



CITY OF SAN DIEGO
MASTER USE AND OCCUPANCY AGREEMENT

between

THE CITY OF SAN DIEGO

and

CROWN CASTLE FIBER LLC,
a New York limited liability company

for

Small Cell Installations on City-owned Poles

**CITY OF SAN DIEGO
MASTER SMALL CELL
USE AND OCCUPANCY AGREEMENT**

This CITY OF SAN DIEGO MASTER USE AND OCCUPANCY AGREEMENT ("Master Agreement") is entered into by and between THE CITY OF SAN DIEGO, a California municipal corporation ("CITY"), and Crown Castle Fiber LLC, a New York limited liability company ("PERMITTEE"), hereinafter collectively referred to as the "Parties," to be effective on the first day of the first month following the date of execution by CITY ("Effective Date"), once the Master Agreement is signed by the San Diego City Attorney.

RECITALS

- A. CITY is the record owner of certain public rights-of-way within the City of San Diego.
- B. PERMITTEE desires to erect, maintain and operate within the CITY's public rights-of-way Small Cell wireless communication facilities, including utility lines, transmission lines, electric light poles to support antennas, electronic equipment, and transmitting and receiving antennas, which facilities are more fully defined below as "Communications Equipment."
- C. PERMITTEE represents that it is designated by the California Public Utilities Commission ("PUC") as a "Telecommunications Service Provider"; and PERMITTEE further represents that, pursuant to that designation, PERMITTEE qualifies as a "Public Utility" under the California Public Utilities Code.
- D. CITY is willing to grant PERMITTEE this Master Agreement for the right to use portions of CITY's public right-of way for the construction, operation and maintenance of the Communications Equipment (defined below), including attaching the Communications Equipment to CITY Street Light or Signalized Poles in order to allow PERMITTEE to provide better service to its wireless customers.
- E. Notwithstanding anything to the contrary contained in this Master Agreement, no provision contained herein shall be construed to mean that PERMITTEE is paying a use fee for any ground space portion of the public right-of-way.

FOR VALUABLE CONSIDERATION, the sufficiency of which is hereby acknowledged, the Parties agree as follows:

1. DEFINITIONS.

As used in this Master Agreement, the terms listed below are defined as follows:

- 1.1. "Approved Site" – a Site (defined below) for which all approvals required for construction or installation to commence have been obtained.

- 1.2. "Communications Equipment" – includes, but is not limited to, PERMITTEE'S antennas, mounting brackets, equipment enclosures, AC disconnects, flexible metal conduits, grounding plates, grounding wires, grounding pipes, coils, NEMA boxes, and fiber optic cables installed by PERMITTEE, more particularly described in Exhibit B as may be updated from time to time at CITY's sole discretion.
- 1.3. "Emergency" – imminent danger to the public health, safety or welfare or property.
- 1.4. "Hazardous Substances" – those hazardous substances listed by the Environmental Protection Agency ("EPA") in regularly released reports and any other substances incorporated into the State of California's list of hazardous substances, and all types of petroleum-related substances and their chemical constituents.
- 1.5. "Permit Areas" – Up to a maximum of 1,500 various CITY-owned Sites (defined below), more particularly described in Exhibit A and described in Exhibit B as updated from time to time.
- 1.6. "PERMITTEE's Operations" – PERMITTEE's development, occupancy, use, and/or maintenance of the Permit Areas.
- 1.7. "Signalized Pole" - any pole equipped with either vehicle signal indications, pedestrian signal indications, pedestrian pushbuttons, emergency vehicle preemption equipment, or any other components that comprise any part of a traffic signal/traffic control device that serves to control and direct traffic, including pedestrian traffic, by display of steady or flashing lighted indications.
- 1.8. "Site" – a Street Light Pole (defined below) or a Signalized Pole (defined above), where the Communications Equipment may be installed pursuant to this Master Agreement.
- 1.9. "Street Light Pole" – any Caltrans Type 15 pole (rounded, metal) street light pole that has a luminaire arm and luminaire for the purpose of providing roadway lighting in accordance with City Standard Drawing SDE-101 the ownership of which shall be retained by the CITY.

2. USE OF PERMIT AREAS.

PERMITTEE shall use the Permit Areas solely for the purposes, with proper permits and approvals obtained, of installing, constructing, modifying, operating, maintaining, and removing, all at PERMITTEE's sole cost and expense, the Communications Equipment ("Permit Use") only as described in Exhibit B.

- 2.1. Primary Purpose of Sites. Any Street Light Pole is for the primary purpose of providing lighting and in some instances traffic control, and any Signalized Pole is for the primary purpose of traffic control, but either may have the secondary purpose of accommodating PERMITTEE's Operations at the Permit Area.
- 2.2. Other Uses. PERMITTEE shall not operate the Communications Equipment or use the Permit Areas for other related or incidental activities of any kind without CITY's prior

written consent, which consent shall be in CITY's sole discretion. Communications Equipment shall not interfere with the operation of the Street Light, or cause visual impairment, distraction, or confusion to motorists.

- 2.3. No Nuisance. PERMITTEE shall not use the Permit Area in any manner which creates a nuisance, as defined in California Civil Code Section 3479.
- 2.4. No Limitation. Nothing contained in this Master Agreement shall be construed as a limitation, restriction or prohibition against CITY entering into agreements with other parties regarding the use of the Permit Areas, Sites or other facilities or the CITY issuing permits for the use of its rights-of-way.

3. RIGHT TO ENTER AND OCCUPY.

Subject to the terms and conditions of this Master Agreement, CITY hereby grants permission to PERMITTEE, its officers, employees, agents, and contractors to enter upon and occupy the Permit Areas solely for the purpose of the Permit Use.

- 3.1. License Only. This Master Agreement is a license to use CITY-owned property. It is not a lease.

4. TERM.

The term of this Master Agreement ("Term") shall not exceed ten (10) years, commencing on the Effective Date. "Agreement Year" shall mean each twelve (12) month period during the Term, commencing on the month and day of the Effective Date and continuing to the same month and day of the following year, minus one (1) calendar day.

- 4.1. Holdover. Any holding over by PERMITTEE after expiration or termination shall not be considered as a renewal or extension of this Permit. The occupancy of the of the Site after expiration or termination shall continue, and all other terms and conditions of this agreement shall continue in full force and effect; provided, however, CITY shall have the right to apply a reasonable increase in rent to bring the rent to fair market value or to such amount as consistent with applicable law and to terminate the holdover at will. Calculation of all prorated rents under this section shall be based on a 30-day month. Notice of any such increase in rent shall be given in writing at least thirty (30) days prior to becoming effective.

5. ANNUAL USE FEE.

PERMITTEE shall pay to CITY an Annual Use Fee for the first year will be in the amount of \$270.00 per Approved Site ("Annual Fee"). The Annual Fee will be calculated from the Effective Date, and shall be paid within thirty (30) calendar days of the Effective Date for the first Permit Year. The Annual Fee will be prorated for any Site that was not an Approved Site for the entire twelve-month period. Calculation of all prorated rents under this section shall be based on a 30-day month.

- 5.1. Time and Place of Payment. The Annual Use Fee is due in advance on or before the first

day of each Agreement Year during the Term (referred to hereinafter as the "Annual Payment"). The Annual Use Fee check shall be made payable to "City Treasurer" and delivered to the Office of the City Treasurer, Civic Center Plaza Building, 1200 Third Avenue, First Floor, San Diego, California 92101, or mailed with an invoice to:

The City of San Diego
Office of the City Treasurer
P.O. Box 129030
San Diego, California 92112-9030

PERMITTEE shall include CITY's customer project account number for PERMITTEE on each of the checks used for the Annual Payment so CITY can apply the Annual Payment to the appropriate account. The place of payment may be changed at any time by CITY upon thirty (30) calendar days written notice to PERMITTEE. Mailed Annual Payments shall be deemed paid upon the date the payments are postmarked by the postal authorities. If a postmark is illegible, the payment shall be deemed paid upon actual receipt by the City Treasurer. PERMITTEE assumes all risk of loss and responsibility for late payment charges if payments are made by mail.

- 5.2. Delinquent Payments. If PERMITTEE fails to pay the Annual Payment when due, PERMITTEE shall pay, in addition to the unpaid Annual Payment, five percent (5%) of the delinquent Annual Payment. If any portion of the Annual Payment is still unpaid fifteen (15) calendar days after the first day of the Permit Year, PERMITTEE shall pay an additional five percent (5%), for a total of ten percent (10%) of the delinquent Annual Payment, which is agreed by the Parties to be appropriate to compensate CITY for loss resulting from fee delinquency, including lost interest, opportunities, legal costs, and the cost of servicing the delinquent account. In no event shall the charge for late payments of the Annual Use Fee be less than \$25 (Twenty-Five Dollars). Acceptance of late charges and any portion of the late payment by CITY shall neither constitute a waiver of PERMITTEE's default with respect to late payment nor prevent CITY from exercising any other rights and remedies available at law or in equity.
- 5.3. Records. PERMITTEE shall maintain, in accordance with generally accepted accounting practices, complete and accurate financial records and other documents reasonably necessary to support all sums paid pursuant to this Agreement. To the extent necessary to confirm compliance with the terms of this Agreement, PERMITTEE shall make all such records available to CITY, promptly upon request, for inspection and audit at a reasonable location and time so that CITY can determine PERMITTEE's compliance with this Master Agreement. PERMITTEE shall maintain all such records for a minimum period of five (5) years past the expiration or earlier revocation or termination of this Master Agreement. This section shall survive the expiration or earlier revocation or termination of this Master Agreement. Failure to maintain records, make them reasonably available for inspection, or provide summary schedules and supporting documentation requested by CITY as reasonably necessary pursuant to this section, is a breach of this Agreement and cause for termination.

6. INSURANCE.

PERMITTEE shall not begin any work on any portion of the Permit Areas until it has: (a) provided to CITY insurance certificates reflecting evidence of all insurance required below; however, CITY reserves the right to request, and PERMITTEE shall make available for review at a mutually agreeable location within the city of San Diego, copies of any policy upon reasonable request by CITY; (b) obtained CITY approval of each insurance company or companies; and (c) confirmed with CITY that all policies contain the specific provisions required below. PERMITTEE's liabilities, including, but not limited to, PERMITTEE's indemnity obligations, under this Master Agreement, shall not be deemed limited in any way to the insurance coverage required herein. Maintenance of specified insurance coverage is a material element of this Master Agreement and PERMITTEE's failure to maintain or renew coverage during the Term may be treated as a material breach of contract by CITY. If PERMITTEE fails to provide a certificate of insurance within five (5) business days upon the City's request this may be treated as a material breach of contract by CITY. PERMITTEE shall not modify any policy or endorsement thereto which increases CITY's exposure to loss for the Term.

6.1. Types of Insurance: At all times during the term of this Master Agreement, the PERMITTEE shall maintain insurance coverage as follows:

- a. Commercial General Liability (CGL). Insurance written on an ISO Occurrence form CG 00 01 04 13 or an equivalent form providing coverage at least as broad which shall cover liability arising from any and all personal injury or property damage in the amount of \$2 million per occurrence and subject to an annual aggregate of \$4 million. There shall be no endorsement or modification of the CGL limiting the scope of coverage for either insured vs. insured claims or contractual liability. All defense costs shall be outside the limits of the policy. The required limits may be met by a combination of primary and excess or umbrella insurance.
- b. Commercial Automobile Liability. For all of PERMITTEE's automobiles including owned, hired and non-owned automobiles, PERMITTEE shall keep in full force and effect automobile insurance written on an ISO form CA 00 01 12 90 or a later version of this form or an equivalent form providing coverage at least as broad for bodily injury and property damage for a combined single limit of \$1 million per occurrence. The insurance certificate shall reflect coverage for any automobile (any auto).
- c. Workers' Compensation. For all of PERMITTEE employees who are subject to this Master Agreement and to the extent required by the applicable state or federal law, PERMITTEE shall keep in full force and effect a Workers' Compensation policy. That policy shall provide a minimum of \$1 million of employers' liability coverage, and PERMITTEE shall provide an endorsement that the insurer waives the right of subrogation against CITY and its respective elected officials, officers, employees, agents and representatives.

6.2. Deductibles: All deductibles on any policy shall be the responsibility of PERMITTEE and shall be disclosed to CITY at the time the evidence of insurance is provided.

6.3. Acceptability of Insurers: Except for the State Compensation Insurance Fund, all insurance required by this Master Agreement shall only be carried by insurance companies with a rating

of at least "A-, VI" by A.M. Best Company, that are authorized by the California Insurance Commissioner to do business in the State of California, and that have been approved by CITY. CITY will accept insurance provided by non-admitted, "surplus lines" carriers only if the carrier is authorized to do business in the State of California and is included on the List of Eligible Surplus Lines Insurers (LESLI list). All policies of insurance carried by non-admitted carriers are subject to all of the requirements for policies of insurance provided by admitted carriers described herein.

- 6.4. Modification: To assure protection from and against the kind and extent of risk existing with PERMITTEE's Operations, CITY, at its reasonable discretion, may require the revision of amounts and coverage at any time by giving PERMITTEE thirty (30) days prior written notice. PERMITTEE shall also obtain any additional insurance required by CITY for new improvements, changed circumstances, or CITY'S reasonable re-evaluation of risk levels related to the Site.
- 6.5. Accident Reports: PERMITTEE shall immediately report to CITY any accident causing property damage or injury to persons on the Permit Areas or otherwise related to PERMITTEE's Operations. Such report shall contain the names and addresses of the involved parties, a statement of the circumstances, the date and hour of the accident, the names and addresses of any witnesses, and other pertinent information.
- 6.6. Required Endorsements: The following endorsements to the policies of insurance are required to be provided to CITY before any work is initiated under this Master Agreement.
 - 6.6.1. Commercial General Liability Insurance Endorsements:
 - i. Additional Insured: To the fullest extent allowed by law, including, but not limited to, California Insurance Code Section 11580.04, the policy or policies must be endorsed to include as an Additional Insured the City of San Diego and its respective elected officials, officers, employees, agents and representatives with respect to liability arising out of (a) ongoing operations performed by PERMITTEE or on PERMITTEE's behalf, (b) PERMITTEE's products, (c) PERMITTEE's work, including, but not limited to, PERMITTEE's completed operations performed by PERMITTEE or on PERMITTEE's behalf, or (d) premises owned, leased, controlled or used by PERMITTEE.
 - ii. Primary and Non-Contributory Coverage: The policy or policies must be endorsed to provide that the insurance afforded by the Commercial General Liability policy or policies is primary to any insurance or self-insurance of the City of San Diego and its elected officials, officers, employees, agents and representatives with respect to the operations of the named insured. Any insurance maintained by the City of San Diego and its elected officials, officers, employees, agents and representatives shall be in excess of PERMITTEE's insurance and shall not contribute to it.
 - iii. Severability of Interest. The policy or policies must be endorsed to provide that PERMITTEE's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability and shall provide cross-liability coverage.

6.6.2. Automobile Liability Insurance Endorsements:

- i. Additional Insured. To the fullest extent allowed by law, including, but not limited to, California Insurance Code Section 11580.04, the policy or policies must be endorsed to include as an Additional Insured the City of San Diego and its respective elected officials, officers, employees, agents and representatives with respect to liability arising out of automobiles owned, leased, hired or borrowed by or on behalf of PERMITTEE.
- ii. Severability of Interest. The policy or policies must be endorsed to provide that PERMITTEE's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability and shall provide cross- liability coverage.

7. PERMITTEE's RISK.

PERMITTEE shall bear all risks and liability arising out of or in any manner directly or indirectly connected with PERMITTEE's Operations and any damages to the improvements on, under, or in the vicinity of the Permit Areas resulting directly or indirectly thereby.

8. ACCEPTANCE OF PERMIT AREAS.

PERMITTEE represents and warrants that PERMITTEE has independently inspected the Site and Pole Attachment Area and made all tests, investigations, and observations necessary to satisfy itself of the condition of the Site and Pole Attachment Area and their suitability for the Allowed Uses. PERMITTEE acknowledges and agrees that PERMITTEE is not relying on any representation by CITY as to the condition of the Site or Pole Attachment Area or their suitability for the Allowed Uses, and PERMITTEE agrees that PERMITTEE is relying solely on its independent inspections, tests, investigations, and observations in entering into this Permit. PERMITTEE acknowledges that the Site and Pole Attachment Area are in the condition called for herein, that CITY has performed all work with respect to the Site and Pole Attachment Area that is necessary and/or required by this Permit, and that PERMITTEE shall not hold CITY responsible for any defects, whether apparent or latent, in the Site and/or Pole Attachment Area. PERMITTEE accepts and assumes all risk of harm to all persons and property, including without limitation, PERMITTEE'S employees, from and defects within the Site and Pole Attachment Area, and shall be solely responsible therefor. PERMITTEE has been given the opportunity to investigate the Site and Pole Attachment Area for the presence of any Hazardous Substances, including, without limitation, the opportunity to perform soil borings and other tests. PERMITTEE shall notify CITY if PERMITTEE'S investigations indicate the presence of any substances on the Site and Pole Attachment Area. PERMITTEE waives any claims against CITY which may result from the presence of Hazardous Substances on the Site and Pole Attachment Area.

9. DEVELOPMENT OF SITES AND MODIFICATION OF PERMIT AREA.

- 9.1. Approved Sites. Prior to the execution of this Master Agreement, and at any time during the first five (5) years of the Term of this Master Agreement that PERMITTEE desires to add Sites to the Permit Area up to the maximum number of 1,500 Sites, PERMITTEE shall provide to CITY's Real Estate Assets Department a list of Approved Sites that PERMITTEE

request be included in the Permit Area of this Master Agreement. A list of all Approved Sites shall be attached hereto as Exhibit A, which shall be updated chronologically as Exhibit A-1, Exhibit A-2, etc., as PERMITTEE obtains additional Approved Sites, without the necessity of a formal amendment, provided that the Communications Equipment being installed on the Approved Sites complies with the Master Structural Plan attached as Exhibit B, or any approved updates thereto PERMITTEE acknowledges and understands that all requests for amendments to the Master Agreement, including those related to adding Approved Sites on which the Communications Equipment does not comply with the approved Master Structural Plan will be subject to appropriate environmental review subject to the California Environmental Quality Act.

- 9.2. Master Structural Plan. In lieu of site plans for each individual Approved Site, PERMITTEE shall provide to CITY, prior to the execution of this Master Agreement, a proposed Master Structural Plan which contains full and complete design plans that show all of the equipment that PERMITTEE proposes to install or construct in the Permit Area, which shall be attached as Exhibit B. Upon approval of the Master Structural Plan, PERMITTEE shall provide an approved Master Structural Plan to CITY which shall replace the proposed Master Structural Plan as Exhibit B. Within fourteen (14) calendar days of the completion of the installation and development of an Approved Site, PERMITTEE shall notify CITY's Real Estate Assets Department in writing that the Approved Site is installed and operating. If during the Term of this Master Agreement, PERMITTEE desires to modify the equipment that is being placed on an Approved Site from what is shown in the approved Master Structural Plan, PERMITTEE shall do the following:
- 9.2.1. Minor Modifications. If the new equipment is the same size or smaller in all dimensions and weighs the same or less than the equipment previously approved through the Master Structural Plan, PERMITTEE may submit a form factor drawing with sufficient information for READ to determine the actual size, weight, location, and aesthetics of the new equipment in the Permit Area. PERMITTEE acknowledges that this form factor drawing, which may be sufficient for the City as the property owner to approve the amendment may not be sufficient for DSD to review and approve construction permits, and this requirement does not relieve PERMITTEE of its obligations to provide DSD staff with all required information for review and issuance of regulatory permits (construction, right-of-way, or any other type of permit determined necessary by DSD). Subject to the foregoing, the CITY will either consent to or deny consent, in its reasonable discretion, subject to applicable law, to the requested Minor Modification in writing within thirty (30) days of receiving the form factor drawing, provided that any applicable review required by CEQA has been completed and any associated appeal periods have run without an appeal being filed.
- 9.2.2 Major Modifications. If the new equipment is larger in any dimension than the previously approved equipment, or if the new equipment weighs more than the previously approved equipment, PERMITTEE shall prepare a new Master Structural Plan and submit that plan at the time the application for amendment of the MUOA is submitted to READ. Subject to the foregoing, the CITY will either consent to or deny consent, in its sole discretion, to the requested Major Modification in writing within thirty (30) days of receiving the form factor drawing, provided that any applicable review required by CEQA has been completed and any associated appeal periods have

run without an appeal being filed.

- 9.3. PERMITTEE shall not develop any Approved Site in the Permit Areas unless and until this Master Agreement) has been executed (or if applicable, amended) by the Parties, and approved by the San Diego City Attorney. PERMITTEE shall develop each Site in the Permit Areas in accordance with the Master Structural Plan and any modifications authorized for the specific Approved Site(s). CITY may, in its sole discretion, authorize changes to the Master Structural Plan, or specific site plans, provided the principal components thereof are not modified, and a document evidencing approved changes is filed with READ.

10. IMPROVEMENTS AND ALTERATIONS.

Other than as approved by the site plans depicted in Exhibit B, PERMITTEE shall not construct any improvements, structures, or installations in the Permit Areas, or make any alterations to the Permit Areas (with the exception of necessary maintenance and/or repairs that does not including like-for-like swapping out or replacing any of the Communications Equipment) without CITY's prior written consent, which consent shall be in CITY's sole discretion, consistent with applicable law. This includes modifications that are considered "eligible facilities" under Section 6409 of the Middle Class Tax Relief and Job Creation Act. PERMITTEE shall not make any structural or architectural design alterations to approved improvements, structures, or installations in the Permit Areas without CITY's prior written consent, which consent shall be in CITY's sole discretion, consistent with applicable law. CITY shall not be obligated by this Master Agreement to make, or assume any expense for, any improvements or alterations.

- 10.1. Alterations to Communications Equipment. PERMITTEE shall not make any alterations, additions or improvements to the Communications Equipment, except for routine maintenance that does not include swapping out or replacing any of the Communications Equipment, unless: PERMITTEE obtains CITY's prior written consent, which consent shall be in CITY's sole discretion as provided above; the alterations, additions or improvements do not damage or interfere with any adjacent improvements in the Permit Areas; and the alterations, additions or improvements comply with the requirements set forth in Exhibit C. Nothing in this section shall be construed to eliminate PERMITTEE's obligation to obtain development related permits and approvals for any alterations to the Communications Equipment that may be required by CITY's Development Services Department or any other governmental agency. CITY, in its proprietary capacity, through READ, retains the right to deny any request for modification or alteration of a Site as a proprietary right, to the extent permitted by applicable law, even if CITY's DSD is required by federal law to approve or permit such request.
- 10.2. Information to Permitting Authorities. In obtaining any required permits for improvements, structures, installations, and/or alterations in the Permit Areas, PERMITTEE shall inform permitting authorities, in writing, that the Permit Areas are CITY-owned property.
- 10.3. Repair and Restoration. Nothing in this section shall relieve PERMITTEE of any obligation under this Master Agreement to maintain the Permit Areas in a decent, safe, healthy, and sanitary condition, as required in Section 19 of this Master Agreement.

- 10.4. Emergency. In the event of an Emergency, as soon as practicable thereafter and not later than two (2) business days after having taken such action, PERMITTEE shall advise CITY in writing of the emergency work performed or the action taken with respect to any emergency modification or alteration of PERMITTEE's Communications Equipment. PERMITTEE shall acquire any necessary permits, if any, to cover the emergency work performed.
- 10.5. Accidental Damage by CITY. In the event CITY should cut or damage PERMITTEE's communication line, PERMITTEE agrees to perform all repairs expeditiously, no later than twenty-four (24) hours from notice of cut. Simultaneously, CITY agrees to cease any and all work to the affected portion of the Permit Areas for a maximum of twenty-four (24) hours or until PERMITTEE completes all repairs, whichever is less.

11. COMPETENT MANAGEMENT.

Throughout the Term, PERMITTEE shall provide competent management of the Permit Areas for the Permit Use to the reasonable satisfaction of CITY. "Competent management" shall mean demonstrated ability in the management and operation of wireless communication facilities and related activities in a responsible manner and in accordance with industry standards.

12. COMPLIANCE WITH LAWS AND POLICIES.

- 12.1. General. PERMITTEE's Operations shall, at all times, comply with all applicable laws, statutes, ordinances, and regulations of CITY, county, state, and federal governments, at PERMITTEE's sole cost and expense. Upon receipt of the same, PERMITTEE shall comply with any and all notices issued by CITY under the authority of all laws, statutes, ordinances, or regulations.
- 12.2. Nondiscrimination/Equal Opportunity. PERMITTEE shall not discriminate in any manner against any person or persons on account of race, color, religion, gender, gender identity, gender expression, sexual orientation, medical status, national origin, age, marital status, or disability in PERMITTEE's Operations.

13. WATER QUALITY ASSURANCES.

CITY and PERMITTEE are committed to the implementation of controls (best management practices, or BMPs) to manage activities on the Site and Permit Area in a manner which aids in the protection of the City of San Diego's precious water resources. It is PERMITTEE's responsibility to identify and implement an effective combination of BMPs so as not to cause pollutant discharges to the storm drain system in violation of San Diego Storm Water Management and Discharge Control Ordinance (San Diego Municipal Code Section 43.0301 to 43.0312).

Therefore, PERMITTEE shall at a minimum implement and comply, as applicable, with the Minimum Industrial and Commercial BMPs adopted under the San Diego Municipal Code Section 43.0307(a).

It is ultimately PERMITTEE's responsibility to prevent pollutant discharges to the storm drain system. Therefore, PERMITTEE will identify and implement any additional BMPs that may be required to avoid the discharge of pollutants to the storm drain system.

14. TELECOMMUNICATIONS PROVISIONS.

- 14.1. Entire Installation. PERMITTEE warrants that the Communications Equipment listed in Exhibit B constitutes the entire installation at each Site within the Permit Areas. PERMITTEE shall update Exhibit B from time to time as any changes to the Communications Equipment are made, or within thirty (30) calendar days after CITY's demand for such an update. No changes to the Communications Equipment shall be made without first obtaining written approval by CITY.
- 14.2. Radio Frequency Radiation. PERMITTEE shall maintain any radio frequency ("RF") radiation associated with the Communications Equipment within the levels allowed by federal regulations set forth in Section 1.1310 of CFR 47 and OET Bulletin 65. Any portion of the Permit Areas casually accessible by the general public or by any worker at ground level shall be maintained below limits stated for General Population/Uncontrolled Exposure. PERMITTEE shall report to CITY any portion of the Permit Areas discovered by PERMITTEE to exceed these federally mandated limits. PERMITTEE shall defend and hold CITY harmless for any liabilities, fines or other penalties claimed or imposed against CITY that result from the existence of excessive levels of radiation that are caused in whole or in part, or contributed to, by PERMITTEE's Operations. Hazardous RF radiation levels may be encountered when climbing on antenna structures (refer to FCC OET Bulletin 65). Any equipment installed within the Permit Areas may, at times, require shutdown to allow maintenance on antenna structures. PERMITTEE shall allow shutdown periods when required for this maintenance, provided CITY shall use reasonable efforts to ensure that these shutdowns do not occur during peak hours of operation. Protection of employees performing service on buildings, roofs, air-conditioning equipment, water tanks, communications equipment, or any other maintenance work is a primary concern. Any areas in which these employees may be subjected to radiation levels that exceed the General Population/Uncontrolled Exposure limits must be clearly identified as required by CAL-OSHA. PERMITTEE shall provide CITY with written shutdown procedures, contact names, and telephone numbers. PERMITTEE shall notify CITY, in writing, of any changes to the shutdown procedures, contact names, or telephone numbers at least ten (10) calendar days prior to such a change. Once the installation is complete, the PERMITTEE shall perform an on-air test and provide documentation to demonstrate that the communications equipment is operating within federally mandated limits. After the initial test, the PERMITTEE shall perform an on-air test within fifteen days of CITY requesting such a test.
- 14.3. Radio Frequency Interference. PERMITTEE warrants that all Communications Equipment installations, modifications, operation, and maintenance will not result in degraded performance or RF interference to any existing authorized uses within the Permit Areas by fulfilling the requirements of Exhibit C, which may be updated from time to time in CITY's sole discretion.
- 14.4. Industry Standards. PERMITTEE shall perform all Communications Equipment installations, modifications, operation, and maintenance in adherence to industry standards set by the "Standards and Guidelines for Communications Sites" Motorola R56© Manual, or any succeeding regulations or standards. In addition to the requirements of the Motorola R56© publication, installations on CITY property shall comply with the following supplemental

requirements:

- 14.4.1. PERMITTEE shall remove all of its trash and debris from the Permit Areas at the end of each workday and on completion of each project;
- 14.4.2. Tower and structure climbing shall be done in compliance with all CAL-OSHA requirements and General Orders promulgated by the CPUC; and
- 14.4.3. All transmitters shall have all necessary protection, such as cavity filtering and transmitter isolators, to eliminate any RF degradation of the receive signal to any other user within the Permit Areas.
- 14.5. Collocation. PERMITTEE shall not access any other wireless communication facility or CITY-owned communications equipment (including any towers) within the Permit Areas without CITY's prior written consent.
- 14.6. Interference with CITY Operations or Public Use. PERMITTEE's Operations shall not unreasonably interfere with CITY operations or public use of CITY-owned property.

15. WASTE, DAMAGE, OR DESTRUCTION.

PERMITTEE shall immediately give notice to CITY of any fire or any other damage that occurs on or within the Permit Areas that occurs either during or after the completion of construction of approved improvements. PERMITTEE shall not commit, or allow to be committed, any waste or injury or any public or private nuisance in connection with the Permit Use. PERMITTEE shall keep the Permit Areas clean and clear of refuse and obstructions, and dispose of all garbage, trash, and rubbish in a manner satisfactory to CITY. If any portion of the Permit Areas is damaged by any cause that puts any portion of the Permit Area into a condition which is not decent, safe, healthy, and sanitary, PERMITTEE shall make, or cause to be made, full repair of the damage and restore the Permit Areas to the condition which existed prior to the damage; or, at CITY's option, PERMITTEE shall clear and remove from the Permit Areas all debris resulting from the damage and restore the Permit Areas in accordance with plans and specifications previously submitted to and approved by CITY, in writing, in order to replace in kind and scope the operation which existed prior to the damage. PERMITTEE shall commence preliminary steps toward performing repairs and/or restoration of the Permit Areas as soon as practicable, but no later than ten (10) calendar days after the occurrence of the fire or damage, and shall complete the required repairs and/or restoration of the Permit Areas within sixty (60) calendar days after such occurrence. Failure to timely repair damage to the Site and/or Permit Areas will be considered a default under the Master Agreement.

16. HAZARDOUS MATERIALS.

PERMITTEE shall not allow the illegal installation, storage, utilization, generation, sale or release of any Hazardous Substance or otherwise regulated substances in, on, under or from the Permit Areas by any of PERMITTEE's officers, employees, agents, contractors, invitees and guests. PERMITTEE and PERMITTEE's officers, employees, agents, contractors, invitees and guests shall not install, store, utilize, generate or sell any Hazardous Substance on the Permit Areas without CITY's prior written consent. PERMITTEE shall, prior to initiating any operations, obtain all required permits from applicable regulatory agencies, including without limitation the San Diego County Department

of Environmental Health, local fire agencies, the San Diego County Department of Weights and Measures, the San Diego County Air Pollution Control District, and the San Diego Regional Water Quality Control Board. Installing, utilizing, storing, or any other presence of a Hazardous Substance includes boxes, bags, bottles, drums, cylinders, above or below ground tanks, equipment with tanks, or any other type of container, equipment or device which holds or incorporates a Hazardous Substance or hazardous waste.

- 16.1. Release. For all purposes of this Master Agreement, a “release” shall include without limitation any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping or otherwise disposing of a Hazardous Substance.
- 16.2. Remediation. If PERMITTEE’s occupancy, use, development, maintenance, or restoration of the Permit Areas results in a release of a Hazardous Substance, PERMITTEE shall pay all costs of remediation and removal to CITY’s satisfaction for unrestricted reuse of the Permit Areas, and in accordance with all applicable laws, rules, and regulations of governmental authorities.
- 16.3. Removal. If PERMITTEE or PERMITTEE’s officers, employees, agents, contractors, invitees and guests have received approval and permits to store, utilize, generate or install, or otherwise bring Hazardous Substances to the Permit Areas, PERMITTEE shall remove all Hazardous Substances in any type of container, equipment or device from the Permit Areas immediately upon or prior to the expiration or earlier termination of this Master Agreement. CITY reserves the right to conduct inspections of the Permit Areas and/or request documentation demonstrating the legal removal and/or disposal of the hazardous materials, wastes or other containers, equipment or devices from the Permit Areas. PERMITTEE shall be responsible for any and all costs incurred by CITY to remove any container, equipment or device requiring disposal or removal as required by this provision.
- 16.4. Indemnity. PERMITTEE shall protect, defend, indemnify, and hold CITY harmless from any and all claims, costs, and expenses related to environmental liabilities resulting from PERMITTEE’s occupancy, use, development, maintenance, or restoration of the Permit Areas, including without limitation: (i) costs of environmental assessments; (ii) costs of regulatory remediation oversight; (iii) costs of remediation and removal; (iv) any necessary CITY response costs; (v) all fines, penalties or fees assessed by any regulatory agency; (vi) damages for injury to natural resources, PERMITTEE’s officers, employees, invitees, guests, agents or contractors, or the public; and (vii) all costs of any health assessments or health effect studies.
- 16.5. Notice of Release. If PERMITTEE knows or has reasonable cause to believe that a Hazardous Substance has been released on, from or beneath any portion of the Permit Areas, PERMITTEE shall immediately notify CITY and any appropriate regulatory or reporting agency pursuant to California Code of Regulations Title 19 and any other applicable laws or regulations. PERMITTEE shall deliver a written report thereof to CITY within three (3) days after receipt of the knowledge or cause for belief and submit any required written reports to regulatory or reporting agencies as required by regulation or law. If PERMITTEE knows or has reasonable cause to believe that such substance is an imminent release or is an imminent substantial danger to public health and safety, PERMITTEE shall take all actions necessary to alleviate the danger. PERMITTEE shall immediately notify CITY in writing of any violation, notice to comply, or notice of violation received or the initiation of environmental actions or private suits related to the Permit Areas.

16.6. Environmental Assessment. Upon reasonable cause to believe that PERMITTEE's occupancy, use, development, maintenance, or restoration of the Permit Areas resulted in any Hazardous Substance being released on, from or beneath any portion of the Permit Areas, CITY may cause an environmental assessment under regulatory oversight of the suspect area to be performed by a professional environmental consultant registered with the State of California as a Professional Engineer, Certified Engineering Geologist or Registered Civil Engineer. The environmental assessment shall be obtained at PERMITTEE's sole cost and expense, and shall establish what, if any, Hazardous Substances have more likely than not been caused by PERMITTEE's occupancy, use, development, maintenance, or restoration of any affected portion of the Permit Areas, and in what quantities. If any such Hazardous Substances exist in quantities greater than allowed by CITY, county, state or federal laws, statutes, ordinances or regulations, or require future restricted re-use of the Permit Areas, then the environmental assessment shall include a discussion of such substances with recommendations for remediation and removal necessary to effect unrestricted re-use and in compliance with those laws or statutes, and estimates of the cost of such remediation or removal. PERMITTEE shall cause, or if PERMITTEE fails to do so within a reasonable period of time, as determined by CITY in its sole discretion, then CITY may cause, the remediation and/or removal recommended in the environmental assessment such that unrestricted re-use of the Permit Areas and compliance with environmental laws and regulations are achieved, and PERMITTEE shall pay all costs and expenses therefor.

17. SIGNS.

PERMITTEE shall only post signs required by federal, state, or local regulations, including, without limitation, safety signs required by OSHA, FAA, CPUC and/or FCC. PERMITTEE shall not erect or display any banners, pennants, flags, posters, signs, decorations, marquees, awnings, or similar devices or advertising within the Permit Areas without CITY's prior written consent, which consent shall be in CITY's sole discretion. If any such unauthorized item is found within the Permit Areas, PERMITTEE shall remove the item, at PERMITTEE's sole cost and expense, upon forty-eight (48) hours' notice by CITY, or CITY may then enter the Permit Areas and remove the item at PERMITTEE's sole cost and expense. PERMITTEE shall post a clearly marked sign at each Site within the Permit Areas indicating PERMITTEE's name and emergency telephone number.

18. MAINTENANCE OF PERMIT AREAS.

PERMITTEE shall, at its sole cost and expense, continuously maintain the Permit Areas throughout the Term. In doing so, PERMITTEE shall, at its sole cost and expense, make all repairs, restoration, and replacements (including structural repairs and restoration of damaged or worn improvements) necessary to maintain and preserve the Permit Areas in a decent, safe, healthy, and sanitary condition. All such maintenance, repairs, restoration, and replacements shall be completed to the satisfaction of CITY, in conformance with the depiction of the Permit Areas set forth in Exhibit A, the approved site plans set forth in Exhibit B, and in compliance with all applicable codes and standards of CITY, state, and federal agencies.

18.1. CITY Maintenance. CITY reserves the right to perform any needed routine maintenance within the Permit Areas at any time without providing notice to PERMITTEE, including, but not limited to, the replacement of light bulbs on a Street Light Pole. However, should CITY

perform non-routine maintenance, including, but not limited to, the replacement of a Street Light Pole, CITY shall provide PERMITTEE with at least forty-eight (48) hours' notice prior to commencing the work (except in the event of an emergency, in which case, no prior notice shall be required, but CITY shall give PERMITTEE notice as soon as reasonably possible thereafter), and PERMITTEE shall comply with all applicable safety requirements issued by CITY to ensure the safety of CITY personnel performing such maintenance within the Permit Areas. In the event CITY's non-routine maintenance includes replacing a Street Light Pole, CITY shall give fifteen (15) days advance notice to PERMITTEE so that PERMITTEE may remove its Communications Equipment prior to the replacement of the Street Light Pole.

- 18.2. Maintenance Procedures for Parties. The Parties shall comply with the emergency maintenance procedures set forth in Exhibit D, including the requirement to notify the other party, in writing, of any changes to its emergency contacts and telephone numbers. PERMITTEE shall provide and install an emergency shut-off switch which will terminate electrical service to PERMITTEE's equipment, with the switch to be used only as set forth in Exhibit D.

19. ENTRY AND INSPECTION.

CITY may, at any time, enter the Permit Areas for the purpose of viewing and ascertaining the condition of the Permit Areas, or to protect CITY's interest in the Permit Areas, or to inspect the operations conducted within the Permit Areas. If CITY's entry or inspection discloses that any portion of the Permit Areas is not in a decent, safe, healthy, and sanitary condition, CITY may, after ten (10) calendar days written notice to PERMITTEE, have any necessary maintenance work done in order to keep the Permit Areas in a decent, safe, healthy, and sanitary condition, all at PERMITTEE's sole cost and expense, and PERMITTEE shall promptly pay any and all costs incurred by CITY in having the necessary maintenance work done. If at any time CITY determines that any portion of the Permit Areas is not in a decent, safe, healthy, and sanitary condition, CITY may, in its sole discretion, without additional notice, require PERMITTEE to file with CITY a faithful performance bond to assure prompt correction of any condition which is not decent, safe, healthy, and sanitary. The bond shall be in an amount adequate, in CITY's opinion, to correct the unsatisfactory condition. PERMITTEE shall pay all costs associated with the bond. The rights reserved in this section shall not create any obligation on CITY or increase CITY's obligations elsewhere in this Master Agreement. As part of its standard practice, PERMITTEE shall schedule a pre-construction inspection and post-construction inspection for each Site within the Permit Areas.

20. UTILITIES.

PERMITTEE shall order, obtain, and pay for all utilities, including installation and service charges, in connection with PERMITTEE's Operations. All utilities shall be installed underground unless such existing utilities are aerial and shall be used for PERMITTEE's Operations only.

21. TAXES.

PERMITTEE shall pay, before delinquency, all taxes, assessments, and fees assessed or levied upon PERMITTEE or the Permit Areas, including the land, any buildings, structures, machinery, equipment, appliances, or other improvements or property of any nature whatsoever erected, installed, or maintained by PERMITTEE, or levied by reason of PERMITTEE's Operations,

including any licenses or permits. PERMITTEE acknowledges that this Master Agreement may create a possessory interest subject to property taxation, and that PERMITTEE may be subject to the payment of taxes levied on that interest. PERMITTEE shall pay all such possessory interest taxes. PERMITTEE's payment for such taxes, assessments, and/or fees shall not reduce any payment due CITY.

22. SUPERIOR INTERESTS.

This Master Agreement is subject to all liens, encumbrances, covenants, conditions, restrictions, reservations, contracts, permits, licenses, easements, and rights-of-way pertaining to the Permit Areas, whether or not of record. PERMITTEE shall obtain all licenses, permits, and agreements from such third parties as may be or become necessary or reasonably advisable to allow PERMITTEE's use of the Permit Areas, relative to any such superior interest. If PERMITTEE's use of the Permit Areas is or becomes inconsistent or incompatible with a preexisting superior interest, PERMITTEE shall take such actions and pay all costs and expenses necessary to remove such inconsistency or incompatibility to the satisfaction of the holder of the superior interest.

23. ENCUMBRANCES.

PERMITTEE shall not permit any encumbrance related to PERMITTEE's Operations. CITY may, in its reasonable discretion, consent to such an encumbrance if exclusively related to PERMITTEE's development of the Permit Areas. If an encumbrance is placed on any portion of the Permit Areas, PERMITTEE shall diligently seek and obtain, at its sole cost and expense, the removal of the encumbrance as soon as possible upon completion of the development, if the encumbrance was authorized by CITY, or, if unauthorized, immediately upon CITY's demand.

23.1. Liens. PERMITTEE shall, at all times, protect, defend, indemnify, and hold CITY harmless from and against any and all claims for labor or materials in connection with PERMITTEE's Operations, and all costs of defending against such claims, including, without limitation, reasonable attorneys' fees. If PERMITTEE's Operations result in a lien or notice of lien being filed against any portion of the Permit Areas, PERMITTEE shall, within ten (10) calendar days after such filing, either: (a) take all actions necessary to record a valid release of the lien; or (b) deliver to CITY a bond, cash, or other security acceptable to CITY in an amount sufficient to pay in full all claims of all persons seeking relief under the lien.

24. ASSIGNMENT AND SUBLICENSING.

24.1. Assignment. This Master Agreement shall not be assigned by PERMITTEE without the express written consent of CITY, which consent shall be in CITY's sole discretion. Notwithstanding the foregoing, the transfer of the rights and obligations of PERMITTEE to a parent, subsidiary, or other affiliate of PERMITTEE or to any successor in interest or entity acquiring fifty-one percent (51%) or more of PERMITTEE's stock or assets (collectively "Exempted Transfers") shall not be deemed an assignment for the purposes of this Master Agreement and therefore shall not require the consent of CITY, provided that PERMITTEE reasonably demonstrates to CITY's lawfully empowered designee the following criteria (collectively the "Exempted Transfer Criteria"): (i) such transferee will have a financial strength after the proposed transfer at least equal to that of PERMITTEE immediately prior to the transfer; (ii) any such transferee assumes all of PERMITTEE's

obligations hereunder; and (iii) the experience and technical qualifications of the proposed transferee, either alone or together with PERMITTEE's management team, in the provision of telecommunications or similar services, evidence an ability to operate PERMITTEE's network. PERMITTEE shall give at least thirty (30) days prior written notice (the "Exempted Transfer Notice") to CITY of any such proposed Exempted Transfer and shall set forth with specificity in such Exempted Transfer Notice the reasons why PERMITTEE believes the Exempted Transfer Criteria have been satisfied. CITY shall have a period of thirty (30) days (the "Exempted Transfer Evaluation Period") from the date that PERMITTEE gives CITY its Exempted Transfer Notice to object in writing to the adequacy of the evidence contained therein. Notwithstanding the foregoing, the Exempted Transfer Evaluation Period shall not be deemed to have commenced until CITY has received from PERMITTEE any and all additional information CITY may reasonably require in connection with its evaluation of the Exempted Transfer Criteria as set forth in the Exempted Transfer Notice, so long as CITY gives PERMITTEE notice in writing of the additional information CITY requires within fifteen (15) days after CITY's receipt of the original Exempted Transfer Notice. If CITY fails to act upon PERMITTEE's Exempted Transfer Notice within the Exempted Transfer Evaluation Period (as the same may be extended in accordance with the foregoing provisions), such failure shall be deemed an affirmation by CITY that PERMITTEE has in fact established compliance with the Exempted Transfer Criteria to CITY's satisfaction.

- 24.2. Sublicensing. PERMITTEE shall not sublicense, in whole or in part, the Site, or any right or appurtenant privilege to the Site, or attempt to transfer any other interest or right to use the Permit Area, in whole or in part, the Site or any right or appurtenant privilege to the Site, without CITY'S prior written consent, which consent shall be in CITY'S sole discretion and shall require additional compensation. Notwithstanding, PERMITTEE may in the ordinary course of its business and without prior written notice to the City, offer or provide capacity or bandwidth from the Communications Equipment to another person; provided that PERMITTEE at all times retains exclusive control over the Communications Equipment and remain responsible for locating, servicing, repairing, maintaining, replacing, relocating, or removing the Communications Equipment pursuant to the provisions of this Agreement and PERMITTEE does not allow any physical installations or access to the Permit Area that has not been consented to by the CITY in writing.
- 24.3. Provisions Binding on Successors. Except as otherwise provided in this Master Agreement, all of the terms, covenants, and conditions of this Master Agreement shall apply to, benefit, and bind the successors and assigns of the respective parties, jointly and individually.

25. INDEMNIFICATION.

PERMITTEE shall protect, defend, indemnify, and hold CITY, its elected officials, officers, representatives, agents, and employees harmless from and against any and all claims asserted or liability established for damages or injuries to any person or property, including injury to PERMITTEE's officers, employees, agents, contractors, invitees and guests, which arise out of or are in any manner directly or indirectly connected with this Master Agreement or PERMITTEE's occupancy, use, development, maintenance, or restoration of the Permit Areas, including damages arising out of release of hazardous materials, and all expenses of investigating and defending against same, including without limitation reasonable attorney fees and costs; provided, however, that PERMITTEE's duty to indemnify and hold harmless shall not include any established liability arising from the sole negligence or willful misconduct of CITY, its elected officials, officers, representatives, agents and employees. CITY may, at its election, conduct the defense or participate in the defense of any claim related in any way to this indemnification. If CITY chooses at its own election to

conduct its own defense, participate in its own defense, or obtain independent legal counsel in defense of any claim related to this indemnification, PERMITTEE shall pay all reasonable costs related thereto, including without limitation reasonable attorney fees and costs.

26. OTHER GOVERNMENTAL ACTIONS.

By entering into this Master Agreement, neither CITY nor the City Council is obligating itself to any other governmental agent, board, commission, or agency with regard to any other discretionary action relating to the development, occupancy, use, or maintenance of the Permit Areas. Discretionary action includes, but is not limited to, rezonings, variances, environmental clearances, or any other governmental agency approvals that may be required for PERMITTEE's Operations. PERMITTEE shall diligently seek, at its sole cost and expense, all entitlements and actions from both CITY and other governmental agencies with jurisdiction over the Permit Areas, as may be necessary for PERMITTEE's Operations.

27. CITY'S RESERVATION OF RIGHTS.

- 27.1. Resources. CITY reserves all rights, title, and interest in any and all subsurface natural gas, oil, minerals, and water on or within the Permit Areas.
- 27.2. Use. CITY may grant and use easements or establish and use rights-of-way over, under, along, and across the Permit Areas for utilities, thoroughfares, or access as CITY deems advisable, in its sole discretion, for the public good.
- 27.3. Entry. CITY may enter the Permit Areas at any time to develop or make repairs to municipal resources and services.

