095	6493898.	5843.	-4.04E-04	0.00	4.10E+12	-56.9489	6774.	0.00
4.0400	0.04853	6528331.	5426.	-3.94E-04	0.00	4.10E+12	-80.7151	10079.	0.00
4.5450	0.04617	6559798.	4872.	-3.84E-04	0.00	4.10E+12	-101.9736		

```
13384.      0.00
   5.0500   0.04387  6587518.     4197.  -3.75E-04     0.00  4.10E+12  -120.8211
16689.      0.00
   5.5550   0.04163  6610800.     3415.  -3.65E-04     0.00  4.10E+12  -137.3545
19994.      0.00
   6.0600   0.03945  6629035.     2539.  -3.55E-04     0.00  4.10E+12  -151.6712
23299.      0.00
   6.5650   0.03733  6641699.     1583.  -3.45E-04     0.00  4.10E+12  -163.8690
26605.      0.00
   7.0700   0.03526  6648344.  559.2537  -3.35E-04     0.00  4.10E+12  -174.0456
29910.      0.00
   7.5750   0.03326  6648595. -520.4699  -3.26E-04     0.00  4.10E+12  -182.2988
33215.      0.00
   8.0800   0.03132  6642150.    -1645.  -3.16E-04     0.00  4.10E+12  -188.7261
36520.      0.00
   8.5850   0.02943  6628772.    -2803.  -3.06E-04     0.00  4.10E+12  -193.4246
39825.      0.00
   9.0900   0.02761  6608290.    -3984.  -2.96E-04     0.00  4.10E+12  -196.4909
43130.      0.00
   9.5950   0.02584  6580590.    -5179.  -2.86E-04     0.00  4.10E+12  -198.0208
46435.      0.00
  10.1000   0.02414  6545616.    -6380.  -2.77E-04     0.00  4.10E+12  -198.1091
49740.      0.00
  10.6050   0.02249  6503365.    -7576.  -2.67E-04     0.00  4.10E+12  -196.8496
53046.      0.00
  11.1100   0.02090  6453883.    -8762.  -2.58E-04     0.00  4.10E+12  -194.3348
56351.      0.00
  11.6150   0.01937  6397263.    -9928.  -2.48E-04     0.00  4.10E+12  -190.6556
59656.      0.00
  12.1200   0.01789  6333640.   -11069.  -2.39E-04     0.00  4.10E+12  -185.9014
62961.      0.00
  12.6250   0.01648  6263189.   -12178.  -2.29E-04     0.00  4.10E+12  -180.1596
66266.      0.00
  13.1300   0.01511  6186119.   -13250.  -2.20E-04     0.00  4.10E+12  -173.5159
69571.      0.00
  13.6350   0.01381  6102676.   -14279.  -2.11E-04     0.00  4.10E+12  -166.0536
72876.      0.00
  14.1400   0.01256  6013133.   -15260.  -2.02E-04     0.00  4.10E+12  -157.8540
76181.      0.00
  14.6450   0.01136  5917792.   -16190.  -1.93E-04     0.00  4.10E+12  -148.9960
79487.      0.00
  15.1500   0.01021  5816977.   -17064.  -1.85E-04     0.00  4.10E+12  -139.5558
82792.      0.00
  15.6550   0.00912  5711036.   -17880.  -1.76E-04     0.00  4.10E+12  -129.6073
86097.      0.00
  16.1600   0.00808  5600334.   -18634.  -1.68E-04     0.00  4.10E+12  -119.2216
89402.      0.00
  16.6650   0.00709  5485252.   -19324.  -1.59E-04     0.00  4.10E+12  -108.4671
92707.      0.00
  17.1700   0.00615  5366185.   -19948.  -1.51E-04     0.00  4.10E+12   -97.4093
96012.      0.00
  17.6750   0.00525  5243540.   -20504.  -1.44E-04     0.00  4.10E+12   -86.1110
99317.      0.00
  18.1800   0.00441  5117731.   -20991.  -1.36E-04     0.00  4.11E+12   -74.6319
102622.      0.00
  18.6850   0.00361  4989180.   -21408.  -1.29E-04     0.00  4.11E+12   -63.0289
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105928.      0.00
  19.1900   0.00285  4858313.   -21754.  -1.21E-04     0.00  4.11E+12   -51.3562
109233.      0.00
  19.6950   0.00214  4725559.   -22030.  -1.14E-04     0.00  4.11E+12   -39.6649
112538.      0.00
  20.2000   0.00146  4591347.   -22235.  -1.07E-04     0.00  4.11E+12   -28.0033
115843.      0.00
  20.7050  8.35E-04  4456105.   -22370.  -1.01E-04     0.00  4.11E+12   -16.4168
119148.      0.00
  21.2100  2.45E-04  4320260.   -22435.  -9.42E-05     0.00  4.11E+12    -4.9480
122453.      0.00
  21.7150 -3.07E-04  4184231.   -22430.  -8.79E-05     0.00  4.11E+12     6.3633
125758.      0.00
  22.2200 -8.21E-04  4048435.   -22358.  -8.19E-05     0.00  4.11E+12    17.4799
129063.      0.00
  22.7250  -0.00130  3913280.   -22219.  -7.60E-05     0.00  4.11E+12    28.3674
132369.      0.00
  23.2300  -0.00174  3779166.   -22015.  -7.03E-05     0.00  4.11E+12    38.9936
135674.      0.00
  23.7350  -0.00215  3646483.   -21747.  -6.48E-05     0.00  4.11E+12    49.3292
138979.      0.00
  24.2400  -0.00253  3515610.   -21418.  -5.96E-05     0.00  4.11E+12    59.3468
142284.      0.00
  24.7450  -0.00287  3386916.   -21029.  -5.45E-05     0.00  4.12E+12    69.0214
145589.      0.00
  25.2500  -0.00319  3260756.   -20583.  -4.96E-05     0.00  4.12E+12    78.3302
148894.      0.00
  25.7550  -0.00347  3137471.   -20228.  -4.49E-05     0.00  4.12E+12    38.7786
67644.      0.00
  26.2600  -0.00373  3015610.   -19981.  -4.04E-05     0.00  4.12E+12    42.5633
69113.      0.00
  26.7650  -0.00396  2895311.   -19713.  -3.60E-05     0.00  4.12E+12    46.1596
70582.      0.00
  27.2700  -0.00417  2776707.   -19423.  -3.18E-05     0.00  4.12E+12    49.5610
72051.      0.00
  27.7750  -0.00435  2659921.   -19112.  -2.78E-05     0.00  4.12E+12    52.7614
73520.      0.00
  28.2800  -0.00451  2545073.   -18784.  -2.40E-05     0.00  4.12E+12    55.7558
74989.      0.00
  28.7850  -0.00464  2432272.   -18437.  -2.03E-05     0.00  4.12E+12    58.5399
76458.      0.00
  29.2900  -0.00475  2321619.   -18075.  -1.68E-05     0.00  4.12E+12    61.1101
77927.      0.00
  29.7950  -0.00484  2213211.   -17697.  -1.35E-05     0.00  4.12E+12    63.4638
79396.      0.00
  30.3000  -0.00492  2107132.   -17306.  -1.03E-05     0.00  4.12E+12    65.5986
80865.      0.00
  30.8050  -0.00497  2003462.   -16903.  -7.31E-06     0.00  4.12E+12    67.5133
82334.      0.00
  31.3100  -0.00500  1902271.   -16489.  -4.44E-06     0.00  4.12E+12    69.2069
83803.      0.00
  31.8150  -0.00502  1803620.   -16065.  -1.72E-06     0.00  4.12E+12    70.6793
85271.      0.00
  32.3200  -0.00503  1707565.   -15633.   8.64E-07     0.00  4.12E+12    71.9307
86740.      0.00
  32.8250  -0.00501  1614151.   -15194.   3.30E-06     0.00  4.12E+12    72.9619
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88209.       0.00
   33.3300   -0.00499   1523416.    -14749.   5.61E-06       0.00   4.12E+12    73.7743
89678.       0.00
   33.8350   -0.00494   1435390.    -14300.   7.78E-06       0.00   4.12E+12    74.3694
91147.       0.00
   34.3400   -0.00489   1350095.    -13848.   9.83E-06       0.00   4.12E+12    74.7495
92616.       0.00
   34.8450   -0.00483   1267544.    -13395.   1.18E-05       0.00   4.12E+12    74.9170
94085.       0.00
   35.3500   -0.00475   1187744.    -12941.   1.36E-05       0.00   4.12E+12    74.8747
95554.       0.00
   35.8550   -0.00466   1110694.    -12488.   1.52E-05       0.00   4.12E+12    74.6259
97023.       0.00
   36.3600   -0.00456   1036383.    -12037.   1.68E-05       0.00   4.12E+12    74.1740
98492.       0.00
   36.8650   -0.00446    964797.    -11590.   1.83E-05       0.00   4.12E+12    73.5227
99961.       0.00
   37.3700   -0.00434    895910.    -11147.   1.97E-05       0.00   4.12E+12    72.6759
101430.       0.00
   37.8750   -0.00422    829692.    -10709.   2.09E-05       0.00   4.12E+12    71.6379
102899.       0.00
   38.3800   -0.00409    766105.    -10279.   2.21E-05       0.00   4.12E+12    70.4130
104368.       0.00
   38.8850   -0.00395    705103.     -9857.   2.32E-05       0.00   4.12E+12    69.0057
105837.       0.00
   39.3900   -0.00381    646635.     -9443.   2.42E-05       0.00   4.12E+12    67.4206
107306.       0.00
   39.8950   -0.00366    590643.     -9040.   2.51E-05       0.00   4.12E+12    65.6626
108775.       0.00
   40.4000   -0.00350    537062.     -8648.   2.59E-05       0.00   4.12E+12    63.7365
110244.       0.00
   40.9050   -0.00334    485821.     -8268.   2.67E-05       0.00   4.12E+12    61.6473
111712.       0.00
   41.4100   -0.00318    436845.     -7901.   2.73E-05       0.00   4.12E+12    59.4001
113181.       0.00
   41.9150   -0.00301    390049.     -7548.   2.79E-05       0.00   4.12E+12    56.9999
114650.       0.00
   42.4200   -0.00284    345347.     -7211.   2.85E-05       0.00   4.12E+12    54.4518
116119.       0.00
   42.9250   -0.00267    302645.     -6889.   2.90E-05       0.00   4.12E+12    51.7612
117588.       0.00
   43.4300   -0.00249    261843.     -6584.   2.94E-05       0.00   4.12E+12    48.9332
119057.       0.00
   43.9350   -0.00231    222838.     -6296.   2.97E-05       0.00   4.12E+12    45.9731
120526.       0.00
   44.4400   -0.00213    185521.     -6027.   3.00E-05       0.00   4.12E+12    42.8862
121995.       0.00
   44.9450   -0.00195    149779.     -5777.   3.03E-05       0.00   4.12E+12    39.6778
123464.       0.00
   45.4500   -0.00176    115495.     -5547.   3.05E-05       0.00   4.12E+12    36.3533
124933.       0.00
   45.9550   -0.00158     82545.     -4875.   3.06E-05       0.00   4.12E+12   185.1641
711011.       0.00
   46.4600   -0.00139     56395.     -3814.   3.07E-05       0.00   4.12E+12   165.2486
719274.       0.00
   46.9650   -0.00121     36314.     -2874.   3.08E-05       0.00   4.12E+12   144.7658
727536.       0.00
   47.4700   -0.00102     21549.     -2061.   3.08E-05       0.00   4.12E+12   123.7354
735799.       0.00
   47.9750  -8.32E-04     11328.     -1376.   3.09E-05       0.00   4.12E+12   102.1722
744062.       0.00
   48.4800  -6.45E-04      4859.  -823.9211   3.09E-05       0.00   4.12E+12    80.0866
752325.       0.00
   48.9850  -4.58E-04      1331.  -407.0773   3.09E-05       0.00   4.12E+12    57.4856
760588.       0.00
   49.4900  -2.71E-04   -85.8566  -128.7461   3.09E-05       0.00   4.12E+12    34.3729
768850.       0.00
   49.9950  -8.38E-05  -240.3194     7.9766   3.09E-05       0.00   4.12E+12    10.7501
777113.       0.00
   50.5000   1.03E-04       0.00       0.00   3.09E-05       0.00   4.12E+12   -13.3826
392688.       0.00
```