28. REASSIGNMENT OF SPACE.

CITY may reassign PERMITTEE to an equivalent amount of space in a different location within the Permit Areas or different Site, if and when reasonably necessary. PERMITTEE will, at the direction of CITY, relocate its Communications Equipment at PERMITTEE's sole cost and expense. This section shall not apply to underground vault sites. PERMITTEE shall cooperate with CITY and its contractors during any such relocation or any renovation, repair, or other alteration of the Permit Areas. During physical relocation of the Communications Equipment to the relocation site, CITY will work with PERMITTEE to attempt to secure a feasible alternative CITY- approved site for PERMITTEE to operate temporary installed communications equipment, which will be installed and maintained at PERMITTEE's sole cost and expense. CITY warrants that every effort will be made to ensure continuous, uninterrupted broadcast and/or receiving capability during any such activity. If any relocation is not satisfactory to PERMITTEE, then PERMITTEE may, in its sole discretion, terminate this Master Agreement or the specific Approved Site or Permit Area upon thirty (30) calendar days written notice to CITY, without further obligation therefor.

29. REVOCATION AND TERMINATION.

29.1. Revocation by CITY.

- 29.1.1. Revocable License. This Master Agreement is not a lease; it is a license to use CITY-

owned property. As such, the Parties hereby acknowledge and agree that CITY, as the licensor, may revoke this Master Agreement at will and at any time during the Term. However, CITY agrees that CITY will not exercise its right to revoke this Master Agreement at will unless CITY determines, in its sole discretion, that PERMITTEE is in default of this Master Agreement, the events of default being set forth in this section. Upon default, CITY may thereafter, in its sole discretion, exercise its right to revoke this Master Agreement at will and at any time during the Term. If CITY exercises its right to revoke this Master Agreement, CITY will provide PERMITTEE written notice of the revocation, and upon PERMITTEE's receipt of the notice, PERMITTEE shall immediately cease PERMITTEE's Operations and remove PERMITTEE's improvements and personal property from the Permit Areas (pursuant to Section 31 of this Permit).

29.12. Events of Default. Each of the following shall constitute an event of default under this Master Agreement:

29.1.2.1. PERMITTEE's failure to make any payment required under this Master Agreement when due, if the failure continues for twenty (20) calendar days following written notice of the failure by CITY;

29.1.2.2. PERMITTEE's breach of any of its obligations under this Master Agreement, other than those requiring payment to CITY, and PERMITTEE either:

29.1.2.2.1. fails to cure the breach within thirty (30) calendar days following written notice from CITY; or,

29.1.2.2.2. if such breach is not curable within thirty (30) calendar days following written notice from CITY, fails to immediately commence to cure the breach and to diligently pursue the cure to completion.

29.1.2.3. PERMITTEE voluntarily files any petition under any bankruptcy or insolvency act or law;

29.1.2.4. PERMITTEE has involuntarily filed against it any petition under any bankruptcy or insolvency act or law and the matter is not dismissed by a court of competent jurisdiction within ninety (90) calendar days of filing;

29.1.2.5. PERMITTEE is adjudicated a bankrupt;

29.1.2.6. PERMITTEE makes a general assignment for the benefit of creditors; and

29.1.2.7. PERMITTEE uses any portion of the Permit Areas for any unauthorized purpose.

29.2. Termination by PERMITTEE. PERMITTEE may terminate this Master Agreement, or remove any specific Site and/or Permit Area thereby terminating PERMITTEE's right to use

said Site or Permit Area, for any reason upon thirty (30) days prior written notice to CITY. Upon PERMITTEE's termination of this Master Agreement, or removal of a specific Site or Permit Area from this Master Agreement, PERMITTEE shall immediately cease PERMITTEE's Operations and remove PERMITTEE's improvements and personal property from the affected Permit Areas (pursuant to Section 31 of this Master Agreement).

- 29.3. No Obligation. CITY shall not be obligated for any loss, financial or otherwise, which may be incurred by PERMITTEE as a result of CITY's revocation or PERMITTEE's termination of this Master Agreement. PERMITTEE expressly waives any claim for expense or loss which PERMITTEE might incur as a result of CITY's revocation or PERMITTEE's termination of this Master Agreement.
- 29.4. Cumulative Remedies. CITY's rights and remedies under this Master Agreement are cumulative and shall not limit or otherwise waive or deny any of its respective rights or remedies at law or in equity.
- 29.5. Waiver. The property constituting the Permit Areas is publicly owned and held in trust for the benefit of CITY's citizens. CITY's failure to insist upon the strict performance of any of PERMITTEE's obligations under this Master Agreement, in one or more instances, shall not be construed as a waiver of any such obligation, and the same shall remain in full force and effect. CITY's waiver of a default shall not be a waiver of any other default. Any waiver of a default must be in writing and executed by CITY to constitute a valid and binding waiver. CITY's delay or failure to exercise a right or seek a remedy shall not be deemed a waiver of that or any other right or remedy under this Master Agreement, at law or in equity. The exercise of any particular right or the use of any particular remedy for any default shall not waive the use of any other right or remedy for the same default or for another or later default. CITY's acceptance of any Annual Use Fee shall not be a waiver of any default preceding such payment. CITY's failure to discover a default or take prompt action to require the cure of any default shall not result in an equitable estoppel, but CITY may, at any and all times, require the cure of the default.
- 29.6. Effect of Termination of Specific Approved Site or Permit Area. Following the early revocation or termination of a specific Approved Site or Permit Area by either CITY or PERMITTEE, no Annual Use Fee will be due to the CITY for that Approved Site or Permit Area.

30. REMOVAL OF IMPROVEMENTS AND PERSONAL PROPERTY.

- 30.1. Improvements. Upon the expiration, revocation or termination of this Master Agreement or upon the termination of a specific Site or Permit Area, PERMITTEE shall, at PERMITTEE's sole cost and expense, remove the Communications Equipment, its improvements, trade fixtures, structures, installations, and/or additions as soon as practicable, but in no event later than sixty (60) calendar days after the expiration or earlier revocation or termination of this Master Agreement. If any removal of such improvements, trade fixtures, structures, installations, and/or additions by PERMITTEE results in damage to any portion of the Permit Areas, PERMITTEE shall repair all such damage at PERMITTEE's sole cost and expense. If PERMITTEE fails to remove any such improvements, trade fixtures, structures, installations, and/or additions identified by CITY, CITY may, at its option, remove them at PERMITTEE's

sole cost and expense.

- 30.2. Personal Property. Upon expiration of this Master Agreement (without the Parties' execution of a new permit for the Permit Areas) or upon earlier revocation or termination of this Master Agreement or any specific Site or Permit Area, PERMITTEE shall remove machines, appliances, equipment (other than trade fixtures), and other items of personal property installed by PERMITTEE as soon as practicable, but in no event later than sixty(60) calendar days after the expiration or earlier revocation or termination of this Master Agreement. If any removal of such personal property by PERMITTEE results in damage to any portion of the Permit Areas, PERMITTEE shall repair all such damage at PERMITTEE's sole cost and expense. Any such items which PERMITTEE fails to remove shall be deemed abandoned and become CITY's property free of all claims and liens, or CITY may, at its option, remove such items at PERMITTEE's sole cost and expense.

- 30.3. Intentionally omitted.

- 30.4. Performance Bond. PERMITTEE shall obtain and provide CITY on a yearly basis proof of security in the form of a performance bond in the amount of \$1,000.00 (One Thousand Dollars) per Site, in favor of CITY, to cover the cost to dismantle or remove PERMITTEE's improvements, trade fixtures, structures, installations, additions, and personal property, including machines, appliances, equipment ("Removal Performance Bond") constructed, installed or erected by PERMITTEE or PERMITTEE's sublicensees, contractors, or subcontractors within the Permit Areas. The Removal Performance Bond shall be for a term of one (1) year and shall be continuously renewed, extended or replaced so that it remains in place for the entire Term of this Master Agreement or until PERMITTEE's secured removal obligations are performed to the satisfaction of CITY, whichever is sooner. In order to ensure continuous renewal of the Removal Performance Bond with no lapse, each bond shall be extended or replaced at least one month in advance of its expiration date. Removal costs may, at CITY's sole discretion, be reevaluated at the conclusion of the fifth (5th) year of the Term of this Master Agreement to ensure sufficient funds for removal. PERMITTEE shall adjust the amount of the Removal Performance Bond at CITY's request. Failure to secure the Removal Performance Bond and all renewals and extensions thereof shall constitute breaches of the PERMITTEE under this Master Agreement.

31. NOTICES.

Any notice required or permitted to be given under this Master Agreement shall be in writing and may be served personally, sent by United States mail, postage prepaid, or sent by reliable overnight courier, addressed to the Parties as follows, or to any mortgagee, trustee, or beneficiary, as applicable, at the appropriate address designated, in writing, by the respective party:

If to PERMITTEE:

CROWN CASTLE FIBER LLC
Attn: Ken Simon, General Counsel
2000 Corporate Drive
Canonsburg, PA 15317

with a copy to:

CROWN CASTLE FIBER LLC

Attn: SCN Contracts Management
2000 Corporate Drive
Canonsburg, PA 15317

Maintenance contact phone # 888-632-0931

Agreement Contact phone # 724-416-2000

SCNcontract.Mgmt@crowncastle.com

If to CITY:

City of San Diego
Real Estate Assets Department
Attn: Real Estate Assets Director
1200 Third Avenue, Suite 1700, MS 51A
San Diego, CA 92101-4155

Contact phone # 619-236-6020

If to CITY's Transportation Stormwater:

City of San Diego
Streets Division
Attn: Deputy Director
2781 Caminito Chollas
San Diego, CA 92105

31.1. Address Changes. Any party entitled or required to receive notice under this Master Agreement may, by like notice, designate a different address to which notices shall be sent.

32.2 When Effective. Notice shall be effective upon personal service, or five (5) calendar days after deposit in the United States mail.

32. MISCELLANEOUS PROVISIONS.

32.1. Governing Law. This Master Agreement shall be governed, construed, and enforced in accordance with the laws of the State of California. Venue for any action under this Master Agreement shall be in the state and federal courts located in the City of San Diego

32.2. Entire Understanding. This Master Agreement contains the entire understanding of the Parties. CITY and PERMITTEE agree that there is no other written or oral understanding between them with respect to PERMITTEE's Operations. Each party has relied on its own examination of the Permit Areas, advice from its own attorneys, and the warranties, representations, and covenants within the Master Agreement itself. Each party agrees that no other party, agent, or

attorney of any other party has made any promise, representation, or warranty whatsoever which is not contained in this Master Agreement. The failure or refusal of any party to read this Master Agreement or other documents, inspect the Permit Areas, and obtain legal or other advice relevant to this transaction shall constitute a waiver of any objection, contention, or claim that might have been based on such actions.

- 32.3. No Affiliation. Nothing contained in this Master Agreement shall be deemed or construed to create a partnership, joint venture, or other affiliation between the Parties, or between CITY and any other entity or party, or cause CITY to be responsible in any way for the debts or obligations of PERMITTEE or any other party or entity.
- 32.4. Standard of Conduct. PERMITTEE and its employees shall, at all times, conduct themselves and PERMITTEE's Operations in a creditable manner and in accordance with industry standards.
- 32.5. Joint and Several Liability. If PERMITTEE is comprised of more than one person or legal entity, such persons and entities, and each of them, shall be jointly and severally liable for the performance of each and every obligation of PERMITTEE under this Master Agreement.
- 32.6. Unavoidable Delay. If the performance of any act required of CITY or PERMITTEE under this Master Agreement is directly prevented or delayed by reason of strikes, lockouts, labor disputes, unusual governmental delays, acts of God, fire, floods, epidemics, freight embargoes, or other causes beyond the reasonable control of the party required to perform an act, that party shall be excused from performing that act for a period equal to the period of the prevention or delay. If CITY or PERMITTEE claims the existence of such a delay, the party claiming the delay shall notify the other party, in writing, of that fact within ten (10) calendar days after the beginning of any such claimed delay.
- 32.7. CITY's Consent or Approval. Whenever required under this Master Agreement, CITY's consent or approval shall mean the written consent or approval of CITY's Mayor or his designee, unless otherwise expressly provided. CITY's discretionary acts hereunder shall be made at the Mayor's discretion, unless otherwise expressly provided.
- 32.8. Permit Modifications. This Master Agreement shall not be modified, altered, or amended unless the modification, alteration, or amendment is in writing and signed by the Parties.
- 32.9. Cost Recovery. CITY collects various fees to offset the administrative costs incurred for CITY staff services. CITY shall process each of PERMITTEE's service requests upon receipt of PERMITTEE's payment of the applicable fee. The fee schedule, which is on file with the Office of the City Clerk, may be updated from time to time in CITY's sole discretion.
- 32.10. Survival. Any obligation under this Master Agreement that requires a party's performance of that obligation after the expiration or earlier revocation or termination of this Master Agreement shall survive such expiration, revocation, or termination.
- 32.11. Number and Gender. In this Master Agreement, words in the singular number shall include the plural, and *vice versa*, as appropriate to the context. Words of either gender shall include the other gender.

- 32.12. California Public Records Act. CITY shall determine, in its sole discretion, whether information provided to CITY by PERMITEE pursuant to this Master Agreement is or is not a public record subject to disclosure under the California Public Records Act ("CPRA"). PERMITEE shall hold CITY, its elected officials, officers and employees harmless for CITY's disclosure of any such information in response to a request for information under the CPRA.
- 32.13. Authority to Execute and Deliver Permit. Each individual executing this Master Agreement on behalf of another person or legal entity represents and warrants that he or she is authorized to execute and deliver this Master Agreement on behalf of such person or entity in accordance with duly adopted resolutions or other authorizing actions which are necessary and proper and under such legal entity's articles, charter, bylaws, or other written rules of conduct or governing agreement, and that this Master Agreement is binding upon such person or entity in accordance with its terms. Each person executing this Master Agreement on behalf of another person or legal entity shall provide CITY with evidence, satisfactory to CITY, that such authority is valid and that such entity is a valid, qualified corporation, limited liability company, partnership, or other unincorporated association, in good standing in its home state, and that such entity is qualified to do business in the State of California.
- 32.14. Exhibits Incorporated. All exhibits referenced in this Master Agreement are incorporated into the Master Agreement by this reference.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, this Master Agreement is executed by CITY and PERMITTEE, to be effective as of the Effective Date.

Date: 6/26/19

THE CITY OF SAN DIEGO, a California
municipal corporation:

BY: [Signature]
Cybele L. Thompson
Director, Real Estate Assets

Date: 6-20-19

CROWN CASTLE FIBER LLC, a New York
limited liability company

BY: Amanda Yetter

Print Name: Amanda Yetter

Title: Interim Director Contract Mgmt

ENVIRONMENTAL ANALYSIS SECTION:

CEQA Exemption 15301 (Existing Facilities) and 15303 (New Construction)

Date: 6/25/2019

Approved as to form this 28th day
of June, 2019

BY: [Signature]
PRINT NAME: JEFF SZYMANSKI
TITLE: SENIOR PLANNER

MARA W. ELLIOTT, City Attorney

By: [Signature]
Name: Melissa Ables
Title: Deputy City Attorney

Exhibit A: Approved Site List of Permit Areas

Exhibit B: Master Structural Plan



200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crowncastle.com

CITY OF SAN DIEGO
ENGINEERING DIVISION

Project Number: 625723

These plans conform to the approved and sealed (s) design of the project number 625723

Authenticated by: [Signature] Date: 6-3-2019

Call to: 625-5984

Revisions to these plans will require approval of the City Engineer or construction changes.

City of San Diego
DEVELOPMENT SERVICES
ENGINEERING DIVISION

☒ LDR-ENG. BUILDING REVIEW
☐ LDR-FLOOD PLAINS
☐ LDR-DRAINAGE & GRADES
☐ RSD-STORM WATER REVIEW

PRINT NAME: Danny Fgk-as
SIGNATURE: [Signature]
DATE: 6/10/2019

MASTER STRUCTURAL PLANS PTS#~~T.B.D.~~ 625723

SCOPE OF WORK: TO ATTACH MICRO-CELLULAR ANTENNAS AND ASSOCIATED EQUIPMENT TO EXISTING TYPE 15, TYPE 15D, TYPE 21, TYPE 21D AND TYPE 15TS STREET LIGHT POLES AND NEW STEEL ROUND TAPERED ANTENNA / STREET LIGHT POLES WITH CONCRETE TEXTURE WITHIN THE CITY OF SAN DIEGO RIGHT-OF-WAY.

DESIGN CODE REFERENCES:

1. 2015 IBC
2. 2016 CBC
3. ASCE MINIMUM DESIGN LOADS - 7-10
4. 2010 CALTRANS STANDARD PLAN RSP ES-6A
5. 2016 CALTRANS STANDARD PLAN RSP ES-6A
6. SAN DIEGO REGIONAL STANDARD DRAWING E-1, E-2
7. 2016 CALIFORNIA RESIDENTIAL CODE
8. 2016 CALIFORNIA BUILDING CODE
9. 2016 CALIFORNIA GREEN BUILDING CODE

CITY OF SAN DIEGO
APPROVED MASTER PLAN
SEPARATE BUILDING PERMIT(S) REQUIRED

625723

Master Plan Project No.

The set of plans and specifications, together with separate approved building permits for each structure, shall be kept on the site at all times during which work authorized by these plans is in progress. These plans shall be made available to City officials upon request. It is unlawful to change, modify or alter the approved plans and specifications without written authorization of the Building Official. The stamping of these plans and specifications SHALL NOT be held to permit nor approve the Violation of City, County, State or Federal laws nor regulations.

Issued by: [Signature] Date: 6-17-19

THIS IS NOT A CONSTRUCTION PERMIT

[Signature]
JERRY L. MICHAL
No. 042280
Exp. 03-31-20
DATE: 5-18-19

SITE ADDRESS: Venue

TITLE:

PTS NO.	825723	SHEET
DRAWING NO.	531 MINI MACRO	
DATE	11/15/18	
SCALE	N.T.S.	

1

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STRUCTURAL DETAILS & FOUNDATION DESIGN FOR 35' TALL ROUND, TAPERED ANTENNA LIGHT POLE

DETAILS:

DETAILS
DETAILS
DETAILS
DETAILS

PTS: 625725

DEVELOPMENT SERVICES STRUCTURAL REVIEW

Christian Soto

Date: 6/3/19



Gregory L. Michel
MECHANICAL
042880

5-23-19
DATE



CROWN CASTLE Master Structural Schematic

SITE ADDRESS		Varies
TITLE:		
PTS NO.	825723	SHEET
DRAWING NO.	531 MINI MACHIO	2
DATE:	11/15/18	
SCALED	N.T.S.	

TRAFFIC SIGNAL GENERAL NOTES *

- PULL BOXES SHALL BE NO. 6, AND CONDUIT 2" UNLESS NOTED OTHERWISE. ASSUME RESPONSIBILITY FOR THEIR RESPECTIVE PORTIONS OF THE DEVELOPMENT.
- LOCATION OF ALL UNDERGROUND UTILITIES ARE APPROXIMATE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATIONS AND VERIFY ALL CONDITIONS ON THE JOB SITE.
- THE TRAFFIC SIGNAL CONTRACTOR SHALL OBTAIN A TRAFFIC CONTROL PLAN PERMIT FROM THE CITY OF SAN DIEGO PERMIT CENTER A MINIMUM OF FIVE (5) WORKING DAYS PRIOR TO START OF WORK.

4. ALL TRAFFIC SIGNAL POLE FOUNDATIONS SHALL HAVE A 3" CONDUIT INSTALLED TO THE ADJACENT PULL BOX AND THE CONTROLLER FOUNDATION SHALL HAVE A SPARE 3" CONDUIT INSTALLED TO THE ADJACENT #6 PULL BOX FOR FUTURE USE.

5. THE TRAFFIC SIGNAL CONTRACTOR IS RESPONSIBLE FOR THE LAYOUT AND INSTALLATION OF LOOP DETECTORS, TRAFFIC STRIPING, PAVEMENT MARKINGS, PARKING REMOVAL AND TRAFFIC SIGNING (EXCEPT "G" SERIES STREET NAME SIGNS) AS SHOWN ON THESE PLANS.

- THE TRAFFIC SIGNAL CONTRACTOR SHALL OBTAIN THE APPROVAL OF CITY RESIDENT ENGINEER OF THE LOOP LOCATION PRIOR TO CUTTING AND THE STRIPING, PAVEMENT MARKING, PARKING REMOVAL AND SIGN LOCATIONS PRIOR TO PAINTING AND INSTALLATION.
- AFTER APPROVAL OF LOCATION, THE TRAFFIC SIGNAL CONTRACTOR SHALL WAIT A MINIMUM OF FIFTEEN (15) WORKING DAYS BEFORE PERMANENTLY REMOVING ANY PARKING, SO THAT ADVANCE NOTICE TO ADJACENT PROPERTY OWNERS CAN BE MADE BY THE CITY.
- THE TRAFFIC SIGNAL CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL OF ALL UNNECESSARY AND CONFLICTING STRIPING AND PAVEMENT MARKING.

6. THE TRAFFIC SIGNAL CONTRACTOR SHALL NOT ERECT ANY SIGNAL STANDARDS MORE THAN THREE (3) WEEKS PRIOR TO SCHEDULED TRAFFIC SIGNAL TURN ON.

7. CONTRACTOR SHALL PROVIDE ALL CABLING AND CONDUCTORS NECESSARY TO PERFORM ALL FUNCTIONS SHOWN ON THESE PLANS.

8. ALL POLES, CONDUIT, PULL BOXES, STRIPING AND LOOP DETECTOR LOCATIONS SHOWN ON THESE PLANS ARE APPROXIMATE. ACTUAL LOCATIONS SHALL BE DETERMINED BY FIELD CONDITIONS AT THE TIME OF CONSTRUCTION AND AS DIRECTED BY THE CITY OF SAN DIEGO.

9. ROUTING AND LOCATIONS OF UNDERGROUND ELECTRICAL SYSTEM IS DIAGRAMMATIC AND SUBJECT TO APPROVAL OF THE ENGINEER.

UNDERGROUND ELECTRICAL LINES AND SUBSURFACE STRUCTURES MAY BE RELOCATED IF NECESSARY TO CLEAR OTHER EXISTING UNDERGROUND FACILITIES.

10. ALL TREES AND SHRUBS SHALL BE TRIMMED OR REMOVED AS DETERMINED BY THE CITY RESIDENT ENGINEER AS REQUIRED TO MAINTAIN SIGNAL HEAD VISIBILITY AND SIGHT DISTANCE.

11. ALL VEHICLE SIGNAL HEADS SHALL BE 12" WITH BACKPLATES.

12. ALL SIGNAL AND PEDESTRIAN INDICATIONS SHALL BE L.E.D.

13. ALL LOOPS TO BE TYPE "E" AS SHOWN ON THIS PLAN. LOOP DETECTORS SHALL BE 8" DIAMETER WITH 10" SPACING AND POSITIONED IN CENTER OF LANE UNLESS OTHERWISE SHOWN. SEE CALIFORNIA STANDARD PLAN SHEET ES-68, FOR DETECTOR LEGEND AND DETAILS. FRONT LOOPS SHALL BE MODIFIED TYPE "E" LOOPS PER SDE-104.

14. PEDESTRIAN SIGNAL HEADS AND PUSH BUTTONS SHALL BE INTERNATIONAL SYMBOLS. PEDESTRIAN SIGNALS SHALL BE 18"X18" L.E.D. COUNTDOWN INDICATIONS. PEDESTRIAN PUSH BUTTONS SHALL BE 7" PER ADA REQUIREMENTS.

15. PLACE TEXTURED HORIZONTAL YELLOW BAND 2 INCHES IN WIDTH ENCIRCLING THE POLE, AND A 1 INCH WIDE DARK BORDER BAND ABOVE AND BELOW THIS YELLOW BAND WHEN PPS ARE PLACED ON A TRAFFIC SIGNAL POLE. (PER CALIFORNIA BUILDING CODE 11B-705.7.2.7).

STREET LIGHT NOTES *

- ALL STREET LIGHT LUMINAIRES SHALL CONFORM TO THE CITY OF SAN DIEGO:
 - STREET DESIGN MANUAL, MARCH 2017
(https://www.sandiego.gov/files/default/files/street_design_manual_march_2017_final.pdf)
 - STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION, 2018
(https://www.sandiego.gov/files/default/files/2018_standard_drawings.pdf)
 - APPROVED MATERIALS LIST, JUNE 2018
(https://www.sandiego.gov/files/default/files/approved_materials_list_lighting.pdf)
- ALL STREET LIGHTING SHALL BE BROAD SPECTRUM LIGHT SOURCES NO GREATER THAN 4000K CORRELATED COLOR TEMPERATURE (CCT). EXCEPT FOR AREAS WITHIN A 35 MILE RADIUS OF MT. PALOMAR OBSERVATORY, WHICH ARE DESIGNATED FOR A MAXIMUM OF 3000K CCT PER COUNCIL RESOLUTION 308251.
- STREET LIGHTING SHALL BE EQUIPPED WITH ADAPTIVE CONTROL NODES WHEREVER POSSIBLE.
- MID-BLOCK STREET LIGHTING WITH FULLY SHIELDED LUMINAIRES SHALL BE PROVIDED AT INTERVALS SET FORTH IN THE STREET DESIGN MANUAL.
- NON-SIGNALIZED INTERSECTION STREET LIGHTING SHALL BE INSTALLED IN ACCORDANCE WITH TABLE 4-1 OF THE STREET DESIGN MANUAL.

STREET LIGHT SCHEDULE

STREET LIGHT #	STREET NAME	LOCATION REFERENCE*	CORNER/ STREET SIDE	TYPE OF WORK LUMINAIRE ITEM #	POLE TYPE/ ITEM #
1	Sample St	@ Sample Dr	NEC	(N) ZM	15
2	Sample Blvd	E/O Sample Ct, 60'	S	(R/U) YMA	DB
3	Sample Rd	N/O Sample Pl, 45'	W	(G) T	P-T

** LOCATION REFERENCE FOR MID-BLOCK STREET LIGHTS: DISTANCE TO CENTERLINE OF NEAREST CROSS STREET.

*** TYPE OF WORK: NEW (N), UPGRADE (U), AND RELOCATE (R).

6. NATIONAL ELECTRICAL CODE (NEC) WIRE COLOR CODING SHALL BE USED FOR ALL ELECTRICAL WORK.

7. IMPROVEMENT PLANS SHALL SHOW AND LABEL ALL EXISTING AND PROPOSED STREET LIGHTS, PULL BOXES, AND SERVICE POINTS IN THE PROJECT VICINITY.

8. ALL NEW STREET LIGHTS SHALL HAVE A PULL BOX ADJACENT TO THE POLE.

9. THE CONTRACTOR INSTALLING THE STREET LIGHTING DISTRIBUTION SYSTEM SHALL NOTIFY THE CITY FIELD ENGINEER AT (619) 627-3200 A MINIMUM OF THREE (3) DAYS PRIOR TO STARTING WORK. ALSO, A PRE-CONSTRUCTION MEETING WILL BE REQUIRED WITH THE CITY ELECTRICAL INSPECTOR (RE) TO REVIEW THE LIGHTING REQUIREMENTS.

10. THE CONTRACTOR SHALL REPAIR AND/OR REPAINT EXISTING STREET LIGHTS IN THE CITY CENTRE TO THE SATISFACTION OF THE CITY ENGINEER.

11. THE CITY ELECTRICAL INSPECTOR (RE) SHALL VERIFY ALL STREET LIGHTS ARE FUNCTIONAL BEFORE SIGNING THE PERMIT OFF.

12. SUPPLEMENTAL AND SPECIAL ORNAMENTAL STREET LIGHTING SHALL BE INCLUDED IN A SPECIAL STREET LIGHTING ASSESSMENT DISTRICT OR MAINTENANCE ASSESSMENT DISTRICT (MAD), AND SHALL BE DESIGNATED WITH AN ASTERISK NEXT TO THE STREET LIGHT NUMBER. THE DEVELOPER/APPLICANT SHALL ESTABLISH A MAD FUND PRIOR TO APPROVAL OF IMPROVEMENT PLANS. INQUIRIES CAN BE DIRECTED TO THE PARK & RECREATION DEPARTMENT, OPEN SPACE DIVISION AT (619) 686-1350.

13. ALL PRIVATE STREET LIGHTS SHALL HAVE A SEPARATE SERVICE POINT AND SHALL NOT BE CONNECTED TO CITY CIRCUITS.

14. PRIVATE STREET LIGHTS SHOWN ON THESE PLANS ARE FOR INFORMATIONAL PURPOSES ONLY. PROPOSED PRIVATE STREET LIGHTS SHALL BE PERMITTED AND INSPECTED UNDER A SEPARATE ELECTRICAL PERMIT.

ADDITIONAL NOTES:

1. THIS IS A MASTER PERMIT TO INSTALL MICROCELLULAR EQUIPMENT ON VARIOUS STREET LIGHTS AND TRAFFIC SIGNALS WITHIN THE CITY OF SAN DIEGO RIGHT OF WAY. THIS PERMIT IS NOT SITE SPECIFIC. ALL DEPICTED REPRESENTATIONS AND STRUCTURAL CALCULATIONS ACCOUNT FOR THE WORST CASE SCENARIO. POLE HEIGHTS, LUMINAIRE HEIGHTS AND EQUIPMENT HEIGHTS COULD VARY DEPENDING ON THE ACTUAL SITE LOCATIONS; HOWEVER THEY WILL NOT EXCEED THE HEIGHTS DEPICTED AND ACCOUNTED FOR IN THIS STRUCTURAL ANALYSIS.

2. THIS MASTER PERMIT IS TO INCLUDE THE FOLLOWING TYPES OF STREET LIGHT POLES AND TRAFFIC SIGNAL POLES:

- EXISTING TYPE 15 STREET LIGHT
- EXISTING TYPE 15D STREET LIGHT
- EXISTING TYPE 21 STREET LIGHT
- EXISTING TYPE 21D STREET LIGHT
- EXISTING TYPE 15 TS
- EXISTING TYPE 21 TS
- NEW STEEL ROUND TAPERED STREET LIGHT

3. THE HIGHEST POINT OF THE ROOF, EQUIPMENT, OR ANY VENT, PIPE, ANTENNA OR OTHER PROJECTION SHALL NOT EXCEED 30 FEET ABOVE BASE OF MEASUREMENT WITHIN THE COASTAL HEIGHT LIMIT OVERLAY ZONE (SDMC SECTION 132.0505). A PRE-CONSTRUCTION INSPECTION IS REQUIRED DUE TO THE HEIGHT OF THE PROPOSED STRUCTURE BEING WITHIN ONE FOOT OF THE MAXIMUM HEIGHT ALLOWED IN THE COASTAL HEIGHT LIMIT OVERLAY ZONE (PROPOSITION D).

4. THIS MASTER PERMIT IS NOT SITE SPECIFIC. THEREFORE, FAA REQUIREMENTS WILL BE ADDRESSED ON A SITE-BY-SITE BASIS AND IS NOT INCLUDED IN THIS PERMIT.

CALTRANS STANDARD PLAN FOR TYPE 15/21 AND TYPE 15D/21D STREET LIGHTS, SEE SHEET 50, DETAILS 10 & 11.

GENERAL NOTES:



200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crowncastle.com



5-28-19
5-28-19
5-28-19

SITE ADDRESS: Varis	
TITLE:	
PTS NO: 625723	SHEET
DRAWING NO: 631 MIN MACRO	3
DATE: 11/15/18	
SCALED: N.T.S.	

MASTER STRUCTURAL PLANS
FOR EXISTING STREET LIGHT POLES

50
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Anthony L. Michel
No. 00000
Exp. 03-31-20
528-19

**CROWN
CASTLE**
200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crowncastle.com

CROWN CASTLE
Master Structural Schematic
EXISTING STREET LIGHT POLE
WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX

SITE ADDRESS: Varies	
TITLE: EXISTING STREET LIGHT POLE WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX	
PTS NO. 625723	SHEET 4
DRAWING NO. 531 MINI MACRO	
DATE: 11/15/16	
SCALE: N.T.S.	



STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Type 15 Pole/Antenna Installation

CALCULATIONS BY: JLM

PROJECT NAME: CROWN CASTLE

DATE: 2-24-2019

PROJECT ADDRESS: VARIOUS AREAS

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft
Steel Pole Ht. = 30' Ave. Pole Dia. = As Noted Steel Strength = 60,000 psi (per manufacturer)
Footings by Design: Dia. = 2.5' dia. x 4.5' deep. Antenna wt. = 45 lbs Total Equipment Wt. = 289 lbs
References: 1. 2015 IBC 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. 2010 Caltrans Standard Plan RSP ES-6A
5. San Diego Standard Drawing SDB-101

30-FOOT round Type 15 steel light pole with top mount antenna, radio and associated equipment.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3)

V = 110 mph (3 sec. Gust)

Coefficients: $K_z(16) = 0.87$ $K_z(32) = 0.94$
 $I_r = 0.87$ $G = 1.142$

Wind Pressures: $P_z(16) = (0.00256) K_z(16) G V^2 I_r = 22$ psf
 $P_z(35.0) = (0.00256) K_z(30.0) G V^2 I_r = 23.8$ psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 9.75 in. $A_{16} = (16) (9.75/12) = 13.0$ sq. ft.
Ave. Dia. (16-30') = 7.88 in. $A_{30} = (14.0) (7.88/12) = 9.19$ sq. ft.

Area of antenna: $A = (14.6/12) (48.0/12) = 4.86$ sq. ft.

Area of equipment unit: $A = (21.53/12) (47.3/12) = 7.07$ sq. ft.

Area of light arm: $A = (0.25) (8) + (0.5) (2) = 3.00$ sq. ft.

Area of sign: $A = (1.25) (1.25) = 1.56$ sq. ft.



Page 1 of 2

3. FORCE ON POLE

Force on pole: $F = P_w A + P_{ls} A = 504.7$ pounds

Force on Antenna: $F = P_w A_{ant} = 115.7$ pounds

Force on equipment: $F = P_w A_{eq} = 155.6$ pounds

Force on light arm: $F = (3.0) (23.8) = 71.4$ pounds

Force on Sign: $F = (22.0) (1.56) = 34.3$ pounds

Total wind load = 881.7 pounds

Depth Requirement: Typical Standard Depth is 4.5 feet per (SDE-101)

$$D = 0.5A (1 + [1 + (4.36h/A)]^2)$$

$$\text{Where } A = (2.34 P/S, b) = [(2.34) (881.7) / (2200) (2.5)] = 0.38$$

$$\text{Therefore } D_m = 3.72 \text{ ft.} < 4.50 \text{ feet ok}$$

4. Bearing Capacity

Gross pole wt: 1597 pounds (for pole + equipment)

$Q_u = 1500$ psf (Traffic signal at 4.5 foot embedment)

Pole ftg dia. = 2.5 ft. Footing area = 4.90 sq. ft.

$$Q = 1500 \text{ psf} > Q_u = (1597) / (4.90) = 325.3 \text{ psf OK}$$

Page 2 of 2

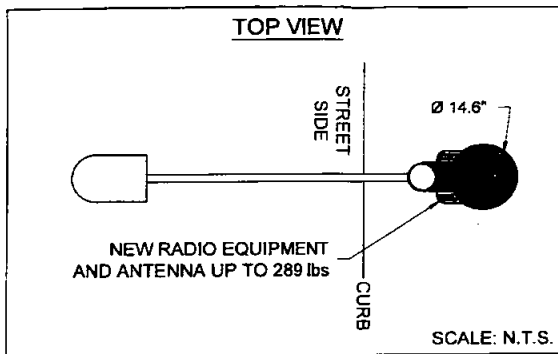
SITE ADDRESS	VARIOUS
TITLE	EXISTING TYPE 15 STREET LIGHT POLE WITH ANTENNA, RADIO EQUIPMENT BOX AND ASSOCIATED EQUIPMENT
DATE	11/15/18
DRAWING NO.	531 MINI MACRO
SCALE	N.T.S.
SHEET	6

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 15 STREET LIGHT POLE
WITH ANTENNA, RADIO EQUIPMENT BOX



200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crowncastle.com

52019
J. L. M.
CIVIL ENGINEER
Exp. 3-31-20



- Existing connections between Type 15 street light poles and their foundations shall be field verified for their type (plate size, number/size of bolts) and current structural conditions.
- Structure(s) will be located entirely on undisturbed native soil, if the Building Inspector suspects fill, expansive soils or any geological instability based upon the foundation excavation, a soils or geological report, and submittal of plans to plan check to verify that the report recommendations have not been incorporated, may be required." Signature *Joseph J. Michel* Owner/Licensed Engineer or Architect
- "As a California licensed Architect/Engineer, I have classified the undisturbed native soils to be silty sands, sandy silts and per Table 1806.2 of the 2016 CBC, I have assigned a foundation pressure of 1500 psf for the design of foundations related to this project". Signature *Joseph J. Michel* Signature of Licensed Architect/Engineer

WCF Note:

- WCF cannot exceed 30' in height west of I-5 and in residential zones.

Note:

- A pre-construction inspection is required due to the height of the proposed structure being within one foot of the maximum height allowed in the Coastal Height Limit Overlay Zone (Proposition D).

NEW SIDE MOUNT KIT 007J FOR AMPHENOL ANTENNA (Ø14.6" x 24") UP TO 75 lbs
FOR INSTALLATION PLAN: USE (3) 3/4" G43098 STAINLESS STEEL BANDS (SEE DETAIL 12, SHEET 51)

Note:

- Poles/foundations need to be evaluated on a case-by-case basis.
- No chipping foundations.
- Equipment to be installed must be the same as approved. If changed, then new structural analysis must be performed.

TOP OF NEW ANTENNA NOT TO EXCEED HEIGHT OF 30' WEST OF I-5

Antenna Note

- (N) Shroud (dashed) to conceal Fiber (Typ) cables and splitter.
- Provide a weather proof tag (Located a minimum of 3' below antenna) which includes:
 - 24 hour emergency contact number
 - Name of owner
 - Cell station number
- Antenna, Shrouds and all equipment to be painted to match the pole

Kill Switch Note

- Kill switch to be installed on Pole.

Description:

Existing Street light with (N) Radio Equipment Shroud attached at 10' 0" min. above ground level. (N) Antenna with (N) mount and (N) shroud attached to the side of the existing street light. Top of (N) antenna will not exceed the height limit of the zone and/or any overlay zones (Coastal Height, Clairemont Mesa Height, etc.), as applicable. *Height of street light may vary per location.

ALTERNATIVE SHROUD OPTIONS		
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)
HP-32	1	214
HPSH60	1	204
SINGLE NOKIA ENCLOSURE	1	60
CHARLES SH60-46 ENCLOSURE	1	175

TYPE 15 - SIDE MOUNT ANTENNA W/ FULLY LOADED HP23 RADIO SHROUD			
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)	TOTAL EQUIP. WEIGHT (lb.)
AMPHENOL 2' CANISTER ANTENNA	1	30	30
ANTENNA MOUNT (007J)	1	45	45
HP23 RADIO SHROUD (FULLY LOADED)	1	214	214
TOTAL WEIGHT (Lbs) = 289			

Note:

- The highest point of the roof, equipment, or any vent, pipe, antenna or other projection shall not exceed 30 feet above of measurement (reference datum).



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CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 15 STREET LIGHT POLE
WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX



SITE ADDRESS:	Varies
TITLE:	EXISTING TYPE 15 STREET LIGHT POLE WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX
PTS NO.	625723
DRAWING NO.	531 MINI MACRO
DATE:	11/15/18
SCALE:	N.T.S.
SHEET	7

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Type 15 Pole/Antenna Installation

CALCULATIONS BY: JLM

PROJECT NAME: CROWN CASTLE

DATE: 11-17-2018

PROJECT ADDRESS: VARIOUS AREAS

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft
Steel Pole Ht. = 30' Ave. Pole Dia. = As Noted, Steel Strength = 60,000 psi (per manufacturer)

Footings by Design: Dia.=2.5' dia. x 4.5'deep. Total Equipment Wt. = 289 lbs

References: 1. 2015 IBC 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. 2010 Caltrans Standard Plan RSP ES-6A
5. San Diego Standard Drawing SDE-101

30-FOOT round Type 15 steel light pole with side mount antenna, radio and associated equipment.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3)

V = 110 mph (3 sec. Gust)

Coefficients:

K_z(16) = 0.87
I_r = 0.87

K_z(32) = 0.94
G = 1.142

Wind Pressures: P_z(16) = (0.00256) K_z(16)G V²/R = 22 psf

P_z(35.0) = (0.00256) K_z(30.0)G V²/R = 23.8 psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 9.75 in.
Ave. Dia. (16-30') = 7.88 in.

A_m = (16) (9.75/12) = 13.0 sq.ft.
A_n = (14.0) (7.88 /12) = 9.19 sq.ft.

Area of antenna: A = (14.6/12)(48.0/12) = 4.86 sq. ft.

Area of equipment unit: A = (14.2/12)(47.3/12) = 4.69 sq.ft

Area of light arm: A = (0.25)(8) + (0.5)(2) = 3.00 sq. ft.

Area of sign: A = (1.25)(1.25) = 1.56 sq.ft



Page 1 of 2

3. FORCE ON POLE

Force on pole: F = P_wA + P_{ls}A = 504.7 pounds

Force on Antenna: F = P_wA_m = 115.7 pounds

Force on equipment: F = P_wA_n = 111.3 pounds

Force on light arm: F = (3.0) (23.8) = 71.4 pounds

Force on Sign: F = (22.0)(1.56) = 34.3 pounds

Total wind load = 837.4 pounds

Depth Requirement: Typical Standard Depth is 4.5feet per (SDE-101)

$$D = 0.5A (1 + [1 + (4.36h / A)]^n)$$

$$\text{Where } A = (2.34 P/S_b) = \{ (2.34) (837.4) / (2200) (2.5) \} = 0.35$$

$$\text{Therefore } D_m = 3.56\text{ft} < 4.50 \text{ feet ok}$$

4. Bearing Capacity

Gross pole wt: 1597 pounds (for pole + equipment)

Q_a = 1500 psf (Traffic signal at 4.5foot embedment)

Pole ftg dia. = 2.5 ft. Footing area = 4.90 sq. ft.

$$Q = 1500 \text{ psf} > Q = (1597) / (4.90) = 325.3 \text{ psf OK}$$

Page 2 of 2

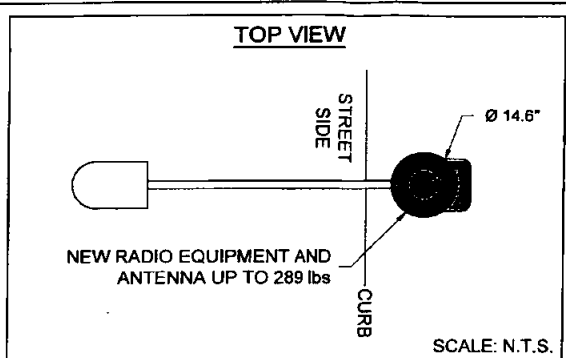
SITE ADDRESS:	Various
TITLE:	EXISTING TYPE 15 STREET LIGHT POLE WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT
PTS NO.	82573
DRAWING NO.	531 MM MACRO
DATE	11/19/18
SCALE	N.T.S.
SHEET	8

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 15 STREET LIGHT POLE
WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX



200 Spectrum Center Drive, Suite 1000
Irvine, CA 92618
www.crowncastle.com

J. L. Michel
JLM
03-31-20
DATE



- Existing connections between Type 15 street light poles and their foundations shall be field verified for their type (plate size, number/size of bolts) and current structural conditions.
- Structure(s) will be located entirely on undisturbed native soil, if the Building Inspector suspects fill, expansive soils or any geological instability based upon the foundation excavation, a soils or geological report, and submittal of plans to plan check to verify that the report recommendations have not been incorporated, may be required." Signature *Joseph L. Michel* Owner/Licensed Engineer or Architect
- "As a California licensed Architect/Engineer, I have classified the undisturbed native soils to be silty sands, sandy silts and per Table 1806.2 of the 2016 CBC, I have assigned a foundation pressure of 1500 psf. for the design of foundations related to this project". Signature *Joseph L. Michel* Signature of Licensed Architect/Engineer

- Note:**
- Poles/foundations need to be evaluated on a case-by-case basis.
 - No chipping foundations.
 - Equipment to be installed must be the same as approved. If changed, then new structural analysis must be performed.

WCF Note:

- WCF cannot exceed 30' in height west of I-5 and in residential zones.

Note:

- A pre-construction inspection is required due to the height of the proposed structure being within one foot of the maximum height allowed in the Coastal Height Limit Overlay Zone (Proposition D).

NEW TOP MOUNT KIT 008H FOR AMPHENOL ANTENNA (Ø14.6" x 24") UP TO 75 lbs FOR INSTALLATION PLAN: (SEE DETAIL 5, SHEET 49)

TOP OF NEW ANTENNA NOT TO EXCEED HEIGHT OF 30' WEST OF I-5

- Antenna Note**
- (N) Shroud (dashed) to conceal Fiber (Typ) cables and splitter.
 - Provide a weather proof tag (Located a minimum of 3' below antenna) which includes:
 - 24 hour emergency contact number
 - Name of owner
 - Cell station number
 - Antenna, Shrouds and all equipment to be painted to match the pole

Kill Switch Note

- Kill switch to be installed on Pole.

Description:
Existing Street light with (N) Radio Equipment Shroud attached at 10' 0" min. above ground level. (N) Antenna with (N) mount and (N) shroud attached to the side of the existing street light. Top of (N) antenna will not exceed the height limit of the zone and/or any overlay zones (Coastal Height, Clairemont Mesa Height, etc.), as applicable. *Height of street light may vary per location.

ALTERNATIVE SHROUD OPTIONS		
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)
HP-32	1	214
HPSH60	1	204
SINGLE NOKIA ENCLOSURE	1	80
CHARLES SH60-46 ENCLOSURE	1	175

TYPE 21 - TOP MOUNT ANTENNA W/ FULLY LOADED HP23 RADIO SHROUD			
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)	TOTAL EQUIP. WEIGHT (lb.)
AMPHENOL 2" CANISTER ANTENNA	1	30	30
ANTENNA MOUNT (008H)	1	45	45
HP23 RADIO SHROUD (FULLY LOADED)	1	214	214
TOTAL WEIGHT (Lbs) = 289			

Notes:

- The highest point of the roof, equipment, or any vent, pipe, antenna or other projection shall not exceed 30 feet above of measurement (reference datum).



CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 21 STREET LIGHT POLE
WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX

DATE 5/28/18
BY [Signature]
CHKD BY [Signature]
APP. BY [Signature]

SHEET 9

DATE 11/15/18
SCALE N.T.S.

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Type 21 Pole /Antenna Installation

CALCULATIONS BY: JLM

PROJECT NAME: CROWN CASTLE

DATE: 11-17-2018

PROJECT ADDRESS: VARIOUS AREAS

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft
Steel Pole Ht. = 35' Ave. Pole Dia. = As Noted,

Footings by Design: Dia. = 2.5' dia. x 5' deep Equip. Wt. 289 lbs

References: 1. 2015 IBC 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. 2015 Revised Caltrans Standard Plan RSA ES-6A

35-foot Type 21 round steel pole with top mount antenna, radio and associated equipment and signs.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3) V = 110 mph (3 sec. Gust)

Coefficients: $K_z(16) = 0.87$ $K_z(32) = 0.94$
 $I_r = 0.87$ $G = 1.142$

Wind Pressures: $P_z(16) = (0.00256) K_z(16) G V^2 I_r = 22$ psf

$P_z(35.0) = (0.00256) K_z(35.0) G V^2 I_r = 23.8$ psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 7.28 in. $A_{16} = (16) (7.28/12) = 9.70$ sq.ft.
Ave. Dia. (16-35') = 4.87 in. $A_{35} = (19.0) (4.87/12) = 7.71$ sq.ft.

Area of light arm: $A = (0.25)(8) + (0.5)(2) = 3.0$ sq. ft.

Area of antenna: $A = (14.6/12)(48.0/12) = 4.86$ sq. ft.

Area of equipment unit: $A = (14.2/12)(47.3/12) = 4.69$ sq.ft

Area of Sign: $A = (1.5)(1.5) + (1)(1.5) = 3.75$ sq.ft



Page 1 of 2

3. FORCE ON POLE

Force on pole: $F = P_{16} A + P_{35} A = 388.8$ pounds

Force on Antenna: $F = P_{16} A_{16} = 115.6$ pounds

Force on equipment: $F = P_{16} A_{16} = 111.6$ pounds

Force on light arm: $F = (3.0)(23.8) = 71.4$ pounds

Force on Signs (2): $F = (3.75)(22.0) = 82.5$ pounds

Total wind load = 770.0 pounds

Depth Requirement: Typical Standard Depth is 5 feet

$D = 0.5A (1 + [1 + (4.36h / A)]^2)$

Where $A = (2.34 P/S, b) = [(2.34) (770.0) / (2200) (2.5)] = 0.33$

Therefore $D_{16} = 3.50$ ft. < 5 feet ok

4. Bearing Capacity

Gross pole wt: 1615 pounds (for pole + equipment)
 $Q_{16} = 1500$ psf

Pole flg dia. = 2.5 ft. Footing area = 4.91 sq. ft.

$Q = 1500$ psf > $Q = (1615)/(4.91) = 328.9$ psf OK

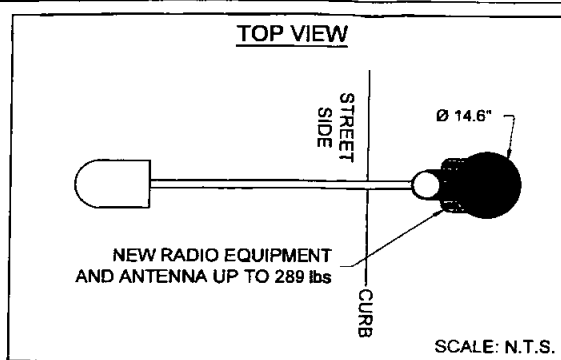
Page 2 of 2

SITE ADDRESS: <u>Voice</u>	
TITLE: <u>EXISTING TYPE 21 STREET LIGHT POLE WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT</u>	
PTS NO. <u>625723</u>	SHEET <u>10</u>
DRAWING NO. <u>531 MM MACRO</u>	
DATE: <u>11/15/18</u>	
SCALE: <u>N.T.S.</u>	

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 21 STREET LIGHT POLE
WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX

CROWN CASTLE
200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crowncastle.com

John J. M. L.
DATE: 11-17-2018
BY: JLM
CHECKED: [Signature]
DATE: 11-17-2018



- Existing connections between Type 15 street light poles and their foundations shall be field verified for their type (plate size, number/size of bolts) and current structural conditions.
- Structure(s) will be located entirely on undisturbed native soil, if the Building Inspector suspects fill, expansive soils or any geological instability based upon the foundation excavation, a soils or geological report, and submittal of plans to plan check to verify that the report recommendations have not been incorporated, may be required." Signature *Gregory L. Michel* Owner/Licensed Engineer or Architect
- As a California licensed Architect/Engineer, I have classified the undisturbed native soils to be silty sands, sandy silts and per Table 1806.2 of the 2016 CBC, I have assigned a foundation pressure of 1500 psf for the design of foundations related to this project". Signature of Licensed Architect/Engineer *Gregory L. Michel*

WCF Note:

- WCF cannot exceed 30' in height west of I-5 and in residential zones.

Note:

- A pre-construction inspection is required due to the height of the proposed structure being within one foot of the maximum height allowed in the Coastal Height Limit Overlay Zone (Proposition D).

Note:

- Poles/foundations need to be evaluated on a case-by-case basis.
- No chipping foundations.
- Equipment to be installed must be the same as approved. If changed, then new structural analysis must be performed.

NEW SIDE MOUNT KIT 007J FOR AMPHENOL ANTENNA (Ø14.6" x 24") UP TO 75 lbs
FOR INSTALLATION PLAN:
USE (3) 3/4" G43089 STAINLESS STEEL BANDS (SEE DETAIL 12, SHEET 51)

TOP OF NEW ANTENNA NOT TO EXCEED HEIGHT OF 30' WEST OF I-5

Antenna Note

- (N) Shroud (dashed) to conceal Fiber (Typ) cables and splitter.
- Provide a weather proof tag (Located a minimum of 3' below antenna) which includes:
 - 24 hour emergency contact number
 - Name of owner
 - Cell station number
- Antenna, Shrouds and all equipment to be painted to match the pole

Kill Switch Note

- Kill switch to be installed on Pole.

Description:

Existing Street light with (N) Radio Equipment Shroud attached at 10' 0" min. above ground level. (N) Antenna with (N) mount and (N) shroud attached to the side of the existing street light. Top of (N) antenna will not exceed the height limit of the zone and/or any overlay zones (Coastal Height, Clairemont Mesa Height, etc.), as applicable. *Height of street light may vary per location.

ALTERNATIVE SHROUD OPTIONS		
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)
HP-32	1	214
HPSH60	1	204
SINGLE NOKIA ENCLOSURE	1	60
CHARLES SH60-46 ENCLOSURE	1	175

TYPE 21 - SIDE MOUNT ANTENNA W/ FULLY LOADED HP23 RADIO SHROUD			
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)	TOTAL EQUIP. WEIGHT (lb.)
AMPHENOL 2' CANISTER ANTENNA	1	30	30
ANTENNA MOUNT (007J)	1	45	45
HP23 RADIO SHROUD (FULLY LOADED)	1	214	214
TOTAL WEIGHT (Lbs) = 289			

Note:

- The highest point of the roof, equipment, or any vent, pipe, antenna or other projection shall not exceed 30 feet above of measurement (reference datum).



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CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 21 STREET LIGHT POLE
WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX

SITE ADDRESS:	Various
TITLE:	EXISTING TYPE 21 STREET LIGHT POLE WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX
PTS NO.	825723
DRAWING NO.	S31 MESH MACRO
DATE:	11/15/18
SCALE:	N.T.S.
SHEET	11

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Type 21 Pole/Antenna Installation

CALCULATIONS BY: JLM

PROJECT NAME: CROWN CASTLE

DATE: 11-17-2018

PROJECT ADDRESS: VARIOUS AREAS

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft

Steel Pole Ht. = 35' Ave. Pole Dia. = As Noted,

Footing by Design: Dia.=2.5' dia. x 5'deep. Equip. Wt. 289 lbs

References: 1. 2015 IBC 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. 2015 Revised Caltrans Standard Plan RSA ES-6A

35-foot Type 21 round steel pole with side mount antenna, radio and associated equipment and signs.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3)

V = 110 mph (3 sec. Gust)

Coefficients:

Kz (16) = 0.87

Kz(32) = 0.94

Ir = 0.87

G = 1.142

Wind Pressures:

Pz(16) = (0.00256) Kz(16)GV²IR = 22 psf

Pz(35.0) = (0.00256) Kz(35.0)GV²IR = 23.8 psf

2. AREA CALCULATIONS

Area of pole:

Ave. Dia. (0-16') = 7.28 in.

A₁₆ = (16) (7.28/12) = 9.70 sq.ft.

Ave. Dia. (16-35') = 4.87 in.

A₃₅ = (19.0) (4.87/12) = 7.71 sq.ft.

Area of light arm:

A = (0.25)(8) + (0.5)(2) = 3.0 sq. ft.

Area of antenna:

A = (14.6/12)(48.0/12) = 4.86 sq. ft.

Area of equipment unit:

A = (14.2/12)(47.3/12) = 4.69 sq.ft.

Area of Sign:

A = (1.5)(1.5) + (1)(1.5) = 3.75 sq.ft



Page 1 of 2

3. FORCE ON POLE

Force on pole: $F = P_{16}A + P_{35}A = 388.8$ pounds

Force on Antenna: $F = P_{16}A_{ant} = 115.6$ pounds

Force on equipment: $F = P_{16}A_{eq} = 111.6$ pounds

Force on light arm: $F = (3.0)(23.8) = 71.4$ pounds

Force on Signs (2): $F = (3.75)(22.0) = 82.5$ pounds

Total wind load = 770.0 pounds

Depth Requirement: Typical Standard Depth is 5 feet

$D = 0.5A (1 + [1 + (4.36h/A)]^2)^{0.5}$

Where $A = (2.34 P/S_b) = \{ (2.34) (770.0) / (2200) (2.5) \} = 0.33$

Therefore $D_{min} = 3.50$ ft. < 5 feet ok

4. Bearing Capacity

Gross pole wt: 1615 pounds (for pole + equipment)

Q_a = 1500 psf

Pole flg dia. = 2.5 ft. Footing area = 4.91 sq. ft.

Q = 1500 psf > Q = (1615)/(4.91) = 328.9 psf OK

Page 2 of 2

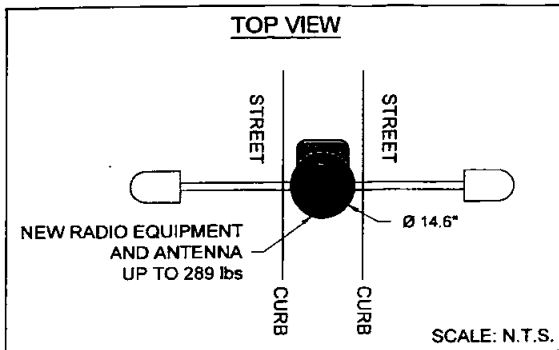
SITE ADDRESS	11/18
TITLE: EXISTING TYPE 21 STREET LIGHT POLE WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX	12
P/S NO. 625723	
DRAWING NO. 531 HEN MACRO	
DATE 11/15/18	
SCALE: N.T.S.	

CROWN CASTLE
Master: Structural Schematic
EXISTING TYPE 21 STREET LIGHT POLE
WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX

CROWN CASTLE

200 Spectrum Center Drive, Suite 1000
Irvine, CA 92618
www.crowncastle.com

Ken L. Mielke
11/18
03-31-20
DATE



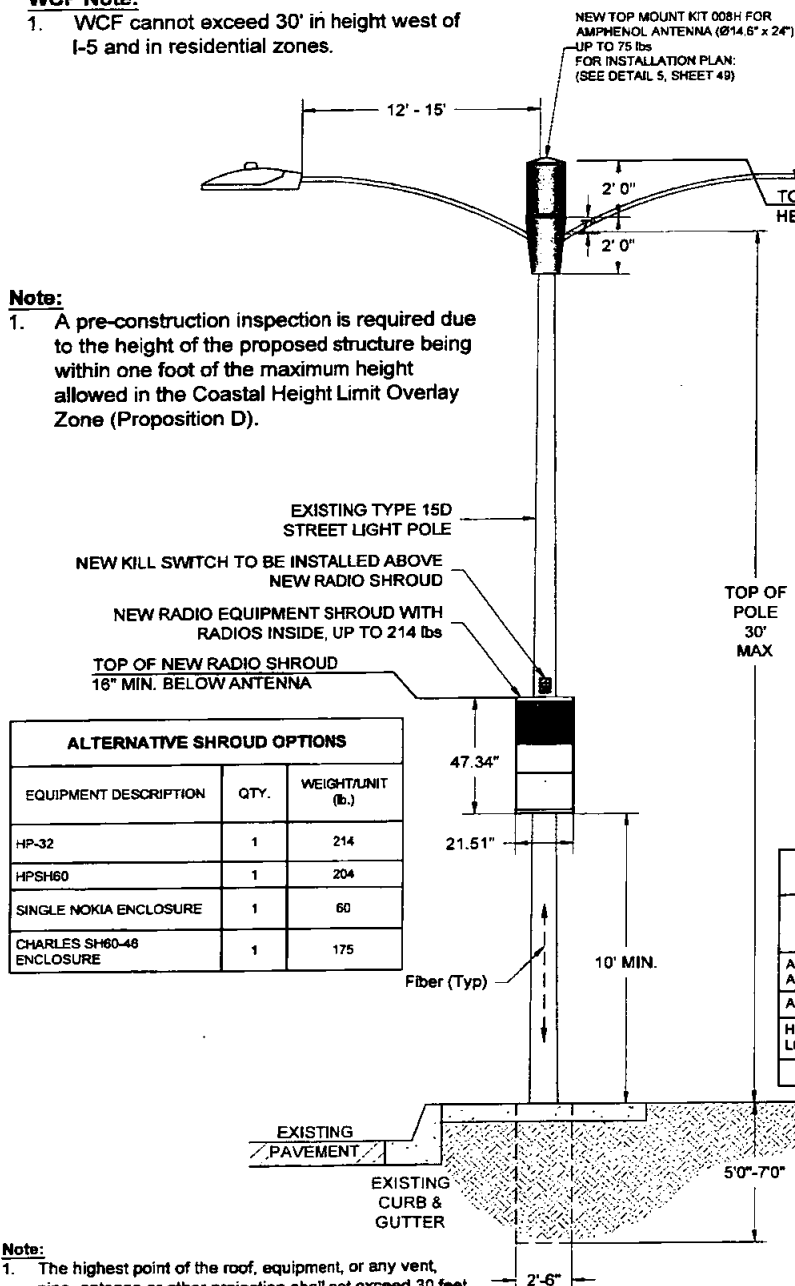
- Existing connections between Type 15 street light poles and their foundations shall be field verified for their type (plate size, number/size of bolts) and current structural conditions.
- Structure(s) will be located entirely on undisturbed native soil. If the Building Inspector suspects fill, expansive soils or any geological instability based upon the foundation excavation, a soils or geological report, and submittal of plans to plan check to verify that the report recommendations have not been incorporated, may be required." Signature *Gray L Michel* Owner/Licensed Engineer or Architect
- "As a California licensed Architect/Engineer, I have classified the undisturbed native soils to be silty sands, sandy silts and per Table 1806.2 of the 2016 CBC, I have assigned a foundation pressure of 1500 psf. for the design of foundations related to this project". Signature *Gray L Michel* Signature of Licensed Architect/Engineer

WCF Note:

- WCF cannot exceed 30' in height west of I-5 and in residential zones.

Note:

- A pre-construction inspection is required due to the height of the proposed structure being within one foot of the maximum height allowed in the Coastal Height Limit Overlay Zone (Proposition D).



ALTERNATIVE SHROUD OPTIONS		
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)
HP-32	1	214
HPSH60	1	204
SINGLE NOKIA ENCLOSURE	1	60
CHARLES SH60-48 ENCLOSURE	1	175

TOP OF NEW ANTENNA NOT TO EXCEED HEIGHT OF 30' WEST OF I-5

Antenna Note

- (N) Shroud (dashed) to conceal Fiber (Typ) cables and splitter.
- Provide a weather proof tag (Located a minimum of 3' below antenna) which includes:
 - 24 hour emergency contact number
 - Name of owner
 - Cell station number
- Antenna, Shrouds and all equipment to be painted to match the pole

Kill Switch Note

- Kill switch to be installed on Pole.

Description:

Existing Street light with (N) Radio Equipment Shroud attached at 10' 0" min. above ground level. (N) Antenna with (N) mount and (N) shroud attached to the side of the existing street light. Top of (N) antenna will not exceed the height limit of the zone and/or any overlay zones (Coastal Height, Clairemont Mesa Height, etc.), as applicable. *Height of street light may vary per location.

TYPE 15D - TOP-MOUNT ANTENNA W/ FULLY-LOADED HP23 RADIO SHROUD			
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)	TOTAL EQUIP. WEIGHT (lb.)
AMPHENOL 2' CANISTER ANTENNA	1	30	30
ANTENNA MOUNT (008H)	1	45	45
HP23 RADIO SHROUD (FULLY LOADED)	1	214	214
TOTAL WEIGHT (Lbs) = 289			

Note:

- The highest point of the roof, equipment, or any vent, pipe, antenna or other projection shall not exceed 30 feet above of measurement (reference datum).



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CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 15D STREET LIGHT POLE
WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX



SITE ADDRESS:		Varies
TITLE:		EXISTING TYPE 15D STREET LIGHT POLE WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX
PROJECT NO.	625723	SHEET
DRAWING NO.	531 MNS MACRO	
DATE	11/15/18	
SCALE	N.T.S.	

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Type 15/Antenna Installation

CALCULATIONS BY: JLM

PROJECT NAME: CROWN CASTLE

DATE: 11-17-2018

PROJECT ADDRESS: VARIOUS AREAS

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft

Steel Pole Ht. = 30' Ave. Pole Dia. = as noted,

Footings by Design: Dia.=2.5' dia. x 4.5'deep. Equip. Wt. = 289 lbs

References: 1. 2015 IBC 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. 2010 Caltrans Standard Plan RSP ES-6D

30-FOOT type 15D round steel pole with top mount antenna, radio, 2 light arms and signs.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3) V = 110 mph (3 sec. Gust)
Coefficients: Kz(16) = 0.87 Kz(32) = 0.94
I = 0.87 G = 1.142

Wind Pressures: Pz(16) = (0.00256) Kz(16)GV²IR = 22 psf
Pz(35.0) = (0.00256) Kz(30.0)GV²IR = 23.8 psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 7.11 in. A₁₆ = (16) (7.11/12) = 9.48 sq.ft.
Ave. Dia. (16-30') = 5.48 in. A₃₀ = (14.0) (5.48/12) = 6.39 sq.ft.

Area of light arms(2): A = (2) (0.25)(8) + (0.5)(2) = 6.0 sq. ft.

Area of antenna: A = (14.6/12)(48.0/12) = 4.86 sq. ft.

Area of equipment unit: A = (14.2/12)(47.3/12) = 4.69 sq.ft.

Area of Sign: A = (1.25)(1.25) + (1)(1.5) = 3.06 sq.ft.



Page 1 of 2

3. FORCE ON POLE

Force on pole: F = P₁₆A + P₃₀A = 541.8 pounds

Force on Antenna: F = P₃₀A_{ant} = 115.6 pounds

Force on equipment: F = P₃₀A_{eq} = 111.6 pounds

Force on light arms(2): F = (2)(3.0)(23.8) = 142.8 pounds

Force on Signs (2): F = (22.0)(3.06) = 67.3 pounds

Total wind load = 701.6 pounds

Depth Requirement: Typical Standard Depth is 4.5 feet (per RSP ES-6D)

$$D = 0.5A [1 + \{1 + (4.36h / A)\}^2]$$

$$\text{Where } A = (2.34 P/S, b) = \{ (2.34) (701.6) / (2200) (2.5) \} = 0.30$$

$$\text{Therefore } D_{req} = 3.29\text{ft.} < 4.50 \text{ feet ok}$$

4. Bearing Capacity

Gross pole wt: 1489 pounds (for pole + equipment)

Q_a = 1500 psf (Light pole at 4.5 foot embedment)

Pole ftg dia. = 2.5 ft. Footing area = 4.91 sq. ft.

$$Q = 1500 \text{ psf} > Q = (1489) / (4.91) = 303.3 \text{ psf OK}$$

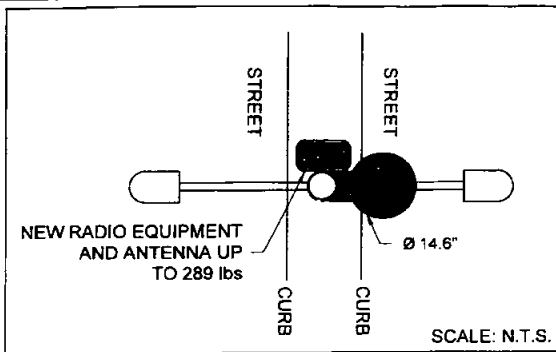
Page 2 of 2

SITE ADDRESS:	VIEW
TITLE:	EXISTING TYPE 15D STREET LIGHT POLE WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX
PROJECT NO.	625723
DATE	11/17/18
SCALE	N.T.S.
14	

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 15D STREET LIGHT POLE
WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX

CROWN CASTLE

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Irvine, CA 92618
www.crowncastle.com



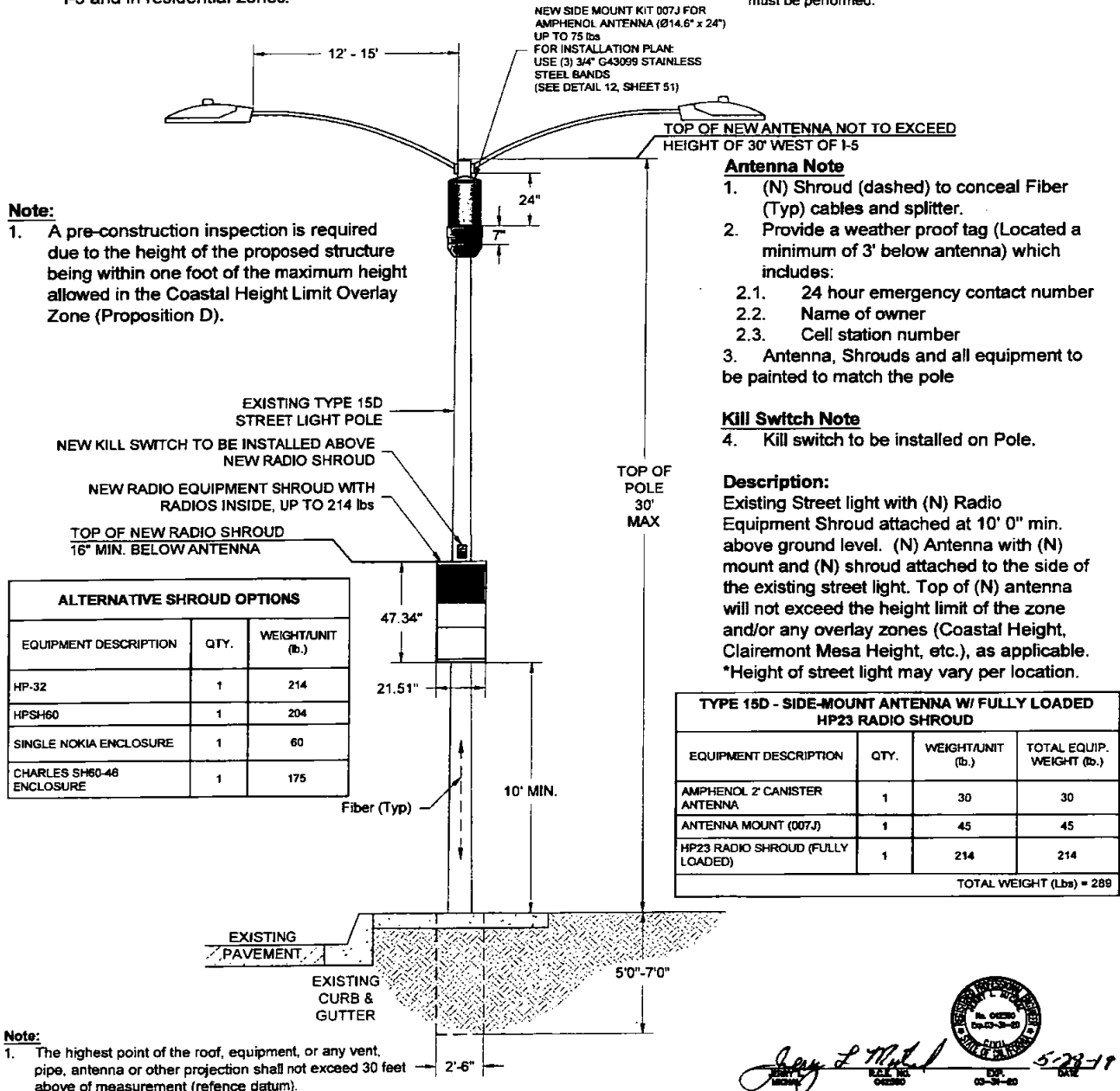
- Existing connections between Type 15 street light poles and their foundations shall be field verified for their type (plate size, number/size of bolts) and current structural conditions.
- Structure(s) will be located entirely on undisturbed native soil. If the Building Inspector suspects fill, expansive soils or any geological instability based upon the foundation excavation, a soils or geological report, and submittal of plans to plan check to verify that the report recommendations have not been incorporated, may be required." Signature *Greg L. Michael* Owner/Licensed Engineer or Architect
- As a California licensed Architect/Engineer, I have classified the undisturbed native soils to be silty sands, sandy silts and per Table 1806.2 of the 2016 CBC, I have assigned a foundation pressure of 1500 psf. for the design of foundations related to this project". Signature *Greg L. Michael* Signature of Licensed Architect/Engineer

WCF Note:

- WCF cannot exceed 30' in height west of I-5 and in residential zones.

Note:

- A pre-construction inspection is required due to the height of the proposed structure being within one foot of the maximum height allowed in the Coastal Height Limit Overlay Zone (Proposition D).



Note:

- The highest point of the roof, equipment, or any vent, pipe, antenna or other projection shall not exceed 30 feet above of measurement (reference datum).

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Type 15D Pole/Antenna Installation

CALCULATIONS BY: JLM

PROJECT NAME: CROWN CASTLE

DATE: 11-17-2018

PROJECT ADDRESS: VARIOUS AREAS

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft
Steel Pole Ht. = 30' Ave. Pole Dia. = AS Noted Footing by Design: Dia. = 2.5' dia. x 5.0' deep.
Equip. Wt. = 289 lbs

References: 1. 2015 IBC 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. 2010 Caltrans Standard Plan RSP ES-6D

30-FOOT type 15D round steel pole with side mount antenna and associated equipment, 2 light arms and signs.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3) V = 110 mph (3 sec. Gust)
Coefficients: Kz (16) = 0.87 Kz (32) = 0.94
Ir = 0.87 G = 1.142

Wind Pressures: Pz (16) = (0.00256) Kz (16) GV^{1/2} IR = 22 psf
Pz (35.0) = (0.00256) Kz (30.0) GV^{1/2} IR = 23.8 psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 6.00 in. A₁₆ = (16) (6.00/12) = 8.00 sq. ft.
Ave. Dia. (16-30') = 6.00 in. A₃₀ = (14.0) (6.00/12) = 7.00 sq. ft.

Area of light arms(2): A = (2) (0.25)(8) + (0.5)(2) = 6.0 sq. ft.

Area of antenna: A = (14.6/12)(48.0/12) = 4.86 sq. ft.

Area of equipment unit: A = (14.2/12)(47.3/12) = 4.69 sq. ft.

Area of Signs: A = (1.0)(2.0) + (2) (1.25)(1.25) = 5.06 sq. ft.



Page 1 of 2

3. FORCE ON POLE

Force on pole: F = P_wA + P_{lw}A = 342.6 pounds

Force on Antenna: F = P_wA_{ant} = 115.6 pounds

Force on equipment: F = P_wA_{eq} = 111.6 pounds

Force on light arms(2): F = (2)(3.0)(23.8) = 142.8 pounds

Force on Signs (2): F = (22.0)(3.06) = 67.3 pounds

Total wind load = 779.8 pounds

Depth Requirement: Typical Standard Depth is 5.0 feet (per RSP ES-6D)

$$D = 0.5A [1 + (4.36h / A)]^2$$

$$\text{Where } A = (2.34 P/S, h) = (2.34) (779.8) / (2200) (2.5) = 0.33$$

$$\text{Therefore } D_m = 3.45 \text{ ft.} < 5.00 \text{ feet ok}$$

4. Bearing Capacity

Gross pole wt: 1489 pounds (for pole + equipment)
Q_a = 1500 psf (Pole at 5.0 foot embedment)

Pole ftg dia. = 2.5 ft. Footing area = 4.91 sq. ft.

$$Q = 1500 \text{ psf} > Q = (1489) / (4.91) = 303.3 \text{ psf OK}$$

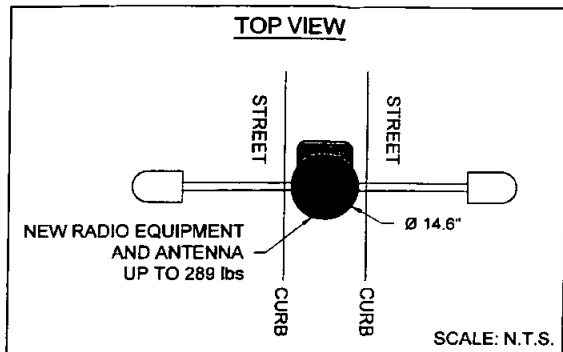
Page 2 of 2

SITE ADDRESS: <u>Various</u>		TITLE: <u>EXISTING TYPE 15D STREET LIGHT POLE WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX</u>	
PTS NO. <u>625723</u>	DATE <u>11/15/18</u>	SCALE <u>N.T.S.</u>	SHEET <u>16</u>

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 15D STREET LIGHT POLE
WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX

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Irvine, CA 92618
www.crowncastle.com

J. L. Michael
J. L. MICHAEL
042590
11-17-18



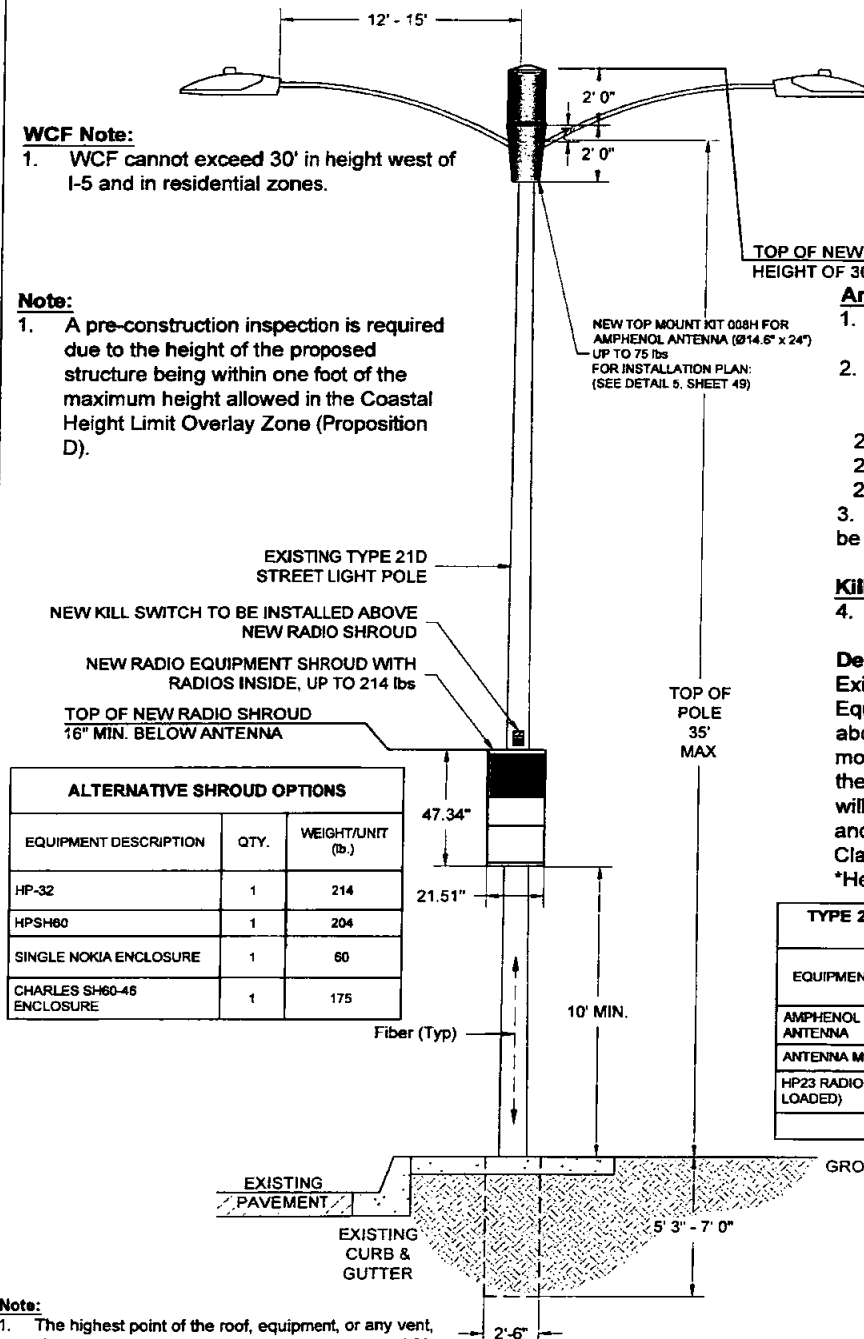
- Existing connections between Type 15 street light poles and their foundations shall be field verified for their type (plate size, number/size of bolts) and current structural conditions.
- Structure(s) will be located entirely on undisturbed native soil. If the Building Inspector suspects fill, expansive soils or any geological instability based upon the foundation excavation, a soils or geological report, and submittal of plans to plan check to verify that the report recommendations have not been incorporated, may be required." Signature *Greg S. Mill* Owner/Licensed Engineer or Architect
- As a California licensed Architect/Engineer, I have classified the undisturbed native soils to be silty sands, sandy silts and per Table 1806.2 of the 2016 CBC, I have assigned a foundation pressure of 1500 psf. for the design of foundations related to this project". Signature *Greg S. Mill* Signature of Licensed Architect/Engineer

WCF Note:

- WCF cannot exceed 30' in height west of I-5 and in residential zones.

Note:

- A pre-construction inspection is required due to the height of the proposed structure being within one foot of the maximum height allowed in the Coastal Height Limit Overlay Zone (Proposition D).



Note:

- Poles/foundations need to be evaluated on a case-by-case basis.
- No chipping foundations.
- Equipment to be installed must be the same as approved. If changed, then new structural analysis must be performed.

Antenna Note

- (N) Shroud (dashed) to conceal Fiber (Typ) cables and splitter.
- Provide a weather proof tag (Located a minimum of 3' below antenna) which includes:
 - 24 hour emergency contact number
 - Name of owner
 - Cell station number
- Antenna, Shrouds and all equipment to be painted to match the pole

Kill Switch Note

- Kill switch to be installed on Pole.

Description:

Existing Street light with (N) Radio Equipment Shroud attached at 10' 0" min. above ground level. (N) Antenna with (N) mount and (N) shroud attached to the side of the existing street light. Top of (N) antenna will not exceed the height limit of the zone and/or any overlay zones (Coastal Height, Clairemont Mesa Height, etc.), as applicable. *Height of street light may vary per location.

ALTERNATIVE SHROUD OPTIONS		
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)
HP-32	1	214
HPSH60	1	204
SINGLE NOKIA ENCLOSURE	1	60
CHARLES SH60-45 ENCLOSURE	1	175

TYPE 21D - TOP-MOUNT ANTENNA W/ FULLY-LOADED HP23 RADIO SHROUD			
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)	TOTAL EQUIP. WEIGHT (lb.)
AMPHENOL 2" CANISTER ANTENNA	1	30	30
ANTENNA MOUNT (008H)	1	45	45
HP23 RADIO SHROUD (FULLY LOADED)	1	214	214
TOTAL WEIGHT (Lbs) = 289			

Note:

- The highest point of the roof, equipment, or any vent, pipe, antenna or other projection shall not exceed 30 feet above of measurement (reference datum).



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CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 21D STREET LIGHT POLE
WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX

SITE ADDRESS:	Vanessa
TITLE:	EXISTING TYPE 21D STREET LIGHT POLE WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX
PTB NO.	625723
DRAWING NO.	531 MINI MACRO
DATE:	11/15/18
SCALE:	N.T.S.
SHEET	17

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Pole Type 21D/Antenna

CALCULATIONS BY: JLM

PROJECT NAME: CROWN CASTLE

DATE: 11-18-2018

PROJECT ADDRESS: VARIOUS AREAS

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft

Steel Pole Ht. = 35' Ave. Pole Dia. = As Noted,

Footings by Design: Dia. = 2.5' dia. x 7'deep. Equip. Wt. 289 lbs

References: 1. 2015 IBC 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. 2015 Revised Caltrans Standard Plan RSP ES-6D

35-foot Type 21D steel pole two light arms with top mount antenna, Radio and signs.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3) V = 110 mph (3 sec. Gust)

Coefficients: Kz (16) = 0.87 Kz (32) = 0.94

Ir = 0.87 G = 1.142

Wind Pressures: Pz(16) = (0.00256) Kz(16)GV^{1/2}IR = 22 psf

Pz(35.0) = (0.00256) Kz(35.0)GV^{1/2}IR = 23.8 psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 7.47 in. A₁₆ = (16) (7.47/12) = 9.96 sq.ft.
Ave. Dia. (16-35') = 4.87 in. A₃₅ = (19.0) (4.87/12) = 7.71 sq.ft.

Area of light arm: A = ((0.25)(8) + (0.5)(2)) (2) = 6.0 sq. ft.

Area of antenna: A = 4.86 sq. ft.

Area of equipment unit: A = 4.69 sq.ft

Area of Sign: A = (1.5)(1.5) + (1)(1.5) = 3.75 sq.ft



Page 1 of 2

3. FORCE ON POLE

Force on pole: F = P₁₆A + P_{19.0}A = 402.6 pounds

Force on Antenna: F = P₁₆A_{ant} = 115.6 pounds

Force on equipment: F = P₁₆A_{eq} = 111.6 pounds

Force on light arm: F = (6.0)(23.8) = 142.8 pounds

Force on Signs (2): F = (3.75)(22.0) = 82.5 pounds

Total wind load = 855.1 pounds

Depth Requirement: Typical Standard Depth is 7 feet
D = 0.5A (1 + [1 + (4.36h / A)]^{1/4})

Where A = (2.34 P/S, b) = [(2.34) (855.1) / (2200) (2.5)] = 0.36

Therefore D_{req} = 5.23 ft. < 7 feet ok

4. Bearing Capacity

Gross pole wt: 1396 pounds (for pole + equipment)

Q_a = 1500 psf

Pole lig dia. = 2.5 ft. Footing area = 4.91 sq. ft.

Q = 1500 psf > Q = (1597)/(4.91) = 325.6 psf OK

Page 2 of 2

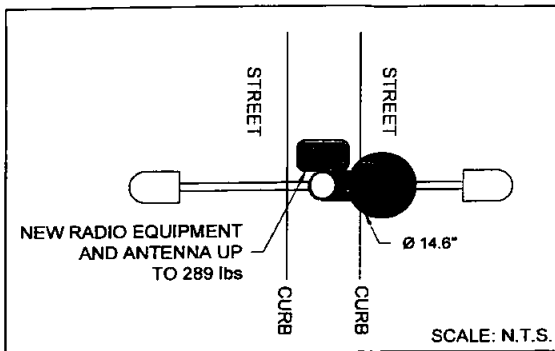
SITE ADDRESS: VLM/44	
TITLE: EXISTING TYPE 21D STREET LIGHT POLE WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX	SHEET: 18
PROJECT NO. 652723	DRAWING NO. 521 MMR MICRO
DATE: 11/15/18	SCALE: N.T.S.

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 21D STREET LIGHT POLE
WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX

CROWN CASTLE

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www.crowncastle.com

George J. Mihal
Professional Engineer
License No. 002580
Exp. 3/31/20



- Existing connections between Type 15 street light poles and their foundations shall be field verified for their type (plate size, number/size of bolts) and current structural conditions.
- Structure(s) will be located entirely on undisturbed native soil. If the Building Inspector suspects fill, expansive soils or any geological instability based upon the foundation excavation, a soils or geological report, and submittal of plans to plan check to verify that the report recommendations have not been incorporated, may be required." Signature *Jerry L. Michel* Owner/Licensed Engineer or Architect
- As a California licensed Architect/Engineer, I have classified the undisturbed native soils to be silty sands, sandy silts and per Table 1806.2 of the 2016 CBC, I have assigned a foundation pressure of 1500 psf. for the design of foundations related to this project". Signature *Jerry L. Michel* Signature of Licensed Architect/Engineer

Note:

- Poles/foundations need to be evaluated on a case-by-case basis.
- No chipping foundations.
- Equipment to be installed must be the same as approved. If changed, then new structural analysis must be performed.

WCF Note:

- WCF cannot exceed 30' in height west of I-5 and in residential zones.

Note:

- A pre-construction inspection is required due to the height of the proposed structure being within one foot of the maximum height allowed in the Coastal Height Limit Overlay Zone (Proposition D).

NEW SIDE MOUNT KIT 007J FOR AMPHENOL ANTENNA (214.5" x 24", UP TO 75 lbs)
FOR INSTALLATION PLAN: USE (3) 3/4" G43099 STAINLESS STEEL BANDS (SEE DETAIL 12, SHEET 51)

TOP OF NEW ANTENNA NOT TO EXCEED HEIGHT OF 30' WEST OF I-5

Antenna Note

- (N) Shroud (dashed) to conceal Fiber (Typ) cables and splitter.
- Provide a weather proof tag (Located a minimum of 3' below antenna) which includes:
 - 24 hour emergency contact number
 - Name of owner
 - Cell station number
- Antenna, Shrouds and all equipment to be painted to match the pole

Kill Switch Note

- Kill switch to be installed on Pole.

Description:

Existing Street light with (N) Radio Equipment Shroud attached at 10' 0" min. above ground level. (N) Antenna with (N) mount and (N) shroud attached to the side of the existing street light. Top of (N) antenna will not exceed the height limit of the zone and/or any overlay zones (Coastal Height, Clairemont Mesa Height, etc.), as applicable. *Height of street light may vary per location.

ALTERNATIVE SHROUD OPTIONS		
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)
HP-32	1	214
HPSH60	1	204
SINGLE NOKIA ENCLOSURE	1	60
CHARLES SH60-46 ENCLOSURE	1	175

TYPE 21D - SIDE-MOUNT ANTENNA W/ FULLY-LOADED HP23 RADIO SHROUD			
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)	TOTAL EQUIP. WEIGHT (lb.)
AMPHENOL 2" CANISTER ANTENNA	1	30	30
ANTENNA MOUNT (007J)	1	45	45
HP23 RADIO SHROUD (FULLY LOADED)	1	214	214
TOTAL WEIGHT (Lbs) = 289			

Note:

- The highest point of the roof, equipment, or any vent, pipe, antenna or other projection shall not exceed 30 feet above of measurement (reference datum).



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CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 21D STREET LIGHT POLE
WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX



Jerry L. Michel
JLM
00000
11/13/16

SITE ADDRESS:	Varies
TITLE:	EXISTING TYPE 21D STREET LIGHT POLE WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX
PTS. NO.	025723
DRAWING NO.	S31 MINI MACRO
DATE	11/13/16
SCALE:	N.T.S.
SHEET	19

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Pole Type 21D/Antenna

CALCULATIONS BY: JLM

PROJECT NAME: CROWN CASTLE

DATE: 11-18-2018

PROJECT ADDRESS: VARIOUS AREAS

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft

Steel Pole Ht. = 35' Ave. Pole Dia. = As Noted,

Footing by Design: Dia. = 2.5' dia. x 7' deep Equip. Wt. 289 lbs

References: 1. 2015 IBC 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. 2015 Revised Caltrans Standard Plan RSP ES-6D

35-foot Type 21D steel pole two light arms with side mount antenna, Radio and signs.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3) V = 110 mph (3 sec. Gust)

Coefficients: Kz(16) = 0.87 Kz(32) = 0.94

Ir = 0.87 G = 1.142

Wind Pressures: Pz(16) = (0.00256) Kz(16)GV²IR = 22 psf

Pz(35.0) = (0.00256) Kz(35.0)GV²IR = 23.8 psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 7.47 in. A_p = (16) (7.47/12) = 9.96 sq. ft.
Ave. Dia. (16-35') = 4.87 in. A_p = (19.0) (4.87/12) = 7.71 sq. ft.

Area of light arm: A = ((0.25)(8) + (0.5)(2)) (2) = 6.0 sq. ft.

Area of antenna: A = 4.86 sq. ft.

Area of equipment unit: A = 4.69 sq. ft.

Area of Sign: A = (1.5)(1.5) + (1)(1.5) = 3.75 sq. ft.



Page 1 of 2

3. FORCE ON POLE

Force on pole: F = P_wA + P_{sw}A = 402.6 pounds

Force on Antenna: F = P_wA_{ant} = 115.6 pounds

Force on equipment: F = P_wA_{eq} = 111.6 pounds

Force on light arm: F = (6.0)(23.8) = 142.8 pounds

Force on Signs (2): F = (3.75)(22.0) = 82.5 pounds

Total wind load = 855.1 pounds

Depth Requirement: Typical Standard Depth is 7 feet

D = 0.5A (1 + [1 + (4.36h / A)]^{0.18})

Where A = (2.34 P/S_h) = [(2.34) (855.1) / (2200) (2.5)] = 0.36

Therefore D_{req} = 5.23 ft. < 7 feet ok

4. Bearing Capacity

Gross pole wt: 1396 pounds (for pole + equipment)

Q_u = 1500 psf

Pole ftg dia. = 2.5 ft. Footing area = 4.91 sq. ft.

Q = 1500 psf > Q = (1597)/(4.91) = 325.6 psf OK

Page 2 of 2

SITE ADDRESS:	Various
TITLE:	EXISTING TYPE 21D STREET LIGHT POLE WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX
PROJECT NO.	62572
DRAWING NO.	501 MINI MACRO
DATE:	11/18/18
SCALE:	N.T.S.
SHEET	20

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 21D STREET LIGHT POLE
WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX

CROWN CASTLE

200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crowncastle.com

Jerry L. Michalek
Professional Engineer
State of California
License No. CA2580
Exp. 3-31-20
5-22-19

59
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MASTER STRUCTURAL PLANS FOR EXISTING TYPE 15 TS (TRAFFIC SIGNAL) POLES


Jerry L. Michael 5-28-19
DATE
042880 03-31-20

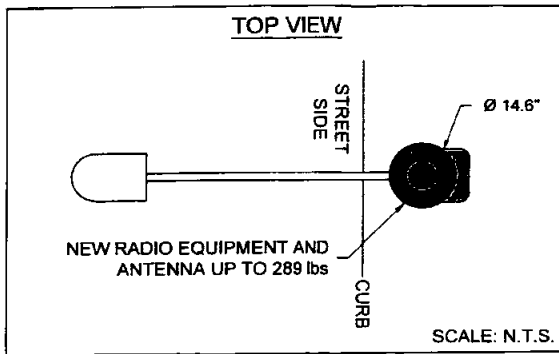


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CROWN CASTLE Master Structural Schematic

EXISTING TYPE 15 TS (TRAFFIC SIGNAL) POLE
WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX

SITE ADDRESS: Varies	
TITLE: EXISTING TYPE 15 TS (TRAFFIC SIGNAL) POLE WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX	
PTS NO.	025723
DRAWING NO.	531 MINI MACRO
DATE:	11/15/18
SCALED:	N.T.S.
SHEET	
21	



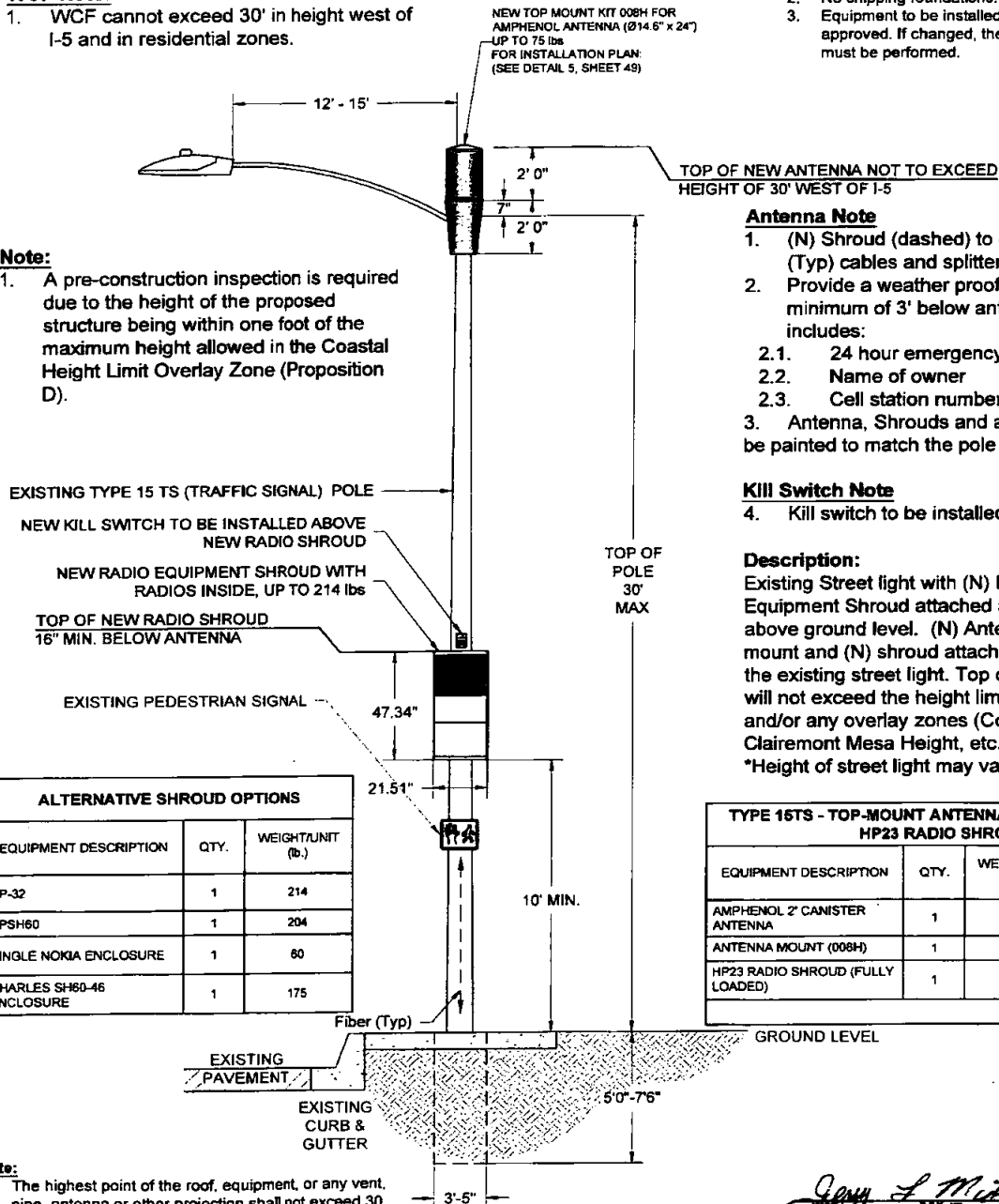
- Existing connections between Type 15 street light poles and their foundations shall be field verified for their type (plate size, number/size of bolts) and current structural conditions.
- Structure(s) will be located entirely on undisturbed native soil, if the Building Inspector suspects fill, expansive soils or any geological instability based upon the foundation excavation, a soils or geological report, and submittal of plans to plan check to verify that the report recommendations have not been incorporated, may be required." Signature *Jerry L. M. [Signature]* Owner/Licensed Engineer or Architect
- As a California licensed Architect/Engineer, I have classified the undisturbed native soils to be silty sands, sandy silts and per Table 1806.2 of the 2016 CBC, I have assigned a foundation pressure of 1500 psf for the design of foundations related to this project". Signature of Licensed Architect/Engineer *Jerry L. M. [Signature]*

WCF Note:

- WCF cannot exceed 30' in height west of I-5 and in residential zones.