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

```
Output Summary for Load Case No. 3:

Pile-head deflection             =     0.06947958 inches
Computed slope at pile head      =    -0.00046957 radians
Maximum bending moment           =       6648595. inch-lbs
Maximum shear force              =        -22435. lbs
Depth of maximum bending moment  =     7.57500000 feet below pile head
Depth of maximum shear force     =    21.21000000 feet below pile head
Number of iterations             =              6
Number of zero deflection points =              2


--------------------------------------------------------------------------------
            Summary of Pile-head Responses for Conventional Analyses
--------------------------------------------------------------------------------

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians


Load Load                Load                 Axial    Pile-head  Pile-head  Max Shear Max
Moment
Case Type   Pile-head    Type     Pile-head   Loading  Deflection  Rotation    in Pile    in
Pile
 No.  1      Load 1       2        Load 2       lbs      inches     radians      lbs
in-lbs
---- ----- ---------- ---------- ---------- ---------- ---------- ---------- ----------
```

```
----------
  1  V, lb     12849.  M, in-lb    1.28E+07     26701.     0.2032   -0.00170    -45820.
1.36E+07
  2  V, lb      5782.  M, in-lb    5747155.     16688.    0.06416  -4.33E-04    -20705.
6136484.
  3  V, lb      6210.  M, in-lb    6231168.     28916.    0.06948  -4.70E-04    -22435.
6648595.


Maximum pile-head deflection = 0.2032297745 inches
Maximum pile-head rotation   = -0.0016962550 radians = -0.097188 deg.

The analysis ended normally.
```

SITE PRO 1
A valmont COMPANY

1545 Pidco Drive
Plymouth, IN 46563
Phone: 574.936.4221
Fax: 574.936.8925
Email: SP1Engineering@valmont.com
www.sitepro1.com

June 3, 2022

Site Pro 1 / Valmont Mounting System:

Part Number = RMVD12 -3xxx & RMVD12-NPNH
Part Description = 12' Monopole Dual Triple T-arm kit. 2.5 sch 40 mast pipe

Mount EPA & Weight (No antenna pipes, (0.67*EPA)):

EPA_N	= 21.51(14.35) Sq-Ft	$EPA_{N\ (0.5''\ Ice)}$	= 26.29(17.54) Sq-Ft	$EPA_{N\ (1''\ Ice)}$	= 31.18(20.79) Sq-Ft
EPA_T	= 20.57(13.72) Sq-Ft	$EPA_{T\ (0.5''\ Ice)}$	= 25.86(17.24) Sq-Ft	$EPA_{T\ (1''\ Ice)}$	= 30.37(20.24) Sq-Ft
Weight = 2081 lb		Weight $_{(0.5''\ Ice)}$	=2317 lb	Weight $_{(1''\ Ice)}$	= 2620 lb

Classification Rating:

M1300R(1300)-4[6]
M800R(1300)-4[24]

Design Standards

ANSI/TIA-222-G-2012
ANSI/TIA-222-H-2018
AT&T Mount Classification
ASCE 7-16
International Building Code 2018
TIA-5053

Analysis and Modeling Technique

An elastic, three-dimensional, frame, truss model was developed to examine the structural behavior of the mount. All orientations in the engineering model correspond with the assembly drawing constraints. The mount was analyzed with four (4) mounting locations (antenna, radio etc. + pipe) evenly spaced across the face of the mount, with six (6) vertical eccentricity and twenty-four (24) inch eccentricity. Wind directions considered were perpendicular (normal) to the face of the frame and at 30 degree increments up to 90 degrees (tangential) to the face of the frame. Wind, dead weight and ice weight on the mount was also included in the model.

Modeling Software

Autodesk Inventor
RISA-3D

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Analysis Design Criteria

Maximum Mount Height	400'
Maximum Ultimate Wind Speed, no Ice	180 mph 3 sec gust
Maximum Design Wind Speed, no Ice	140 mph 3 sec gust
Maximum Design Wind Speed on Ice	60 mph 3 sec gust
Structure Class	I or II
Exposure Category	B or C
Topographic Category	I
Maximum Design Ice Thickness, t_i	1" (2.75" factored ice)
Wind Direction Probability Factor, K_d	0.95
Gust Effect Factor, G_h	1.0

Capacity Results

The following factored loads at each mounting location represent the capacity of the mount based on the criteria and modeling technique described above. Capacity below represents 6 inch offset

Normal Wind Load (no ice), F_{no}	.....................1300 lb	[813lb Non-Factored]
Tangential Wind Load (no ice), F_{to}	.....................1300 lb	[813 lb Non-Factored]
Vertical (Dead) Load, F_{zo}	.....................650 lb	[542 lb Non-Factored]
Normal Wind on Ice, F_{ni}	.....................325 lb	
Tangential Wind on Ice, F_{ti}	.....................325 lb	
Vertical (Dead + Ice) Load, F_{zi}	.....................1300 lb	
Normal Maintenance Wind Load, F_{nm}	.....................130 lb	
Tangential Maintenance Wind Load, F_{tm}	.....................130 lb	
Vertical Dead Load, F_{zm}	.....................650 lb	[417 lb Non-Factored]
Vertical Live Load, L_M*	.....................750 lb	[500 lb Non-Factored]

* In addition to a nominal Live Load of two (2) 250 lb concentrated on either side of a mounting location to provide access for climbers.

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6 inch offset

Effective Projected Area $(EPA)_A$ (sq-ft)

WIND LOAD: 1.0000 kips

HEIGHT (ft)	WIND SPEED (mph) 90	100	110	120	130	140	150	160	170	180	190
50	46.4112	37.5931	31.0687	26.1063	22.2444	19.1802	16.7080	14.6848	13.0080	11.6028	10.4136
100	40.1096	32.4888	26.8502	22.5617	19.2241	16.5759	14.4395	12.6909	11.2418	10.0274	8.9997
150	36.8279	29.8306	24.6534	20.7157	17.6512	15.2197	13.2580	11.6526	10.3220	9.2070	8.2633
200	34.6636	28.0775	23.2046	19.4983	16.6139	14.3253	12.4789	10.9678	9.7154	8.6659	7.7777
250	33.0729	26.7890	22.1397	18.6035	15.8515	13.6679	11.9062	10.4645	9.2696	8.2682	
300	31.8275	25.7802	21.3060	17.9029	15.2546	13.1532	11.4579	10.0704	8.9205	7.9569	
350	30.8111	24.9570	20.6256	17.3313	14.7675	12.7332	11.0920	9.7488	8.6357	7.7028	
400	29.9570	24.2652	20.0539	16.8508	14.3581	12.3802	10.7845	9.4786	8.3963	7.4893	
450	29.2234	23.6709	19.5627	16.4381	14.0065	12.0770	10.5204	9.2465	8.1906		
500	28.5823	23.1517	19.1336	16.0775	13.6992	11.8121	10.2896	9.0436	8.0110		

24 inch offset

Effective Projected Area $(EPA)_A$ (sq-ft)

WIND LOAD: 1.3000 kips

HEIGHT (ft)	WIND SPEED (mph) 90	100	110	120	130	140	150	160	170	180	190
50	60.3346	48.8710	40.3893	33.9382	28.9178	24.9342	21.7205	19.0903	16.9104	15.0837	13.5377
100	52.1425	42.2354	34.9053	29.3302	24.9914	21.5487	18.7713	16.4982	14.6143	13.0356	11.6996
150	47.8762	38.7798	32.0494	26.9304	22.9466	19.7856	17.2354	15.1483	13.4186	11.9691	10.7423
200	45.0627	36.5008	30.1659	25.3478	21.5981	18.6228	16.2226	14.2581	12.6300	11.2657	10.1110
250	42.9947	34.8257	28.7816	24.1845	20.6069	17.7682	15.4781	13.6038	12.0504	10.7487	
300	41.3757	33.5143	27.6978	23.2738	19.8310	17.0991	14.8952	13.0915	11.5966	10.3439	
350	40.0545	32.4441	26.8133	22.5307	19.1977	16.5531	14.4196	12.6735	11.2263	10.0136	
400	38.9442	31.5448	26.0701	21.9061	18.6655	16.0943	14.0199	12.3222	10.9151	9.7360	
450	37.9904	30.7722	25.4316	21.3696	18.2084	15.7001	13.6765	12.0204	10.6478		
500	37.1570	30.0971	24.8737	20.9008	17.8090	15.3557	13.3765	11.7567	10.4142		