Note:

- A pre-construction inspection is required due to the height of the proposed structure being within one foot of the maximum height allowed in the Coastal Height Limit Overlay Zone (Proposition D).



Antenna Note

- (N) Shroud (dashed) to conceal Fiber (Typ) cables and splitter.
- Provide a weather proof tag (Located a minimum of 3' below antenna) which includes:
 - 24 hour emergency contact number
 - Name of owner
 - Cell station number
- Antenna, Shrouds and all equipment to be painted to match the pole

Kill Switch Note

- Kill switch to be installed on Pole.

Description:

Existing Street light with (N) Radio Equipment Shroud attached at 10' 0\" min. above ground level. (N) Antenna with (N) mount and (N) shroud attached to the side of the existing street light. Top of (N) antenna will not exceed the height limit of the zone and/or any overlay zones (Coastal Height, Clairemont Mesa Height, etc.), as applicable. *Height of street light may vary per location.

ALTERNATIVE SHROUD OPTIONS		
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)
HP-32	1	214
HPSH60	1	204
SINGLE NOKIA ENCLOSURE	1	80
CHARLES SH60-46 ENCLOSURE	1	175

TYPE 15TS - TOP-MOUNT ANTENNA W/ FULLY-LOADED HP23 RADIO SHROUD			
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)	TOTAL EQUIP. WEIGHT (lb.)
AMPHENOL 2\" CANISTER ANTENNA	1	30	30
ANTENNA MOUNT (008H)	1	45	45
HP23 RADIO SHROUD (FULLY LOADED)	1	214	214
TOTAL WEIGHT (Lbs) = 289			

Note:

- The highest point of the roof, equipment, or any vent, pipe, antenna or other projection shall not exceed 30 feet above of measurement (reference datum).



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CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 15 TS (TRAFFIC SIGNAL) POLE
WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX



SITE ADDRESS:	Varies
TITLE:	EXISTING TYPE 15 TS (TRAFFIC SIGNAL) POLE WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX
PTS NO.	625723
DRAWING NO.	531 MEN MACRO
DATE:	11/15/18
SCALE:	N.T.S.
SHEET	22

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Type 15TS Pole/Antenna Installation

CALCULATIONS BY: JLM

PROJECT NAME: CROWN CASTLE

DATE: 11-18-2018

PROJECT ADDRESS: VARIOUS AREAS

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft
Steel Pole Ht. = 30' Ave. Pole Dia. = As Noted, Footing by Design: Dia.=2.5' dia. x 4.5'deep.
Total Equipment Wt. = 289 lbs

References: 1. 2015 IBC 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. 2010 Caltrans Standard Plan RSP ES-6A

30-FOOT round Type 15 steel light pole with top mount antenna, radio pedestrian signal and associated equipment.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3)

V = 110 mph (3 sec. Gust)

Coefficients:

K_z(16) = 0.87
I_r = 0.87

K_z(32) = 0.94
G = 1.142

Wind Pressures:

P_z(16) = (0.00256) K_z(16) G V² I_r = 22 psf

P_z(35.0) = (0.00256) K_z(30.0) G V² I_r = 23.8 psf

2. AREA CALCULATIONS

Area of pole:

Ave. Dia. (0-16') = 9.75 in.
Ave. Dia. (16-30') = 7.88 in.

A₁₆ = (16) (9.75/12) = 13.0 sq.ft.

A₃₀ = (14.0) (7.88/12) = 9.19 sq.ft.

Area of antenna:

A = (14.6/12)(48.0/12) = 4.86 sq. ft.

Area of equipment unit:

A = (14.2/12)(47.3/12) = 4.69 sq.ft.

Area of light arm:

A = (0.25)(8) + (0.5)(2) = 3.00 sq. ft.



Page 1 of 2

Area of pedestrian signal: $A = (1.25)(2) = 2.50 \text{ sq. ft.}$

3. FORCE ON POLE

Force on pole: $F = P_w A + P_{w,eq} A = 504.7 \text{ pounds}$

Force on Antenna: $F = P_w A_{ant} = 115.7 \text{ pounds}$

Force on equipment: $F = P_w A_{eq} = 111.3 \text{ pounds}$

Force on light arm: $F = (3.0)(23.8) = 71.4 \text{ pounds}$

Force on Signal $F = (22.0)(2.50) = 55.0 \text{ pounds}$

Total wind load = 858.1 pounds

Depth Requirement: Typical Standard Depth is 4.5 feet per (SDE-101)

$D = 0.5A [1 + (4.36h / A)]^{0.5}$

Where $A = (2.34 P/S_b) = [(2.34)(858.1) / (2200)(2.5)] = 0.36$

Therefore $D_{req} = 3.62 \text{ ft.} < 4.50 \text{ feet ok}$

4. Bearing Capacity

Gross pole wt: 1597 pounds (for pole + equipment)

$Q_u = 1500 \text{ psf}$ (Traffic signal at 4.5 foot embedment)

Pole ftg dia. = 2.5 ft. Footing area = 4.90 sq. ft.

$Q = 1500 \text{ psf} > Q = (1798)/(4.90) = 366.9 \text{ psf OK}$

Page 2 of 2

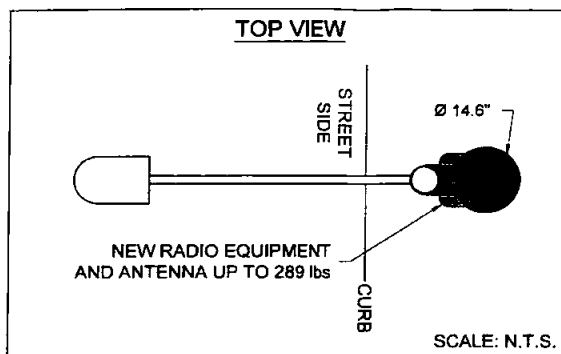
SITE ADDRESS:	Various
TITLE:	EXISTING TYPE 15 TS (TRAFFIC SIGNAL) POLE WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX
PTS. NO.	82572
DRAWING NO.	331 MRB MACRO
DATE:	11/18/18
SCALE:	N.T.S.
	23

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 15 TS (TRAFFIC SIGNAL) POLE
WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX

CROWN CASTLE

200 Spectrum Center Drive, Suite 1800
San Diego, CA 92108
www.crowncastle.com

Greg L. M... 5-28-19
11-18-2018



- Existing connections between Type 15 street light poles and their foundations shall be field verified for their type (plate size, number/size of bolts) and current structural conditions.
- Structure(s) will be located entirely on undisturbed native soil, if the Building Inspector suspects fill, expansive soils or any geological instability based upon the foundation excavation, a soils or geological report, and submittal of plans to plan check to verify that the report recommendations have not been incorporated, may be required." Signature *Joey L. Michel* Owner/Licensed Engineer or Architect
- "As a California licensed Architect/Engineer, I have classified the undisturbed native soils to be silty sands, sandy silts and per Table 1806.2 of the 2016 CBC, I have assigned a foundation pressure of 1500 psf for the design of foundations related to this project". Signature of *Joey L. Michel* Licensed Architect/Engineer

Note:

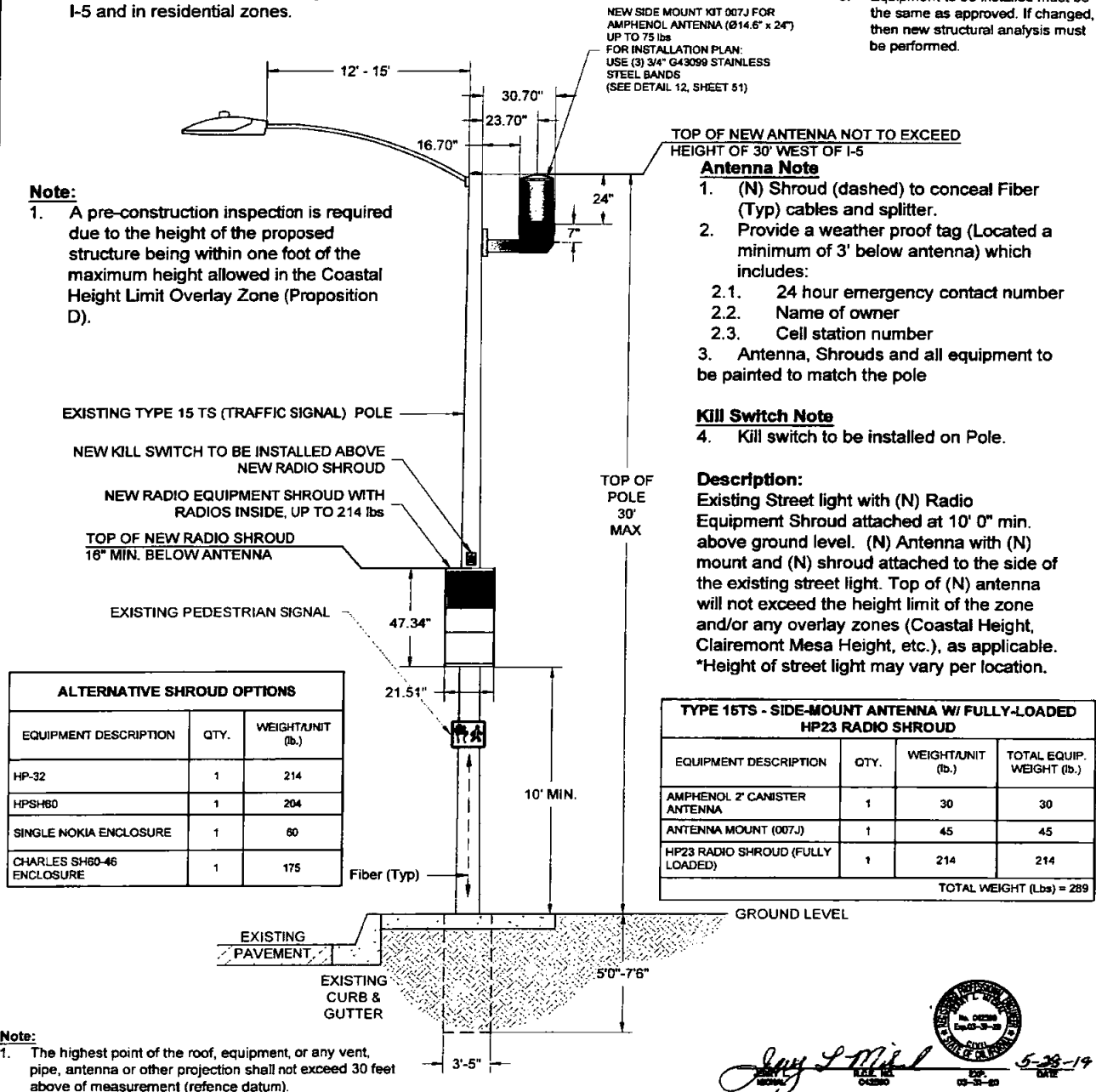
- Poles/foundations need to be evaluated on a case-by-case basis.
- No chipping foundations.
- Equipment to be installed must be the same as approved. If changed, then new structural analysis must be performed.

WCF Note:

- WCF cannot exceed 30' in height west of I-5 and in residential zones.

Note:

- A pre-construction inspection is required due to the height of the proposed structure being within one foot of the maximum height allowed in the Coastal Height Limit Overlay Zone (Proposition D).



ALTERNATIVE SHROUD OPTIONS		
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)
HP-32	1	214
HPSH60	1	204
SINGLE NOKIA ENCLOSURE	1	60
CHARLES SH60-46 ENCLOSURE	1	175

TYPE 15TS - SIDE-MOUNT ANTENNA W/ FULLY-LOADED HP23 RADIO SHROUD			
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)	TOTAL EQUIP. WEIGHT (lb.)
AMPHENOL 2\" CANISTER ANTENNA	1	30	30
ANTENNA MOUNT (007J)	1	45	45
HP23 RADIO SHROUD (FULLY LOADED)	1	214	214
TOTAL WEIGHT (Lbs) = 289			

Note:

- The highest point of the roof, equipment, or any vent, pipe, antenna or other projection shall not exceed 30 feet above of measurement (reference datum).



200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crowncastle.com

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 15 TS (TRAFFIC SIGNAL) POLE
WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX

SITE ADDRESS:		Version
TITLE: EXISTING TYPE 15 TS (TRAFFIC SIGNAL) POLE WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX		
PTS NO.	625723	SHEET
DRAWING NO.	531 8299 MACRO	
DATE:	11/15/18	
SCALE:	N.T.S.	
		24

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Type 15TS Pole/Antenna Installation

CALCULATIONS BY: JLM

PROJECT NAME: CROWN CASTLE

DATE: 11-18-2018

PROJECT ADDRESS: VARIOUS AREAS

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft
Steel Pole Ht. = 30' Ave. Pole Dia. = As Noted, Footing by Design: Dia.=2.5' dia. x 4.5'deep.
Total Equipment Wt. = 289 lbs

References: 1. 2015 IBC 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. 2010 Caltrans Standard Plan RSP ES-6A

30-FOOT round Type 15 steel light pole with side mount antenna, radio, pedestrian signal and associated equipment.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3)

V = 110 mph (3 sec. Gust)

Coefficients: $K_z(16) = 0.87$ $K_z(32) = 0.94$
 $I_r = 0.87$ $G = 1.142$

Wind Pressures: $P_z(16) = (0.00256) K_z(16) G V^2 I_r = 22$ psf

$P_z(35.0) = (0.00256) K_z(30.0) G V^2 I_r = 23.8$ psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 9.75 in. $A_{16} = (16) (9.75/12) = 13.0$ sq.ft.
Ave. Dia. (16-30') = 7.88 in. $A_{30} = (14.0) (7.88/12) = 9.19$ sq.ft.

Area of antenna: $A = (14.6/12)(48.0/12) = 4.86$ sq. ft.

Area of equipment unit: $A = (14.2/12)(47.3/12) = 4.69$ sq.ft

Area of light arm: $A = (0.25)(8) + (0.5)(2) = 3.00$ sq. ft.



Page 1 of 2

Area of pedestrian signal: $A = (1.25)(2) = 2.50$ sq.ft

3. FORCE ON POLE

Force on pole: $F = P_{16} A + P_{30} A = 504.7$ pounds

Force on Antenna: $F = P_{16} A_{ant} = 115.7$ pounds

Force on equipment: $F = P_{16} A_{eq} = 111.3$ pounds

Force on light arm: $F = (3.0) (23.8) = 71.4$ pounds

Force on Signal $F = (22.0)(2.50) = 55.0$ pounds

Total wind load = 858.1 pounds

Depth Requirement: Typical Standard Depth is 4.5 feet per (SD) 101

$D = 0.5A [1 + (1 + (4.36h/A))]^m$

Where $A = (2.34 P/S, b) = [(2.34) (858.1) / (2200) (2.5)] = 0.36$

Therefore $D_{req} = 3.62$ ft. < 4.50 feet ok

4. Bearing Capacity

Gross pole wt: 1597 pounds (for pole + equipment)

$Q_u = 1500$ psf (Traffic signal at 4.5 foot embedment)

Pole ftg dia. = 2.5 ft. Footing area = 4.90 sq. ft.

$Q = 1500$ psf > $Q = (1798) / (4.90) = 366.9$ psf OK

Page 2 of 2

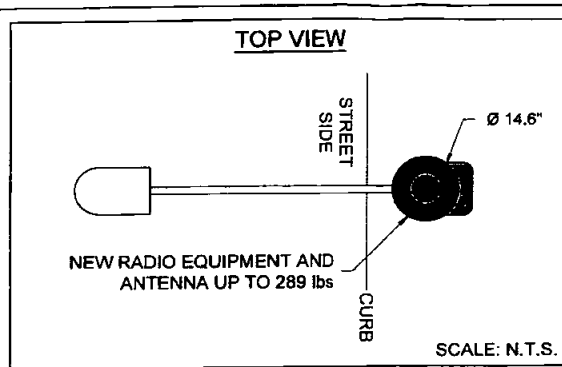
DATE	11/18/18
SCALE	N.T.S.
DRAWING NO.	531 MINE MACRO
PROJECT NO.	05722
SHEET	25
TITLE	EXISTING TYPE 15 TS (TRAFFIC SIGNAL) POLE WITH ANTENNA, SIDE MOUNT AND ASSOCIATED EQUIPMENT BOX

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 15 TS (TRAFFIC SIGNAL) POLE
WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX

CROWN CASTLE

200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crowncastle.com

Jerry L. Michael
Professional Engineer
No. C-42590
Exp. 03-31-20
DATE 5-22-19



- Existing connections between Type 15 street light poles and their foundations shall be field verified for their type (plate size, number/size of bolts) and current structural conditions.
- Structure(s) will be located entirely on undisturbed native soil. If the Building Inspector suspects fill, expansive soils or any geological instability based upon the foundation excavation, a soils or geological report, and submittal of plans to plan check to verify that the report recommendations have not been incorporated, may be required." Signature *Gregory J. Mohl* Owner/Licensed Engineer or Architect
- "As a California licensed Architect/Engineer, I have classified the undisturbed native soils to be silty sands, sandy silts and per Table 1806.2 of the 2016 CBC, I have assigned a foundation pressure of 1500 psf. for the design of foundations related to this project". Signature *Gregory J. Mohl* Signature of Licensed Architect/Engineer

Note:

- Poles/foundations need to be evaluated on a case-by-case basis.
- No chipping foundations.
- Equipment to be installed must be the same as approved. If changed, then new structural analysis must be performed.

WCF Note:

- WCF cannot exceed 30' in height west of I-5 and in residential zones.

Note:

- A pre-construction inspection is required due to the height of the proposed structure being within one foot of the maximum height allowed in the Coastal Height Limit Overlay Zone (Proposition D).

TOP OF NEW ANTENNA NOT TO EXCEED HEIGHT OF 30' WEST OF I-5

Antenna Note

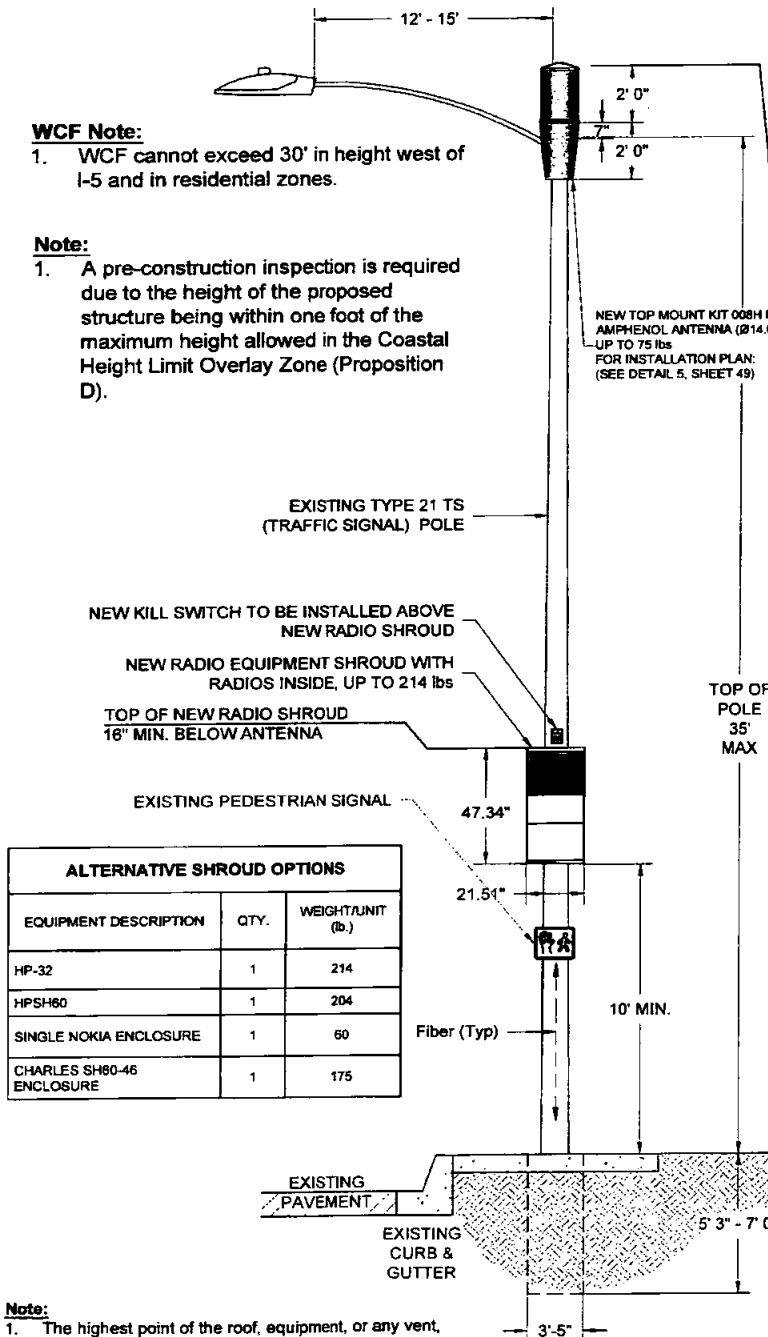
- (N) Shroud (dashed) to conceal Fiber (Typ) cables and splitter.
- Provide a weather proof tag (Located a minimum of 3' below antenna) which includes:
 - 24 hour emergency contact number
 - Name of owner
 - Cell station number
- Antenna, Shrouds and all equipment to be painted to match the pole

Kill Switch Note

- Kill switch to be installed on Pole.

Description:

Existing Street light with (N) Radio Equipment Shroud attached at 10' 0" min. above ground level. (N) Antenna with (N) mount and (N) shroud attached to the side of the existing street light. Top of (N) antenna will not exceed the height limit of the zone and/or any overlay zones (Coastal Height, Clairemont Mesa Height, etc.), as applicable. *Height of street light may vary per location.



ALTERNATIVE SHROUD OPTIONS

EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)
HP-32	1	214
HPSH60	1	204
SINGLE NOKIA ENCLOSURE	1	60
CHARLES SH60-46 ENCLOSURE	1	175

TYPE 21TS - TOP-MOUNT ANTENNA W/ FULLY-LOADED HP23 RADIO SHROUD			
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)	TOTAL EQUIP. WEIGHT (lb.)
AMPHENOL 2' CANISTER ANTENNA	1	30	30
ANTENNA MOUNT (008H)	1	45	45
HP23 RADIO SHROUD (FULLY LOADED)	1	214	214
TOTAL WEIGHT (Lbs) = 289			

Note:

- The highest point of the roof, equipment, or any vent, pipe, antenna or other projection shall not exceed 30 feet above of measurement (reference datum).



200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crowncastle.com

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE
WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX



Gregory J. Mohl
DATE: 03-31-20

SITE ADDRESS:	Varies
TITLE:	EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX
PTS. NO.	625723
DRAWING NO.	531 M20 MACRO
DATE:	11/15/18
SCALE:	N.T.S.
SHEET	26

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Type 21TS Pole /Antenna Installation CALCULATIONS BY: JLM

PROJECT NAME: CROWN CASTLE DATE: 11-18-2018

PROJECT ADDRESS: VARIOUS AREAS

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft

Steel Pole Ht. = 35' Ave. Pole Dia. = As Noted,

Footings by Design: Dia.=2.5' dia. x 5'deep. Equip. Wt. 289 lbs

References: 1. 2015 IBC 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. 2015 Revised Caltrans Standard Plan RSA ES-6A

35-foot Type 21TS round steel pole with top mount antenna, radio, Pedestrian signal.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3) V= 110 mph (3 sec. Gust)

Coefficients: Kz (16) = 0.87 Kz(32) = 0.94
Ir= 0.87 G = 1.142

Wind Pressures: Pz(16) = (0.00256) Kz(16)GV²IR = 22 psf

Pz(35.0) = (0.00256) Kz(35.0)GV²IR = 23.8 psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 7.28 in. A₁₆ = (16) (7.28/12) = 9.70 sq.ft.
Ave. Dia. (16-35') = 4.87 in. A₃₅ = (19.0) (4.87/12) = 7.71 sq.ft.

Area of light arm: A = (0.25)(8) + (0.5)(2) = 3.0 sq. ft.

Area of antenna: A = (14.6/12)(48.0/12) = 4.86 sq. ft.

Area of equipment unit: A = (14.2/12)(47.3/12) = 4.69 sq.ft

Area of Pedestrian Signal: A = (1.5)(2.0) = 2.50 sq.ft



Page 1 of 2

3. FORCE ON POLE

Force on pole: F = P₁₆A + P₁₆₋₃₅A = 388.8 pounds

Force on Antenna: F = P₁₆A_{ant} = 115.6 pounds

Force on equipment: F = P₁₆A_{eq} = 111.6 pounds

Force on light arm: F = (3.0)(23.8) = 71.4 pounds

Force on Signal: F = (2.50)(22.0) = 55.0 pounds

Total wind load = 775.4 pounds

Depth Requirement: Typical Standard Depth is 5 feet

D = 0.5A (1 + { 1 + (4.36h / A) }^{1/4})

Where A = (2.34 P/S_b) = { (2.34) (775.4) / (2200) (2.5) } = 0.33

Therefore D_{req} = 3.50 ft. < 5 feet ok

4. Bearing Capacity

Gross pole wt: 1715 pounds (for pole + equipment)
Q_a = 1500 psf

Pole ftg dia. = 2.5 ft. Footing area = 4.91 sq. ft.

Q = 1500 psf > Q = (1715)/(4.91) = 350.0 psf OK

Page 2 of 2

SITE ADDRESS:	Veritas
TITLE: EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX	SHEET
PTS NO. 62572	DRAWING NO. SS1 MINI MACRO
DATE 11/18/18	SCALE: N.T.S.
	27

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE
WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX

CROWN CASTLE
200 Spectrum Center Drive, Suite 1000
Irvine, CA 92618
www.crowncastle.com

Jerry L. Michael
Professional Engineer
State of California
License No. C42590
Exp. 7-1-20

1. Existing connections between Type 15 street light poles and their foundations shall be field verified for their type (plate size, number/size of bolts) and current structural conditions.
2. Structure(s) will be located entirely on undisturbed native soil. If the Building Inspector suspects fill, expansive soils or any geological instability based upon the foundation excavation, a soils or geological report, and submittal of plans to plan check to verify that the report recommendations have not been incorporated, may be required." Signature July J. Mohr Owner/Licensed Engineer or Architect
3. "As a California licensed Architect/Engineer, I have classified the undisturbed native soils to be silty sands, sandy silts and per Table 1806.2 of the 2016 CBC, I have assigned a foundation pressure of 1500 psf. for the design of foundations related to this project".

Owner/Licensed Engineer or Architect

Gary J. Michel Signature of Licensed Architect/Engineer

Note:

1. Poles/foundations need to be evaluated on a case-by-case basis.
2. No chipping foundations.
3. Equipment to be installed must be the same as approved. If changed, then new structural analysis must be performed.

WCF Note:

1. WCF cannot exceed 30' in height west of I-5 and in residential zones.

Note:

1. A pre-construction inspection is required due to the height of the proposed structure being within one foot of the maximum height allowed in the Coastal Height Limit Overlay Zone (Proposition D).

NEW SIDE MOUNT KIT 007J FOR
AMPHENOL ANTENNA (Ø14.6" x 24")
UP TO 75 lbs
- FOR INSTALLATION PLAN:
USE (3) 3/4" G43099 STAINLESS
STEEL BANDS
(SEE DETAIL 12, SHEET 51)

TOP OF NEW ANTENNA NOT TO EXCEED
HEIGHT OF 30' WEST OF I-5

Antenna Note

1. (N) Shroud (dashed) to conceal Fiber (Typ) cables and splitter.
2. Provide a weather proof tag (Located a minimum of 3' below antenna) which includes:
 - 2.1. 24 hour emergency contact number
 - 2.2. Name of owner
 - 2.3. Cell station number
3. Antenna, Shrouds and all equipment to be painted to match the pole

Kill Switch Note

- 4. Kill switch to be installed on Pole.**

Description:

Existing Street light with (N) Radio Equipment Shroud attached at 10' 0" min. above ground level. (N) Antenna with (N) mount and (N) shroud attached to the side of the existing street light. Top of (N) antenna will not exceed the height limit of the zone and/or any overlay zones (Coastal Height, Clairemont Mesa Height, etc.), as applicable. *Height of street light may vary per location.

ALTERNATIVE SHROUD OPTIONS		
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)
HP-32	1	214
HPSH60	1	204
SINGLE NOKIA ENCLOSURE	1	60
CHARLES SH60-46 ENCLOSURE	1	175

TYPE 21TS - SIDE-MOUNT ANTENNA W/ FULLY-LOADED HP23 RADIO SHROUD			
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)	TOTAL EQUIP. WEIGHT (lb.)
AMPHENOL 2" CANISTER ANTENNA	1	30	30
ANTENNA MOUNT (007J)	1	45	45
HP23 RADIO SHROUD (FULLY LOADED)	1	214	214
TOTAL WEIGHT (Lbs) =			289

TOTAL WEIGHT (Lbs) = 289

Note:

1. The highest point of the roof, equipment, or any vent, pipe, antenna or other projection shall not exceed 30 feet above of measurement (reference datum).



200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crownccle.com

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE
WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX

SITE ADDRESS

Varies

TITLE: EXISTING TYPE 21 TS (TRAFFIC SIGNAL)
POLE WITH ANTENNA SIDE MOUNT AND
RADIO EQUIPMENT BOX

PTS NO. 625724

DRAWING NO	521 MM MACRO
------------	--------------

DRAWING NO. 531 MB

DATE: 11/15/1

SCALED: N.T.S.

28

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Type 21TS Pole /Antenna Installation CALCULATIONS BY: JLM

PROJECT NAME: CROWN CASTLE DATE: 11-18-2018

PROJECT ADDRESS: VARIOUS AREAS

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft

Steel Pole Ht. = 35' Ave. Pole Dia. = As Noted,

Footings by Design: Dia.=2.5' dia. x 5'deep. Equip. Wt. 289 lbs

References: 1. 2015 IBC 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. 2015 Revised Caltrans Standard Plan RSA ES-6A

35-foot Type 21TS round steel pole with side mount antenna, radio, Pedestrian signal.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3) V = 110 mph (3 sec. Gust)
Coefficients: $K_z(16) = 0.87$ $K_z(32) = 0.94$
 $I_r = 0.87$ $G = 1.142$

Wind Pressures: $P_z(16) = (0.00256) K_z(16) G V^2 I_r = 22 \text{ psf}$

$P_z(35.0) = (0.00256) K_z(35.0) G V^2 I_r = 23.8 \text{ psf}$

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 7.28 in. $A_{16} = (16) (7.28/12) = 9.70 \text{ sq.ft.}$
Ave. Dia. (16-35') = 4.87 in. $A_{35} = (19.0) (4.87/12) = 7.71 \text{ sq.ft.}$

Area of light arm: $A = (0.25)(8) + (0.5)(2) = 3.0 \text{ sq. ft.}$

Area of antenna: $A = (14.6/12)(48.0/12) = 4.86 \text{ sq. ft.}$

Area of equipment unit: $A = (14.2/12)(47.3/12) = 4.69 \text{ sq.ft}$

Area of Pedestrian Signal: $A = (1.5)(2.0) = 2.50 \text{ sq.ft}$



Page 1 of 2

3. FORCE ON POLE

Force on pole: $F = P_{16} A + P_{35} A = 388.8 \text{ pounds}$

Force on Antenna: $F = P_{35} A_{ant} = 115.6 \text{ pounds}$

Force on equipment: $F = P_{35} A_{eq} = 111.6 \text{ pounds}$

Force on light arm: $F = (3.0)(23.8) = 71.4 \text{ pounds}$

Force on Signal: $F = (2.50)(22.0) = 55.0 \text{ pounds}$

Total wind load = 775.4 pounds

Depth Requirement: Typical Standard Depth is 5 feet

$D = 0.5A (1 + [1 + (4.36h / A)]^{1/4})$

Where $A = (2.34 P/S, b) = [(2.34) (775.4) / (2200) (2.5)] = 0.33$

Therefore $D_{min} = 3.50 \text{ ft.} < 5 \text{ feet ok}$

4. Bearing Capacity

Gross pole wt: 1715 pounds (for pole + equipment)
 $Q_{av} = 1500 \text{ psf}$

Pole ftg dia. = 2.5 ft. Footing area = 4.91 sq. ft.

$Q = 1500 \text{ psf} > Q = (1715)/(4.91) = 350.0 \text{ psf OK}$

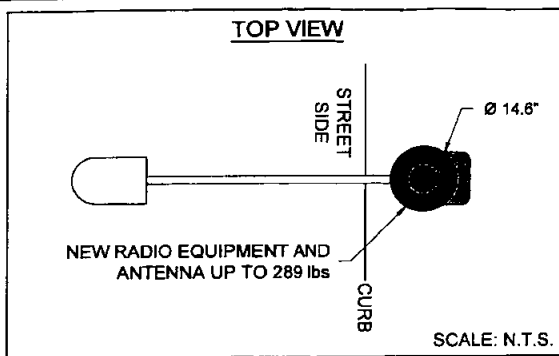
Page 2 of 2

SITE ADDRESS	VIEW
TITLE: EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX	SHEET
PTS NO. 62573	29
DRAWING NO. E31 MINI MACRO	
DATE 11/15/18	
SCALE: N.T.S.	

CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE
WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX

CROWN CASTLE
200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crowncastle.com

J. L. Michael
Professional Engineer
State of California
License No. C 42590
Exp. 3-31-20



- Existing connections between Type 15 street light poles and their foundations shall be field verified for their type (plate size, number/size of bolts) and current structural conditions.
- Structure(s) will be located entirely on undisturbed native soil, if the Building Inspector suspects fill, expansive soils or any geological instability based upon the foundation excavation, a soils or geological report, and submittal of plans to plan check to verify that the report recommendations have not been incorporated, may be required." Signature *Greg S. Muhl* Owner/Licensed Engineer or Architect
- "As a California licensed Architect/Engineer, I have classified the undisturbed native soils to be silty sands, sandy silts and per Table 1806.2 of the 2018 CBC, I have assigned a foundation pressure of 1500 psf. for the design of foundations related to this project". Signature *Greg S. Muhl* Signature of Licensed Architect/Engineer

Note:

- Poles/foundations need to be evaluated on a case-by-case basis.
- No chipping foundations.
- Equipment to be installed must be the same as approved. If changed, then new structural analysis must be performed.

WCF Note:

- WCF cannot exceed 30' in height west of I-5 and in residential zones.

Note:

- A pre-construction inspection is required due to the height of the proposed structure being within one foot of the maximum height allowed in the Coastal Height Limit Overlay Zone (Proposition D).

TOP OF NEW ANTENNA NOT TO EXCEED HEIGHT OF 30' WEST OF I-5

Antenna Note

- (N) Shroud (dashed) to conceal Fiber (Typ) cables and splitter.
- Provide a weather proof tag (Located a minimum of 3' below antenna) which includes:
 - 24 hour emergency contact number
 - Name of owner
 - Cell station number
- Antenna, Shrouds and all equipment to be painted to match the pole

Kill Switch Note

- Kill switch to be installed on Pole.

Description:

Existing Street light with (N) Radio Equipment Shroud attached at 10' 0" min. above ground level. (N) Antenna with (N) mount and (N) shroud attached to the side of the existing street light. Top of (N) antenna will not exceed the height limit of the zone and/or any overlay zones (Coastal Height, Clairemont Mesa Height, etc.), as applicable. *Height of street light may vary per location.

NEW KILL SWITCH TO BE INSTALLED ABOVE NEW RADIO SHROUD

NEW RADIO EQUIPMENT SHROUD WITH RADIOS INSIDE, UP TO 214 lbs

TOP OF NEW RADIO SHROUD 16" MIN. BELOW ANTENNA

EXISTING PEDESTRIAN SIGNAL

ALTERNATIVE SHROUD OPTIONS		
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)
HP-32	1	214
HPSH60	1	204
SINGLE NOKIA ENCLOSURE	1	60
CHARLES SH60-46 ENCLOSURE	1	175

EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE

EXISTING PAVEMENT

EXISTING CURB & GUTTER

TOP OF POLE 35' MAX

TRAFFIC SIGNAL W/ 2 OR MORE MAST ARMS - TOP-MOUNT ANTENNA W/ FULLY-LOADED HP23 RADIO SHROUD

EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)	TOTAL EQUIP. WEIGHT (lb.)
AMPHENOL 2' CANISTER ANTENNA	1	30	30
ANTENNA MOUNT (008H)	1	45	45
HP23 RADIO SHROUD (FULLY LOADED)	1	214	214
TOTAL WEIGHT (Lbs) = 289			

Note:

- The highest point of the roof, equipment, or any vent, pipe, antenna or other projection shall not exceed 30 feet above of measurement (reference datum).



200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
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CROWN CASTLE
Master Structural Schematic

EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE
WITH 2 OR MORE MAST ARMS AND WITH ANTENNA TOP MOUNT
AND RADIO EQUIPMENT BOX



SITE ADDRESS: Varies	
TITLE: EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE WITH 2 OR MORE MAST ARMS AND WITH ANTENNA TOP MOUNT AND RADIO EQUIPMENT BOX	SHEET
PTS NO. 625723	
DRAWING NO. 531 MSH MACRO	
DATE: 1/15/18	30
SCALE: N.T.S.	

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Steel Traffic Pole / Antenna Installation CALCULATIONS BY: JLM
 PROJECT NAME: CROWN CASTLE DATE: 2-24-2019
 PROJECT ADDRESS: VARIOUS AREAS
San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft
 Steel Pole Ht. = 35' Ave. Pole Dia. = As Noted,
 Footing by Design: Dia. = 3.5' dia. x 12' Deep. Equip. Wt. 289 lbs
 References: 1. 2015 IBC 3. ASCE MINIMUM DESIGN LOADS - 7-10
 2. 2016 CBC 4. 2015 Revised Caltrans Standard Plan RSA ES-7P

35-foot Type round steel traffic pole with top mount antenna, radio and associated equipment and signs.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3) V = 110 mph (3 sec. Gust)
 Coefficients: $K_z(16) = 0.87$ $K_z(32) = 0.94$
 $I_r = 0.87$ $G = 1.142$
 Wind Pressures: $P_z(16) = (0.00256) K_z(16) G V^2 I_r = 22$ psf
 $P_z(35.0) = (0.00256) K_z(35.0) G V^2 I_r = 23.8$ psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 14.87 in. $A_{16} = (16) (14.87/12) = 19.8$ sq. ft.
 Ave. Dia. (16-35') = 13.3 in. $A_{35} = (19.0) (13.3/12) = 15.5$ sq. ft.

Area of light arm: $A = (0.25)(8) + (0.5)(2) = 3.0$ sq. ft.

Area of antenna: $A = (14.6/12)(48.0/12) = 4.86$ sq. ft.

Area of equipment unit: $A = (14.2/12)(47.3/12) = 4.69$ sq. ft.

Area of Signs: $A = (1.25)(1.25) + (5)(1.83) = 16.2$ sq. ft.

Area of Traffic Arm: $A = (30)(0.25) = 7.5$ sq. ft.

Area of signals: $A = (2)(3)(1) = 6.0$ sq. ft.



Page 1 of 2

Area of Pedestrian sign: $A = (1.25)(1.25) = 1.56$ sq. ft.

3. FORCE ON POLE

Force on pole: $F = P_{16} A + P_{16.25} A = 836.0$ pounds

Force on Antenna: $F = P_{16} A_{16} = 115.6$ pounds

Force on equipment: $F = P_{16} A_{16} = 111.6$ pounds

Force on light arm: $F = (3.0)(23.8) = 71.4$ pounds

Force on Traffic Arm: $F = (23.8)(7.5) = 178.5$ pounds

Force on signals: $F = (6)(23.8) = 142.8$ pounds

Force on Pedestrian sign: $F = (1.56)(22) = 34.3$ pounds

Force on Signs (2): $F = (3.75)(22.0) = 82.5$ pounds

Total wind load = 1394.0 pounds

Depth Requirement: Typical Standard Depth is 12 feet

$$D = 0.5A(1 + [1 + (4.36h/A)]^{0.16})$$

$$\text{Where } A = (2.34 P/S, b) = [(2.34) (1394.0) / (2200) (3.5)] = 0.42$$

Therefore $D_{16} = 3.50$ ft. < 12 feet ok

4. Bearing Capacity

Gross pole wt: 2079 pounds (for pole + equipment)
 $Q_{16} = 1500$ psf

Pole ftg dia. = 3.5 FEET Footing area = 9.62 sq. ft.

$Q = 1500$ psf > $Q = (2079)/(9.62) = 216.2$ psf OK

Page 2 of 2

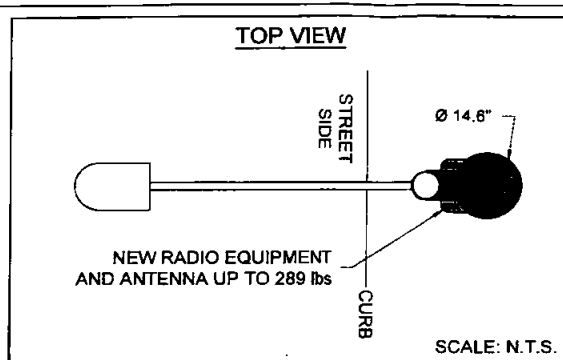
SITE ADDRESS	Various
TITLE	EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE WITH 2 OR MORE MAST ARMS AND WITH ANTENNA FOR MOUNT AND RADIO EQUIPMENT BOX
PTS. NO.	085723
DRAWING NO.	STI BONE MACRO
DATE	11/15/18
SCALE	N.T.S.
SHEET	31

CROWN CASTLE
 Master Structural Schematic
 EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE
 WITH 2 OR MORE MAST ARMS AND WITH ANTENNA FOR MOUNT
 AND RADIO EQUIPMENT BOX

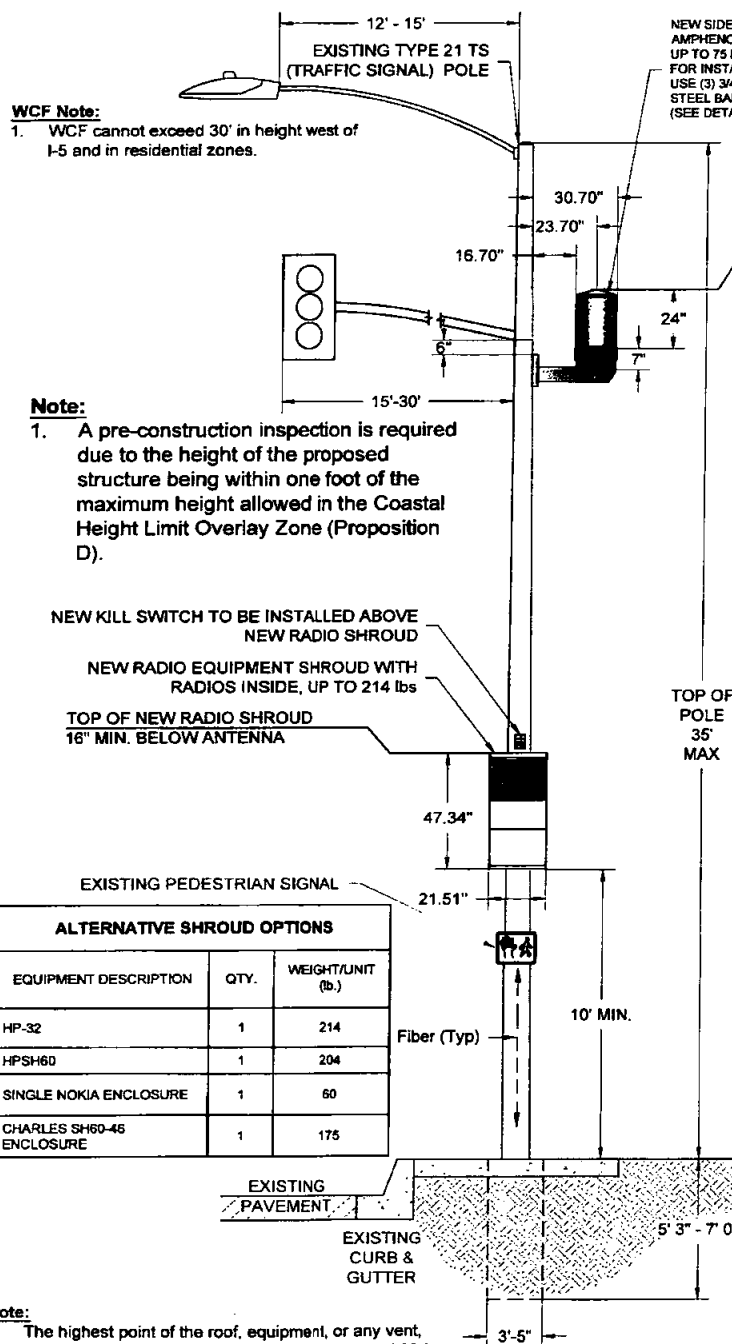


200 Spectrum Center Drive, Suite 1800
 Irvine, CA 92618
 www.crowncastle.com

Jerry L. Michalek
 042590
 02-31-20



- Existing connections between Type 15 street light poles and their foundations shall be field verified for their type (plate size, number/size of bolts) and current structural conditions.
- Structure(s) will be located entirely on undisturbed native soil. If the Building Inspector suspects fill, expansive soils or any geological instability based upon the foundation excavation, a soils or geological report, and submittal of plans to plan check to verify that the report recommendations have not been incorporated, may be required." Signature *Gregory S. Michels* Owner/Licensed Engineer or Architect
- "As a California licensed Architect/Engineer, I have classified the undisturbed native soils to be silty sands, sandy silts and per Table 1806.2 of the 2016 CBC, I have assigned a foundation pressure of 1500 psf. for the design of foundations related to this project". Signature *Gregory S. Michels* Signature of Licensed Architect/Engineer



Note:

- Poles/foundations need to be evaluated on a case-by-case basis.
- No chipping foundations.
- Equipment to be installed must be the same as approved. If changed, then new structural analysis must be performed.