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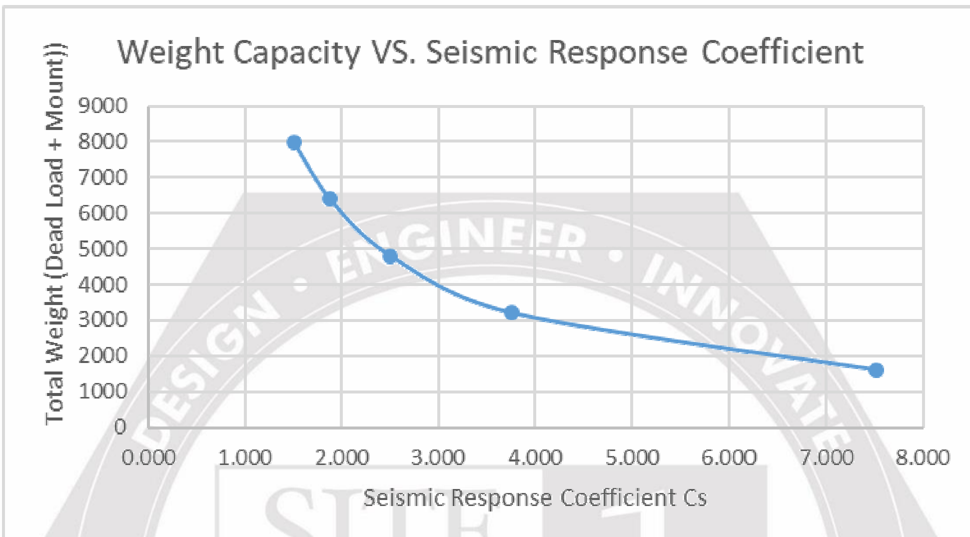
Seismic Results

The following Seismic Response Coefficient chart below represent the allowable weight capacity of the bracket based on the criteria and modeling technique described in TIA-222-H Section 2.7.7.1.1. Total allowable seismic shear must be less than or equal to the Capacity Results (**F_{no}**) stated above.

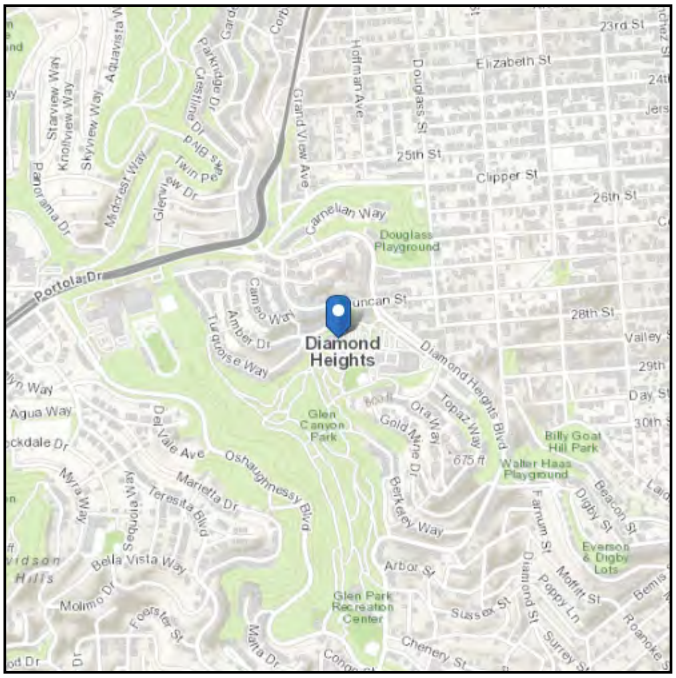


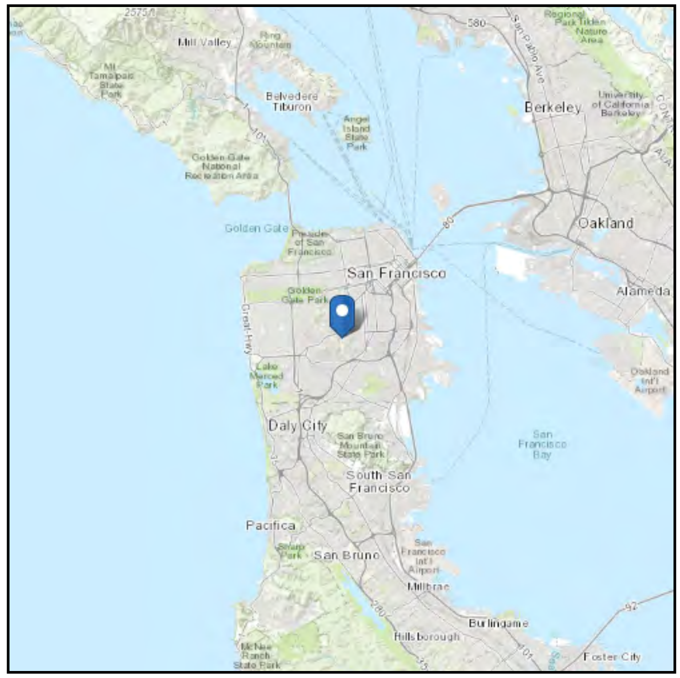
ASCE Hazards Report

Address:
350 Amber Dr
San Francisco, California
94131

Standard: ASCE/SEI 7-22
Risk Category: III
Soil Class: D - Stiff Soil

Latitude: 37.744251
Longitude: -122.441405
Elevation: 558.5025355328418 ft (NAVD 88)





Wind

Results:

Wind Speed	99 Vmph
10-year MRI	63 Vmph
25-year MRI	70 Vmph
50-year MRI	74 Vmph
100-year MRI	78 Vmph
300-year MRI	86 Vmph
700-year MRI	92 Vmph
1,700-year MRI	99 Vmph
3,000-year MRI	103 Vmph
10,000-year MRI	112 Vmph
100,000-year MRI	128 Vmph
1,000,000-year MRI	147 Vmph

Data Source: ASCE/SEI 7-22, Fig. 26.5-1C and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Tue Jan 27 2026

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-22 Standard. Wind speeds correspond to approximately a 3% probability of exceedance in 50 years (annual exceedance probability = 0.000588, MRI = 1,700 years). Values for 10-year MRI, 25-year MRI, 50-year MRI and 100-year MRI are Service Level wind speeds, all other wind speeds are Ultimate wind speeds.

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-22 Section 26.2.