TOP OF NEW ANTENNA NOT TO EXCEED HEIGHT OF 30' WEST OF I-5

Antenna Note

- (N) Shroud (dashed) to conceal Fiber (Typ) cables and splitter.
- Provide a weather proof tag (Located a minimum of 3' below antenna) which includes:
 - 24 hour emergency contact number
 - Name of owner
 - Cell station number
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- Kill switch to be installed on Pole.

Description:

Existing Street light with (N) Radio Equipment Shroud attached at 10' 0" min. above ground level. (N) Antenna with (N) mount and (N) shroud attached to the side of the existing street light. Top of (N) antenna will not exceed the height limit of the zone and/or any overlay zones (Coastal Height, Clairemont Mesa Height, etc.), as applicable. *Height of street light may vary per location.

ALTERNATIVE SHROUD OPTIONS		
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)
HP-32	1	214
HPSH60	1	204
SINGLE NOKIA ENCLOSURE	1	60
CHARLES SH60-46 ENCLOSURE	1	175

TRAFFIC SIGNAL W/ 2 OR MORE MAST ARMS - SIDE-MOUNT ANTENNA W/ FULLY-LOADED HP23 RADIO SHROUD			
EQUIPMENT DESCRIPTION	QTY.	WEIGHT/UNIT (lb.)	TOTAL EQUIP. WEIGHT (lb.)
AMPHENOL 2" CANISTER ANTENNA	1	30	30
ANTENNA MOUNT (007J)	1	45	45
HP23 RADIO SHROUD (FULLY LOADED)	1	214	214
TOTAL WEIGHT (lbs) = 289			

Note:

- The highest point of the roof, equipment, or any vent, pipe, antenna or other projection shall not exceed 30 feet above of measurement (reference datum).



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CROWN CASTLE
Master Structural Schematic
EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE
WITH 2 OR MORE MAST ARMS AND WITH ANTENNA SIDE MOUNT
AND RADIO EQUIPMENT BOX



SITE ADDRESS	Various
TITLE	EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE WITH 2 OR MORE MAST ARMS AND WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX
PTS. NO.	625723
DRAWING NO.	531 MINI MACRO
DATE	11/15/18
SCALE	N.T.S.
SHEET	32

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Steel Traffic Pole/Antenna Installation CALCULATIONS BY: JLM
 PROJECT NAME: CROWN CASTLE DATE: 2-24-2019
 PROJECT ADDRESS: VARIOUS AREAS
San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 100 psf/ft
 Steel Pole Ht. = 35' Ave. Pole Dia. = As Noted,
 Footing by Design: Dia. = 3.5' dia. x 12' Deep. Equip. Wt. 289 lbs
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 2. 2016 CBC 4. 2015 Revised Caltrans Standard Plan RSA ES-7F

35-foot Type round steel traffic pole with top mount antenna, radio and associated equipment and signs.

1. Wind Loading:
 Wind Zone: (Fig. 3-2.3) V = 110 mph (3 sec. Gust)
 Coefficients: Kz (16) = 0.87 Kz(32) = 0.94
 Ir = 0.87 G = 1.142
 Wind Pressures: Pz(16) = (0.00256) Kz(16)GVIR = 22 psf
 Pz(35.0) = (0.00256) Kz(35.0)GVIR = 23.8 psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 14.87 in. $A_w = (16) (14.8/12) = 19.8 \text{ sq. ft.}$
 Ave. Dia. (16-35') = 13.3 in. $A_w = (19.0) (13.3/12) = 15.5 \text{ sq. ft.}$

Area of light arm: $A = (0.25)(8) + (0.5)(2) = 3.0 \text{ sq. ft.}$

Area of antenna: $A = (14.6/12)(48.0/12) = 4.86 \text{ sq. ft.}$

Area of equipment unit: $A = (14.2/12)(47.3/12) = 4.69 \text{ sq. ft.}$

Area of Signs: $A = (1.25)(1.25) + (5)(1.83) = 16.2 \text{ sq. ft.}$

Area of Traffic Arm: $A = (30)(0.25) = 7.5 \text{ sq. ft.}$

Area of signals: $A = (2)(3)(1) = 6.0 \text{ sq. ft.}$



Page 1 of 2

Area of Pedestrian sign: $A = (1.25)(1.25) = 1.56 \text{ sq. ft.}$

3. FORCE ON POLE

Force on pole: $F = P_w A + P_{sw} A = 836.0 \text{ pounds}$

Force on Antenna: $F = P_w A_w = 115.6 \text{ pounds}$

Force on equipment: $F = P_w A_w = 111.6 \text{ pounds}$

Force on light arm: $F = (3.0)(23.8) = 71.4 \text{ pounds}$

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Total wind load = 1394.0 pounds

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$$D = 0.5A (1 + [(4.36h / A)]^2)$$

$$\text{Where } A = (2.34 P/S, b) = [(2.34) (1394.0) / (2200) (3.5)] = 0.42$$

$$\text{Therefore } D_w = 3.50 \text{ ft.} < 12 \text{ feet ok}$$

4. Bearing Capacity

Gross pole wt: 2079 pounds (for pole + equipment)
 $Q_w = 1500 \text{ psf}$

Pole ftg dia. = 3.5 FEET Footing area = 9.62 sq. ft.

$$Q = 1500 \text{ psf} > Q = (2079) / (9.62) = 216.2 \text{ psf OK}$$

Page 2 of 2

SITE ADDRESS:	Various
TITLE:	EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE WITH 2 OR MORE MAST ARMS AND WITH ANTENNA SIDE MOUNT AND RADIO EQUIPMENT BOX
DATE:	1/15/18
SCALE:	N.T.S.
DESIGNED BY:	33
CHECKED BY:	
DATE:	
PROJECT NO.	531 MINI MACRO
DRAWING NO.	1/15/18
DATE:	
SCALE:	N.T.S.

CROWN CASTLE
 Master Structural Schematic
 EXISTING TYPE 21 TS (TRAFFIC SIGNAL) POLE
 WITH 2 OR MORE MAST ARMS AND WITH ANTENNA SIDE MOUNT
 AND RADIO EQUIPMENT BOX



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 Irvine, CA 92618
 www.crowncastle.com

Jerry L. Michael
 JLM
 03-31-20
 DATE

MASTER STRUCTURAL PLANS FOR NEW CONCRETE TEXTURED STEEL STREET LIGHT POLES TO REPLACE EXISTING CONCRETE POLES

30
30
30
30
30

Gary J. Michel

 REG. ENG. 012540
 EXP. 03-31-20
 DATE 5/27/19



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Irvine, CA 92618
www.crowncastle.com

CROWN CASTLE
Master Structural Schematic
 NEW CONCRETE TEXTURED STEEL STREET LIGHT POLE
 WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX

SITE ADDRESS: Varies	
TITLE: NEW STEEL STREET LIGHT POLE WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX	
PTS NO. 025723	SHEET
DRAWING NO. 531 MINI MACRO	34
DATE: 11/15/18	
SCALED: N.T.S.	



STRUCTURAL DETAILS & FOUNDATION INSTALLATION

FOR:
**PROPOSED / NEW
ROUND / OCTAGONAL TAPERED
ANTENNA / LIGHT POLES**

LOCATED AT:
**VARIOUS NETWORK
NODE SITES FOR THE
SAN DIEGO SMALL CELL PROJECT
SAN DIEGO, CA
SAN DIEGO COUNTY**

WESTERN
UTILITY / TELECOM, INC.
5032 SALEM DALLAS HWY
SALEM, OR 97304
Ph: 503-587-0101 Fx: 503-316-1854
WesternUtilityTelecom.com

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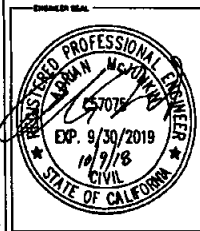
PROJECT
ANTENNA / LIGHT POLE

LOCATION
VARIOUS NETWORK
NODE SITES FOR THE:
SAN DIEGO SMALL CELL PROJECT
SAN DIEGO, CA
SAN DIEGO COUNTY

DESIGNED FOR
INSTALL OR PERMIT

DATE BY **DATE BY** **DATE**
DV AM 04OCT18

REV	DESCRIPTION	DATE	BY
1	ADDED BLANK DESIGN	04OCT18	DV



SHEET TITLE
TITLE
SHEET

WEST PROJECT NUMBER
18-0459

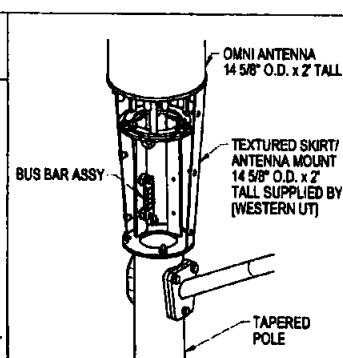
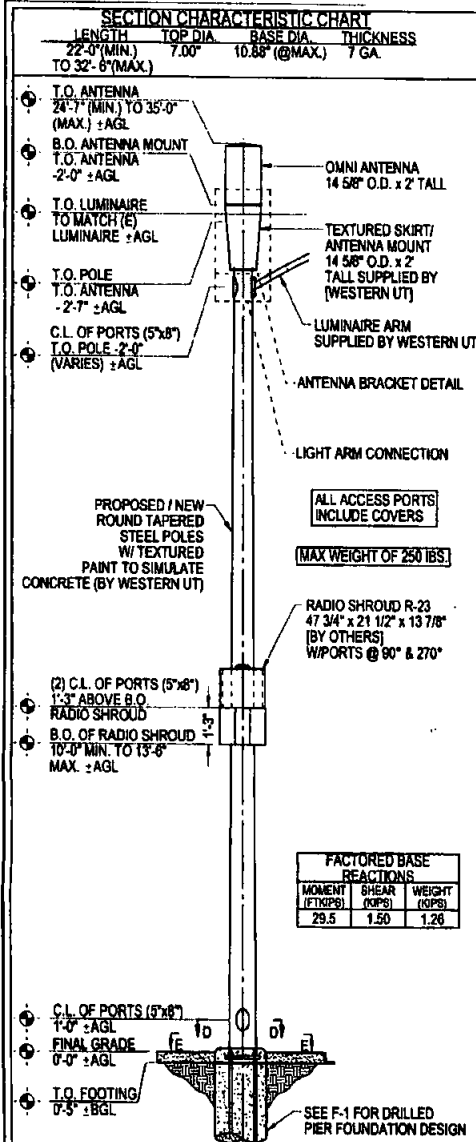
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PRINT NUMBER
T-1

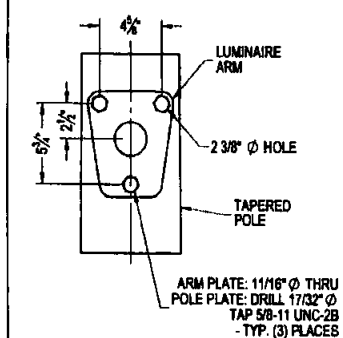
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SHEET	35
PTS NO.	035703
DRAWING NO.	031 MIN MACRO
DATE	11/15/18
SCALE	N.T.S.

CROWN CASTLE
Master Structural Schematic
NEW STEEL STREET LIGHT POLE
WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX

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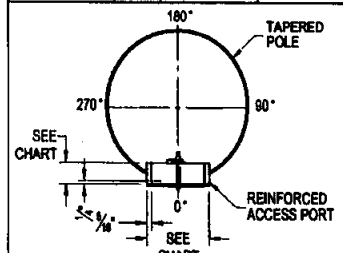


ANTENNA ATTACH BRACKETS SCALE: NONE 2

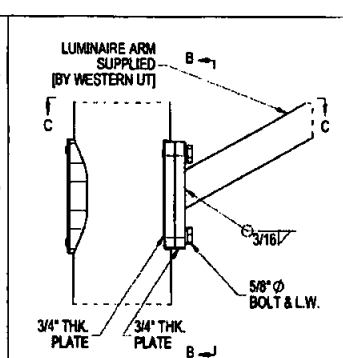


SECTION B-B SCALE: NONE 4

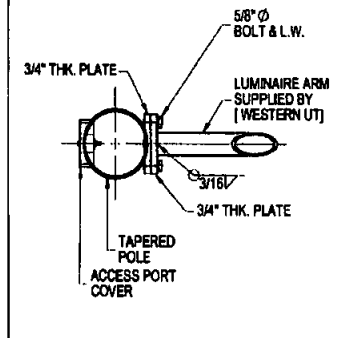
C.L. ELEVATION	QTY.	SIZE	ORIENTATION
VARIES	1	4" X 6" X 1"	0°
1'-3" ABOVE B.O. RADIO SHROUD	1	5" X 8" X 1 1/2"	VARIES
1'-0" AGL	1	5" X 8" X 1 1/2"	0°



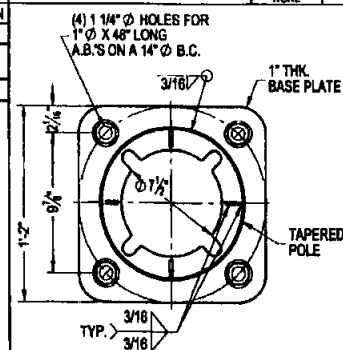
SECTION D-D SCALE: NONE 6



LIGHT ARM CONNECTION SCALE: NONE 3



SECTION C-C SCALE: NONE 5



SECTION E-E SCALE: NONE 7

GENERAL DESIGN NOTES

- DESIGN NOTES AND MATERIAL REQUIREMENTS:**
- THE DESIGN CRITERIA FOR THIS STRUCTURE IS AS FOLLOWS:
 - A) STANDARDS AND DESIGN CODES:
 - INDUSTRY STANDARDS: ANSI / TIA-222-G & 2015 CBC
 - STEEL MANUAL: AISC 13TH EDITION
 - CONCRETE CODE: ACI 318-14
 - WELDING CODE: AWS D1.1
 - SOIL: PER 2015 CBC
 - TABLE 1808.2, CLASS 5 MATERIAL
 - DESIGN:
 - WIND: 85 MPH (3-SECOND GUST) PER ASCE 7-10 & 2015 CBC, SECTION 18.01.1, EXCEPTION 4
 - CLASSIFICATION OF STRUCTURE: II
 - EXPOSURE CATEGORY: C
 - TOPOGRAPHIC CATEGORY: 1
 - V_W = 85 MPH (3-SECOND GUST) PER 2015 CBC, SECTION 18.01.1
 - V_W = 110 MPH (3-SEC. GUST) PER 2015 CBC, RISK CAT II
 - ICE: NOT REQUIRED FOR THIS STRUCTURE
 - SEISMIC: PER 2015 CBC, SECTION 18.13, ASCE 7-10, SECTIONS 18.13.3 & 18.13.4
 - LOADING:
 - (1) - OMNI ANT. C.L. @ 34'-0" ± AGL
 - (1) - OMNI ANT. LOWER SHROUD, C.L. @ 32'-0" ± AGL
 - (1) - 48"W X 8" H LUMINAIRE P.H. ± 2" ± AGL
 - (1) - 27" O.D. X 12' LONG SUPPORT ARM @ P.H. - 1.5' ± AGL
 - (1) - 18"W X 24" T SIGNAGE, C.L. OF SIGN @ 13' ± AGL
 - (1) - 18"W X 24" T SIGNAGE, C.L. OF SIGN @ 10' ± AGL
 - (2) - 12"W X 8" T SIGNAGE, C.L. OF SIGN @ 9' ± AGL
 - (1) - R-23 RADIO SHROUD C.L. @ 17'-0" ± AGL
 - GENERAL STRUCTURAL NOTES:
 - A) ALL MATERIALS SHALL CONFORM TO THE FOLLOWING STANDARDS:
 - POLE SHAFT: ASTM A36
 - BASE PLATE, PLATES, SHAPES: ASTM A36
 - WELDS: E70XX ELECTRODES
 - ANCHOR BOLTS: ASTM F1554 GR. 55
 - PORTS: ASTM A58
 - REBAR: ASTM A618 GR. 60
 - B) COATINGS: GALVANIZING: ASTM A123
 - C) ALL WELDING TO BE PERFORMED BY WELDERS CERTIFIED IN ACCORDANCE WITH AWS D1.1. FIELD WELDING IS PROHIBITED
 - D) ALL STRUCTURAL BOLTS SHALL BE TIGHTENED TO SNUG-TIGHT AS DEFINED BY AISC 13TH ED., PG. 16.2-4.5 PARAGRAPH 8.1

- GENERAL NOTES**
- 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 WESTERN UT, PRIOR TO BEGINNING PROJECT. ALL WORK SHALL BE PERFORMED USING ACCEPTED CONSTRUCTION PRACTICES.
 - NO FIELD MODIFICATIONS MAY BE MADE TO MONOPOLE STRUCTURE WITHOUT THE EXPRESS WRITTEN CONSENT FROM THE ENGINEER OF RECORD, WESTERN UT, 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.
 - NOTICE TO THE APPLICANT / OWNER / OWNER'S AGENT / ARCHITECT OR ENGINEER OF RECORD: BY USING THE PERMITTED CONSTRUCTION DRAWINGS FOR CONSTRUCTION/INSTALLATION OF THE WORK SPECIFIED HEREIN YOU AGREE TO COMPLY WITH THE REQUIREMENTS OF CITY OF SAN DIEGO FOR SPECIAL INSPECTIONS, STRUCTURAL OBSERVATIONS, CONSTRUCTION MATERIAL TESTING AND OFF-SITE FABRICATION OF BUILDING COMPONENTS, CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS AND, AS REQUIRED BY THE CALIFORNIA CONSTRUCTION CODES.
 - NOTICE TO THE CONTRACTOR / BUILDER / INSTALLER / SUB-CONTRACTOR / OWNER-BUILDER: BY USING THIS PERMITTED CONSTRUCTION DRAWINGS FOR CONSTRUCTION/INSTALLATION OF THE WORK SPECIFIED HEREIN, YOU ACKNOWLEDGE AND ARE AWARE OF, THE REQUIREMENTS CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS. YOU AGREE TO COMPLY WITH THE REQUIREMENTS OF CITY OF SAN DIEGO FOR SPECIAL INSPECTIONS, STRUCTURAL OBSERVATIONS, CONSTRUCTION MATERIAL TESTING AND OFF-SITE FABRICATION OF BUILDING COMPONENTS, CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS AND, AS REQUIRED BY THE CALIFORNIA CONSTRUCTION CODES.
 - FABRICATOR MUST BE APPROVED BY THE CITY OF SAN DIEGO, DEVELOPMENT SERVICES FOR THE FABRICATION OF BUILDING COMPONENTS ON THE PREMISES OF THE FABRICATOR'S SHOP.
 - FABRICATOR SHALL SUBMIT AN APPLICATION TO PERFORM OFF-SITE FABRICATION TO THE INSPECTION SERVICES DIVISION FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.
 - FABRICATOR SHALL SUBMIT A CERTIFICATE OF COMPLIANCE FOR OFF-SITE FABRICATION TO THE INSPECTION SERVICES DIVISION PRIOR TO ERECTION OF FABRICATED ITEMS AND ASSEMBLIES.
 - THE SPECIAL INSPECTIONS IDENTIFIED ON PLANS ARE, IN ADDITION TO, AND NOT A SUBSTITUTE FOR, THOSE INSPECTIONS REQUIRED TO BE PERFORMED BY A CITY'S BUILDING INSPECTOR.
 - WHERE MATERIALS OR ASSEMBLIES ARE REQUIRED BY THE BUILDING CODE TO BE LABELED, SUCH MATERIALS SHALL BE LABELED BY THE FABRICATOR. MATERIALS APPROVED BY THE CITY OF SAN DIEGO IN ACCORDANCE WITH SECTION 1703.2.1 THROUGH 1703.2.6, IDENTIFY ON PLANS, NAME AND ADDRESS OF THE TESTING/INSPECTION AGENCY, SECTION 1703.9.

WESTERN
UTILITY / TELECOM, INC.

5032 SALEM DALLAS HWY
SALEM, OR 97304
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WesternUtilityTelecom.com

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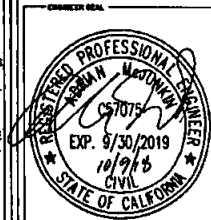
PROJECT
ROUND TAPERED ANTENNA / LIGHT POLE

LOCATION
VARIOUS NETWORK NODE SITES FOR THE:
SAN DIEGO SMALL CELL PROJECT
SAN DIEGO, CA
SAN DIEGO COUNTY

ISSUED FOR
INSTALL OR PERMIT

DATE BY CTD BY DATE
DV AM 04OCT18

REV	CHANGES	DATE	BY
A	ADDED SLAB DESIGN	05OCT18	DV



SHEET TITLE
ELEVATION VIEW & STRUCTURAL DETAILS

WUT PROJECT NUMBER
18-0459

DRAWING NUMBER
18458-APP

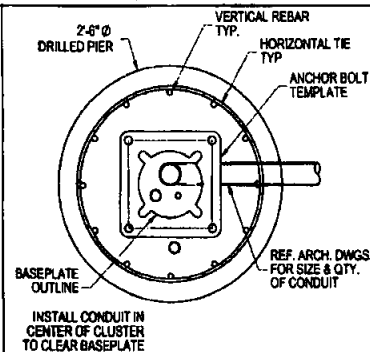
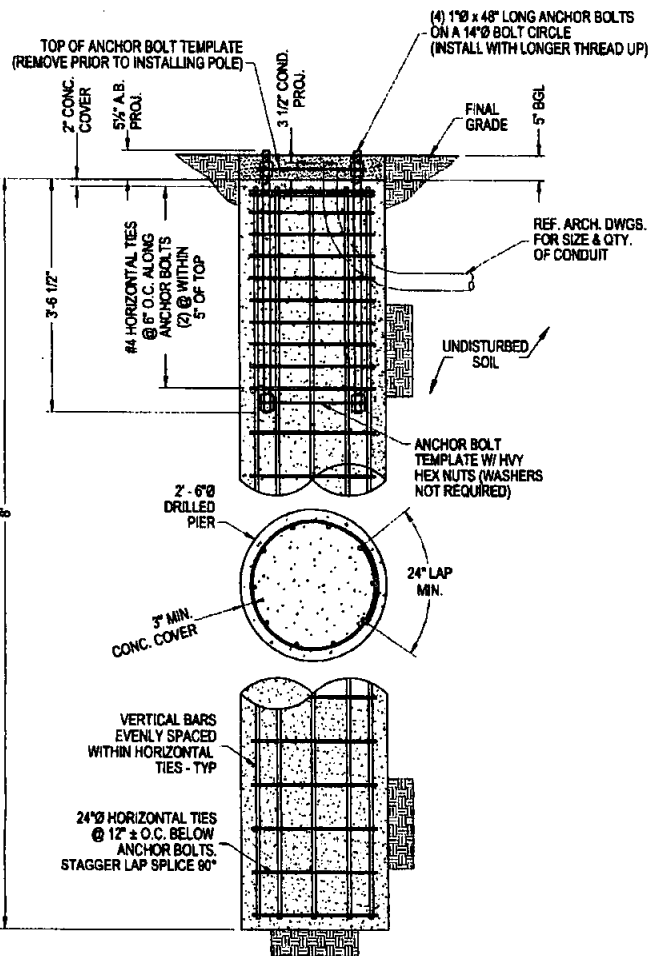
PLANS NUMBER
S-1

DATE ADDRESS	
TITLE:	NEW STEEL STREET LIGHT POLE WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX
SHEET	36
PTS. NO.	05272
DRAWING NO.	EST MINI MACRO
DATE	11/15/18
SCALE	N.T.S.

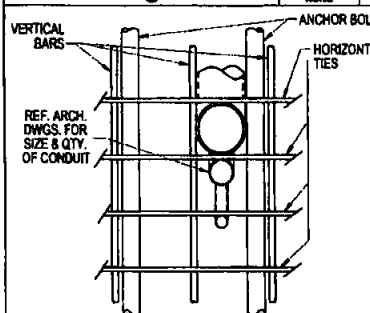
CROWN CASTLE
Master Structural Schematic
NEW STEEL STREET LIGHT POLE
WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX

CROWN CASTLE

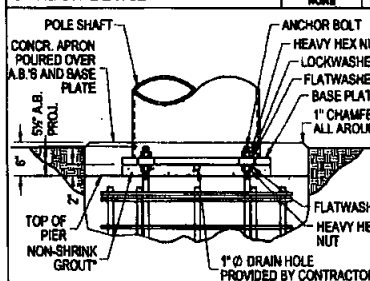
200 Spectrum Center Drive, Suite 1800
San Diego, CA 92108
www.crowncastle.com



CONDUIT DETAIL @ PIER SECTION



CONDUIT DETAIL



* NON-SHRINK GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 8,000 PSI.

BASE PLATE SHALL NOT BE GROUTED UNTIL AFTER THE STRUCTURE HAS BEEN INSTALLED AND PLUMBED.

BASE GROUTING DETAIL

SCALE: NONE 3

GENERAL NOTES

- THE CONTRACTOR 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 (DISHA) REQUIREMENTS.
- THE CONTRACTOR SHALL SUPERVISE AND DIRECT ALL WORK TO THE BEST OF HIS/her ABILITY AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, PROCEDURES, AND SEQUENCES, AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
- THE CONTRACTOR SHALL VERIFY, COORDINATE, AND PROVIDE ALL NECESSARY BLOCKING, BRACING, 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.
- IT IS THE INTENT OF THESE DRAWINGS TO SHOW THE COMPLETED INSTALLATION OF THE STRUCTURE SHOWN.
- 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.
- CONTRACTOR TO HOLD ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT.
- 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 CONNECTION WITH THE EXECUTION OF WORK ON THIS PROJECT.
- CONTRACTOR IS RESPONSIBLE FOR CHECKING AREA FOR UNDERGROUND FACILITIES PRIOR TO EXCAVATING ANY MATERIALS.
- CONTRACTOR SHALL REFER TO SOILS REPORT IF AVAILABLE FOR SITE CONDITIONS AND FURTHER CONSTRUCTION INFORMATION.
- IF NO SOILS REPORT, THE STRUCTURE(S) WILL BE LOCATED ENTIRELY ON UNDISTURBED NATIVE SOIL.
- SIGNATURE: 11. AS A CALIFORNIA LICENSED ARCHITECT / ENGINEER, I HAVE CLASSIFIED THE UNDISTURBED NATIVE SOILS TO BE CLASS S AND PER TABLE 1100.2 OF THE 2018 CBC I HAVE ASSIGNED A FOUNDATION PRESSURE OF 1500 PSF. FOR THE DESIGN OF FOUNDATIONS RELATED TO THIS PROJECT.
- SIGNATURE: 12. CONTRACTOR SHALL INSPECT AND REMOVE ALL DEBRIS FROM BOTTOM OF EXCAVATION.
- CONTRACTOR SHALL VERIFY ANCHOR BOLT LAYOUT PRIOR TO, AND IMMEDIATELY AFTER PLACING CONCRETE. ANCHOR BOLT LAYOUT IS CRITICAL FOR MONOPOLE INSTALLATION.
- CONTRACTOR SHALL USE AND PROVIDE DEFORMED REINFORCING BARS CONFORMING TO ASTM A615 GR. 60 (60,000 PSI MIN. YIELD). CONTRACTOR SHALL USE STEEL WIRE TO HOLD REINFORCING BARS TOGETHER. IF WELDING REBAR IS PREFERRED, SUBSTITUTE USING A706 GR. 60 DEFORMED BARS.
- CONTRACTOR SHALL USE AND PROVIDE CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI. CONCRETE SHALL USE 1" MAXIMUM STONE AGGREGATE. MIX DESIGN: 5 1/2 BAGS OF CEMENT MINIMUM PER CUBIC YARD, 9" MINIMUM AND 7" MAXIMUM CONCRETE SLUMP.
- CONCRETE SHALL BE CONSOLIDATED USING VIBRATORY METHODS THROUGHOUT DEPTH OF FOUNDATION. VIBRATING LOWER DEPTHS MAY BE ACCOMPLISHED BY TOUCHING REBAR CAGE WITH VIBRATOR.
- 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 BE PLACED USING CONVENTIONAL METHODS TO MINIMIZE SEGREGATION OF CONCRETE AND AGGREGATE. CONCRETE SHALL NOT FREE FALL MORE THAN 5 FT. CONCRETE MAY BE PLACED BELOW WATER USING TREMIE METHODS.
- CONCRETE SHALL BE PLACED TO THE DEPTH INDICATED, AND THE ABOVE GRIND 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.
- THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ADEQUATE CONCRETE COVERAGE OVER REINFORCING BARS TO MINIMIZE CORROSION POTENTIAL. UNLESS OTHERWISE NOTED, CONTRACTOR SHALL USE 3" CONCRETE COVER OVER REBAR. TOP OF FOOTING SHALL BE TROWELLED LEVEL AND SMOOTH.
- DRILLED PIER FOUNDATION DESIGN PER 2018 CBC, TABLE 1106.2, CLASS S MATERIAL.
- TOTAL VOLUME OF CONCRETE REQUIRED FOR THIS FOUNDATION IS APPROXIMATELY 1.5 CU. YDS.

FACTORED BASE REACTIONS - ROUND

MOMENT (FT-KIPS)	SHEAR (KIPS)	WEIGHT (KIPS)
29.5	1.50	1.26

FACTORED BASE REACTIONS - OCTAGONAL

MOMENT (FT-KIPS)	SHEAR (KIPS)	WEIGHT (KIPS)
30.7	1.67	1.08

WESTERN
UTILITY / TELECOM, INC.
5032 SALEM DALLAS HWY
SALEM, OR 97304
Ph: 503-687-0101 Fax: 503-316-1864
WesternUtilityTelco.com

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CROWN CASTLE

ANTENNA / LIGHT POLE

VARIOUS NETWORK NODE SITES FOR THE:

BAR DEGO SMALL CELL PROJECT
SAN DIEGO, CA
SAN DIEGO COUNTY

INSTALL OR PERMIT

DATE BY: DV AM 04OCT18

REVISIONS

FOUNDATION DETAILS

18-0459

18459-APP

F-1

TITLE: NEW STEEL STREET LIGHT POLE WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX	DATE: 11/9/18
PTS NO: 02573	DRAWING NO: 531 MINI MACRO
SCALE: N.T.S.	37

CROWN CASTLE

ANTENNA / LIGHT POLE

VARIOUS NETWORK NODE SITES FOR THE:

BAR DEGO SMALL CELL PROJECT
SAN DIEGO, CA
SAN DIEGO COUNTY

INSTALL OR PERMIT

DATE BY: DV AM 04OCT18

REVISIONS

FOUNDATION DETAILS

18-0459

18459-APP

F-1

TITLE: NEW STEEL STREET LIGHT POLE WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX	DATE: 11/9/18
PTS NO: 02573	DRAWING NO: 531 MINI MACRO
SCALE: N.T.S.	37

CROWN CASTLE

ANTENNA / LIGHT POLE

VARIOUS NETWORK NODE SITES FOR THE:

BAR DEGO SMALL CELL PROJECT
SAN DIEGO, CA
SAN DIEGO COUNTY

INSTALL OR PERMIT

DATE BY: DV AM 04OCT18

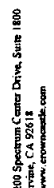
REVISIONS

FOUNDATION DETAILS

18-0459

18459-APP

F-1





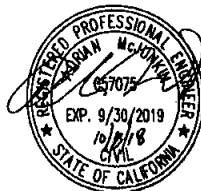
WESTERN
UTILITY / TELECOM, INC.

Structural Calculations with Foundation Design

For A
35' Tall (Max. Ht.) Round Tapered Antenna Light Pole

Located At:
San Diego Small Cell Project
San Diego, CA 92109
San Diego County

Prepared for:
Crown Castle



Dated:
October 8, 2018

Revision A: Added optional slab foundation design.

Western UT Project No.: 18-0459

1022 Brown-Collins Highway NW, Salem, OR 97304
Phone: (503) 657-0101 Fax: (503) 316-1884
www.WesternUtilityTelecom.com



WESTERN
UTILITY / TELECOM, INC.

Customer: Crown Castle
Project: 35' Tall (Max. Ht.) Round Tapered /
Site: San Diego Small Cell Project

Project No: 18-0459
Date: 10/8/18

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Structural Calculations

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Drilled Pier Foundation Design:		Page 9 - 10
Slab Foundation Design:		Page 11 - 13

PROFESSIONAL ENGINEER SEAL

I hereby certify that this structural design report was prepared by me, or under my direct supervision, and that I am a duly licensed Professional Engineer under the laws of the State of California.

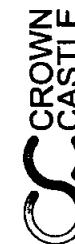


Ph: (503) 657-0101; Fx: (503) 316-1884

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SITE ADDRESS:	Notes
TITLE:	NEW STEEL STREET LIGHT POLE WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX
PTS NO.	652728
DRAWING NO.	SDI MSH MACRO
DATE:	11/15/18
SCALE:	N.T.S.
SHEET:	39

CROWN CASTLE
Master Structural Schematic
NEW STEEL STREET LIGHT POLE
WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX



200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crowncastle.com



WESTERN UTILITY & TELECOM, INC.

Customer: Crown Castle
Project: 35' Tall (Max. Ht.) Round Tapered Antenna
Site: San Diego Small Cell Project

Project No.: 16-069
Date: 10/6/16
Page: 1

Summary of Design Loading

- Antennas: (1) - 14 5/8" Ø X 24" Tall Omni Antenna, C.L. @ 34' - 0" ± AGL (See Note 4 below)
(1) - 14 5/8" Ø X 24" Tall Omni Antenna Lower Shroud, C.L. @ 32' - 0" ± AGL
Optional: (1) - Antenna Mount / Shroud Assembly, Weight = 155 pounds
Lights: (1) - 9" Tall X 48" (Flat) Luminaire, C.L. @ Pole Height + 3.0' AGL
(1) - 2 7/8" OD X 12" Long Luminaire Support Arm, C.L. @ Pole Height + 1.6' AGL
Radials: (1) - 47 3/4" Tall x 21 1/2" Wide Radio Shroud R-23, Bottom of Shroud @ 13' - 6" AGL (Max.)
Other: (1) - 18" Wide X 24" Tall Signage, C.L. of Sign @ 13' - 0" AGL
(1) - 18" Wide X 24" Tall Signage, C.L. of Sign @ 10' - 5" AGL
(2) - 72" Wide X 6" Tall Signage, C.L.'s of Signs @ 9' - 0" ± AGL

- *Notes: 1) Not all the loading shown under "Summary of Design Loading" will be present at each node. The indicated loading and attachment elevations have conservatively been utilized as a "worst case" scenario to anticipate variations in actual loading at the specific node sizes, or the addition of future traffic control or informational signage.
2) Luminaire size and shape may vary. No luminaire loading will exceed that for the size and shape indicated above.
3) These calculations are for poles of various heights, and that have identical loading where only the elevation of the luminaire and antenna varies. The base reactions indicated below will not be exceeded at any node site.
4) To allow for future expansion capabilities, the omni antenna dimensions used for loading purposes is 24" Ø X 36" tall at a centerline height of 34' (see Page 3).
5) Variations (ranges) shall be shown on plans, to be reviewed and approved. If a variation is later proposed outside the revised/approved range, it will require structural review and approval, as a minimum.

Summary of Factored Base Reactions

Design Base Moment, M_{max} = 29.5 ft-kips

Design Base Shear, V_{max} = 1.60 kips

Design Base Weight, WT_{max} = 1.26 kips



WESTERN UTILITY & TELECOM, INC.

Customer: Crown Castle
Project: 35' Tall (Max. Ht.) Round Tapered Antenna L
Site: San Diego Small Cell Project

Project No.: 16-069
Date: 10/6/16
Page: 2

Design Criteria, Codes, and Materials

Design Criteria:

Wind (V_{max}): 85 mph (3-Second Gust) Per ANSI/TIA-222-G(2) & 2016 CBC, Section 1609.1.1, Exception 5

Classification of Structure: II Per Table 2-1

Exposure Category: C Per Section 2.6.3.1

Topographic Category: 1 Per Section 2.6.3.2

Wind (V_{ref}): 110 mph Per 2016 CBC, Section 1609.3.1, Risk Category II

Ice: Not required for this structure

Seismic: Per 2016 CBC Section 1613, ASCE 7-10 Sections 15.1.3 & 12.8

Codes and Specifications:

Concrete: ACI 318-14

Steel: AISC "Steel Construction Manual", 13th Edition

Welding: ANSI/AWS D1.1-10

Soil: Per 2016 CBC, Table 1808.2, Class 4 Material

Materials:

Pole Shaft: ASTM A36

Baseplate: ASTM A36

Shapes: ASTM A36

Plates: ASTM A36

Welds: E70XX Electrodes

Anchor Bolts: ASTM F1554 Gr 55

Port Rim: ASTM A106 Gr B

Rebar: ASTM A615 Gr. 60

Coatings:

Galvanizing: ASTM A123

Paint: Textured to Simulate Concrete Pole

SITE ADDRESS: VFW

TITLE: NEW STEEL STREET LIGHT POLE WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX			
P/S NO.	608723	DRAWING NO.	531 MINI MACRO
DATE	11/16/16	SCALE	N.T.S.
			40

CROWN CASTLE
Master Structural Schematic
NEW STEEL STREET LIGHT POLE
WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX



200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crowncastle.com



Customer: Crown Castle
 Project: 35' Tall (Max. Ht.) Round Tapered Antenna Light Pole
 Site: San Diego Small Cell Project

Project No.: 18-0458
 Date: 10/8/18
 Page: 4

Wind Loading Calculations - Sectorized Antennas and Mounts:

Description	CL Elevation (feet)	Quantity Per Sector	Weight (lbs)	Height (inches)	Width (inches)	Depth (inches)	Shielding Factor K_s	C_g Calc (Normal)	C_g Calc (Transverse)	$(EPA)_n$ (ft ²)	$(EPA)_t$ (ft ²)	$(EPA)_a$ (ft ²)	Unfactored Wind Pressure (psf)	Factored Loads		
														Factored V_{wind} (kips)	Factored M_{wind} (ft-kips)	Factored Total Wt (kips)
Shear, Moment, and Weight Summations:														0.00	0.00	0.00

Wind Loading Calculations - Miscellaneous Appurtenances:

Description	CL Elevation (feet)	Quantity	Weight (lbs)	Shape Round (R) or Flat (F)	Height (inches)	Width (inches)	Area Factor	A _f (ft ²)	Aspect Ratio (Height / Width)	C	C _s	C _{FA} (ft ²)	ΣC _{FA} (ft ²)	Unfactored Wind Pressure (psf)	Factored Loads		
															Factored V _{wind} (kips)	Factored M _{wind} (ft-kips)	Factored Total Wt (kips)
9" X 48" Luminaire Head	35.0	1	35.0	F	48.0	9.00	1.00	3.00	5.33	N/A	1.33	3.98	3.98	19.6	0.12	4.39	0.04
2 7/8" OD X 12' Support Arm	33.5	1	75.0	R	144	2.88	1.00	2.88	50.1	20.4	1.20	3.45	3.45	19.4	0.11	3.61	0.09
Omni Antenna or Concealment Shroud	34.0	1	50.0	R	36.0	24.0	1.00	6.00	1.50	171	0.50	3.00	3.00	19.5	0.09	3.20	0.06
Antenna / Mount Assembly (DL Only)	32.0	1	165	R	0.00	0.00	0.00	0.00	1.00	0.01	0.70	0.00	0.00	19.2	0.00	0.00	0.20
Radio Shroud w/Equipment	21.3	1	232.0	F	47.5	21.5	1.00	7.09	2.21	N/A	1.20	8.51	8.51	17.7	0.24	5.15	0.28
18" X 24" Signage - Traffic Control	13.0	1	15.0	F	24.0	18.0	1.00	3.00	1.33	N/A	1.20	3.60	3.60	16.4	0.09	1.25	0.02
18" X 24" Signage - Traffic Control	10.5	1	15.0	F	24.0	18.00	1.00	3.00	1.33	N/A	1.20	3.60	3.6	16.4	0.09	1.01	0.02
8" X 72" Signage - Street Name	9.0	2	25.0	F	72.0	8.0	1.00	4.00	9.00	N/A	1.47	5.87	11.73	16.4	0.31	2.83	0.06
Shear, Moment, and Weight Summations:															1.06	21.4	0.76

Wind Loading Summary - Factored Base Reactions:

Design Base Moment, M_{pole} = 29.5 ft-kips
 Design Base Shear, V_{pole} = 1.60 kips
 Design Base Weight, WT_{pole} = 1.26 kips

SITE ADDRESS:	View
TITLE:	NEW STEEL STREET LIGHT POLE WITH ANTENNA MOUNT AND RADIO EQUIPMENT
PTS NO.	025725
DRAWING NO.	S31 MINI MACRO
DATE	11/15/18
SCALE	N.T.S.
	42

CROWN CASTLE
 Master Structural Schematic
 NEW STEEL STREET LIGHT POLE
 WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX

CROWN
 CASTLE
 200 SpectraStar Center Drive, Suite 1800
 Irvine, CA 92618
 www.crowncastle.com



Customer: Crown Castle
Project: 35', Tall (Max. Ht.) Round Tapered Antenna Ligh
Site: San Diego Small Cell Project

Project No.: 19-0469
Date: 10/09/19
Page: 6

Stress Check - Monopole Shaft / Access Ports

Access Port Information:

Port Width = 5.00 in. Number of Ports = 1
Port Height = 8.00 in.
Port CL Offset = 12.0 in. (AGL)

Monopole Shaft Information:

Pole Diameter @ Port, D = 10.7 in. Wall Slenderness Ratio, $\lambda = D/t = 79.6$
Wall Thickness, t = 0.13 in. Plastic Design Slenderness Ratio, $\lambda_p = 67.6$
Yield Stress, F_y = 36.0 ksi Limiting Slenderness Ratio, $\lambda_{lim} = 400$
Distance to Extreme Fiber, C = 5.35 in. Effective Section Modulus, S_{xx} = 11.4 in³
Effective Radius of Gyration, R_{xx} = 3.69 in.

MP Shaft Section Properties at Access Ports:

Nominal Pipe Section:

Mass Area, A_{nominal} = 4.47 in²
Mom Of Inertia, I_{nominal} = 62.4 in⁴

Reinforced Port:

Mass Area, A_{total} = 4.47 in²
Mom Of Inertia, I_{total} = 61.0 in⁴

Design Flexural Strength:

Compact Slenderness Ratio, $\lambda_c = 57.5$ Nominal Flexural Strength, M_n = 41.4 ft-kips
Noncompact Slenderness Ratio, $\lambda = 249$ Design Flexural Strength, $\phi_b M_n = 37.2$ ft-kips (OK)
Section is Non-Compact Factored Moment, M_{fact} = 28.5 ft-kips

Design Compressive Strength:

Noncompact Slenderness Ratio, $\lambda_c = 81.8$ Nominal Compressive Strength, P_n = 128 kips
Column Slenderness, $\lambda_c = 0.77$ Design Compressive Strength, $\phi_c P_n = 113$ kips (OK)
Effective Area Factor, Q = 1.00 Factored Weight, W_{fact} = 1.28 kips

Combined Flexure and Axial Force Check: (Section 4.8.1.1)

$P_u / \phi_c P_n = 0.01$ $P_u / \phi_c P_n + M_u / \phi_b M_n = 0.797 < 1.00$ OK

Summary - Monopole Shaft and Access Ports

Monopole Shaft:

USE: 10.75" OD @ Base Tapering to 7" OD @ Top
USE: 0.1348" wall (10 Gage), A36 Monopole Shaft

Access Ports:

USE: (1) - 4" x 6" Unreinforced Access Port, C.L. @ 30" ± AGL (Luminaire Cable)
(1) - 8" x 8" Reinforced Access Port, C.L. @ 10'-0" ± AGL (Radio Cables)
(1) - 8" x 8" Reinforced Access Port, C.L. @ 1'-0" ± AGL

Port reinforcement is 1/4" T x 1 1/2" Deep x 1/4" Projection, ASTM A106 Gr. B Pipe
Verify port elevations and requirements prior to fabrication.

Ph: (602) 988-0101; Fx: (602) 318-1884

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Customer: Crown Castle
Project: 35', Tall (Max. Ht.) Round Tapered Antenna L
Site: San Diego Small Cell Project

Project No.: 19-0469
Date: 10/09/19
Page: 6

Anchor Bolt Design

Factored Base Reactions From Wind Loading:

M_{fact} = 28.5 ft-kips
V_{fact} = 1.60 kips
W_{fact} = 1.28 kips

Anchor Bolt Design:

Reference: ANSI/TIA 222-G, Section 4.9.9, Addendum 2

No. of Anchor Bolts, n = 4
Anchor Bolt Diameter, D_{AB} = 1.00 in. A.B. Tensile Stress Area, A_s = 0.61 in²
Anchor Bolt Circle, D_{BC} = 14.0 in. Minimum AB Circle = 13.3 in.
Anchor Bolt Length, L_{AB} = 48.0 in. Minimum Yield Strength, F_{y,AB} = 55.0 ksi
Minimum Anchor Bolt Projection = 6.00 in. Minimum Tensile Strength, F_{u,AB} = 76.0 ksi
Base Detail Type = d Figure 4-4 $\eta = 0.60$
 $\phi = 0.80$

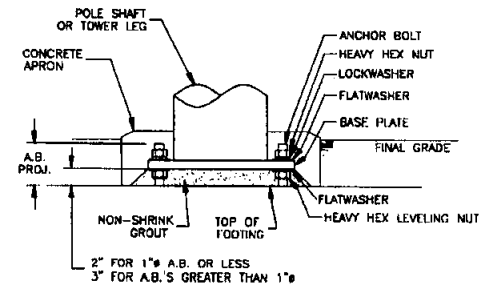
Maximum Design Force per bolt, C_{max} or T_{max} = $[4 * M_{fact} / (n * D_{BC})] + W_{fact} / n = 25.6$ kips

Maximum Shear Force per bolt, V_{AB,Max} = V_{fact} / n = 0.37 kips

Design Anchor Bolt Tensile Strength, $\phi F_{t,AB} = \phi * F_{y,AB} * A_s = 36.4$ kips

Combined Interaction Check = $[T_{max} + V_{AB,Max} / \eta] / \phi F_{t,AB} = 0.724 < 1.00$ - (OK)

USE: (4) - 1" Ø x 48" Long ASTM F1554 Gr 68 Anchor Bolts on a 14" Ø B.C.



Ph: (602) 987-0101; Fx: (602) 318-1884

www.WesternUtilityTelecom.com

SITE ADDRESS:		NEW STEEL STREET LIGHT POLE WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX
PYS NO.	622729	
DRAWING NO.	S31 MINI MACRO	
DATE	11/19/18	
SCALE	N.T.S.	
		43

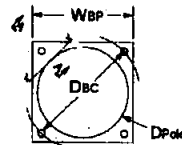
CROWN CASTLE
Master Structural Schematic
NEW STEEL STREET LIGHT POLE
WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX

CROWN CASTLE
200 Spectrum Center Drive, Suite 1000
Irvine, CA 92618
www.crowncastle.com

Base Plate Design

Factored Base Reactions From Wind Loading:

Base Moment, M_{pole} = 29.5 ft-kips
Base Shear, V_{pole} = 1.50 kips
Base Weight, W_{pole} = 1.26 kips



Base Plate Design:

Base Plate Width, W_{BP} = 14.0 in. Min. Base Plate Width, $W_{\text{BP, min}}$ = 13.6 in.
Base Plate Yield Strength, $F_{y, \text{BP}}$ = 36.0 ksi Pole Diameter, D_{pole} = 10.4 in.
Anchor Bolt Circle, D_{ABC} = 14.0 in.
Design Bending Strength, $\phi F_{t, \text{BP}}$ = $0.90 \cdot F_{y, \text{BP}}$ = 32.4 ksi

Assume failure across x'-x', model as a fixed-end cantilevered beam.

b = section length of x'-x' = 9.42 in.