Seismic

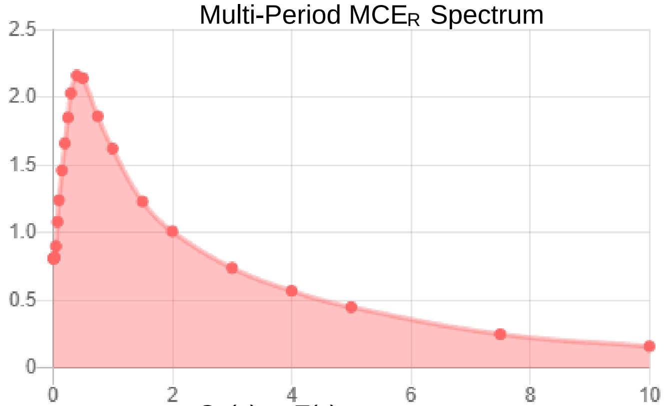
Site Soil Class: D - Stiff Soil

Results:

PGA_M :	0.67	T_L :	12
S_{MS} :	1.95	S_S :	1.84
S_{M1} :	2.07	S_1 :	0.7
S_{DS} :	1.3	V_{S30} :	260
S_{D1} :	1.38		

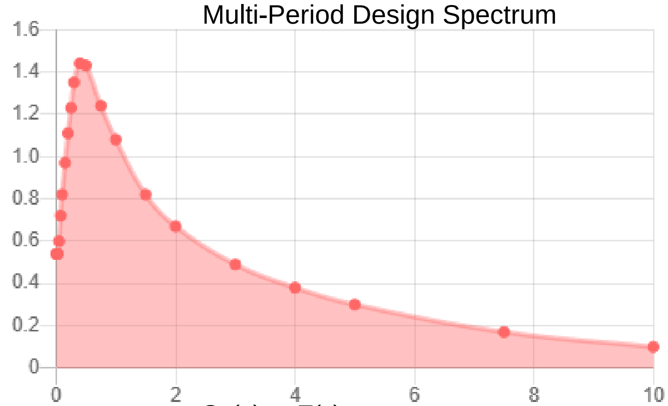
Seismic Design Category: D

Multi-Period MCE_R Spectrum



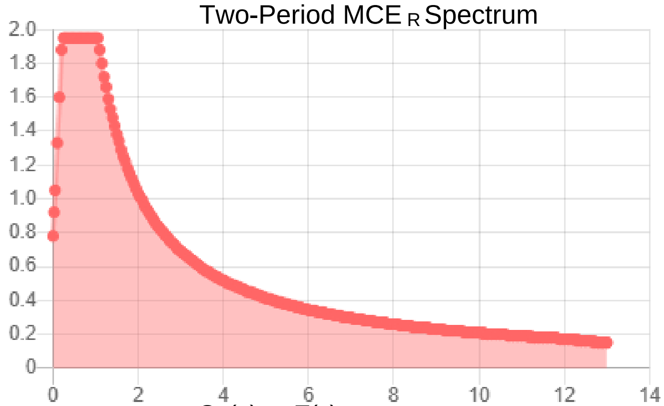
S_a(g) vs T(s)

Multi-Period Design Spectrum



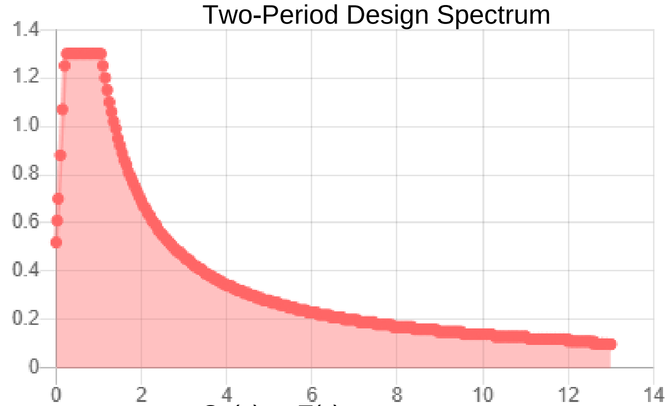
S_a(g) vs T(s)

Two-Period MCE_R Spectrum



S_a(g) vs T(s)

Two-Period Design Spectrum



S_a(g) vs T(s)

MCE_R Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Data Accessed: **Tue Jan 27 2026**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness:	N/A
Concurrent Temperature:	N/A
3-s Gust Speed	N/A
Data Source:	Standard ASCE/SEI 7-22, Figs. 10-2 through 10-8
Date Accessed:	Tue Jan 27 2026

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain for 250, 500, 1,000, and 1,400-year mean recurrence intervals along with concurrent 3-s gust speeds and concurrent air temperatures. The shading indicates special icing regions, with elevations above 2,100 ft (640 m) in the east, 6,000 ft (1829 m) in the west, and 1,600 ft (488 m) in Alaska, with sparse weather station data for determining design ice loads. In these regions, as well as in regions with complex terrain causing unusual icing conditions and regions where snow or in-cloud icing results in larger loads, the mapped values should be adjusted based on a combination of local historical records and experience, reanalysis data, and numerical weather prediction systems.

Exhibit E

Exhibit E

Thomas William Oldag

Retired Firefighter / Fire Investigator

toldag@icloud.com

530 919-4521

I, Thomas W. Oldag, declare as follows:

I am a retired fire investigator with over 33 years-experience in the suppression, investigation, and fighting of all types of fires. During that time, I have filled different roles in these areas as an employee of the California Department of Forestry and Fire Protection (Cal Fire), including arson and bomb investigator, fire suppression captain, fire apparatus engineer, and fire fighter.

I am an educator in the field of fire investigation and currently teach a class in Wildland Fire Origin and Cause Determination to multiple fire-fighting organizations. I hold several certificates and have completed countless training hours in the areas of fire prevention, control, and investigation. My experience and training has provided me with an understanding of the sources of fire ignition and the behavior of electrical equipment and its potential role in fire ignition.

I have been asked to review the proposed AT&T Macro Wireless Telecommunications Facility at 350 Amber Drive in San Francisco, CA. A monopole is proposed for to be installed near a San Francisco Police Academy building. I have been asked to review the proposed Facility in light of the opponents' allegations of supported fire and related risks.

The proposed tower sits on the southern side of the selected property. The tower will be placed in a small grove of eucalyptus trees, approximately 100 feet south of the San Francisco Police Academy building. Northeast of the site is an asphalt parking lot. A proposed 12' wide access road is shown east of the tower and wraps around to the north of the existing parking area. The George Christopher Playground and Diamond Heights Baseball Field are located to the east and south of the proposed site. Visible in Google

Earth satellite photos are walking trails with stairs going from the baseball field towards the labelled Islais Creek Trail. South and west of the site is an area that contains various types of grasses, brush and trees. Approximately 300 feet west of the site is Turquoise Way. This area is known as Glen Canyon Park.

Wildland fire concerns are very low in the Diamond Heights area due to several conditions. The proposed site is located within 4 miles of the Pacific Ocean and San Francisco Bay, and very high humidity in the area. The geography of Diamond Heights invites frequent fog to the area, based on the interaction of San Francisco's traditional marine layer and the neighborhood's exposed hilltop setting near Twin Peaks and Mount Davidson, which funnels, lifts, and cools moist ocean air arriving from the west. The neighborhood's elevation and exposure place it directly in the path of the funneled marine layer and westerly winds, so it runs cooler, windier, and foggier than many other San Francisco neighborhoods. Though San Francisco overall is not a fire friendly climate, the area of Diamond Heights tends to be foggier and windier than other areas of the City.

I have reviewed the submission of Susan Foster on behalf of the opponents of AT&T's cell tower installation. Ms. Foster offers many unsubstantiated and speculative assertions regarding alleged fire risk associated with the tower, some of which I discuss below. In particular, she attempts to offer cautionary examples of wildfires caused by downed or damaged power lines in Southern California in particularly hot and dry conditions, and fierce Santa Ana winds – conditions that simply do not exist in San Francisco.