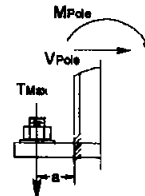
a = $(D_{\text{ABC}} - D_{\text{pole}})/2$ = 1.81 in.

Maximum Tensile Force per bolt, T_{max} = 25.6 kips

Maximum Moment in Plate, M_{plate} = $T_{\text{max}} \cdot a$ = 46.3 in.-kips

Min. Base Plate Thickness, t_{min} = $(4 \cdot M_{\text{plate}} / (b \cdot \phi F_{t, \text{BP}}))^{1/2}$ = 0.78 in.

Use: 14 Inch Square x 1 Inch Thick ASTM A36 Base Plate



Section A-A

Base Plate-to-Pole Shaft Weld Design:

Minimum weld size per AWS/AWS d1.1, Table 5.8, Low-Hydrogen process = 1/8 inch
Upper Weld Size, w_u = 0.188 in. Weld Tensile Strength, F_{weld} = 70.0 ksi (E70XX)
Lower Weld Size, w_l = 0.000 in. Design Weld Strength, ϕF_w = 31.5 ksi

Distance to Centroid of Upper Weld, L_{uw} = $D_{\text{pole}}/2 + w_u/3$ = 5.25 inches

Distance to Centroid of Lower Weld, L_{lw} = $D_{\text{pole}}/2 - w_l/3$ = 5.19 inches

Section Modulus of Upper Weld, S_{uw} = $0.707 \cdot w_u \cdot \pi \cdot L_{\text{uw}}^2$ = 11.5 in.³

Section Modulus of Lower Weld, S_{lw} = $0.707 \cdot w_l \cdot \pi \cdot L_{\text{lw}}^2$ = 0.00 in.³

Total Weld Area, A_{weld} = 4.37 in.²

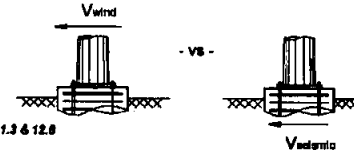
Required Weld Strength, f_w = $M_{\text{plate}} / (S_{\text{uw}} + W_{\text{pole}} / A_{\text{weld}})$ = 31.1 ksi (OK)

Use: 3/16" Fillet Weld all around, E70XX Electrodes

Seismic Base Shear Calculations

Factored Base Reactions from Wind Loading:

M_{pole} = 29.5 ft-kips
 V_{pole} = 1.50 kips
 W_{pole} = 1.26 kips



Seismic Parameters:

Per 2016 CBC Section 1613, ASCE 7-10 Sections 16.1.3 & 12.6

Site Classification = D Chapter 20, Table 20.3-1
Short-Period Spectral Acceleration, S_s = 1.682 g
1-Second Period Spectral Acceleration, S_1 = 0.869 g

Seismic Shear Factors:

I = 1.00 Table 11.8-1 Location: San Diego, CA 92109
 R = 1.50 Table 12.8-1
 F_a = 1.000 Values for S_s , S_1 , F_a , and F_v obtained from USGS "Earthquake Ground Motion Parameters", Version 6.1.0 (Maximum values based on the location listed above)
 F_v = 1.500

Seismic Design Classifications:

Occupancy Category: I I - IV, Table 11-1
Seismic Design Category: E A - F, Section 11.6

Seismic Base Shear (Nominal Value)

Equation 12.8-1: $V = C_s \cdot W$ = 0.84 kips
Equation 12.8-2: $C_s = S_{DS} / (R / I)$ = 0.748
Equation 11.4-3: $S_{DS} = (2/3) \cdot S_{S1}$ = 1.121
Equation 11.4-1: $S_{S1} = S_a \cdot F_a$ = 1.682

Seismic Base Shear (Need Not Exceed Value, $T \leq T_L$)

Equation 12.8-1: $V = C_s \cdot W$ = 1.85 kips
Equation 12.8-3: $C_s \leq S_{D1} / [T \cdot (R / I)] \leq 1.600$
Equation 11.4-4: $S_{D1} = (2/3) \cdot S_{M1}$ = 0.869
Equation 12.8-7: $T_s = C_u \cdot T_n$ = 0.288 Seconds
Equation 11.4-2: $S_{M1} = S_1 \cdot F_v$ = 1.004

Seismic Base Shear (Minimum Value)

Equation 12.8-1: $V = C_s \cdot W$ = 0.04 kips
Equation 12.8-5: $C_s = 0.030$

Seismic Base Shear (Minimum Value, $S_1 \geq 0.05g$)

Equation 12.8-1: $V = C_s \cdot W$ = 0.28 kips
Equation 12.8-6: $C_s = 0.5 \cdot S_1 / (R / I)$ = 0.223

Total Seismic Shear = 0.84 kips

Total Wind Shear = 1.50 kips

Design Base Shear is Governed by Wind Loading

Drilled Pier Foundation Design

Factored Monopole Base Reactions:

M_{pole} = Overturning Moment = 29.5 ft-kips
 V_{pole} = Base Shear = 1.50 kips
 W_{pole} = Base Weight = 1.26 kips

Design Basis:

- Ref. 2018 CBC Section 1807.3.2.1, Nonconstrained Condition
- ACI 318-14 - Requirements for Reinforced Concrete.
- Soil Design Values: Per 2018 CBC, Table 1808.2, Class 4 Material

Soil Characteristics:

Based on CBC Soil Classification for Type: 5 (1-5)
 P_p = Allow. Lateral Bearing at 1' below grade = 150 psf/ft
 d_{neg} = Depth of soil below grade neglected = 0.00 ft

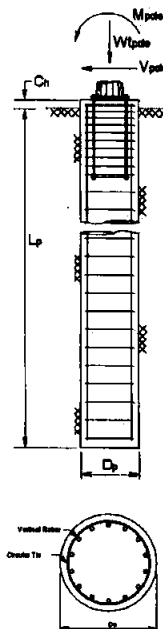
Drilled Pier Characteristics:

Minimum Diameter:

D_{templ} = OD of AB Template = 15.6 in.
 S_b = Minimum AB and Rebar Separation = 1.25 in.
Concrete Cover = C_{cover} = 3.00 in.
 $D_{p, min}$ = $D_{templ} + 2(S_b + d_b + d_{neg} + C_{cover})$ = 26.6 in.
Use D_p = Pier Diameter = 30.0 in.

Minimum Length/Depth:

C_p = Pier Projection AGL = 0.00 ft
 $S_1 = 2 * P_p * (L_p - d_{neg}) / 3$ = 800 psf, Where $(L_p - d_{neg}) \leq 12$ ft.
 $A = 2.34 * V_{pole} / (S_1 * D_p)$ = 1.75
 $L_{p, min} = A/2 * [1 + (1 + 4.38 * A)^{1/2}] + d_{neg}$ = 7.07 ft.
Use: L_p = Below Grade Pier Length = 8.00 ft.
 L_{tot} = Total Length of Pier = 8.00 ft.
Total Volume of Concrete Required = 1.5 cu. yds.



Drilled Pier Foundation Design

Reinforcement:

Vertical Reinforcement Parameters:

Vertical Bar Size = 6 Tie Bar Size = 4
Qty of Vertical Bars = 8 $f_y = 4.0$ ksi
 d_b = Diameter of Bar = 0.75 in. $f_y = 60.0$ ksi
 A_s = Total Area of Vert. Bars = 3.53 sq. in.

Pier Moment Capacity: Verify $M_{ult} \leq \phi M_n$

$M_{ult} = 1.3 * [M_{pole} + V_{pole} * (L_p - d_{neg})]$ = 43.5 ft-kips
 $\phi M_n = 199$ ft-kips (OK)
 $A_{steel} = 4 * M_{ult} / (\phi * f_y * N * D_p)$ = 0.1811 sq. in.
 $\rho_{prov} = A_s / (pi/4 * 0.8 * D_p^2)$ = 0.0050
 $\rho_{min} = 0.0050$ (OK)

Vertical Bar Development Length:

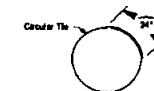
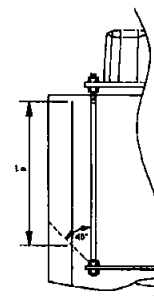
$L_{db} = [0.04 * d_b * f_y / f_c] * M_{ult} / \phi M_n$ = 6.22 in.
 $L_{db, prov'd}$ = 33.9 in. (OK)

Shear Reinforcement:

Factored Shear, $V_u = 1.4 * V_{pole}$ = 2.10 kips
Horizontal Tie Shear Capacity, V_s = 98.0 kips ACI 318 Equation 11-15
Concrete Shear Capacity, V_c = 87.4 kips ACI 318 Equation 11-5
Total Shear Capacity, $\phi V_c + \phi V_s$ = 138 kips (OK)
 D_{tie} = Diameter of Tie = 24" ϕ

Reinforcement Summary:

Vertical Bars: 8 - #6 x 7.5 ft. Long A615 Gr. 60 Deformed Vertical Bars
Spaced evenly (approx. 6.4" o.c.) within Horizontal Tie
Horizontal Ties: 12 - #4 Horizontal Ties, 24 in. Diameter, with 24 in. lap
Spaced at 6" o.c. along the anchor bolts and 12" o.c. in remainder of pier
Rebar Weights: Vertical Bars = 80 pounds
Horizontal Ties = 67 pounds
Horizontal Tie Length = 8' - 4"



DATE: 10/05/18	SCALE: N.T.S.
DRAWING NO. 531 BKT MACRO	
PYS NO. 629723	
TITLE: NEW STEEL STREET LIGHT POLE WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX	
SHEET	45

CROWN CASTLE
Master Structural Schematic
NEW STEEL STREET LIGHT POLE
WITH ANTENNA MOUNT AND RADIO EQUIPMENT BOX

Slab Foundation Design

Factored Base Reactions:

Overturing Moment, $\alpha M_{\text{fact}} = 31$ ft-kips
Base Shear, $\alpha V_{\text{fact}} = 1.7$ kips
Base Weight, $\alpha W_{\text{fact}} = 1.1$ kips

Design Basis:

1. Soils Investigation report performed by: 2018 CSC, Table 16062, Class 5 Material
2. American Concrete Institute, ACI 318-14.

Design Parameters:

Slab Dimensions:

Slab Width, $b_{\text{slab}} = 6.0$ ft
Slab Thickness, $t_{\text{slab}} = 2.00$ ft
Pocket Depth, $d_p = 1.79$ ft
Pocket Width, $w_p = 2.00$ ft
Weight of Slab, $W_{\text{slab}} = 14.3$ kips
Volume of Concrete, $\text{Vol}_{\text{conc}} = 2.9$ cu yds

Nominal Soil Resistance Values:

Bearing Resistance, $R_{n,\text{Bearing}} = 3,000$ lbs/sq ft
Lateral Resistance, $R_{n,\text{Lateral}} = 150$ lbs/sq ft
Soil Density, $\gamma_{\text{soil}} = 100$ lbs/cu ft

Resistance Factors:

Bearing Resistance Factor, $\phi_b = 0.75$
Lateral Resistance Factor, $\phi_s = 0.75$

Slab Overturning Stability:

Moment Acting @ Toe of Slab:

$$\alpha M_{\text{act}} = \text{OTM} + V \cdot t_{\text{slab}} = 34 \text{ ft-kips}$$

Resisting Moment @ Toe of Slab:

$$\phi M_R = (W_{\text{fact}} + W_{\text{slab}}) \cdot (b_{\text{slab}} / 2) = 46 \text{ ft-kips}$$

$$\text{Overturning Factor of Safety} = M_R / M_{\text{act}} = 1.35 > 1.11 \text{ (OK)}$$

Bearing Pressure Calculations:

$$\text{Eccentricity, } e = M_{\text{act}} / (W_{\text{fact}} + W_{\text{slab}}) = 2.22 > 1 \text{ (OK)}$$

$$\text{Contact Length, } L_c = 3 \cdot (b_{\text{slab}} / 2 - e) = 2.3 \text{ ft}$$

Factored Gross Bearing:

$$q_{\text{gross}} = (W_{\text{fact}} + W_{\text{slab}}) / (3/4 \cdot L_c \cdot b_{\text{slab}}) = 2.19 \text{ ksf/ft}$$

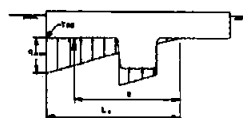
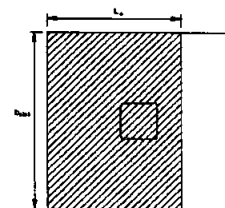
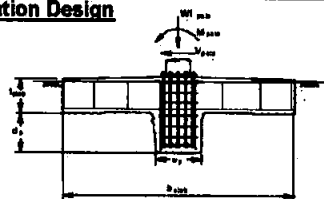
Required Bearing Strength:

$$q_{\text{req}} = q_{\text{gross}} \cdot t_{\text{slab}} \cdot \gamma_{\text{soil}} = 1.99 \text{ ksf/ft}$$

Maximum Bearing Strength:

$$\phi_b R_{n,\text{Bearing}} = 2.25 \text{ ksf (OK)}$$

USE: 6 ft. Square x 2.0 ft. Thick Slab



Slab Foundation Design (Cont.)

Slab Reinforcement Details:

Top mat rebar size: 8 Top mat Quantity: 6 $f_y = 60.0$ ksi
Bott. mat rebar size: 8 Bott. mat Quantity: 6 $f_c = 3.0$ ksi
 $A_{s,\text{top}} = 4.7$ in² $A_{s,\text{bot}} = 4.7$ in² $d = 19.5$ in

Check Minimum Horizontal Reinforcement Ratios:

$$\rho_{\text{min}} = 200/f_y = 0.0033 \text{ (OK)} \quad 1/4 \rho_{\text{min}} = 0.00170 \text{ (OK)}$$

$$\rho_{\text{development}} = 0.0018 \text{ (OK)}$$

$$\rho_{\text{total,prov'd}} = (A_{s,\text{top}} + A_{s,\text{bot}}) / A_g = 0.0055 \text{ (OK)}$$

Analysis of One-Way Beam Shear:

$$\text{Pressure Slope} = q_{\text{max}} / L_c = 0.934 \text{ ksi}$$

$$L_{\text{dev}} = 1/4 \cdot b_{\text{slab}} = 3.00 \text{ ft}$$

$$q' = q_{\text{max}} - (q_{\text{max}} / L_c) \cdot L_{\text{dev}} = -0.618 \text{ ksi}$$

Analysis of Cantilever Loads:

Factored Moment:

$$\alpha M_u = [(q' \cdot L_{\text{dev}}^2 \cdot 1/6 + (q_{\text{max}} - q') \cdot 1/2 \cdot L_{\text{dev}}^2) \cdot b_{\text{slab}} + \alpha M_{\text{act}}] = 34 \text{ ft-kips}$$

Reinforcement Ratio of lower rebar mat:

$$\rho_{\text{dev}} = A_{s,\text{bot}} / (b_{\text{slab}} \cdot t_{\text{slab}}) = 0.0027 \text{ (OK)}$$

Nominal Moment Strength:

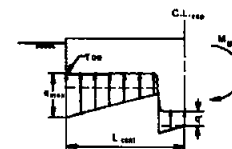
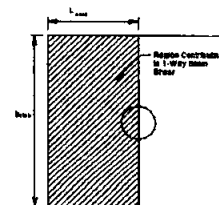
$$\phi M_u = 0.9 \cdot A_s \cdot F_y \cdot [d - (A_s \cdot F_y) / (1.3 \cdot f_c \cdot b_{\text{slab}})] = 392 \text{ ft-kips (OK)}$$

Factored Shear:

$$\alpha V_u = [q' \cdot L_{\text{dev}} + 1/2 \cdot (q_{\text{max}} - q') \cdot L_{\text{dev}}] \cdot b_{\text{slab}} = 14 \text{ kips}$$

Nominal Shear Strength of Concrete:

$$\phi V_c = 0.75 \cdot 2 \cdot f_c^{1/2} \cdot b_{\text{slab}} \cdot d = 115 \text{ kips (Vs not req'd)}$$



Top Rebar Mat:

USE: #8 A615 Gr. 60 Bars 6.6 ft. long, Spaced at 13.2 in. o-c for top rebar mat

Bottom Rebar Mat:

USE: #8 A615 Gr. 60 Bars 6.6 ft. long, Spaced at 13.2 in. o-c for bottom rebar mat

Slab Foundation Design (Cont.)

Anchor Bolt Pocket Reinforcement Details:

Reinforcement Details:

L (Vertical) rebar size: 6 Quantity of Verticals: 6 $A_{s, \text{req}} = 2.65$ sq in
Shear Tie rebar size: 4 Spacing of Ties, s = 6 in $A_{s, \text{req}} = 0.39$ sq in / tie
Pocket Width, $w_p = 2.00$ ft. $d' = 18.0$ in

Reinforcement Dimensions:

L-bar length = $L_{lb} = (C_h + l_{dev}) - 6" = 39.5$ in
Z-bar hook length = $12 * d_b = 9.00$ in
Circular Shear Tie Size = $C_s - 6" = 18.0$ in

Minimum Reinforcement Ratios, $\rho = (A_{s, \text{total}} / A_g)_{\text{center}}$

$\rho_{min} = 200/f_y = 0.0033$ (OK) $\frac{1}{2}\rho_{min} = 0.0170$ (OK)
 $\rho_{min, \text{shear}} = 0.0018$ (OK)

Total Provided Reinforcement Ratio: $\rho_{total, \text{provided}} = 0.0101$ ($A_{s, \text{req}} / A_g$)

Factored Moment in Pocket:

$\alpha M_u = V_{pos} * (l_{dev} + \frac{1}{2} * d_p) = 5$ ft-kips

Nominal Moment Strength:

$\phi M_n = 0.9 * (1/2 * A_{s, \text{req}} * f_y * (d' - (A_{s, \text{req}} * f_y) / (1.3 * f_c * C_h)) + M_{u, \text{dev}}) = 97$ ft-kips (OK)

Factored Shear in Pocket:

$V_u = V_{dev} = 1.7$ kips

Nominal Shear Strength:

$\phi V_s = 0.75 * (A_{s, \text{req}} * f_y * d') / s = 53$ kips (OK)

Vertical Reinforcement in Slab:

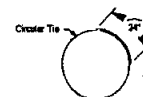
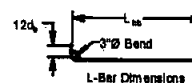
USE: 24 - #4 A615 Gr. 60 Bars x 18" Long

Vertical Reinforcement for Pocket:

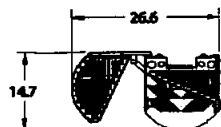
USE: 6 - #6 L-bars 39.5 in. long, with a 9 in. long hook

Anchor Bolt Confining Shear Reinforcement:

USE: 8 - #4 Horizontal Ties 18 in. Ø, spaced at 6 in. on center



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CHARLES UNIVERSAL BROADBAND ENCLOSURE
SH60-48 SERIES
 PRIVATE - N.T.S.

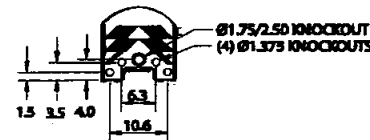
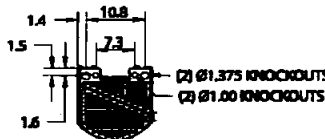
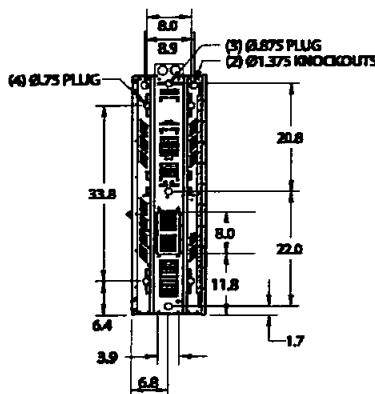
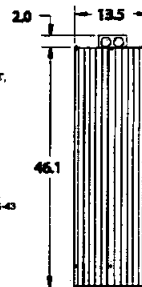
PRODUCT DESCRIPTION
 THE SH60-4814140N1 HOUSES (4) ERICSSON 220X RADIOS, (2) COMMSCOPE CBC1923T-06-43 DIPLEXERS, (1) PDS AC DISCONNECT, (1) FIBER BOX (CHARLES CFTT, AFL OPTIND 500, OR CORNING OPTSHEATH).

THE SH60-4814140N4 HOUSES (2) NOKIA 3800 RADIOS, (2) COMMSCOPE CBC1923T-06-43 DIPLEXERS, (1) RAYCAP RS2AC-3802-P-120-0 AC DISCONNECT, (1) FIBER BOX (CHARLES CFTT, AFL OPTIND 500, OR CORNING OPTSHEATH).

THE SH60-4814140N51 HOUSES (1) COMMSCOPE IONAH AND (1) COMMSCOPE E14F05P57 DIPLEXER.

THE SH60-4814140N4 HOUSES (3) NOKIA AIRSCALE MICRO RADIOS, (1) NOKIA PWRH B41 M9H MACRO RADIO, (2) ERICSSON 220X RADIOS, (2) COMMSCOPE CBC1923T-06-43 DIPLEXERS, (1) CHARLES CFTT FIBER BOX.

ALL RADIOS, DIPLEXERS, AC DISCONNECTS, AND FIBER BOXES ARE CUSTOMER SUPPLIED.



9 SCALE N.T.S.

TYPE 15 AND TYPE 21
ELEVATION A

TYPE 15 AND TYPE 21 BARRIER RAIL MOUNTED
ELEVATION B

TYPE	15	21
HEIGHT	15'-0"	21'-0"
WIND SPEED	120	120
WIND DIRECTION	120	120
WIND DURATION	120	120

TYPE	15	21
HEIGHT	15'-0"	21'-0"
WIND SPEED	120	120
WIND DIRECTION	120	120
WIND DURATION	120	120

TYPE	15	21
HEIGHT	15'-0"	21'-0"
WIND SPEED	120	120
WIND DIRECTION	120	120
WIND DURATION	120	120

NOTES:

1. For Type 15 and 21, see Notes 1 through 10 on page 10.
2. For Type 15 and 21, see Notes 1 through 10 on page 10.
3. For Type 15 and 21, see Notes 1 through 10 on page 10.
4. For Type 15 and 21, see Notes 1 through 10 on page 10.
5. For Type 15 and 21, see Notes 1 through 10 on page 10.
6. For Type 15 and 21, see Notes 1 through 10 on page 10.

LUMINAIRE MAST ARM CONNECTION
DETAIL A

BASE PLATE
DETAIL B

ELECTRICAL SYSTEMS
(LIGHTING STANDARD, TYPES 15 AND 21)

10 SCALE N.T.S.

TYPE 150 AND TYPE 210
ELEVATION A

TYPE 150 AND TYPE 210
MEDIAN BARRIER MOUNTED
ELEVATION B

TYPE	150	210
HEIGHT	15'-0"	21'-0"
WIND SPEED	120	120
WIND DIRECTION	120	120
WIND DURATION	120	120

TYPE	150	210
HEIGHT	15'-0"	21'-0"
WIND SPEED	120	120
WIND DIRECTION	120	120
WIND DURATION	120	120

TYPE	150	210
HEIGHT	15'-0"	21'-0"
WIND SPEED	120	120
WIND DIRECTION	120	120
WIND DURATION	120	120

NOTES:

1. For Type 150 and 210, see Notes 1 through 10 on page 10.
2. For Type 150 and 210, see Notes 1 through 10 on page 10.
3. For Type 150 and 210, see Notes 1 through 10 on page 10.
4. For Type 150 and 210, see Notes 1 through 10 on page 10.
5. For Type 150 and 210, see Notes 1 through 10 on page 10.
6. For Type 150 and 210, see Notes 1 through 10 on page 10.

LUMINAIRE MAST ARM CONNECTION
DETAIL A

BASE PLATE
DETAIL B

ELECTRICAL SYSTEMS
(LIGHTING STANDARD, TYPES 150 AND 210, DOUBLE LUMINAIRE MAST ARM)

11 SCALE N.T.S.



SITE ADDRESS:	
Title: _____	
DETAIL SHEET	
PTS NO. 825723	SHEET
DRAWING NO. 531 MENE MACRO	50
DATE: 11/15/18	
SCALED: N.T.S.	

GIANTSTEEL BAND
PRIVATE - N.T.S.

Giant Band

The widest and thickest band provides maximum strength. Available in 201 SS bright or matte finish.

(back to index)



Giant Band

Giant Buckle Ear-Lokt Style

Giant Band

BAND-IT® Giant Band is tough where tough counts. Giant Band produces the strongest band clamp in the industry. It is used primarily in the utility market and telecommunications. Giant Band can be formed into a single or double wrapped clamp configuration.

- The thickest BAND-IT® band
- 201 stainless steel in a shiny finish, offers good resistance to oxidation and many moderate corrosive agents
- Used with G40269 Giant Tool and G44199 Giant Buckle (below)

Product	Material	Width In. (mm)	Thickness In. (mm)	Average Breakout Strength (Lbs)	Package Quantity	Weight Lbs. Kg.	Use with Buckle Type Giant Ear-Lokt
G43099	201 SS	3/4	1/2.1	3100	100 Roll	11.455.6	G44099
G43199	201 SS	1	25.4	4400	100 Roll	15.718.4	G44199
G43299	201 SS	1-1/4	31.8	5500	100 Roll	17.218.0	G44299

Polished Carbon Steel is also available.

Giant Ear-Lokt Buckle

- 201 stainless steel offers good resistance to oxidation and many moderate corrosive agents
- Provides maximum strength
- Giant style buckle for use with G43099 3/4" Giant Band (above)
- Installed with the G00369 Heavy Duty BAND-IT® Tool or G40269 Giant Tool
- Ear-Lokt style buckle for heavy duty applications, can hold a single or double wrapped band configuration

Product	Material	Width		Package Quantity	Weight	
		In.	(mm)		Lbs.	Kg.
G44099	201 Stainless Steel	3/4	19.1	25/Box	1.8	0.8
G44199	201 Stainless Steel	1	25.4	25/Box	2.4	1.1
G44299	201 Stainless Steel	1-1/4	31.8	25/Box	3.2	1.4

12 SCALE
N.T.S.

NOT IN USE

13 SCALE
N.T.S.



200 Spectrum Center Drive, Suite 1800
Irvine, CA 92618
www.crowncastle.com

CROWN CASTLE
Master Structural Schematic

DETAIL SHEET



SITE ADDRESS:		Veritas	
TITLE:		DETAIL SHEET	
PTS NO.	025723	SHEET	
DRAWING NO.	531 MINI MACRO		
DATE:	11/15/18		
SCALED:	N.T.S.		
		51	



MASTER STRUCTURAL PLANS & CALCULATIONS

PTS # 626751

SCOPE OF WORK: INSTALLATION OF NEW INTEGRATED ANTENNA AND RADIO UNIT INSIDE SHROUD KIT 6513 FOR EXISTING STEEL STREET LIGHT POLES, NEW CONCRETE-TEXTURED STEEL STREET LIGHT REPLACEMENT POLES AND EXISTING STEEL TRAFFIC / CROSSING SIGNAL POLES TO BE USED IN VARIOUS LOCATIONS WITHIN PUBLIC RIGHT-OF-WAY.

THIS PROJECT PROVIDES A SCOPE OF WORK FOR A MASTER DESIGN CONCEPT. IT DOES NOT IDENTIFY ANY SPECIFIC SITES OR LOCATIONS. REFERENCES TO FAA CLEARANCE AND SPECIFIC LOCATIONS FOR SOILS TESTING ARE NOT INCLUDED OR PART OF THIS PROJECT. SITE SPECIFIC REQUIREMENTS WILL BE ADDRESSED THROUGH INDIVIDUAL SITE SPECIFIC PERMIT APPLICATIONS.

DESIGN CODE REFERENCES:

- 2016 CBC
- ACI 318-14
- ASCE 7-10
- AISC 14th EDITION

City of San Diego
DEVELOPMENT SERVICES
ENGINEERING DIVISION

☒ LDR-ENG. BUILDING REVIEW
☐ LDR-FLOOD PLAINS
☐ LDR-DRAINAGE & GRADES
☐ DSD-STORM WATER REVIEW

PRINT NAME: Bernie Doran
SIGNATURE: Bernie Doran
DATE: 6/10/2019

CITY OF SAN DIEGO
APPROVED MASTER PLAN
SEPARATE BUILDING PERMIT(S) REQUIRED

626751

Master Plan Project No.

This set of plans and specifications, together with separate approved building permits for each structure, shall be kept on the site at all times during which work authorized by these plans is in progress. These plans shall be made available to City officials upon request. It is unlawful to change, modify or alter the approved plans and specifications without written authorization of the Building Official. The stamping of these plans and specifications SHALL NOT be held to permit nor approve the violation of City, County, State or Federal laws nor restrictions.

Issued by: [Signature] Date: 6/17/19

THIS IS NOT A CONSTRUCTION PERMIT

PTS: 626751

DEVELOPMENT SERVICES
STRUCTURAL REVIEW

Christian Soto

Date: 6/6/19

Project Number: 626751

These plans conform to the approved master plan for project number 626751.

Authenticity by: [Signature] Date: 6/3/19

City of San Diego, Department of Planning, Legislation

Revisions to these plans shall require a separate stamp of authenticity or construction change.

CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 626751

DEVELOPER
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PREPARED BY
**SUPDESIGN
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STAMP
I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 8703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.
I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

REGISTERED PROFESSIONAL ENGINEER
JERRY L. MICHAL
No. C42590
Exp. 03-31-20
CIVIL
STATE OF CALIFORNIA

Jerry L. Michal DATE: 6/24/19
EXP. 03/31/20

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REGISTERED PROFESSIONAL ENGINEER
ADRIAN M. JARON
No. C57075
Exp. 09-30-19
5/23/19
CIVIL
STATE OF CALIFORNIA

ADRIAN M. JARON DATE: 5/23/19
EXP. 09/30/19

SHEET TITLE
TITLE SHEET

SHEET NUMBER
1 OF 31

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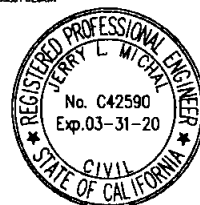
CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 626751



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I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT. THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 8702 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS. I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.



Jerry L. Michal DATE 5/23/19
JERRY L. MICHAL REG. C42590
EXP. 03/31/20

STAMP

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DATE 05/23/19
ADRIAN MCLUNGHIN REG. C57875
EXP. 09/30/19

SHEET TITLE
SHEET INDEX

SHEET NUMBER
2 OF 31



N.T.S.



3 OF 31



CAUTION

KEEP BACK 3 FT FROM
THIS ANTENNA. FCC RF PUBLIC
EXPOSURE LIMITS MAY BE
EXCEEDED WITHIN THIS DISTANCE.
CALL 888-632-0931 FOR INSTRUCTIONS.
QUALIFIED WORKERS:
FCC OCCUPATIONAL LIMITS MAY BE
EXCEEDED WITHIN THIS DISTANCE.

SITE ID #

**CROWN
CASTLE**

7 RF ADVISORY CAUTION SIGN

N.T.S.

CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 826751

DEVELOPER
**CROWN
CASTLE**
10301 MEANLEY DR, SUITE 250
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WWW.CROWNCASTLE.COM

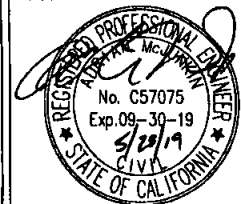
PREPARED BY
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Jerry L. Michal
JERRY L. MICHAL
DATE: 12/1/19
SCE # C42590
EXP: 03/31/20

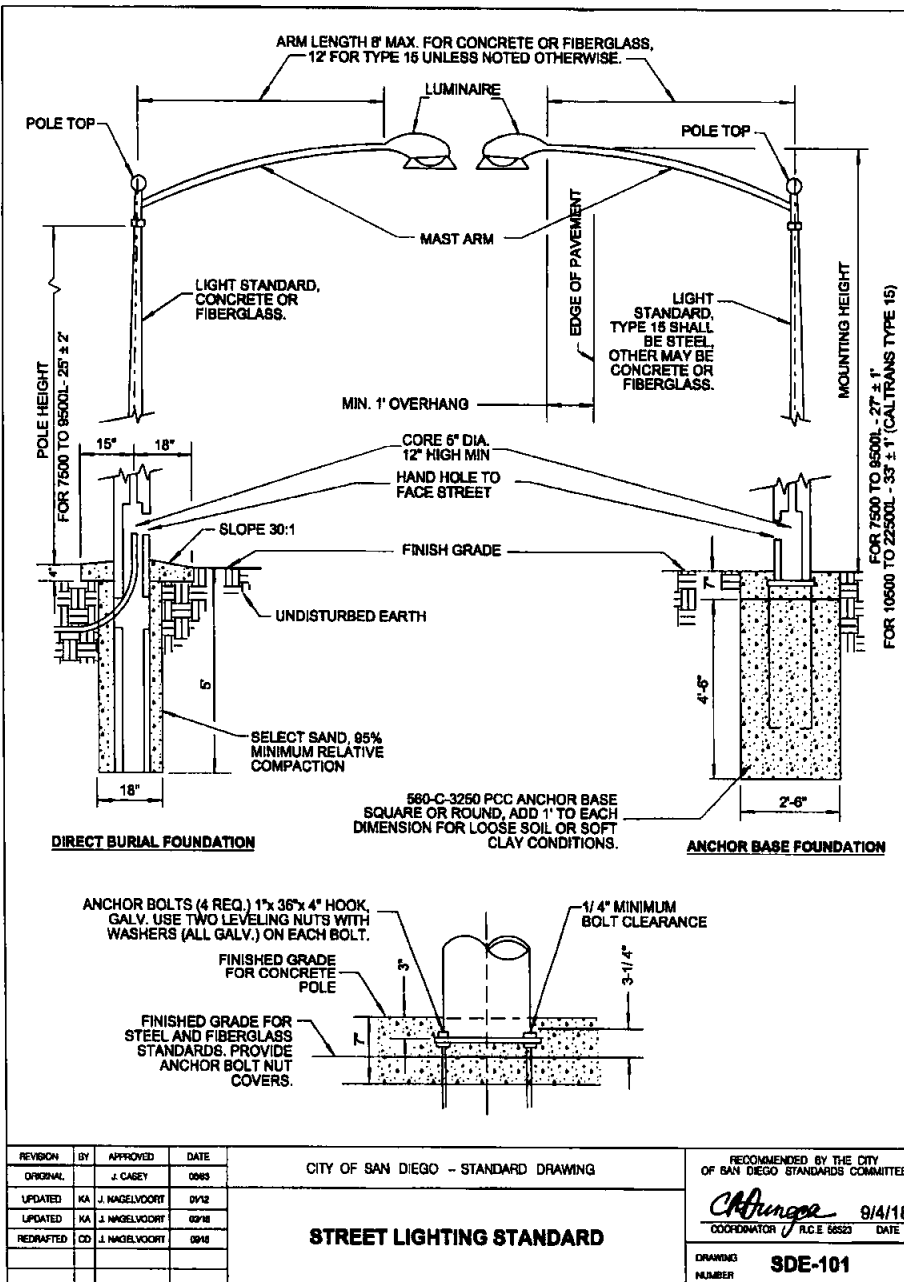
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PROJECT DESIGN.



ADRIAN MCLAUGHLIN
DATE: 5/28/19
SCE # C57075
EXP: 09/30/19

SHEET TITLE
**PROPOSED EQUIPMENT
DETAILS**

SHEET NUMBER
4 OF 31



CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**
PTS # 626751

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REGISTERED PROFESSIONAL ENGINEER
JERRY L. MICHAL
No. C42590
Exp. 03-31-20
CIVIL
STATE OF CALIFORNIA
JERRY L. MICHAL
EXP. 03/31/20

STAMP
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REGISTERED PROFESSIONAL ENGINEER
ADRIAN MOLJUNEN
No. C57075
Exp. 09-30-19
CIVIL
STATE OF CALIFORNIA
ADRIAN MOLJUNEN
EXP. 09/30/19

SHEET TITLE:
**SAN DIEGO
STANDARD DRAWING SDE-101
(AS REFERENCE ONLY)**

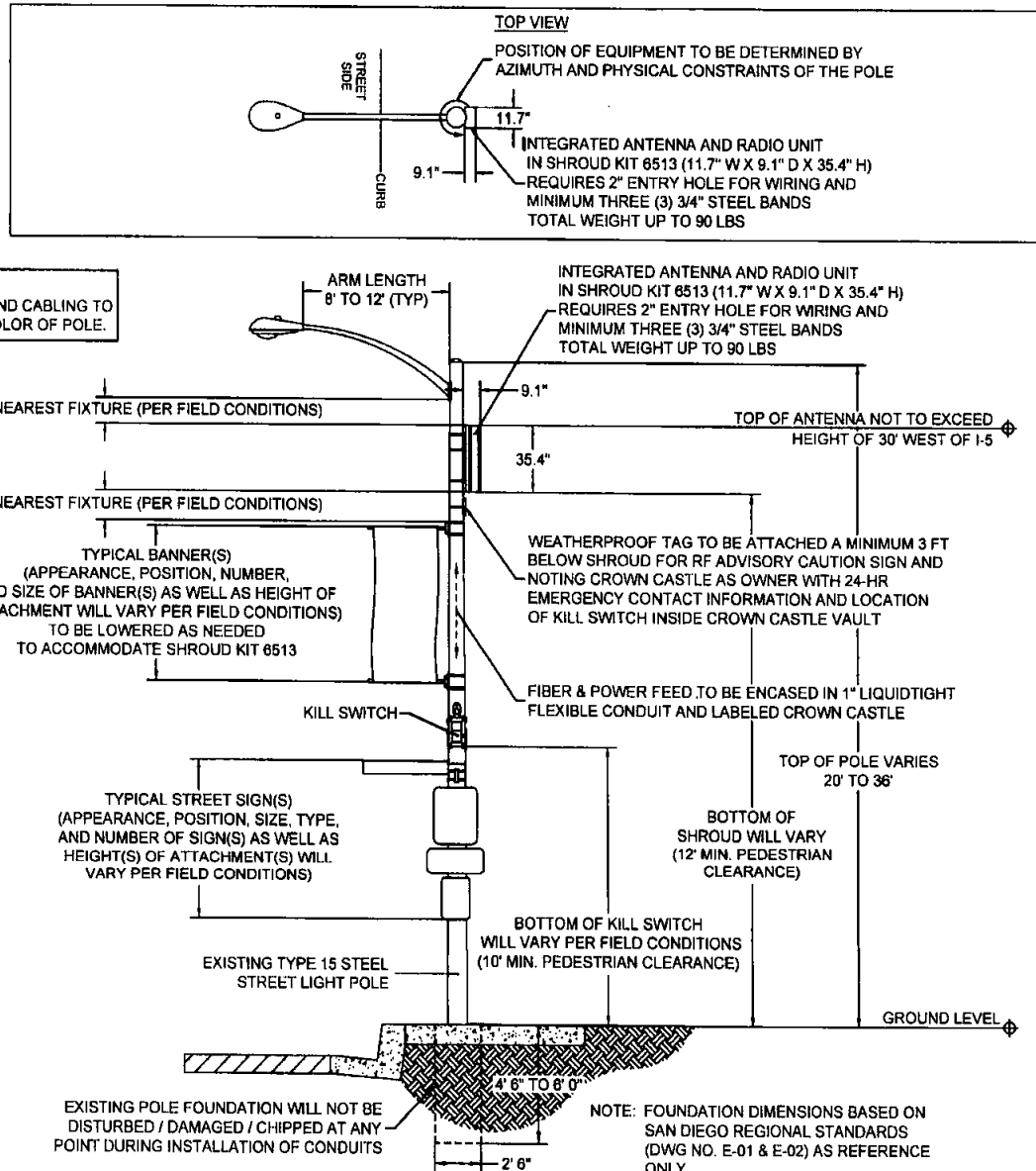
SHEET NUMBER
5 OF 31

MASTER STRUCTURAL PLANS AND CALCULATIONS FOR EXISTING TYPE 15 STEEL STREET LIGHT POLE CONFIGURATIONS

CITY OF SAN DIEGO, CA DEVELOPMENT SERVICES DEPARTMENT																	
MASTER STRUCTURAL PLANS & CALCULATIONS																	
PTS # 626751																	
 CROWN CASTLE 10301 MEANLEY DR, SUITE 250 SAN DIEGO, CA 92131 www.crowncastle.com																	
 SUPDESIGN GROUP 10151 PACIFIC MESA BLVD, SUITE 104 SAN DIEGO, CA 92121 www.supdesigninc.com																	
I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBILITY AND CONTROL OVER THE DESIGN OF THE PROJECT AS REQUIRED IN SECTION 8753 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS. I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS AN ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.																	
																	
 JERRY L. MICHAL No. C42590 Exp. 03-31-20																	
DRAWN BY: MK CHECKED BY: SY DATE: 12/18/18 REVISIONS <table border="1"> <thead> <tr> <th>REV.</th> <th>DATE</th> <th>DESCRIPTION</th> <th>BY</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>01/25/19</td> <td>MIDPOLE CONFG. REMOVED</td> <td>MK</td> </tr> <tr> <td>2</td> <td>04/18/19</td> <td>REMOVED PER REVIEW COMMENTS</td> <td>MK</td> </tr> <tr> <td>3</td> <td>05/14/19</td> <td>REVISED SPACING RATS MARK & OUTL</td> <td>MK</td> </tr> </tbody> </table>		REV.	DATE	DESCRIPTION	BY	1	01/25/19	MIDPOLE CONFG. REMOVED	MK	2	04/18/19	REMOVED PER REVIEW COMMENTS	MK	3	05/14/19	REVISED SPACING RATS MARK & OUTL	MK
REV.	DATE	DESCRIPTION	BY														
1	01/25/19	MIDPOLE CONFG. REMOVED	MK														
2	04/18/19	REMOVED PER REVIEW COMMENTS	MK														
3	05/14/19	REVISED SPACING RATS MARK & OUTL	MK														
SHEET TITLE																	
MASTER STRUCTURAL PLANS AND CALCULATIONS FOR EXISTING TYPE 15 STEEL STREET LIGHT POLE CONFIGURATIONS																	
LOCATION																	
VARIES																	
SCALE																	
NOT TO SCALE																	
SHEET NUMBER																	
6 OF 31																	

DESCRIPTION:

EXISTING TYPE 15 STEEL STREET LIGHT POLE WITH INTEGRATED ANTENNA AND RADIO UNIT IN EQUIPMENT SHROUD ATTACHED AT 12' MINIMUM ABOVE GROUND LEVEL. TOP OF ANTENNA WILL NOT EXCEED THE HEIGHT OF 30' 0" WEST OF INTERSTATE 5 PER CITY OF SAN DIEGO REQUIREMENTS. HEIGHT OF STREET LIGHT POLE MAY VARY PER LOCATION.



CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 626751

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PREPARED BY
**SUPREDESIGN
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SAN DIEGO, CA 92121
www.supredesign.com

I HEREBY DECLARE THAT I AM THE ENGINEER OF RECORD FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBILITY AND CONTROL OVER THE DESIGN OF THE PROJECT AS REQUIRED IN SECTION 8703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS IN CONFORMANCE WITH CURRENT STANDARDS.

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Jerry L. Michal DATE: 12/18/18
JERRY L. MICHAL P.E. C42590
EXP. 03-31-20

REV	DATE	DESCRIPTION	BY
1	01/25/19	REVISIONS	
1	01/25/19	REVISIONS	
2	04/15/19	REVISIONS	
3	08/14/19	REVISIONS	

SHEET TITLE
**CONFIGURATION A:
EXISTING TYPE 15 STEEL STREET
LIGHT POLE WITH SHROUD KIT 6513
FOR INTEGRATED ANTENNA AND
RADIO UNIT**

LOCATION

VARIAS

SCALE

NOT TO SCALE

SHEET NUMBER

7 OF 31

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Typical Antenna Pole Installation

CALCULATIONS BY: JLM

PROJECT NAME: Pole Installation

DATE: 1-15-2019

PROJECT ADDRESS: Various Locations

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 150 psf/ft

Steel Pole Ht. = 20' Ave. Pole Dia. = As Noted,

Footings by design - 2.5' x 4.5' Equipment weight = 90 lbs

References: 1. 2018 UBC 3. ASCE MINIMUM DESIGN LOADS - 7-16
2. 2016 CBC 4. STANDARD PLAN RSP ES-6A
5. San Diego Regional Standard Drawing E-01

20-Foot steel light pole with side mount equipment and signs.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3)

V = 100 mph (3 sec. Gust)

Coefficients: Kz(16) = 0.87 Kz(32) = 0.94
Iz = 0.87 G = 1.142

Wind Pressures: Pz(16) = (0.00256) Kz(16)GV²Iz = 22 psf

Pz(39.0) = (0.00256) Kz(30.0)GV²Iz = 23.8 psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 7.34 in. A_{wp} = (16) (7.34/12) = 9.79 sq.ft.
Ave. Dia. (16-20.0') = 5.67 in. A_{sp} = (4.0) (5.67/12) = 1.89 sq.ft.

Area of antenna: Area = (10.22/12)(35.4/12) = 88.3 sq.ft

Area of Arm: A = (0.25)(8) + (0.5)(2) = 3 sq. ft.

Area of signs: A = (1)(2) + (1.5)(1.5) + (1)(2.5) = 6.75 sq. ft.

3. FORCE ON POLE

Force on pole: F = Q_hH_{wp}A + Q_hH_{sp}A + Q_uA_{ant} = 260.4 pounds

Force on Arm: F = 71.45 pounds

Force on Antenna: F = Q_uA_{ant} = 14.6 pounds

Force on Signs: F = 148.5 lbs

Total wind load = 494.9 pounds

3. Depth Requirement: Typical Standard Depth is 4.5 feet

$$D = 0.5A [1 + (1 + (4.36h/A))^n]$$

$$\text{Where } A = (2.34 P/S, b) = [(2.34) (494.9) / (1200) (2.5)] = 0.39$$

$$\text{Therefore } D_{req} = 3.12 \text{ ft.} < 4.5 \text{ feet OK}$$

4. Bearing:

Load to footing: Pole+ light: 850.0 lbs.
Signs: 4lbs
Antenna: 92 lbs

Total 944 lbs

Footing Diameter = 30 inches

Footing area = 4.91 sq. ft.

$$q_u = 944 / 4.91 \text{ sq. ft.} = 192.3 \text{ psf} < q_u = 1500 \text{ psf OK}$$

CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 626751

**CROWN
CASTLE**

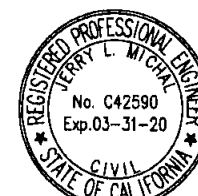
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www.crowncastle.com

**SUPDESIGN
GROUP, INC.**

10151 PACIFIC MESA BLVD, SUITE 104
SAN DIEGO, CA 92126
www.supdesigninc.com

I HEREBY DECLARE THAT I AM THE ENGINEER OF RECORD FOR THIS PROJECT. THAT I HAVE EXERCISED REASONABLE CARE AND SKILL IN THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 9103 OF THE BUILDING AND SAFETY CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS AN ENGINEER OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.



Jerry L. Michal DATE: 1/15/19
JERRY L. MICHAL REG. NO. C42590
EXP. 03/31/20

REV.	DATE	DESCRIPTION	BY
1	01/22/18	MONOPOLE CONFIG REMOVED	MK
2	04/18/18	REVISED PER REVIEW COMMENTS	MK
3	06/14/18	REVISED TO INCLUDE KIT'S BOMK & EQ TO	MK

CONFIGURATION A:
EXISTING TYPE 15 STEEL STREET
LIGHT POLE WITH SHROUD KIT 6513
FOR INTEGRATED ANTENNA AND
RADIO UNIT (CALCULATIONS)

LOCATION:

VARIES

SCALE:

NOT TO SCALE

8 OF 31

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Typical Antenna Pole Installation

CALCULATIONS BY: JLM

PROJECT NAME: Pole Installation

DATE: 1-15-2019

PROJECT ADDRESS: Various Locations

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 150 psf/ft
STEEL Pole Ht. = 36' Ave. Pole Dia. = As Noted, Footing by design - 2.5' x 6.0'

Equipment weight = 90 lbs

References: 1. 2018 UBC 3. ASCE MINIMUM DESIGN LOADS - 7-16
2. 2016 CBC 4. STANDARD PLAN RSP ES-6A
5. San Diego Regional Standard Drawing E-01

36-Foot STEEL light pole with equipment and signs.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3) V = 110 mph (3 sec. Gust)

Coefficients: Kz (16) = 0.87 Kz(32) = 0.94
K_r = 0.87 G = 1.142

Wind Pressures: Pz(16) = (0.00256) Kz(16)GV²IR = 22 psf

Pz(35.0) = (0.00256) Kz(30.0)GV²IR = 23.8 psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 9.94 in. A₁₆ = (16) (9.94/12) = 13.3 sq.ft.
Ave. Dia. (16-36.0') = 6.44 in. A₃₆ = (20.0) (6.44/12) = 10.7 sq.ft.