The San Francisco area has a different climate and weather than Southern California. San Francisco averages 24 inches of rainfall per year while Los Angeles averages 15 inches per year. San Francisco Area does not get Santa Ana or El Diablo winds. Those winds are exceptionally strong easterly winds coming from the high elevation desert that blow downhill and are warmed up and sped up as they blow. San Francisco is surrounded on three sides by water which aids in the nighttime humidity recovery and greatly reduces any possible wildland fire threat. Nor do the trees in the area of the proposed tower present any fire risk. As set out in a January 28, 2026, Arborist Report on the Facility, '[t]here is no tree-related fire risk associated with the vegetation at this site. The site is located within a gap in the tree canopies and has a flat non-flammable asphalt surface. The trees are not a threat to the infrastructure nor is the infrastructure a threat to the trees."

Ms. Foster states that macro cell towers "pose a fire risk," and that "these fires are covered up by the telecommunications industry," yet she offers no examples or evidence for this accusation. By law, local fire departments are required to complete an initial origin and cause reports for fires in their jurisdiction to which they are called to respond. The allegation that these fires are "covered up" by local fire departments is wholly unsupported by Ms. Foster, which is consistent with the conspiracy-based approach reflected in most of the assertions in her letter.

Cell towers are not known to randomly catch fire. The proposed AT&T tower and associated equipment will be constructed of noncombustible materials. The associated powerlines and communication lines will be enclosed within the metal structure. Cell towers require electricity to function. The power lines supplying the site will be underground. Wildland fires usually occur due to branches falling onto power lines, or power lines making contact with other nearby facilities. There are no exposed power lines associated with the proposed tower, however.

The National Fire Protection Association (NFPA) has a standard for telecommunications facilities, NFPA 76 – Standard for the Fire Protection of Telecommunications Facilities. This prevention guideline was created to minimize fires in telecommunication facilities. The proposed facility will comply with these standards, which mandates the storage of any combustible materials in approved non-combustible containers near or around the facility.

Most cell towers utilize a source of backup power in the event of a power failure. This site will have a diesel generator incorporated into its design. The positioning of diesel generators, as in this case, is regulated by accepted building standards.

I do not believe the location at 350 Amber Drive of this proposed tower presents a fire risk. The site's secure location, rigid engineering standards, compliance with NFPA Standards, the higher humidity in the area, and the absence of any exposed power lines near the proposed tower all reduce any potential fire threat.

I have reviewed the California Public Utility Commission (CPUC) Report on the 2007 Malibu Fire, which indicates that fire started when 3 wooden poles fell in 85-100 mph winds on a dry hot day in Malibu Canyon, causing a 12,000-volt Edison power line to contact dry grass, sparking a fire. There was no cell tower or wireless telephone equipment involved in that fire.

Based on the published Woolsey Fire (2018) Investigation Report, that fire started when a loose Edison guy wire came loose in 70 mph winds and contacted a 16,000-volt Edison power line. Moreover, no cell tower or wireless telephone equipment was involved in that fire. Neither of the other fires that Foster mentions (Guejito, Silverado) were caused by or in any way involved a cell tower. Power lines, loose wires, high winds and nearby receptive vegetation were the contributing factors in those fires' ignition, both of which occurred in conditions that do not exist in San Francisco, involving equipment that does not resemble the planned tower.

Ms. Foster claims that if there is a fire on a cell tower (which is by itself a rare event, and one for which Ms. Foster cannot give one example of, save for a football light tower fire that was <u>not</u> blamed on a nearby cell antenna), it would supposedly be difficult to combat such a fire, since the power "from the grid" will take time to shut off. Power provided to a macro cell tower, like all commercial power, is stepped down by transformers and regulated to the end user. There are also fuses and breakers built into the system. In the possible event of a fault (arc), the involved fuse or breaker will turn off the power to that phase (power line). The grid at large is not affected. As an example, in a structure fire, firefighters can fight the fire after securing the utilities, power and gas to that structure; they do not need to shut off the power "on the grid," or to the larger area.

Thomas W. Oldag

Thomas W. Oldag

THOMAS W. OLDAG

CURRICULUM VITAE

RETIRED FIRE INVESTIGATOR

Currently instruct yearly wildland fire investigation (Wildland Fire Origin and Cause Determination FI-210) classes.

DUTIES WHILE EMPLOYED

Investigate fires of accidental, suspicious, and incendiary origin and instruct various fire investigation classes.

POLICE / FIRE EMPLOYMENT HISTORY

California Department of Forestry and Fire Protection – Office of the State Fire Marshal April 2015 to October 2015 – Senior Arson Bomb Investigator

California Department of Forestry and Fire Protection, November 2000 to 2015
Fire Captain - Fire Investigator

Lake County Sheriff's Department June 1994 to June 1998
Level II Reserve Deputy Sheriff

Lake County Sheriff's Search and Rescue, January 1990 to May 1996.
Team K9 Team Leader

California Department of Forestry and Fire Protection, May 1994 to November 2000
Fire Suppression Captain

California Department of Forestry and Fire Protection, August 1987 to May 1994
Fire Apparatus Engineer

California Department of Forestry and Fire Protection, August 1982 to August 1986
Seasonal Fire Fighter

INVESTIGATIVE EXPERIENCE	# OF SCENES	ACCIDENTAL	ARSON	Undet.
Structure Fires	79	38	32	9
Mobile Homes	13	10	2	1
Vehicle Fires	98	24	67	7
Wildland Fires	1274	921	304	49
Totals	1464	993	405	66

While assigned to a fire engine, I have been involved in the suppression of approximately 1700 fires and assisted in approximately 700 fire investigations.

FORMAL EDUCATION

American River College, Cosumnes River College, Ukiah College, Santa Rosa Jr. College – obtained over 95 college units.

VOCATIONAL CERTIFICATES

Firefighter I - California State Board of Fire Service - 1988
Basic POST Academy, Sacramento Sheriff's Academy – 2001 – 707 hours
Basic POST Certificate – 2002