Area of antenna: Area = (10.22/12)(35.4/12) = 88.3 sq.ft

Area of Arm: A = (0.25)(8) + (0.5)(2) = 3 sq. ft.

Area of signs: A = (1)(2) + (1.5)(1.5) + (1)(2.5) = 6.75 sq. ft.

3. FORCE ON POLE

Force on pole: $F = Q_{16}H_{16}A + Q_{36}H_{36}A + Q_{eq}A_{eq} = 547.2$ pounds

Force on Antenna: $F = Q_{eq}A_{eq} = 14.6$ pounds

Force on Signs: $F = 148.5$ lbs

Force on light arm: $F = 71.4$ pounds

Total wind load = 779.6 pounds

3. Depth Requirement: Typical Standard Depth is 6 feet

$$D = 0.5A (1 + [1 + (4.36h / A)]^2)$$

$$\text{Where } A = (2.34 P/S, b) = [(2.34) (779.6) / (1400) (2.5)] = 0.52$$

$$\text{Therefore } D_m = 4.78 \text{ ft.} < 6.0 \text{ feet ok}$$

4. Bearing:

Load to footing: Pole+ light: 2100 lbs.
Signs: 4lbs
Antenna: 90 lbs
Total 2194 lbs

Footing Diameter = 30 inches

Footing area = 4.91 sq. ft.

q_a = 1500 psf

$$Q_s = (2194) / (4.91) = 446.8 \text{ psf} < q_a = 1500 \text{ psf OK}$$

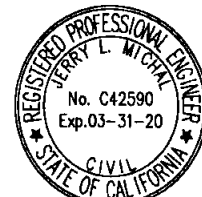
CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 626751



I HEREBY DECLARE THAT I AM THE ENGINEER OF RECORD FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBILITY AND CONTROL OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 1703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONFORMANT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.



Jerry L. Michal DATE: 1/15/19
JERRY L. MICHAL REG. NO. C42590
EXP. 03/31/20

DRAWN BY: MK CHECKED BY: RT DATE: 12/18/18			
REV	DATE	DESCRIPTION	BY
1	01/29/19	MONOPOLE CONFIG. RELAYED	MM
2	04/15/19	REVISED PER REVIEW COMMENTS	MM
3	05/14/19	REVISED BY-POUND KITS BOX & DITTO	MM

SHEET TITLE

CONFIGURATION A:
EXISTING TYPE 15 STEEL STREET
LIGHT POLE WITH SHROUD KIT 8513
FOR INTEGRATED ANTENNA AND
RADIO UNIT (CALCULATIONS)

LOCATION

VARIES

SCALE

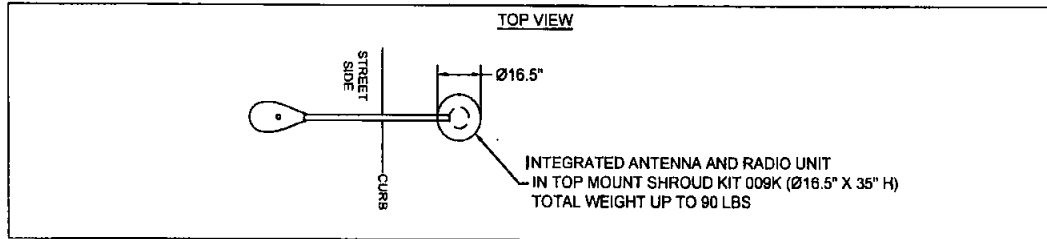
NOT TO SCALE

SHEET NUMBER

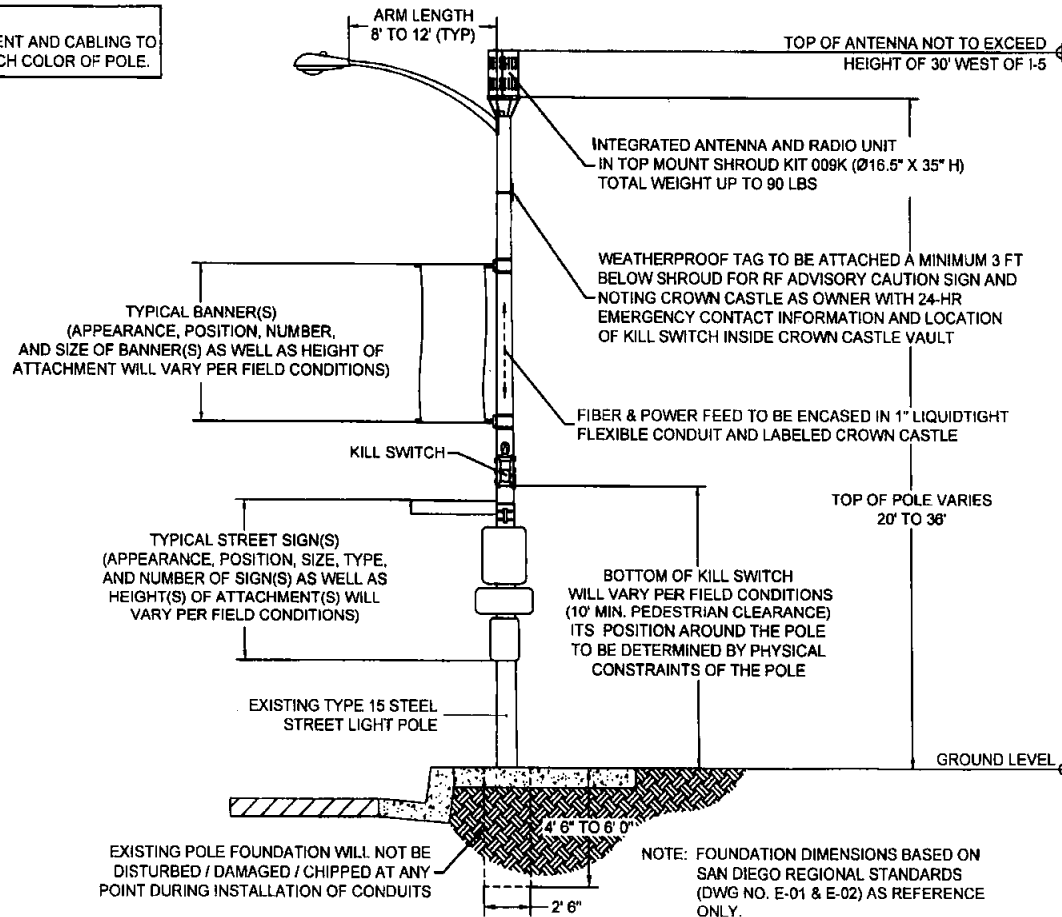
9 OF 31

DESCRIPTION:

EXISTING TYPE 15 STEEL STREET LIGHT POLE WITH INTEGRATED ANTENNA AND RADIO UNIT IN EQUIPMENT SHROUD ATTACHED AT 12' MINIMUM ABOVE GROUND LEVEL. TOP OF ANTENNA WILL NOT EXCEED THE HEIGHT OF 30' 0" WEST OF INTERSTATE 5 PER CITY OF SAN DIEGO REQUIREMENTS. HEIGHT OF STREET LIGHT POLE MAY VARY PER LOCATION.



NOTE:
PROPOSED EQUIPMENT AND CABLING TO BE PAINTED TO MATCH COLOR OF POLE.



CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**
PTS # 626751

DEVELOPER
**CROWN
CASTLE**
10001 MEANLEY DR, SUITE 250
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www.crowncastle.com

PREPARED BY
**SUPDESIGN
GROUP, LLC**
10151 PACIFIC MESA BLVD, SUITE 104
SAN DIEGO, CA 92121
www.supdesignllc.com

STAMP
I HEREBY DECLARE THAT I AM THE ENGINEER OF RECORD FOR
THIS PROJECT. THAT I HAVE EXERCISED INDEPENDENT
JUDGMENT AND HAVE NOT BEEN INFLUENCED BY ANY
CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED
IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS
CODE, AND THAT THE DESIGN IS CONFORMANT WITH
CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS
AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS
CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME
AS ENGINEER OF WORK OF MY RESPONSIBILITY FOR
PROJECT DESIGN.

REGISTERED PROFESSIONAL ENGINEER
JERRY L. MICHAL
No. C42590
Exp. 03-31-20
CIVIL
STATE OF CALIFORNIA

Jerry L. Michal
JERRY L. MICHAL
EXP. 03/31/20

REV.	DATE	REVISIONS	BY
1	01/26/18	MONOPOLY CONING REMOVED	JK
2	04/15/18	REVISED PER REVIEW COMMENTS	JK
3	05/14/18	REVISED SHROUD KIT 009K & 007C	JK

SHEET TITLE
**CONFIGURATION B:
EXISTING TYPE 15 STEEL STREET
LIGHT POLE WITH TOP MOUNT
SHROUD KIT 009K FOR INTEGRATED
ANTENNA AND RADIO UNIT**

LOCATION
VARIES

SCALE
NOT TO SCALE

SHEET NUMBER
10 OF 31

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Typical Antenna Pole Installation

CALCULATIONS BY: JLM

PROJECT NAME: Pole Installation

DATE: 4-1-2019

PROJECT ADDRESS: Various Locations

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 150 psf/ft

Steel Pole Ht. = 20' Ave. Pole Dia. = As Noted,

Footings by design - 2.5' x 6.0'

Equipment weight = 90 lbs

References: 1. ACI-318-14

3. ASCE MINIMUM DESIGN LOADS - 7-10

2. 2016 CBC

4. STANDARD PLAN RSP ES-6A

5. San Diego Regional SDE-101

6. AISC 14TH ED.

20-Foot steel light pole with top mount equipment, kill switch, banner and signs.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3)

V = 110 mph (3 sec. Gust)

Coefficients:

K_z(16) = 0.87

K_z(32) = 0.94

I_r = 0.87

G = 1.142

Wind Pressures:

P_z(16) = (0.00256) K_z(16) G V² / I_r = 22 psf

P_z(39.0) = (0.00256) K_z(30.0) G V² / I_r = 23.8 psf

2. AREA CALCULATIONS

Area of pole:

Ave. Dia. (0-16') = 7.34 in.

A₁₆ = (16) (7.34/12) = 9.79 sq.ft.

Ave. Dia. (16-20.0') = 5.67 in.

A₂₀ = (4.0) (5.67/12) = 1.89 sq.ft.

Area of antenna:

Area = (18.5/12)(35.0/12) = 4.5 sq.ft.

Area of Arm:

A = (0.25)(8) + (0.5)(2) = 3 sq. ft.

Area of signs:

A = (1)(2) + (1.5)(1.5) + (1)(2.5) = 6.75 sq. ft.

Area of kill switch:

A = (10/12)(15.36/12) = 1.1 sq. ft.

Area of Banner:

A = (2)(6) = 12 sq. ft.

3. FORCE ON POLE

Force on pole: $F = Q_{16}H_{16,16}A + Q_{16,20}H_{16,20}A + Q_{20}A_{20} = 260.4$ pounds

Force on Arm: $F = 71.45$ pounds

Force on Antenna: $F = Q_{20}A_{20} = 107$ pounds

Force on Signs: $F = 148.5$ lbs

Force on Kill Switch: $F = (1.1)(22) = 23.4$ pounds

Force on Banner: $F = 285.6$ pounds

Total wind load = 896.1 pounds

3. Depth Requirement: Typical Standard Depth is 6.0 feet

$$D = 0.5A(1 + [1 + (4.36h/A)]^0.9)$$

$$\text{Where } A = (2.34 P/S, b) = [(2.34)(896.1)/(1200)(2.5)] = 0.69$$

$$\text{Therefore } D_{min} = 4.23 \text{ ft.} < 6.0 \text{ feet ok}$$

4. Bearing:

Load to footing:

Pole+ light: 850.0 lbs.

Signs: 4lbs

Equipment 90 lbs

Total 944 lbs

Footing Diameter = 30 inches

Footing area = 4.91 sq. ft.

$$q_u = 944 / 4.91 \text{ sq. ft.} = 192.3 \text{ psf} < q_u = 1500 \text{ psf OK}$$

CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 626751

DEVELOPER
**CROWN
CASTLE**

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www.crowncastle.com

PREPARED BY
SUPDESIGN
ORLANDO, LLC

10151 PACIFIC MESA BLVD, SUITE 104
SAN DIEGO, CA 92121
www.supdesign.com

I HEREBY DECLARE THAT I AM THE ENGINEER OF RECORD FOR THIS PROJECT. THAT I HAVE EXERCISED REASONABLE CARE AND SKILL IN THE DESIGN AND CALCULATIONS OF THE PROJECT AS SHOWN IN SECTION 2700 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS IN ACCORDANCE WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE SEAL OF PROFESSIONAL ENGINEER AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELEASE AN ENGINEER OF WORK, OR ANY RESPONSIBILITIES FOR PROJECT DESIGN.

Jerry L. Mitchell
No. C42590
Exp. 03-31-20
CIVIL
STATE OF CALIFORNIA

REV	DATE	DESCRIPTION	BY
1	01/25/18	MONOPOL POLE CONFIG REMOVED	AK
2	04/15/18	REVISIO RLM REVIEW COMMENTS	AK
3	05/1/18	REVISIO BIRGOLD RITE CORP. & DOTO	AK

SHEET TITLE
**CONFIGURATION B:
EXISTING TYPE 15 STEEL STREET
LIGHT POLE WITH TOP MOUNT
SHROUD KIT 009K FOR INTEGRATED
ANTENNA AND RADIO UNIT
(CALCULATIONS)**

LOCATION
VARIES

SCALE
NOT TO SCALE

SHEET NUMBER
11 OF 31

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Typical Antenna Pole Installation

CALCULATIONS BY: JLM

PROJECT NAME: Pole Installation

DATE: 4-1-2019

PROJECT ADDRESS: Various Locations

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 150 psf/ft

STEEL Pole Ht. = 36' Ave. Pole Dia. = As Noted, Footing by design - 2.5' x 6.0'

Equipment weight = 90 lbs

References: 1. ACI-318-14 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. STANDARD PLAN RSP ES-6A
5. San Diego Regional SDE-101 6. AISC 14TH ED.

36-Foot STEEL light pole with top mount equipment, kill switch, banner and signs.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3)

V = 100 mph (3 sec. Gust)

Coefficients: K_z (16) = 0.87 K_z(32) = 0.94
I_r = 0.87 Q = 1.142

Wind Pressures: P_z(16) = (0.00256) K_z(16)G_zV²I_r = 22 psf
P_z(36.0) = (0.00256) K_z(30.0)G_zV²I_r = 23.8 psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 9.94 in. A_{st} = (16) (9.94/12) = 13.3 sq.ft.
Ave. Dia. (16-36.0') = 6.44 in. A_{st} = (20.0) (6.44/12) = 10.7 sq.ft.

Area of antenna: Area = (18.5/12)(35/12) = 4.50 sq.ft.

Area of Arm: A = (0.25)(8) + (0.5)(2) = 3 sq. ft.

Area of signs: A = (1)(2) + (1.5)(1.5) + (1)(2.5) = 6.75 sq. ft.

Area of kill switch: A = (10/12)(15.36/12) = 1.1 sq.ft.

Area of Banner: A = (2)(6) = 12 sq. ft.

3. FORCE ON POLE

Force on pole: $F = Q_{st}H_{st}A + Q_{st}H_{st}A + Q_{st}A_{st} = 547.2$ pounds

Force on Antenna: $F = Q_{st}A_{st} = 107$ pounds

Force on Signs: $F = 148.5$ lbs

Force on light arm: $F = 71.4$ pounds

Force on kill switch: $F = 23.4$ pounds

Force on Banner: $F = (2)(6)(23.8) = 285.6$ pounds

Total wind load = 1183.1 pounds

3. Depth Requirement: Typical Standard Depth is 6 feet

$$D = 0.5A (1 + \{ 1 + (4.36h / A) \}^2)$$

$$\text{Where } A = (2.34 P/S, b) = [(2.34) (1183) / (1400) (2.5)] = 0.79$$

$$\text{Therefore } D_{st} = 5.97 \text{ ft.} < 6.0 \text{ feet ok}$$

4. Bearing:

Load to footing: Pole+ light: 2100 lbs.
Signs: 4lbs
Equipment 90 lbs
Total 2194 lbs

Footing Diameter = 30 inches

Footing area = 4.91 sq. ft.

$$q_s = 1500 \text{ psf}$$

$$Q_s = (2194) / (4.91) = 446.8 \text{ psf} < q_s = 1500 \text{ psf OK}$$

CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 626751

**CROWN
CASTLE**

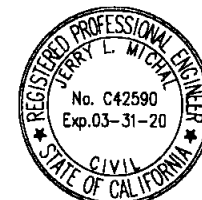
10001 MEANLEY DR, SUITE 250
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www.crowncastle.com

**SUPDESIGN
GROUP, LLC**

10151 PACIFIC MESA BLVD, SUITE 104
SAN DIEGO, CA 92121
www.supdesignllc.com

I HEREBY DECLARE THAT I AM THE ENGINEER OF RECORD FOR THIS PROJECT. THAT I HAVE EXERCISED RESPONSIBLE CHANGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6700 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONFORMANT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS AN ENGINEER OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.



Jerry L. Michal DATE: 4/1/19
JERRY L. MICHAL No. C42590
EXP: 03/31/20

REV.	DATE	DESCRIPTION	BY
1	01/29/19	MONOPOLE CONFIG. REMOVED	AK
2	04/19/19	REVISED PER REVIEW COMMENTS	AK
3	04/19/19	REVISED SHROUD KIT'S WORK & GOTO	AK

SHEET TITLE:
CONFIGURATION B:
EXISTING TYPE 15 STEEL STREET
LIGHT POLE WITH TOP MOUNT
SHROUD KIT WORK FOR INTEGRATED
ANTENNA AND RADIO UNIT
(CALCULATIONS)

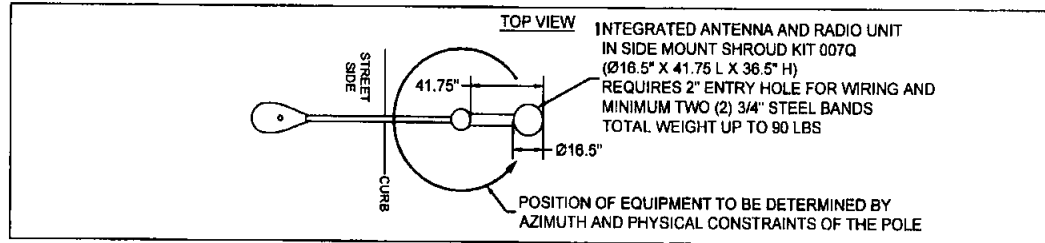
LOCATION:
VARIES

SCALE:
NOT TO SCALE

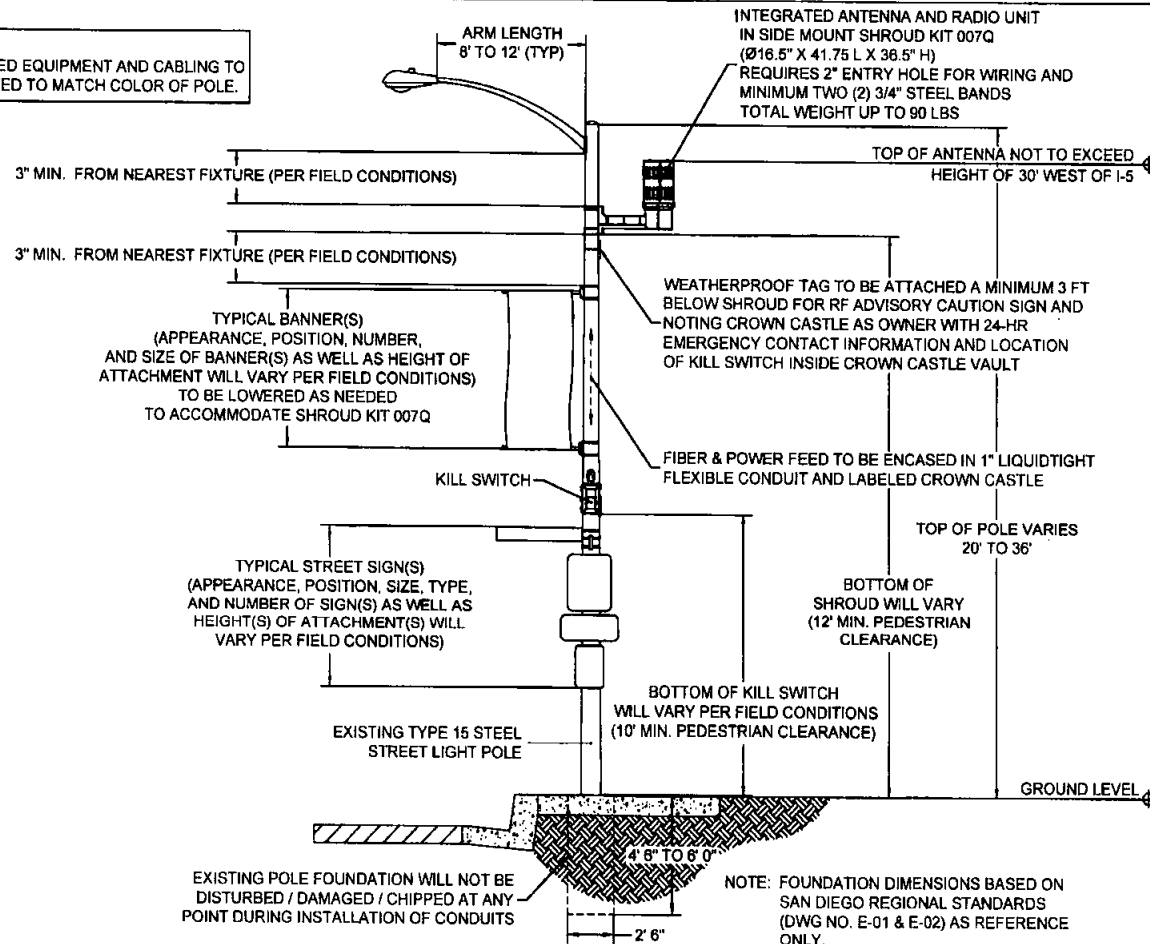
SHEET NUMBER:
12 OF 31

DESCRIPTION:

EXISTING TYPE 15 STEEL STREET LIGHT POLE WITH INTEGRATED ANTENNA AND RADIO UNIT IN EQUIPMENT SHROUD ATTACHED AT 12' MINIMUM ABOVE GROUND LEVEL. TOP OF ANTENNA WILL NOT EXCEED THE HEIGHT OF 30' 0" WEST OF INTERSTATE 5 PER CITY OF SAN DIEGO REQUIREMENTS. HEIGHT OF STREET LIGHT POLE MAY VARY PER LOCATION.



NOTE:
PROPOSED EQUIPMENT AND CABLING TO BE PAINTED TO MATCH COLOR OF POLE.



CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**
PTS # 626751

PREPARED BY:
**CROWN
CASTLE**
10301 MEANLEY DR, SUITE 250
SAN DIEGO, CA 92131
WWW.CROWNCASTLE.COM

DESIGNED BY:
**SUPDESIGN
GROUP, LLC**
10151 PACIFIC MESA BLVD, SUITE 104
SAN DIEGO, CA 92121
WWW.SUPDESIGNGROUP.COM

I HEREBY DECLARE THAT I AM THE ENGINEER OF RECORD FOR THIS PROJECT, THAT I HAVE ASSIGNED RESPONSIBILITY FOR THE DESIGN OF THE PROJECT AS REQUIRED IN SECTION 050 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS IN ACCORDANCE WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS AN ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

REGISTERED PROFESSIONAL ENGINEER
JERRY L. MITCHELL
No. C42590
Exp. 03-31-20
CIVIL
STATE OF CALIFORNIA

DATE: 12/18/18
REV. 1: 12/18/18
REV. 2: 12/18/18

REV	DATE	DESCRIPTION	BY
1	12/18/18	MONITOR & CORRECT REMOVED	UK
2	04/13/19	REVISED PER REVIEW COMMENTS	UK
3	06/14/19	REVISED: SHROUD KITS DSK & 007Q	UK

SHEET TITLE:
**CONFIGURATION C:
EXISTING TYPE 15 STEEL STREET
LIGHT POLE WITH SIDE MOUNT
SHROUD KIT 007Q FOR INTEGRATED
ANTENNA AND RADIO UNIT**

LOCATION:
VARIES

SCALE:
NOT TO SCALE

SHEET NUMBER:
13 OF 31

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Typical Antenna Installation

CALCULATIONS BY: JLM

PROJECT NAME: Traffic Pole Installation

DATE: 4-1-2019

PROJECT ADDRESS: Various Locations

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 150 psf/ft

Steel Pole Ht. = 20' Ave. Pole Dia. = As Noted, Equipment Weight: 90 pounds

Footings by Design: Dia. = 3.5' dia. x 5' deep.

- References:
- | | |
|-----------------------------|--|
| 1. ACL-318-14 | 3. ASCE MINIMUM DESIGN LOADS - 7-10 |
| 2. 2016 CBC | 4. 2016 Caltrans Standard Plan RSP ES-7C |
| 5. AISC 14 TH ED | 6. SDE-101 |

20 foot steel light pole with side mount antenna, equipment and signs

1. Wind Loading:

Wind Zone: (Fig. 3-2.3)

V = 110 mph (3 sec. Gust)

Coefficients: $K_z(16) = 0.87$ $K_z(32) = 0.94$
 $L = 0.87$ $Q = 1.142$

Wind Pressures: $P_z(16) = (0.00256) K_z(16) G V^2 I R = 22 \text{ psf}$

$P_z(36.0) = (0.00256) K_z(30.0) G V^2 I R = 23.8$

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 9.86 in. $A_{p1} = (16)(9.86/12) = 13.1 \text{ sq. ft.}$
 Ave. Dia. (16-20') = 9.11 in. $A_{p2} = (4.0)(9.11/12) = 3.04 \text{ sq. ft.}$

Area of traffic arm: $A = (0.47)(30) + (1.0)(2)(2) = 18.3 \text{ sq. ft.}$

Area of pole signals (1): $A = (2)(3) = 6 \text{ sq. ft.}$

Area of antenna: $A = (10.22/12)(35.4/12) = 2.97 \text{ sq. ft.}$

Area of light arm: $A = (0.25)(8) + (0.5)(2) = 3 \text{ sq. ft.}$

Area of arm signals: $A = (3)(2)(3) = 18 \text{ sq. ft.}$

Area of signs: $A = (1)(2) = 2 \text{ sq. ft.}$

Area of Banner: $A = (2)(4) = 8 \text{ sq. ft.}$

Area of Kill switch: $A = (10/12)(15.36/12) = 1.1 \text{ sq. ft.}$

3. FORCE ON POLE

Force on pole: $F = P_{z1} P_z H_{z1} A + P_{z2} P_z H_{z2} A = 360.4 \text{ pounds}$

Force on light arm: $F = (23.8)(3) = 70.8 \text{ pounds}$

Force on Antenna: $F = P_{z1} P_z H_{z1} A_{ant} = 70.7 \text{ pounds}$

Force on Traffic Arm: $F = P_{z1} P_z H_{z1} A = 435.5 \text{ pounds}$

Force on pole Signal: $F = (2)(6) = 264 \text{ pounds}$

Force arm signals: $F = (18)(23.8) = 428 \text{ pounds}$

Force on signs: $F = (16)(2) = 44 \text{ pounds}$

Force on Banner: $F = (22)(8) = 176 \text{ pounds}$

Force on Kill switch: $F = (1.1)(22) = 23.4 \text{ pounds}$

Total wind load = 1902.8 pounds

3. Depth Requirement: Typical Standard Depth is 5.0 feet (per reference 4)

$$D = 0.5A (1 + [1 + (4.36h / A)]^2)$$

$$\text{Where } A = (2.34 P/S, b) = [(2.34)(1902.8)/(2200)(3.5)] = 0.58$$

$$\text{Therefore } D_m = 3.56 \text{ ft.} < 5.0 \text{ feet ok}$$

4. Bearing Capacity

Gross pole wt: 1985 pounds (for pole + equipment)

$$Q_u = 1500 \text{ psf}$$

Pole fig dia. = 3.5 ft. Footing area = 9.62 sq. ft.

$$Q_u = 1500 \text{ psf} > Q = (1985)/(9.62) = 206.3 \text{ psf OK}$$

CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 626751

DEVELOPER
**CROWN
CASTLE**

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PREPARED BY
**SUPDESIGN
GROUP, LLC**

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SAN DIEGO, CA 92124
www.supdesign.com

I HEREBY DECLARE THAT I AM THE ENGINEER OF RECORD FOR THIS PROJECT, THAT I HAVE EXERCISED REASONABLE CARE AND SKILL IN THE DESIGN OF THE PROJECT AND DEFINED IN SECTION 8702 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONFORMANT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.



Jerry L. Mitchell
JERRY L. MITCHELL
EXP. 03/31/20

REV.	DATE	DESCRIPTION	BY
1	01/29/19	MONOPOLE CONING REMOVED	MX
2	04/19/19	REVISED PER REVIEW COMMENTS	MX
3	05/14/19	REVISED MONOPOLE WITH CONE & GUTS	MX

SHEET TITLE
**CONFIGURATION C:
EXISTING TYPE 15 STEEL STREET
LIGHT POLE WITH SIDE MOUNT
SHROUD KIT 007Q FOR INTEGRATED
ANTENNA AND RADIO UNIT
(CALCULATIONS)**

LOCATION
VARIES

SCALE
NOT TO SCALE

SHEET NUMBER
14 OF 31

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Typical Antenna Pole Installation

CALCULATIONS BY: JLM

PROJECT NAME: Pole Installation

DATE: 4-1-2019

PROJECT ADDRESS: Various Locations

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 150 psf/ft

STEEL Pole Ht. = 36' Ave. Pole Dia. = As Noted, Footing by design - 2.5' x 6.0'

Equipment weight = 90 lbs

References: 1. ACI-318-14 3. ASCE MINIMUM DESIGN LOADS - 7-10
2. 2016 CBC 4. STANDARD PLAN RSP ES-6A
5. San Diego Regional SDE-01 6. AISC 14TH ED.

36-Foot STEEL light pole with equipment and signs.

1. Wind Loading:

Wind Zone: (Fig. 3-2.3) V = 110 mph (3 sec. Gust)

Coefficients: Kz (16) = 0.87 Kz(32) = 0.94
Ir = 0.87 G = 1.142

Wind Pressures: Pz(16) = (0.00256) Kz(16)GV²IR = 22 psf

Pz(36.0) = (0.00256) Kz(30.0)GV²IR = 23.8 psf

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 9.94 in. A₁₆ = (16) (9.94/12) = 13.3 sq.ft.
Ave. Dia. (16-36.0') = 6.44 in. A₃₆ = (20.0) (6.44/12) = 10.7 sq.ft.

Area of antenna: Area = (10.22/12)(35.4/12) = 88.3 sq.ft

Area of Arm: A = (0.25)(8) + (0.5)(2) = 3 sq. ft.

Area of signs: A = (1)(2) + (1.5)(1.5) + (1)(2.5) = 6.75 sq. ft.

Area of Kill switch: A = (10/12)(15.36/12) = 1.1 sq. ft.

3. FORCE ON POLE

Force on pole: F = Q₁₆H₁₆₋₁₆A + Q₁₆₋₃₆H₁₆₋₃₆A + Q₁₆A_{ant} = 547.2 pounds

Force on Antenna: F = Q₁₆A_{ant} = 14.6 pounds

Force on Signs: F = 148.5 lbs

Force on light arm: F = 71.4 pounds

Force on kill switch: F = 23.4 pounds

Total wind load = 804.9 pounds

3. Depth Requirement: Typical Standard Depth is 6 feet

$$D = 0.5A (1 + [1 + (4.36h / A)]^2)$$

$$\text{Where } A = (2.34 P/S, b) = [(2.34) (804.9) / (1200) (2.5)] = 0.63$$

$$\text{Therefore } D_m = 5.21 \text{ ft.} < 6.0 \text{ feet ok}$$

4. Bearing:

Load to footing: Pole+ light: 2100 lbs.
Signs: 4lbs
Antenna: 90 lbs

Total 2194 lbs

Footing Diameter = 30 inches

Footing area = 4.91 sq. ft.

q_a = 1500 psf

$$Q_u = (2194) / (4.91) = 446.8 \text{ psf} < q_a = 1500 \text{ psf OK}$$

CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 626751

DEVELOPER
**CROWN
CASTLE**

10301 MEANLEY DR, SUITE 250
SAN DIEGO, CA 92131
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PREPARED BY TTT
**SUPDESIGN
GROUP, LLC**

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I HEREBY DECLARE THAT I AM THE ENGINEER OF RECORD FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBILITY AND CONTROL OVER THE DESIGN OF THIS PROJECT AS REQUIRED IN SECTION 8703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONFORMANT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT REQUIREMENTS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS AN ENGINEER OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.



Jerry L. Michal DATE: 4/1/19
JERRY L. MICHAL No. C42590
Exp. 03/31/20

REV.	DATE	DESCRIPTION	BY
1	01/20/19	MONOPOLE CONFIG. REMOVED	MK
2	04/16/19	REVISED PER REVIEW COMMENTS	MK
3	05/14/19	REVISED SHROUD KIT FROM 6.00 TO 6.75	MK

SHEET TITLE:
**CONFIGURATION C:
EXISTING TYPE 15 STEEL STREET
LIGHT POLE WITH SIDE MOUNT
SHROUD KIT 0070 FOR INTEGRATED
ANTENNA AND RADIO UNIT
(CALCULATIONS)**

LOCATION:

VARIES

SCALE:

NOT TO SCALE

SHEET NUMBER

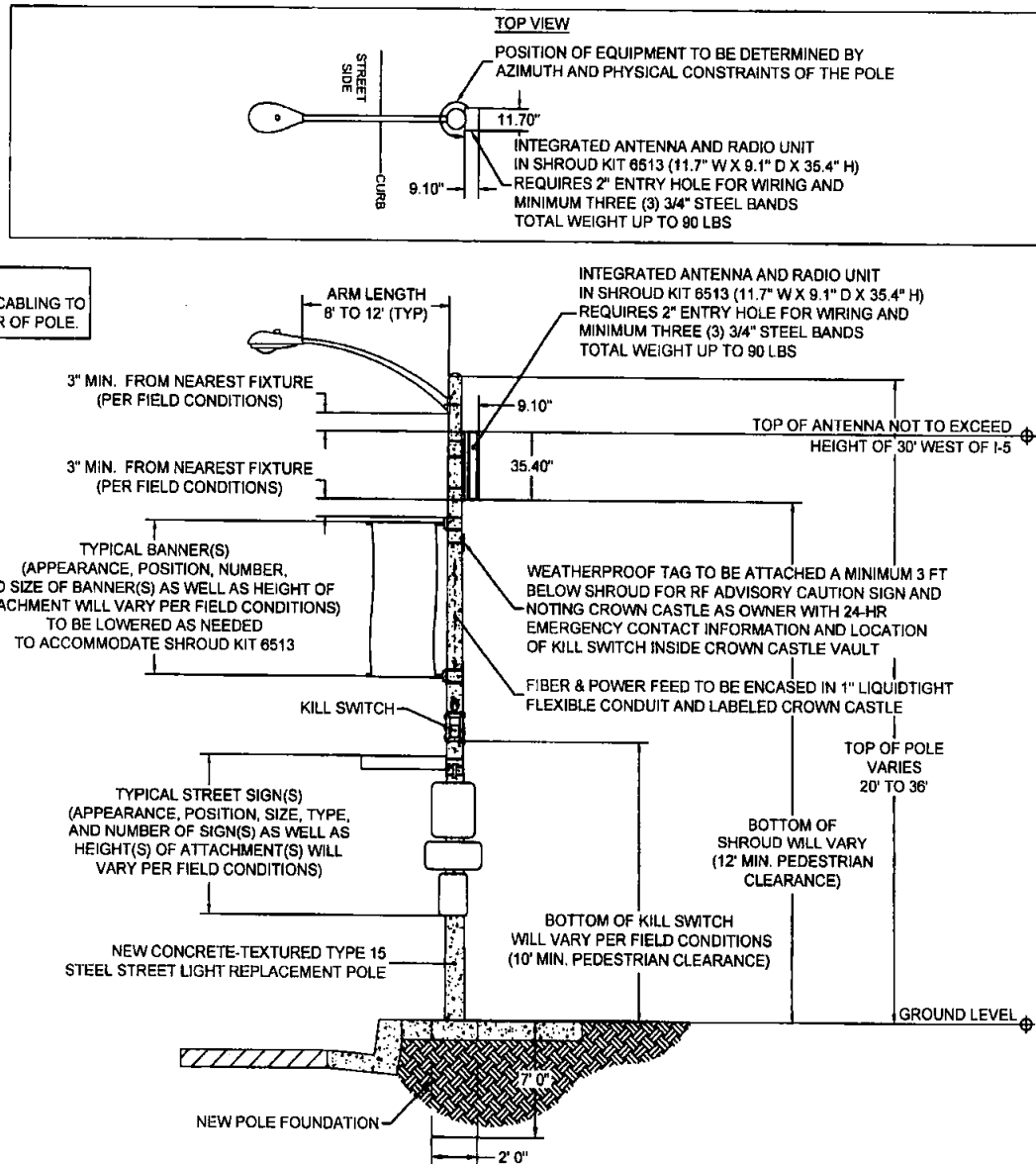
15 OF 31

MASTER STRUCTURAL PLANS AND CALCULATIONS FOR NEW CONCRETE-TEXTURED TYPE 15 STEEL STREET LIGHT REPLACEMENT POLES

CITY OF SAN DIEGO, CA DEVELOPMENT SERVICES DEPARTMENT			
MASTER STRUCTURAL PLANS & CALCULATIONS			
PTS # 628751			
DEVELOPER			
 CROWN CASTLE 10301 MEANLEY DR, SUITE 250 SAN DIEGO, CA 92131 www.crowncastle.com			
PREPARED BY			
 SUPDESIGN GROUP, LLC 10151 PACIFIC MESA BLVD, SUITE 400 SAN DIEGO, CA 92121 www.supdesignllc.com			
STAMP			
I HEREBY DECLARE THAT I AM THE ENGINEER OF RECORD FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE JUDGMENT OVER THE DESIGN OF THE PROJECT AS REQUIRED IN SECTION 9703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.			
I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME OF MY OBLIGATION OF WORK OR MY RESPONSIBILITY FOR PROJECT DESIGN.			
			
DATE REVISED BY	DATE REVISED BY		
ADRIAN MCJANNET	05/23/19		
DRAWN BY: MK CHECKED BY: BY DATE: 12/19/18			
REVISIONS			
REV.	DATE	DESCRIPTION	BY
1	01/25/19	MONOPOLIC CONFOID REMOVED	MC
2	04/15/19	REMOVED PER NEW VIEW COMMENTS	MC
3	05/14/19	REMOVED BOLD KITS DARK & DTPD	MC
SHEET TITLE			
MASTER STRUCTURAL PLANS AND CALCULATIONS FOR NEW CONCRETE-TEXTURED STEEL STREET LIGHT REPLACEMENT POLES			
LOCATION			
VARIES			
SCALE			
NOT TO SCALE			
SHEET NUMBER			
16 OF 31			

DESCRIPTION:

NEW CONCRETE-TEXTURED TYPE 15 STEEL STREET LIGHT REPLACEMENT POLE WITH INTEGRATED ANTENNA AND RADIO UNIT IN EQUIPMENT SHROUD ATTACHED AT 12' MINIMUM ABOVE GROUND LEVEL. TOP OF ANTENNA WILL NOT EXCEED THE HEIGHT OF 30' 0" WEST OF INTERSTATE 5 PER CITY OF SAN DIEGO REQUIREMENTS. HEIGHT OF STREET LIGHT POLE MAY VARY PER LOCATION.



CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 826751

DEVELOPER
**CROWN
CASTLE**
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www.crownccastle.com

PREPARED BY
**SUPDESIGN
GROUP, LLC**
10151 PACIFIC MESA BLVD #619-104
SAN DIEGO, CA 92121
www.supdesignllc.com

STAMP
I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBILITY AND SUPERVISION OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 4700 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.
I UNDERSTAND THAT THE CHECK ENGINEER'S DUTY IS LIMITED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS AN ENGINEER OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

REGISTERED PROFESSIONAL ENGINEER
No. C57075
Exp. 09-30-19
5/20/19
STATE OF CALIFORNIA
ADRIAN MARJON

REV	DATE	DESCRIPTION	BY
1	01/25/18	MONOPOLIS COMPIS REMOVED	NA
2	04/18/18	REVISED PER REVIEW COMMENTS	AK
3	09/19/18	REVISED TO SHOW KITS CONK & OCTO	NA

SHEET TITLE
**CONFIGURATION D:
NEW CONCRETE-TEXTURED TYPE 15
STEEL STREET LIGHT REPLACEMENT
POLE WITH SHROUD KIT 6513 FOR
INTEGRATED ANTENNA AND RADIO
UNIT**

LOCATION
VARIES

SCALE
NOT TO SCALE

SHEET NUMBER
17 OF 31



Structural Analysis with Foundation Design

For A
36' - 0" (Max. Ht.) Antenna / Street Light Pole

Located At:
San Diego
Nodes in and around
San Diego, CA
San Diego County

Prepared for:
Crown Castle

Dated:
April 1, 2019

Revision A: Shroud was labeled Ericsson Enclosure 6613.
Revision B: Max height was 39'-0".

Western UT Project No.: 18-0570

8032 Balboa Office Highway NW, Salem, OR 97304
Phone: (503) 587-0101, Fax: (503) 318-1884
www.WesternUtilityTelecom.com



Customer: Crown Castle
Project: 36' - 0" (Max. Ht.) Antenna / Street Light Pole
Site: San Diego

Project No.: 18-0570
Date: 4/1/19

Table of Contents

Loading, Codes, and Materials:	Design Loading Design Criteria Codes and Specifications Materials	Page 2
Design Calculations:	Wind Pressure Monopole Shaft Wind Loading Antenna/Appurtenance Wind Loading Base Reactions	Page 3 - 5
Monopole Shaft Stress Check:		Page 6
Anchor Bolt & Base Plate Design:		Page 7
Seismic Base Shear Computation:		Page 8
Drilled Pier Foundation Design:		Page 9 - 10

Summary of Analysis

These calculations have been performed in accordance with AASHTO LR8-4, ANSI/TIA-222-G(2), and local building codes, for an 85 mph ($V_{w, 3}$ 3-second gust) design wind speed. This is in conformance with the 2016 CBC, Section 1609.1.1, Exception #5. This is equivalent to a 110 mph ($V_{w, 3}$ 3-second gust) wind speed in accordance with the 2016 CBC, Section 1609.1.1.

PROFESSIONAL ENGINEER SEAL

I hereby certify that this structural design report was prepared by me, or under my direct supervision, and that I am a duly licensed Professional Engineer under the laws of the State of California.

Ph: (503) 587-0101; Fax: (503) 318-1884

www.WesternUtilityTelecom.com

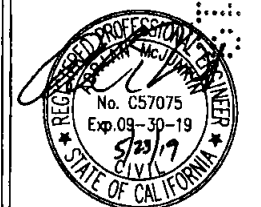
CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
MASTER STRUCTURAL
PLANS & CALCULATIONS

PTS # 626751

DEVELOPER
CROWN CASTLE
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PREPARED BY
SUPDESIGN GROUP, LLC
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SAN DIEGO, CA 92121
www.supdesignllc.com

STAMP
I HEREBY DECLARE THAT I AM THE ENGINEER RESPONSIBLE FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE JUDGMENT IN THE DESIGN OF THIS PROJECT AS DEFINED IN SECTION 1609 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.
I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITY FOR PROJECT DESIGN.