VOCATIONAL TRAINING AND EDUCATION

Basic Fire Control / Fire Apparatus Engineer CDF Academy – 1988 – 360 hours
Arson / Bomb Investigation 1A, State Fire Marshal – 1988 – 40 hours
Hazardous Material Materials Recognition, State Fire Marshal – 1990 – 24 hours
Arson / Bomb Investigation 1B, State Fire Marshal – 1992 – 40 hours
Intermediate Fire Behavior – USFS – 1995 – 40 hours
Serial Arsonist Analysis and Planning, State Fire Marshal – 1998 – 40 hours
Arson / Bomb Investigation 2A, State Fire Marshal – 1999 – 40 hours
Prop 115 Class – Sacramento Sheriff's Academy - 2001
FEMA Juvenile Firesetters Prevention & Intervention Workshop – 2001 – 16 hours
Forest Practice Enforcement Course – 2002 – 32 hours
Interview and Interrogation Class – Interview and Interrogation Institute – 2003 – 24 hours
Fire Scene Death Investigations – State Fire Marshal – 2003 – 16 hours
Arson – Explosives Foundation Specialty Course, Robert Presley Institute of Criminal Investigation's – 2003 – 40 hours
Arson / Bomb Investigation 2B, State Fire Marshal – 2003 – 40 hours
Post Blast Explosive Class, Alcohol Tobacco and Firearms – 2003 – 40 hours
Electrical Fire Investigation – CCAI – 2003 – 6 hours
Statutes and Regulations Class, Title 19, State Fire Marshal – 2004 – 24 hours
CCAI Conference – 2005 – 40 hours
NFPA 921 Class – CCAI – 2005 – 8 hours
Wildland Fire Origin and Cause Determination FI-210 – USFS – 2005 – 40 hours
Public Display Fireworks Training – CSFM – 2005 – 6 hours
Vehicle Fire Investigation – Live Fire Training – CCAI – 2005 – 8 hours
CDF Type III Fire Investigator - 2006
Wildland Fire Case Development Course FI-310 – USFS – 2006 – 40 hours
CDF Type II Fire Investigator – 2007
Forensic Fire Death Investigation – San Luis Obispo CA – CCAI – 2009 – 40 hours
NFPA 921 Class – CCAI / Fire Cause Analysis – 2009 – 8 hours
Wildland Fire Civil Case Development Course FI-311 – 2011 – 40 Hours
Post Flashover Fire Investigation – 2011 – 8 hours
Wildland Fire Investigation Team Member – 2011

I have deliberately set approximately 550 fires in various wildland fuel types, construction type (wood framed, cement block, metal siding) buildings, and vehicles to observe fire spread and behavior. The fires duplicated accidental and incendiary fires. Many of the fires were used for fire suppression training.

I have instructed fire fighters in classes on Fire Suppression and Basic Fire Investigation, Origin and Cause. I taught thirteen Wildland Fire Origin and Cause Determination FI-210 Classes, seventeen Wildland Fire Origin and Cause Determination FI-110 Classes, and assisted at the 2010 - 2015 Forensic Fire Death Investigation Class in San Luis Obispo CA. Since retiring I have continued to teach FI-210 Classes.

I have attended thirteen seminars, eight to thirty-two hours in length sponsored by the California Conference of Arson Investigators. In 2012, I taught a three-hour block on serial arson at the Fall California Conference of Arson Investigators in San Luis Obispo. In 2012, I taught at an Arson for Prosecutor's Class in El Dorado County. In 2013, I taught a two-hour block at a Serial Arson Conference in Las Vegas. November 2014, I taught a two-and-a-half-day course on wildland fire investigation at the California Conference of Arson Investigators.

In 2022, I co-wrote a chapter in the book, The Path of Flames – Understanding and Responding to Fatal Wildfires.

I have testified six times in El Dorado County as an expert witness. Three times during the Preliminary Hearings for arson cases, once to the Grand Jury involving a homicide case and once during a homicide trail:

2001 – El Dorado County Superior - Juvenile Court – Arson Case – Sentencing
2007 – El Dorado County Superior Court – Cunha Arson Case – Preliminary Hearing
2008 – El Dorado County Superior Court – McFarland Arson Case – Preliminary Hearing
2009 – El Dorado County Grand Jury – Presba Murder / Arson Case – Grand Jury
2011 – El Dorado County Superior Court – Tyler / Whit Murder Case – Jury Trial
2013 – El Dorado County Superior Court – Dobbs Arson Case – Jury Trial

I testified once in El Dorado County in a non fire related murder trial in 2009 – Mt. Aukum Shooting.

I have testified once as an expert witness in Amador County:

2004 – Amador County Superior Court – Juvenile Court – Arson Case - Sentencing

I testified once in Amador County in a non fire related pursuit and resisting trial in 2006.

While employed by CAL FIRE, I was a member from 2001of the Sacramento – Sierra Arson Task Force and the El Dorado County Arson Task Force.

In addition to fire related cases, I have also been involved in investigating fraud, theft, conspiracy, narcotics, burglary, forgery, forest practice issues and vehicle code violations to name a few.

Deposition and Civil Court:
Giovannotto Land and Cattle, LLC, A California Corporation v. Elliot French, and individual; and DOES 1-50, – Case No.: 20CV372857 – Superior Court of the State of California County of Santa Clara

Exhibit F

Exhibit F

Tree Management Experts

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San Francisco, CA 94115

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Certified Arborists, Tree Risk Assessment Qualified

NextEdge Networks
Attn: Ben Foust, Senior Program Manager
via email: ben.foust@nextedgenetworks.com

RE: AT&T Site Number CCL05350
AT&T Site Name: SF Police Academy

Date: 1/28/26

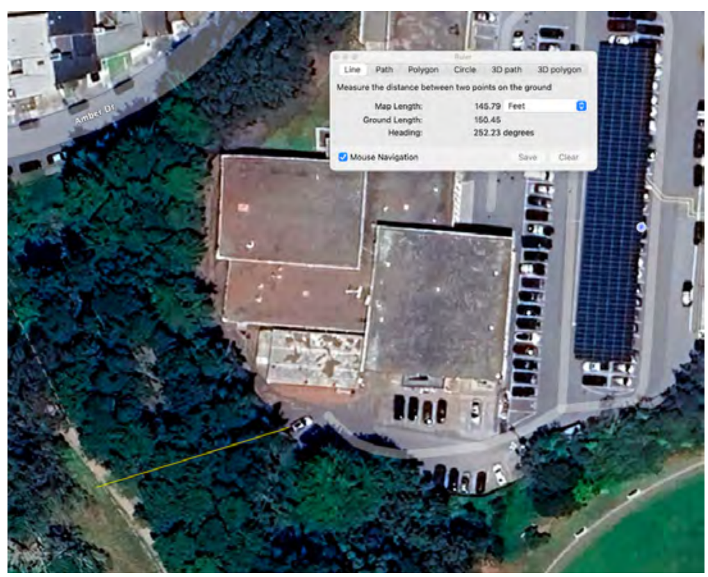
ARBORIST REPORT

Assignment and Summary

On 1/20/26, Certified Arborist Roy Leggitt provide a site visit to inspect trees that are adjacent to the construction site and within a distance that would likely have roots present. Trees and vegetation on the adjacent park property and at the south corner of the SF Police Academy site were inspected, photographed and characterized. Plans dated 11/18/25 were provided and considered during the assessment. Construction impacts that might put any tree at a risk of harm, and risk mitigation that could benefit the trees was considered. In addition, consideration was given to any fire risk issues, as related to trees. As discussed in detail below, anticipated root impacts are negligible and there is not tree-related fire risk associated with the vegetation at the site.

Trees Adjacent to Site

There are 6 trees adjacent to the site that are Monterey cypress (*Hesperocyparis macrocarpa*). Of these trees, only one is close enough potentially be impacted by construction. The tree is 25 feet away from construction, measures 47.4" diameter and is in fair condition.



There is no impact to an "Mixed Exotic Oak Woodland" since there are no oaks anywhere near this project. The nearest oak is 145 feet away (as shown at right), is a small tree, and is the other side of a park pathway and retaining wall. All trees closer than this are exotic species not native to San Francisco ecosystems and include Tasmanian blue gum eucalyptus, Monterey cypress and Monterey pine. These trees would be correctly referred to as "Mixed Exotic Species", and there is no “Oak Woodland” present. The “Mixed Exotic Species” in the adjacent park will not be affected by construction.

Root Zones and Potential Construction Impacts

Structural roots (a subset of the entire root system discussed above) are close to the trunk and hold the tree up. Other roots, typically further out, absorb water and nutrients, but given the pavement there is little water available and therefore less root growth in such an area. The more distant roots are likely far fewer and far less important than those on the park side of the tree. There will be no impacts to structural roots since the proposed AT&T non-exclusive parking space already exists and will not change existing conditions for the tree.

The root zone of the subject tree likely extends throughout the construction area, although root development is severely limited by the existing concrete curbing and asphalt surface. Under ideal conditions, the root zone could extend to a radius in feet of 10 times the trunk diameter inches, and therefore creating a circle that is 474 inches radius, or 39.5 feet.

The root zone is expected to have developed preferentially in the park and much less so where it is covered by pavement. The reduced root development due to the pavement is predictive that the root system will be less than half as extensive and reaching less than 20 feet radius. The entire lease area is about 550 square feet, and the bult portion of the lease area is less than half of that area. The percent root loss is under 5 percent, even with a fully developed root zone. Given the limited development of a root zone beneath pavement, it is likely that 2 to 3 percent of the root zone could be affected. This is a negligible amount of root loss and does not pose any threat to the tree.

The utility trench is located within the road/driveway portion of the existing parking lot and is far from this tree and any other tree. It is anticipated that few if any roots are present at that distance.

Best Practices

- Anticipated root impacts are negligible.
- A Project Arborist from Tree Management Experts shall be on site during all demolition and excavation work.
- Saw cut asphalt in discreet locations as shown on plans for placement of the pier, structures, generator pad and utility trench.
- Retain adjacent asphalt to protect soil and any potential roots.
- Any roots encountered will be cleanly cut with a sharp tool.

Tree-Related Fire Risk

There is no tree-related fire risk associated with the vegetation at this site. The site is located within a gap in the tree canopies, and has a flat non-flammable asphalt surface. The trees are not a threat to the infrastructure nor is the infrastructure a threat to the trees.

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Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. Title and ownership of all property considered are assumed to be good and marketable. No responsibility is assumed for matters legal in character. Any and all property is appraised or evaluated as though free and clear, under responsible ownership and competent management.
2. It is assumed that any property is not in violation of any applicable codes, ordinances, statutes or other governmental regulations.
3. Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible. The consultant can neither guarantee nor be responsible for the accuracy of information provided by others.
4. Various diagrams, sketches and photographs in this report are intended as visual aids and are not to scale, unless specifically stated as such on the drawing. These communication tools in no way substitute for nor should be construed as surveys, architectural or engineering drawings.
5. Loss or alteration of any part of this report invalidates the entire report.
6. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person to whom it is addressed, without the prior written or verbal consent of the consultant.
7. This report is intended to be conveyed to the City and County of San Francisco and will be part of the Public record. Such limitations apply to the original report, a copy, facsimile, scanned image or digital version thereof.
8. This report represents the opinion of the consultant. In no way is the consultant's fee contingent upon a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.
9. The consultant shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services as described in the fee schedule, an agreement or a contract.
10. Information contained in this report reflects observations made only to those items described and only reflects the condition of those items at the time of the site visit. Furthermore, the inspection is limited to visual examination of items and elements at the site, unless expressly stated otherwise. There is no expressed or implied warranty or guarantee that problems or deficiencies of the plants or property inspected may not arise in the future.

Disclosure Statement

Arborists are tree specialists who use their education, knowledge, training, and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of the arborist, or to seek additional advice.

Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that fail in ways we do not fully understand. Conditions are often hidden within trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments, like any medicine, cannot be guaranteed.

Treatment, pruning, and removal of trees may involve considerations beyond the scope of the arborist's services such as property boundaries, property ownership, site lines, disputes between neighbors, and other issues. An arborist cannot take such considerations into account unless complete and accurate information is disclosed to the arborist. An arborist should then be expected to reasonably rely upon the completeness and accuracy of the information provided.

Trees can be managed, but they cannot be controlled. To live near trees is to accept some degree of risk. The only way to eliminate all risk associated with trees is to eliminate the trees.

Tree risk assessment is not tree risk management. The arborist typically has the distinct and separate role of being the tree risk assessor. The tree risk manager is typically the property owner or the agent thereof. Tree risk management should consider tree risk assessment, and may consider many additional factors related to property management decision making.

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Certification of Performance

I, Roy C. Leggitt, III, Certify:

- That we have inspected the trees and/or property evaluated in this report. We have stated findings accurately, insofar as the limitations of the Assignment and within the extent and context identified by this report;
- That we have no current or prospective interest in the vegetation or any real estate that is the subject of this report, and have no personal interest or bias with respect to the parties involved;
- That the analysis, opinions and conclusions stated herein are original and are based on current scientific procedures and facts and according to commonly accepted arboricultural practices;
- That no significant professional assistance was provided, except as indicated by the inclusion of another professional report or professional attribution within this report;
- That compensation is not contingent upon the reporting of a predetermined conclusion that favors the cause of the client or any other party.

I am a member in good standing of the American Society of Consulting Arborists, and of the International Society of Arboriculture.

I am a Certified Arborist and am Tree Risk Assessment Qualified (TRAQ), as designated by the International Society of Arboriculture.

I maintain a California State Contractor's License for Tree Service (C-61, D-49).

I have attained professional training in all areas of knowledge asserted through this report by completion of a Bachelor of Science degree in Plant Science, by routinely attending pertinent professional conferences and by reading current research from professional journals, books and other media.

I have rendered professional services in a full-time capacity in the field of horticulture and arboriculture for more than 38 years.

Signed: Roy C. Leggitt, III
Certified Arborist WE-0564A

Date: *1/2826*

roy@treemanagementexperts.com
Cell (415) 606-3610


Cypress, Pine
and Eucalyptus
Oaks and
Willows

Exhibit G

Exhibit G

AT&T Wireless

CCL05350 SF Police Academy
350 Amber Drive, San Francisco, CA
Photosims Produced on 1-23-2026

AdvanceSim
Photo Simulation Solutions
Contact (925) 202-8507

Shot Point Map

Existing

Proposed

view from lot adjacent to Diamond Heights Boulevard looking southwest at site

AT&T Wireless

CCL05350 SF Police Academy
350 Amber Drive, San Francisco, CA
Photosims Produced on 1-23-2026

AdvanceSim
Photo Simulation Solutions
Contact (925) 202-8507

Existing

Proposed

view from Duncan Street looking southwest at site

AT&T Wireless

CCL05350 SF Police Academy
350 Amber Drive, San Francisco, CA
Photosims Produced on 1-23-2026

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Photo Simulation Solutions
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Existing

Proposed

view from Duncan Street looking southwest at site

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