DATE: 4/1/19
P.E. # C57075
EXP. 09/30/19

REV.	DATE	DESCRIPTION	BY
1	01/25/18	MONOPOLE CORNERS REMOVED	MR
2	04/15/18	REVISED FOR REVIEW COMMENTS	MR
3	09/14/19	REVISED BASED ON LTR 0084 & 0072	MR

SHEET TITLE
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NOT TO SCALE

SHEET NUMBER
18 OF 31

Loading, Codes, and Materials

Design Loading:

- Antennas:** (1) - Shroud Kit 6513, C.L. @ 33.5' +/- AGL
- Misc:** (1) - 8" Tall x 27" Long Cobra Head Style Luminaire, C.L. @ 40' +/- AGL
 (1) - 12' Long (Max.) Luminaire Arm, C.L. @ 39' +/- AGL
 (1) - 72" Tall x 30" Wide Banner, C.L. @ 23' +/- AGL
 (1) - 8" Tall x 36" Wide Street Sign, C.L. @ 12.5' +/- AGL
 (1) - 36" Tall x 24" Wide 'No Parking' Type Signs, C.L. @ 10' +/- AGL
 (2) - 24" Tall x 36" Wide Misc. Signs, C.L. @ 8' +/- AGL
 (1) - Disconnect, C.L. @ 10.42' +/- AGL

Design Criteria:

- Wind (V_{ref}):** 85 mph (3-Second Gust) Per ANSI/TIA-222-G(2) & 2016 CBC, Section 1609.1.1, Exception 5
 Classification of Structure: II Per Table 2-1
 Exposure Category: C Per Section 2.6.5.1
 Topographic Category: 1 Per Section 2.6.6.2
- Wind (V_{ref}):** 110 mph (3-Second Gust) Per 2016 CBC, Section 1609.3.1
- Wind (V_{ASHTO}):** 85 mph (3-Second Gust) Per AASHTO LTS-6, Figure 3.8.3-1
- Ice:** Not required for this structure per ANSI/TIA-222-G(2), Annex B
- Seismic:** Per 2016 CBC, Section 1613, ASCE 7-10 Sections 15.1.3 & 12.8

Codes and Specifications:

- Concrete:** ACI 318-11
- Steel:** AISC 13th Edition
- Welding:** ANSI/AWS D1.1-10
- Soil:** Per 2016 CBC, Table 1806.2, Class 4 Material

Materials:

- Pole Shaft:** ASTM A595 Gr. A or A607 Gr. 50
- Plates:** ASTM A36
- Anchor Bolts:** ASTM F1554 Gr 55
- Bolts:** ASTM A325
- Welds:** E70XX Electrodes

Monopole Shaft Wind Loading per ANSI/TIA-222 Rev. G Addendum 2

Reference: ANSI/TIA-222-G, Section 2.6.9.8

- $V = 85.0$ mph (3-Second Gust)
 $G_{\text{ref}} = 1.10$ Gust Response Factor - 1.10 for Poles
 $K_z = 0.85$ Wind Direction Probability Factor
 $I = 1.00$ Importance Factor
 $SC = II$ Classification of Structure
 $E = C$ Exposure Category
 $TC = 1$ Topographic Category

Velocity Pressure, $q_z = 0.00256 * K_z * K_{zt} * K_d * V^3$ Where:

K_z = Velocity Pressure Exposure Coefficient, Section 2.6.5.2 and Table 2-4

K_{zt} = Topographic Factor, Section 2.6.6.4, Table 2-4 and 2-5

K_d = Wind Direction Probability Factor, Table 2-2

V = Basic Wind Speed, 3-Second Gust, mph

I = Importance Factor, Table 2-3

Section Wind Force, $F_{\text{st}} = q_z * G_{\text{ref}} * (EPA)_s$ Where:

$(EPA)_s = C_s A_p$

Shaft Section Properties					Section Area				Wind Pressure								Wind Loading								
Average Section Elevation (feet AGL)	Section Width (inches)	Monopole Shaft Wall Thickness (inches)	Section Height (feet)	Section Elevation At Base (feet)	Gross Section Area (Square Feet)	Force Coefficient (mph - feet)	Effective Section Area (Square Feet)	Velocity Pressure Coefficient	Topographic Factor	Wind Direction Probability Factor	Importance Factor	Velocity Pressure (psf)	Gust Effect Factor	Unfactored Wind Pressure (psf)	Section Base Wind Shear (kips)	Factored Section Base Wind Shear (kips)	Section Base Wind Moment (Foot-kips)	Factored Section Base Wind Moment (Foot-kips)	Factored Section Weight						
Z	D _p	T _w	H	Z _{base}	A _g	C	C _s	EPA _s	K _z	K _{zt}	I	q _z	G _{ref}	q _z G _{ref}	F _{st}	1.6*F _{st}	F _{st} *Z	1.6*F _{st} *Z	W _t						
1.80	10.88	0.179	3.80	0.00	3.28	99.2	0.80	1.96	0.85	1.00	0.95	1.00	14.9	1.10	16.4	0.032	0.051	0.06	0.09	0.09					
5.40	10.05	0.179	3.80	3.60	3.02	65.7	0.80	1.81	0.85	1.00	0.95	1.00	14.9	1.10	16.4	0.030	0.048	0.18	0.26	0.08					
9.00	9.51	0.179	3.80	7.20	2.85	62.1	0.82	1.76	0.85	1.00	0.95	1.00	14.9	1.10	16.4	0.029	0.046	0.28	0.42	0.08					
12.60	8.96	0.179	3.80	10.80	2.69	58.5	0.86	1.76	0.85	1.00	0.95	1.00	14.9	1.10	16.4	0.029	0.046	0.37	0.58	0.07					
16.20	8.41	0.179	3.80	14.4	2.62	55.3	0.89	1.75	0.86	1.00	0.95	1.00	15.2	1.10	16.7	0.029	0.047	0.47	0.78	0.07					
19.80	7.86	0.179	3.80	18.0	2.38	52.8	0.73	1.71	0.90	1.00	0.95	1.00	15.8	1.10	17.4	0.030	0.048	0.59	0.94	0.06					
23.40	7.32	0.179	3.80	21.6	2.19	50.0	0.77	1.68	0.93	1.00	0.95	1.00	16.4	1.10	18.0	0.030	0.048	0.71	1.14	0.08					
27.00	6.77	0.179	3.80	25.2	2.03	47.0	0.82	1.65	0.96	1.00	0.95	1.00	16.9	1.10	18.6	0.031	0.049	0.83	1.33	0.05					
30.60	6.22	0.179	3.80	28.8	1.87	43.8	0.86	1.64	0.99	1.00	0.95	1.00	17.3	1.10	19.1	0.031	0.050	0.96	1.53	0.05					
34.20	5.67	0.179	3.80	32.4	1.70	40.4	0.95	1.62	1.01	1.00	0.95	1.00	17.7	1.10	19.5	0.032	0.051	1.08	1.73	0.05					
Loading Summations:															8.30	0.48	8.48	8.78	0.66						
Overall Length of Pole = 36.00 feet																									
Base Elevation of Pole = 0.00 feet (AGL)																									
Top of Pole Elevation = 36.00 feet (AGL)																									

CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT

**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 626751

DEVELOPER

**CROWN
CASTLE**

10301 MEANLEY DR, SUITE 250
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www.crowncastle.com

PREPARED BY

**SUPDESIGN
GROUP, LLC**

10151 PACIFIC MESA BLVD, G#104
SAN DIEGO, CA 92121
www.supdesignllc.com

I HEREBY DECLARE THAT I AM THE LICENSEE OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED REASONABLE CARE OVER THE DESIGN OF THE PROJECT AND DESIGN IN SECTION 4751 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHIEF OF PROJECT DESIGN AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS AN ENGINEER OF WORK, OF MY RESPONSIBILITY FOR PROJECT DESIGN.



DATE: 05/20/19
 BY: C57075
 FOR: 09/28/17

REV.	DATE	DESCRIPTION	BY
1	07/25/19	MONOPOLE CONFIG. REMOVED	AK
2	04/15/19	REVISED PER REVIEW COMMENTS	AK
3	05/14/19	REVISED 194100 KITS DESK A 0270	AK

SHEET TITLE

WUT
STRUCTURAL CALCULATIONS FOR
CONFIGURATION D

LOCATION

VARIES

SCALE

NOT TO SCALE

SHEET NUMBER

19 OF 31

Sectorized Antenna and Mount Wind Loading per ANSI/TIA-222 Rev. G Addendum 2																	
Description	CL Diameter (ft)	Offset from Street C.L. (ft)	Quantity Per Sector	Weight (lbs)	Height (feet)	Width (feet)	Depth (feet)	Shallow Factor K _s	C _d Cyclic (Normal)	C _d Cyclic (Transverse)	GPA _N (ft)	GPA _E (ft)	GPA _W (ft)	Factored Loads			
														Unbalanced Wind Pressure (psf)	Positive W _{ind} Pressure (psf)	Positive T _{ension} (kips)	Positive M _{oment} (kips)
Shear, Moment, and Weight Summations:														0.00	0.00	0.00	0.00

Appurtenance Wind Loading per ANSI/TIA-222 Rev. G Addendum 2:

Description	Cl. Elevation (feet)	Offset from Road (ft.)	Quantity	Weight (feet)	Shape	Road (ft.) or (ft. x ft.)	Height (feet)	Width (feet)	Area (sq. ft.)	A ₁	Aspect ratio (Height / Width)	C	S	C ₁ (ft.)	C ₂ (ft.)	Unbalanced Wind Pressure (psf)	Factored Loads			
																	Factored V ₁ (kip)	Factored T ₁ (kip)	Factored M ₁ (kip-ft)	Factored T ₂ (kip)
3" Tall x 27" Long Dangle Head Style Luminaires	40.0	186	1	35.0	R	8.0	27.0	1.00	1.80	0.33	196.4	0.80	0.84	0.84	20.2	0.027	0.35	1.08	0.04	
12" Long (Side) Luminaires Arm	38.0	72	1	120.0	R	2.0	144.00	1.00	2.88	0.02	1038.2	0.50	1.44	1.44	20.1	0.048	0.28	1.00	0.15	
Standard NR 5515	33.6	8.0	1	90.0	F	35	114.00	1.00	2.81	3.1	N/A	1.23	3.44	3.44	19.4	0.107	0.86	3.59	0.11	
72" Tall x 30" Wide Banner	23.0	24.0	1	45.0	F	72.0	30.0	8.50	15.00	2.40	N/A	1.20	18.00	8.00	18.0	0.268	0.62	8.96	0.08	
3" Tall x 30" Wide Street Sign	12.6	30.0	1	20.0	F	8.0	38.00	1.00	2.25	0.25	N/A	1.20	2.70	2.70	16.4	0.071	0.18	0.89	0.02	
36" Tall x 24" Wide No Parking Type Signs	10.0	0.00	1	40.0	F	36.0	24.00	1.00	8.00	1.50	N/A	1.20	7.20	7.20	16.4	0.189	0.80	1.86	0.05	
24" Tall x 36" Wide Miss. Signs	8.0	0.00	2	30.0	F	24.0	36.00	1.00	6.00	0.87	N/A	1.20	7.20	14.40	16.4	0.379	0.80	3.23	0.07	
Disconnect	10.42	0.00	1	25.0	F	10.0	8.0	1.00	0.42	1.87	N/A	1.20	0.60	0.60	16.4	0.013	0.00	0.14	0.00	
Shear, Moment, and Weight Summations:																	1.091	1.41	16.37	0.83

Wind Loading Summary - Factored Base Reactions:

Design Base Moment, M_{fact}	=	27.1	ft-kips
Design Base Shear, V_{fact}	=	1.59	kips
Design Base Torque, T_{fact}	=	1.61	ft-kips
Design Base Weight, W_{fact}	=	1.19	kips

Monopole Shaft Wind Loading per AASHTO LT8-8

$V = 88.0$ mph (3-Second Gust)
 $G = 1.14$ Gust Response Factor
 $C = 1.00$ Exposure Category
 $I_e = C$ Importance Factor

V =	88.0	mph (3-Second Gust)
G =	1.14	Gust Response Factor
C =		Exposure Category
I =	1.00	Importance Factor

Velocity Pressure, $P_z / C_e = 0.00256 * K_z * G * V^2 * I$, Where:

- K_z = Height and Exposure Factor, Section 3.8.4, Table 3.8.4.1 & Equation C3.8.4-1
- C_e = Wind Drag Coefficient, Section 3.8.6 & Table 3.8.6.1
- G = Gust Effect Factor, Section 3.8.6, Minimum Value = 1.14
- V = Basic Wind Speed (mph), 3-Second Gust, Section 3.8.2 & Figure 3.8.3
- I = Wind Importance Factor, Section 3.8.9 & Table 3.8.3-1

[illegible]

Overall Length of Pole =	38.0	feet
Base Elevation of Pole =	0.0	feet (AGL)
Top of Pole Elevation =	36.0	feet (AGL)

CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT

**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 626751



**CROWN
CASTLE**

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PREPARED BY _____



SUPDESIGN
GROUP, LLC
CORP.

10151 PACIFIC MESA BLVD, SUITE 104
SAN DIEGO, CA 92121
www.iupdesignllc.com

I HEREBY DECLARE THAT I AM THE ENGINEER OF RECORD FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 9703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN



DATE	05/07/79
ACR #	C57079
ADRIAN MAJUNEN	FBI - DB/30/17

DRAWN BY: MK	CHECKED BY: BY	DATE: 12/8/18
--------------	----------------	---------------

[illegible]

SHEET TITLE: _____

WUT
STRUCTURAL CALCULATIONS FOR
CONFIGURATION D

LOCATION _____

VARIES

SCALE
NOT TO SCALE

20 OF 31

Sectorized Antenna and Mount Wind Loading per AASHTO LTS-6:

Description	CL Elevation (ft)	Offset from Shell C.L. (ft)	Quantity Per Sector	Weight (lb)	Height (ft)	Width (inches)	Depth (inches)	Area Factor	C _g Calc (Normal)	C _g Calc (Transverse)	EPN _g (ft)	EPN _h (ft)	EPN _l (ft)	Applied Wind Pressure, psf	Applied Loads			
															V _{max} (kips)	Torque (kips-in)	M _{max} (kips-ft)	Total Weight (kips)
Shear, Torque, Moment, and Weight Summations:															0.00	0.00	0.0	0.00

Miscellaneous Appurtenance Wind Loading per AASHTO LTS-6:

Description	CL Elevation (ft)	Offset from Shell C.L. (ft)	Quantity	Weight (lb)	Height (ft)	Width (ft)	Depth (ft)	Area Factor	Projected Area, A _p (ft ²)	Aspect Ratio (Height/Width)	C _g Calc	Wind Drag Coefficient, C _d	EPN _g (ft)	EPN _h (ft)	EPN _l (ft)	Applied Wind Pressure, psf	Applied Loads			
																	V _{max} (kips)	Torque (kips)	M _{max} (ft-kips)	Total Weight (kips)
8" Tall x 27" Long Cobra Head Style Luminaire	40.0	168	1	35.0	R	9.0	27.0	1.00	1.68	0.33	191	0.45	0.76	0.76	22.0	0.017	0.22	0.67	0.04	
12" Long (Max.) Luminaire Arm	39.0	72	1	128.0	R	2.0	144.0	1.00	2.88	0.02	1020	0.45	1.29	1.29	21.9	0.028	0.17	1.10	0.13	
Shroud Kit 0813	33.5	9.0	1	90.0	F	35	11.42	1.00	2.81	3.1	N/A	1.20	3.37	3.37	21.2	0.071	0.05	2.38	0.09	
72" Tall x 30" Wide Banner	23.0	24.0	1	45.0	F	72.0	30.0	0.60	18.00	2.40	N/A	1.20	18.00	9.00	19.6	0.178	0.35	4.05	0.05	
8" Tall x 36" Wide Street Sign	12.5	30.00	1	20.0	F	9.0	36.00	1.00	2.25	0.25	N/A	1.12	2.52	2.52	18.1	0.046	0.11	0.57	0.02	
36" Tall x 24" Wide "No Parking" Type Signs	10.0	0.00	1	40.0	F	36.0	24.00	1.00	8.00	1.50	N/A	1.19	7.14	7.14	18.1	0.130	0.00	1.30	0.04	
24" Tall x 36" Wide Misc. Signs	8.0	0.00	2	30.0	F	24.0	36.0	1.00	6.00	0.67	N/A	1.12	6.72	13.44	18.1	0.244	0.00	1.95	0.08	
Disconnected	10.42	0.00	1	25.0	F	10.0	8.0	1.00	0.42	1.67	N/A	1.19	0.50	0.50	16.1	0.009	0.00	0.05	0.03	
Shear, Torque, Moment, and Weight Summations:														0.721	0.91	12.13	0.44			

Wind Loading Summary - Base Reactions:

Design Base Moment, M_{base} = 18.16 ft-kips
Design Base Shear, V_{base} = 1.03 kips
Design Base Torque, T_{base} = 0.81 ft-kips
Design Base Weight, W_{base} = 0.99 kips

Stress Check - Monopole Shaft @ Base

Summary - Monopole Shaft

Monopole Shaft Information:

Pole Diameter @ Base, D_{base} = 10.88 in. Wall Slenderness Ratio, $\lambda = D/t$ = 65.2
Nominal Wall Thickness, t = 0.167 in. Plastic Design Slenderness Ratio, λ_p = 32.6
Yield Stress, F_y = 50.0 ksi Limiting Slenderness Ratio, λ_{lim} = 400
Effective Yield Stress, F_y = 63.5 ksi Effective Section Modulus, S_{eff} = 14.7 in³
Distance to Extreme Fiber, C = 5.44 in. Effective Radius of Gyration, R_{eff} = 3.78 in.

MP Shaft Section Properties at Access Ports:

Nominal Shaft Section:

Mast Area, $A_{nominal}$ = 5.61 in²
Mom Of Inertia, $I_{nominal}$ = 80.1 in⁴

Design Flexural Strength:

Compact Slenderness Ratio, λ_p = 32.6 Nominal Flexural Strength, M_n = 89.3 ft-kips
Noncompact Slenderness Ratio, λ_c = 141 Design Flexural Strength, $\phi_b M_n$ = 80.4 ft-kips (OK)
Section is Non-Compact Factored Moment, $M_{factored}$ = 27.1 ft-kips

Design Compressive Strength:

Noncompact Slenderness Ratio, λ_c = 52.1 Nominal Compressive Strength, P_n = 226 kips
Column Slenderness, λ_c = 0.99 Design Compressive Strength, $\phi_c P_n$ = 203 kips (OK)
Effective Area Factor, Q = 0.93 Factored Weight, W_{base} = 1.19 kips

Combined Flexure and Axial Force Check: (Section 4.6.1.1)

$$P_u / \phi_c P_n = 0.006 \quad P_u / 2 \phi_c P_n + M_u / \phi_b M_n = 0.341 < 1.00 \text{ OK}$$

Monopole Shaft:

USE: 10.875" Flat-to-Flat @ Base Tapering to 5.4" Flat-to-Flat @ Top
USE: 0.1793" wall (10 ga.), A585 Gr. A or A607 Gr. 50 Round Tapered Tube Shaft
USE: (1) - 6" x 12" Reinforced Access Ports, C.L. @ 1'-0" ± AGL
USE: (1) - 4" x 6" Unreinforced Access Port, C.L. @ 8" Below Integrated Antenna/Radio Unit
USE: (1) - 4" x 6" Unreinforced Access Port, C.L. @ Light Arm Attachment (TBD)

CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**
PTS # 626751

DEVELOPER
**CROWN
CASTLE**
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www.crowncastle.com

PREPARED BY

**SUPDESIGN
GROUP, LLC**
10151 PACIFIC MESA BLVD, SUITE 104
SAN DIEGO, CA 92121
www.supdesigngroup.com

STAMPED
I HEREBY DECLARE THAT I AM THE ENGINEER OF RECORD FOR THIS PROJECT, THAT I HAVE OBTAINED RESPONSIBILITY AND SPECIFICATIONS BY THE CITY OF SAN DIEGO, AND CHANGE OVER THE DESIGN OF THE PROJECT AS REQUIRED IN SECTION 4703 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.
I UNDERSTAND THAT THE CHECK OF PROJECT DESIGN AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AN ENGINEER OF RECORD, OF MY RESPONSIBILITY FOR THE PROJECT DESIGN.



DATE: 08/20/19
CHK # C57075
EXP: 09/30/19
ALFRED MOUNIR

REV	DATE	CHECKED BY	BY DATE	DESCRIPTION	BY
1	01/24/18	MONOPOLAR CONFO. REMOVED			NR
2	04/11/18	REVIEWED FOR REVIEW COMMENTS			NR
3	05/14/18	REVIEWED RE-ROLD KITE 000K & 0070			NR

SH-SHEET TITLE
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STRUCTURAL CALCULATIONS FOR
CONFIGURATION D

LOCATION
VARIES

SCALE
NOT TO SCALE

SHEET NUMBER
21 OF 31



WESTERN™
UTILITY / TELECOM, INC.

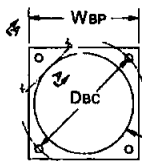
Customer: Crown Castle
Project: 38" - 0" (Max. Ht.) Antenna / Street Light Pole
Site: San Diego

Project No.: 18-0570
Date: 04/01/19
Page: 7

Anchor Bolt & Base Plate Analysis with Code Result Comparison:

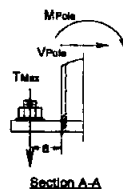
Anchor Bolt & Base Plate Data:

No. of Anchor Bolts, $n = 4$
AB Diameter, $D_{AB} = 1.00$ in.
AB Circle, $D_{AC} = 14.0$ in.
AB Length, $L_{AB} = 48.0$ in.
Yield Strength, $F_{y,AB} = 55.0$ ksi
Tensile Strength, $F_{t,AB} = 78.0$ ksi
Tensile Stress Area, $A_t = 0.61$ in²
Base Plate Width, $W_{BP} = 14.0$ in.
BP Yield Strength, $F_{y,BP} = 36.0$ ksi
Pole Diameter, $D_{pole} = 10.88$ in.



Failure across x'-x', modeled as fixed-end cantilevered beam.

$b = \text{length of } x'-x' = 8.9$ in.
 $a = (D_{AC} - D_{pole})/2 = 1.56$ in.



Section A-A

ANSI/TIA 222-G Addendum 2, Section 4.9.9

Factored Base Reactions:

$\alpha M_{pole} = 27.14$ ft-kips
 $\alpha V_{pole} = 1.58$ kips
 $\alpha T_{pole} = 1.41$ ft-kips
 $\alpha W_{pole} = 1.19$ kips

Factored Tensile Force per bolt:

$$\alpha T_{bolt} = [4 \alpha M_{pole} / (n D_{AC})] - \alpha W_{pole} / n = 23.0 \text{ kips}$$

Factored Shear Force per bolt:

$$\alpha V_{bolt} = \alpha V_{pole} / n = \alpha T_{pole} / (n D_{AC} / 2) = 1.00 \text{ kips}$$

Design Anchor Bolt Tensile Force: (Figure 4-4)

$\phi R_{t,AB} = \phi \cdot F_{t,AB} \cdot A_t = 36.4$ kips
Base Detail Type = d
Reduction factor, $\phi = 0.90$
 $\eta = 0.50$

Combined Shear & Tension Interaction Check:

$$[T_{max} + V_{AB, shear} / \eta] / \phi R_{t,AB} = 0.89 < 1.00 \text{ (OK)}$$

Base Plate: Section 4.7

Factored Base Plate Loading:

BP Bending, $M_{pole} = \alpha T_{AB} \cdot a = 35.9$ in.-kips

Design Base Plate Bending Strength:

$$\phi F_{B, BP} = 0.90 \cdot F_{y, BP} = 32.4 \text{ ksi}$$

Minimum Base Plate thickness:

$$t_{min} = [0.4 M_{pole} / (b \cdot \phi F_{B, BP})]^{1/2} = 0.883 \text{ inches}$$

AASHTO LTS-6, Section 5.17.4.2

Maximum Base Reactions:

$M_{pole} = 18.18$ ft-kips
Seismic V: $V_{pole} = 1.54$ kips
 $T_{pole} = 0.91$ ft-kips
 $W_{pole} = 0.99$ kips

Maximum Tensile Stress per bolt:

$$f_t = [4 M_{pole} / (n D_{AC})] - W_{pole} / n / A_t = 25.3 \text{ ksi}$$

Maximum Shear Stress per bolt:

$$f_v = (V_{pole} + 2 T_{pole} / D_{AC}) / (n \cdot A_t) = 1.28 \text{ ksi}$$

Allowable Anchor Bolt Tensile Stress:

$$F_{t,AB} = 0.8 \cdot F_{t,AB} = 33 \text{ ksi}$$

Allowable Anchor Bolt Shear Stress:

$$F_{v,AB} = 0.30 \cdot F_{t,AB} = 18.5 \text{ ksi}$$

Combined Shear & Tension Interaction Check:

$$[(f_v / F_{v,AB})^2 + (f_t / F_{t,AB})^2] = 0.89 < 1.00 \text{ (OK)}$$

Base Plate: Section 6.8

Base Plate Loading:

BP Bending, $M_{pole} = f_t \cdot A_t \cdot a = 23.9$ ksi

Allowable Base Plate Bending Stress:

$$F_{y,AB} = 0.75 \cdot F_{t,AB} = 27.0 \text{ ksi}$$

Minimum Base Plate thickness:

$$t_{min} = [0.4 M_{pole} / (b \cdot \phi F_{y,AB})]^{1/2} = 0.814 \text{ inches}$$

Use: (4) - 1" ϕ Grade 55 Anchor Bolts on a 14" ϕ B.C.

Structural Usage = 88.7%

Use: 1" Thick by 14" Square, Grade 36 Base Plate

Structural Usage = 82.8%



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Customer: Crown Castle
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Site: San Diego

Project No.: 18-0570
Date: 04/01/19
Page: 8

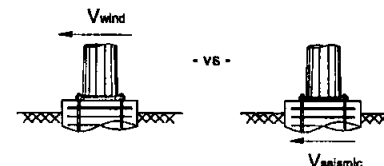
Seismic Base Shear Calculations

Factored Base Reactions from Wind Loading:

$M_{pole} = 27.1$ ft-kips
 $V_{pole} = 1.58$ kips
 $W_{pole} = 1.19$ kips

Seismic Parameters:

Per ASCE 7-10 Sections 15.1.3 & 12.8



Site Classification = D Chapter 20, Table 20.3-1

Short-Period Spectral Acceleration, $S_s = 2.911$ g Latitude: 34° 24' 48.04" N
1-Second Period Spectral Acceleration, $S_1 = 1.019$ g Longitude: 119° 41' 33.04" W

Seismic Shear Factors:

$I = 1.00$ Table 11.5-1 Location: San Diego, CA
 $R = 1.50$ Table 12.2-1
 $F_a = 1.00$ Values for S_s , S_1 , and F_a obtained from USGS "Earthquake Ground Motion Parameters", Version 5.1.0 (Based on latitude and longitude indicated above).
 $F_v = 1.50$

Seismic Design Classifications:

Occupancy Category: I I-IV, Table 1-1
Seismic Design Category: D A-F, Section 11.8

Seismic Base Shear (Nominal Value)

Equation 12.8-1: $V = C_s \cdot W = 1.54$ kips
Equation 12.8-2: $C_s = S_{DS} / (R / I) = 1.294$
Equation 11.4-3: $S_{DS} = (2 / 3) \cdot S_{MS} = 1.941$
Equation 11.4-1: $S_{MS} = S_s \cdot F_a = 2.911$

Seismic Base Shear (Need Not Exceed Value, $T \leq T_L$)

Equation 12.8-1: $V = C_s \cdot W = 2.75$ kips
Equation 12.8-3: $C_s \leq S_{D1} / [T \cdot (R / I)] \leq 2.311$
Equation 11.4-4: $S_{D1} = (2 / 3) \cdot S_{M1} = 1.019$
Equation 12.8-7: $T_a = C_t \cdot h^n = 0.294$ Seconds
Equation 11.4-2: $S_{M1} = S_1 \cdot F_v = 1.629$

Seismic Base Shear (Minimum Value)

Equation 12.8-1: $V = C_s \cdot W = 0.04$ kips
Equation 12.8-5: $C_s = 0.030$

Seismic Base Shear (Minimum Value, $S_1 \geq 0.8g$)

Equation 12.8-1: $V = C_s \cdot W = 0.40$ kips
Equation 12.8-5: $C_s = 0.6 \cdot S_1 / (R / I) = 0.340$

Total Seismic Shear = 1.54 kips

Total Wind Shear = 1.58 kips

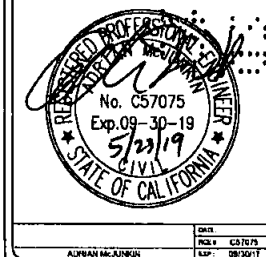
Design Base Shear is Governed by Wind Loading

CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**
PTS # 628751

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I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT. THAT I HAVE EXAMINED THE PROJECT AND CHANGE OVER THE DESIGN OF THIS PROJECT AS DELETED IN SECTION 670 OF THE BUSINESS AND PROFESSIONAL CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.



REV.	DATE	DESCRIPTION	BY
1	01/26/19	MONOPOLE CONFIG REMOVED	MR
2	04/19/19	REVISED PER REVIEW COMMENTS	MR
3	05/14/19	REVISED 3RD FLOOR KTR DOKK A DOTO	MR

SHEET TITLE:
**WUT
STRUCTURAL CALCULATIONS FOR
CONFIGURATION D**

LOCATION:
VARIES

SCALE:
NOT TO SCALE

SHEET NUMBER:
22 OF 31

Drilled Pier Foundation Design

Factored Monopole Base Reactions:

$$\begin{aligned} \alpha M_{pole} &= \text{Overturning Moment} = 27.1 \text{ ft-kips} \\ \alpha V_{pole} &= \text{Base Shear} = 1.58 \text{ kips} \\ \alpha W_{pole} &= \text{Base Weight} = 1.19 \text{ kips} \end{aligned}$$

Design Basis:

1. Ref. 2016 CBC & 2012 IBC, Section 1807.3.2.1, Nonconstrained Condition
2. ACI 318-11 - Requirements for Reinforced Concrete.
3. Soil Design Values: Per 2016 CBC, Table 1808.2, Class 4 Material

Soil Characteristics:

$$\begin{aligned} \text{Based on IBC Soil Classification for Type: } & 4 \quad (1-5) \\ \phi R_p &= \text{Nominal Lateral Resistance at 1' below grade} = 225 \text{ psf/ft} \\ d_{negl} &= \text{Depth of soil below grade neglected} = 0.00 \text{ ft} \end{aligned}$$

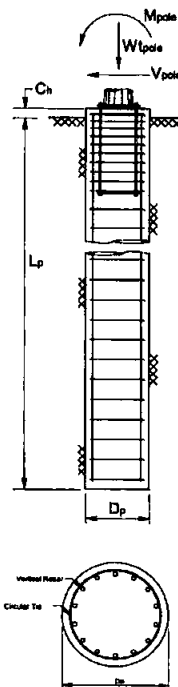
Drilled Pier Characteristics:

Minimum Diameter:

$$\begin{aligned} D_{templ} &= \text{OD of AB Template} = 15.5 \text{ in.} \\ S_b &= \text{Minimum AB and Rebar Separation} = 0.75 \text{ in.} \\ \text{Concrete Cover} &= C_{cover} = 3.00 \text{ in.} \\ D_{p,min} &= D_{templ} + 2(S_b + d_b + d_{bar} + C_{cover}) = 24.0 \text{ in.} \\ \text{Use } D_p &= \text{Pier Diameter} = 24.0 \text{ in.} \end{aligned}$$

Minimum Length/Depth:

$$\begin{aligned} C_h &= \text{Pier Projection AGL} = 0.00 \text{ ft} \\ S_1 &= 2 * \phi R_p * (L_p - d_{negl}) / 3 = 1050 \text{ psf; Where } (L_p - d_{negl}) \leq 12 \text{ ft.} \\ A &= 2.34 * V_{pole} / (S_1 * D_p) = 1.76 \\ L_{p,min} &= A/2 * [1 + (1 + 4.36 * A)^{1/2}] + d_{negl} = 6.89 \text{ ft.} \\ \text{Use: } L_p &= \text{Below Grade Pier Length} = 7.00 \text{ ft.} \\ L_{tot} &= \text{Total Length of Pier} = 7.00 \text{ ft.} \\ \text{Total Volume of Concrete Required} &= 0.8 \text{ cu. yds.} \end{aligned}$$



Drilled Pier Foundation Design

Reinforcement:

Vertical Reinforcement Parameters:

$$\begin{aligned} \text{Vertical Bar Size} &= 8 \\ \text{Qty of Vertical Bars} &= 8 \\ d_b &= \text{Diameter of Bar} = 0.75 \text{ in.} \\ \text{Tie Bar Size} &= 4 \\ f_y &= 4.0 \text{ ksi} \\ f_y &= 60.0 \text{ ksi} \\ A_s &= \text{Total Area of Vert. Bars} = 2.65 \text{ sq. in.} \end{aligned}$$

Pier Moment Capacity: Verify $M_{ult} \leq \phi M_n$

$$\begin{aligned} M_{ult} &= 1.3 * [M_{pole} + V_{pole} * (L_p/3 + d_{negl})] = 40.1 \text{ ft-kips} \\ \phi M_n &= 163.0 \text{ ft-kips (OK)} \\ A_{s,min} &= 4 * M_{ult} / (\phi * f_y * N * D_p) = 0.2473 \text{ sq. in.} \\ \rho_{prov} &= A_s / (\pi/4 * D_p^2) = 0.0059 \\ \rho_{min} &= 0.0050 \text{ (OK)} \end{aligned}$$

Vertical Bar Development Length:

$$\begin{aligned} L_{db} &= [0.04 * d_b * f_y / f_c^{1/2}] * M_{ult} / \phi M_n = 7.00 \text{ in.} \\ L_{db,prov'd} &= 36.9 \text{ in. (OK)} \end{aligned}$$

Shear Reinforcement:

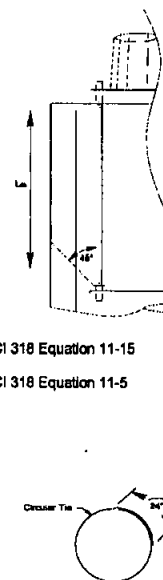
$$\begin{aligned} \text{Factored Shear, } V_u &= 1.4 * V_{pole} = 2.21 \text{ kips} \\ \text{Horizontal Tie Shear Capacity, } V_s &= 76.8 \text{ kips} \quad \text{ACI 318 Equation 11-15} \\ \text{Concrete Shear Capacity, } V_c &= 56.0 \text{ kips} \quad \text{ACI 318 Equation 11-5} \\ \text{Total Shear Capacity, } \phi V_s + \phi V_c &= 99.8 \text{ kips (OK)} \\ D_{tie} &= \text{Diameter of Tie} = 18" \phi \end{aligned}$$

Reinforcement Summary:

Vertical Bars: 8 - #8 x 6.50 ft. Long A615 Gr. 60 Deformed Vertical Bars
Spaced evenly (approx. 8.1" o.c.) within Horizontal Ties

Horizontal Ties: 11 - #4 Horizontal Ties, 18 in. Diameter, with 24 in. lap
Spaced at 8" o.c. along the anchor bolts and 12" o.c. in remainder of pier

Rebar Weights: Vertical Bars = 59 pounds
Horizontal Ties = 50 pounds
Horizontal Tie Length = 6' - 10"



REV.	DATE	REVISION	BY
1	01/25/18	MONOPOLIS COM'G'S REMOVED	AM
2	04/18/18	REVISED PER REVIEW COMMENTS	AM
3	05/14/18	REVISED REINFORCEMENT DETAIL	AM



STRUCTURAL DETAILS & FOUNDATION INSTALLATION

FOR:
**36'-0" (MAX HT.)
ANTENNA / LIGHT POLES**

LOCATED AT:
**SAN DIEGO
NODES IN & AROUND
SAN DIEGO, CA
SAN DIEGO COUNTY**

CONSULTANT
WESTERN
UTILITY / TELECOM, INC.
5032 SALEM DALLAS HWY
SALEM, OR 97304
Ph: 503-587-0101 Fx: 503-318-1864
WesternUtilityTelecom.com
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CLIENT
CROWN CASTLE

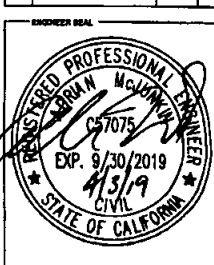
PROJECT
**36'-0" (MAX HT.)
ANTENNA/STREET LIGHT POLE**

LOCATION
SAN DIEGO
NODES IN & AROUND
SAN DIEGO, CA
SAN DIEGO COUNTY

ISSUED FOR
APPROVAL

DATE BY
BS AM 04JAN19

REV.	CHANGES	DATE	BY
A	UPDATE SHROUD KIT	01JAN18	BS
B	DISCONNECT WAS 36'	03APR19	RN

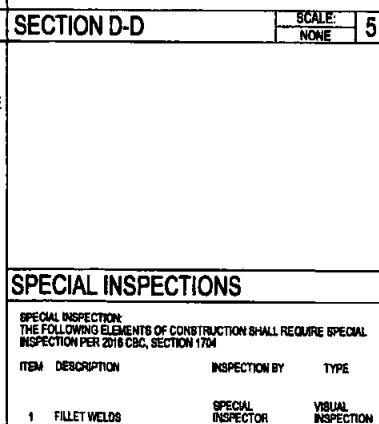
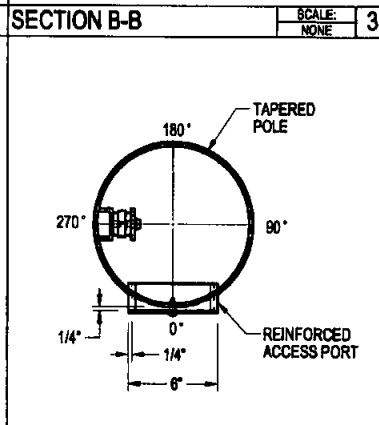
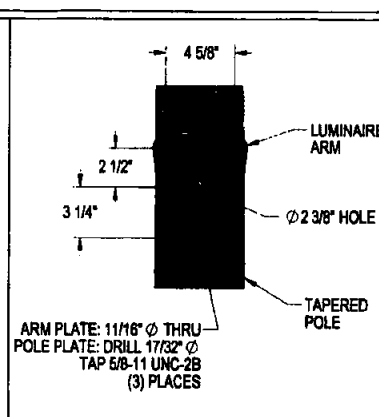
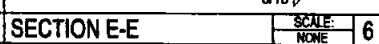
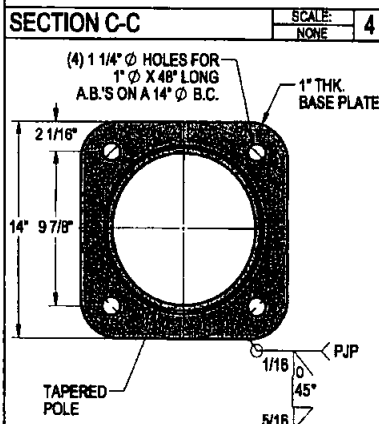
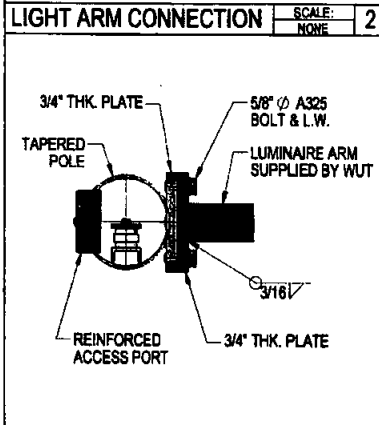
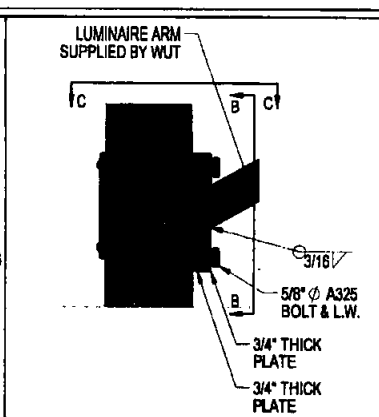
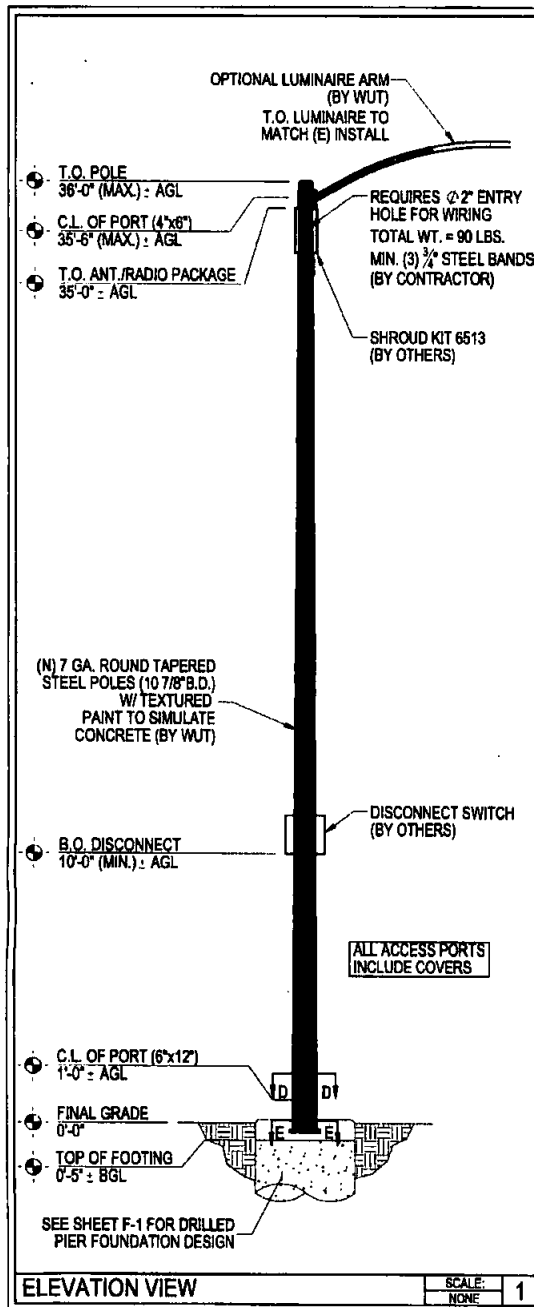


SHEET TITLE
TITLE SHEET

WUT PROJECT NUMBER
18-0570

CHANGING NUMBER
18570-APP

PAGE NUMBER
24 OF 31



GENERAL DESIGN NOTES

DESIGN NOTES AND MATERIAL REQUIREMENTS:

1) THE DESIGN CRITERIA FOR THIS STRUCTURE IS AS FOLLOWS:

A) STANDARDS AND DESIGN CODES:

INDUSTRY STANDARDS: ANSI / TIA-222-G & 2013/2016 CBC

STEEL MANUAL: AISC 13TH EDITION

CONCRETE CODE: ACI 318-11

WELDING CODE: ANSI / AWS D1.1-10

SOIL: PER 2013/2016 CBC TABLE 1808.2, CLASS 5 MATERIAL

B) DESIGN:

WIND: $V_w = 85$ MPH (3-SECOND GUST) PER ANSI/TIA 222-G (2) & 2013/2016 CBC, SECTION 1808.1.1, EXCEPTION 5

CLASSIFICATION OF STRUCTURE: (I)

EXPOSURE CATEGORY: C

TOPOGRAPHIC CATEGORY: 1

$V_w = 110$ MPH (3-SECOND GUST) PER 2013/2016 CBC, SECTION 1808.1.1

WINDSPEED 85 MPH (3-SECOND GUST) PER AASHTO LTB-8, FIGURE 3.8.3-1

ICE: NOT REQUIRED FOR THIS STRUCTURE

SEISMIC: PER 2013/2016 CBC SECTION 1613, ASCE 7-10 SECTION 18.1.3 & 12.8

C) LOADING:

(1) - SHROUD KIT 6513, C.L. @ 33.5' ± AGL

(1) - 8" T X 27" LONG COBRA HEAD STYLE LUMINAIRE 40' ± AGL

(1) - 12" LONG (MAX.) LUMINAIRE ARM, C.L. @ 30' ± AGL

(1) - 72" TALL X 30" WIDE BANNER, C.L. @ 23' ± AGL

(1) - 8" TALL X 30" WIDE STREET SIGN, C.L. @ 12.5' ± AGL

(1) - 30" TALL X 24" WIDE NO PARKING TYPE SIGN, C.L. @ 10' ± AGL

(1) - 24" TALL X 30" WIDE MISC. SIGN, C.L. @ 8' ± AGL

(1) - DISCONNECT, C.L. @ 10.42' ± AGL

2) GENERAL STRUCTURAL NOTES:

A) ALL MATERIALS SHALL CONFORM TO THE FOLLOWING STANDARDS:

POLE SHAFT: AASHTO A OR AASHTO GR.50

BASE PLATE, PLATES, SHAPES: ASTM A36

WELDS: E70XX ELECTRODES

ANCHOR BOLTS: ASTM F1554 GR.55

PORTS: ASTM A108 GR. B

REBAR: ASTM A615 GR.60

B) COATINGS:

GALVANIZING: ASTM A123

PAINT: TEXTURED TO SIMULATE CONCRETE POLE

C) ALL WELDING TO BE PERFORMED BY WELDERS CERTIFIED IN ACCORDANCE WITH AWS D1.1. FIELD WELDING IS PROHIBITED.

D) ALL STRUCTURAL BOLT SHALL BE TIGHTENED TO SNUG-TIGHT AS DEFINED BY AISC 13TH ED., PG. 16.2-46 PARAGRAPH 6.1

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 WUT, P.C. PRIOR TO BEGINNING PROJECT. ALL WORK SHALL BE PERFORMED USING ACCEPTED CONSTRUCTION PRACTICES.

2. NO FIELD MODIFICATIONS MAY BE MADE TO MONOPOLE STRUCTURE WITHOUT THE EXPRESS WRITTEN CONSENT FROM THE ENGINEER OF RECORD, WUT, P.C. 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.

3. NOTICE TO THE APPLICANT / OWNER / OWNER'S AGENT / ARCHITECT OR ENGINEER OF RECORD: BY USING THIS PERMITTED CONSTRUCTION DRAWINGS FOR CONSTRUCTION/INSTALLATION OF THE WORK SPECIFIED HEREIN YOU AGREE TO COMPLY WITH THE REQUIREMENTS OF CITY OF SAN DIEGO FOR SPECIAL INSPECTIONS, STRUCTURAL OBSERVATIONS, CONSTRUCTION MATERIAL TESTING AND OFF-SITE FABRICATION OF BUILDING COMPONENTS, CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS AND, AS REQUIRED BY THE CALIFORNIA CONSTRUCTION CODES.

4. NOTICE TO THE CONTRACTOR / BUILDER / INSTALLER / SUB-CONTRACTOR / OWNER-BUILDER: BY USING THIS PERMITTED CONSTRUCTION DRAWINGS FOR CONSTRUCTION/INSTALLATION OF THE WORK SPECIFIED HEREIN, YOU ACKNOWLEDGE AND ARE AWARE OF THE REQUIREMENTS CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS. YOU AGREE TO COMPLY WITH THE REQUIREMENTS OF CITY OF SAN DIEGO FOR SPECIAL INSPECTIONS, STRUCTURAL OBSERVATIONS, CONSTRUCTION MATERIAL TESTING AND OFF-SITE FABRICATION OF BUILDING COMPONENTS, CONTAINED IN THE STATEMENT OF SPECIAL INSPECTIONS AND, AS REQUIRED BY THE CALIFORNIA CONSTRUCTION CODES.

5. FABRICATOR MUST BE APPROVED BY THE CITY OF SAN DIEGO, DEVELOPMENT SERVICES FOR THE FABRICATION OF MEMBERS AND ASSEMBLIES ON THE PREMISES OF THE FABRICATOR'S SHOP.

6. FABRICATOR SHALL SUBMIT AN APPLICATION TO PERFORM OFF-SITE FABRICATION TO THE INSPECTION SERVICES DIVISION FOR APPROVAL PRIOR TO COMMENCEMENT OF FABRICATION.

7. FABRICATOR SHALL SUBMIT A CERTIFICATE OF COMPLIANCE FOR OFF-SITE FABRICATION TO THE INSPECTION SERVICES DIVISION PRIOR TO ERECTION OF FABRICATED ITEMS AND ASSEMBLIES.

8. THE SPECIAL INSPECTIONS IDENTIFIED ON PLANS ARE, IN ADDITION TO, AND NOT A SUBSTITUTE FOR, THOSE INSPECTIONS REQUIRED TO BE PERFORMED BY A CITY'S BUILDING INSPECTOR.

9. WHERE MATERIALS OR ASSEMBLIES ARE REQUIRED BY THE BUILDING CODE TO BE LABELED, SUCH MATERIALS AND ASSEMBLIES SHALL BE LABELED BY AN AGENCY APPROVED BY THE CITY OF SAN DIEGO IN ACCORDANCE WITH SECTION 1703. PRODUCTS AND MATERIALS TO BE LABELED SHALL BE TESTED, INSPECTED AND LABELED IN ACCORDANCE WITH THE PROCEDURES SET FORTH IN SECTIONS 1703.5.1 THROUGH 1703.5.3 IDENTIFY ON PLANS, NAME AND ADDRESS OF THE TESTING/INSPECTION AGENCY. [SECTION 1703.5]

SPECIAL INSPECTIONS

SPECIAL INSPECTION: THE FOLLOWING ELEMENTS OF CONSTRUCTION SHALL REQUIRE SPECIAL INSPECTION PER 2016 CBC, SECTION 1704

ITEM	DESCRIPTION	INSPECTION BY	TYPE
1	FILLET WELDS	SPECIAL INSPECTOR	VISUAL INSPECTION

CONSULTANT

WESTERN
UTILITY / TELECOM, INC.

5032 SALEM DALLAS HWY
SALENA, CA 97350
Ph: 603-587-0101 Fax: 503-316-1864
WesternUtilityTelecom.com

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CUSTOMER

CROWN CASTLE

PROJECT

36'-0" (MAX.) H.T.
ANTENNA/STREETLIGHT POLE

LOCATION

SAN DIEGO...

NOTES IN & AROUND
SAN DIEGO, CA
SAN DIEGO COUNTY

ISSUED FOR

APPROVAL

DRAWN BY

BS

CHECKED BY

AM

DATE

01/24/19

REVISIONS

REV.	CHANGES	DATE	BY
A	UPDATE SHROUD KIT	01/24/19	BS
B	DISCONNECT, WAS 30' 10" (10' 10" + 20' 10")	01/24/19	BS

ENGINEER SEAL

REGISTERED PROFESSIONAL ENGINEER
NORMAN MCOWEN
EXP. 9/30/2019
4/8/19
CIVIL
STATE OF CALIFORNIA

SHEET TITLE

ELEVATION VIEW & STRUCTURAL DETAILS

WUT PROJECT NUMBER

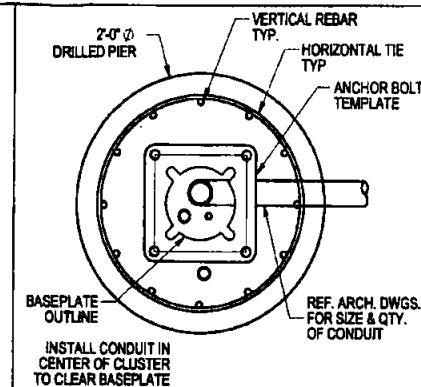
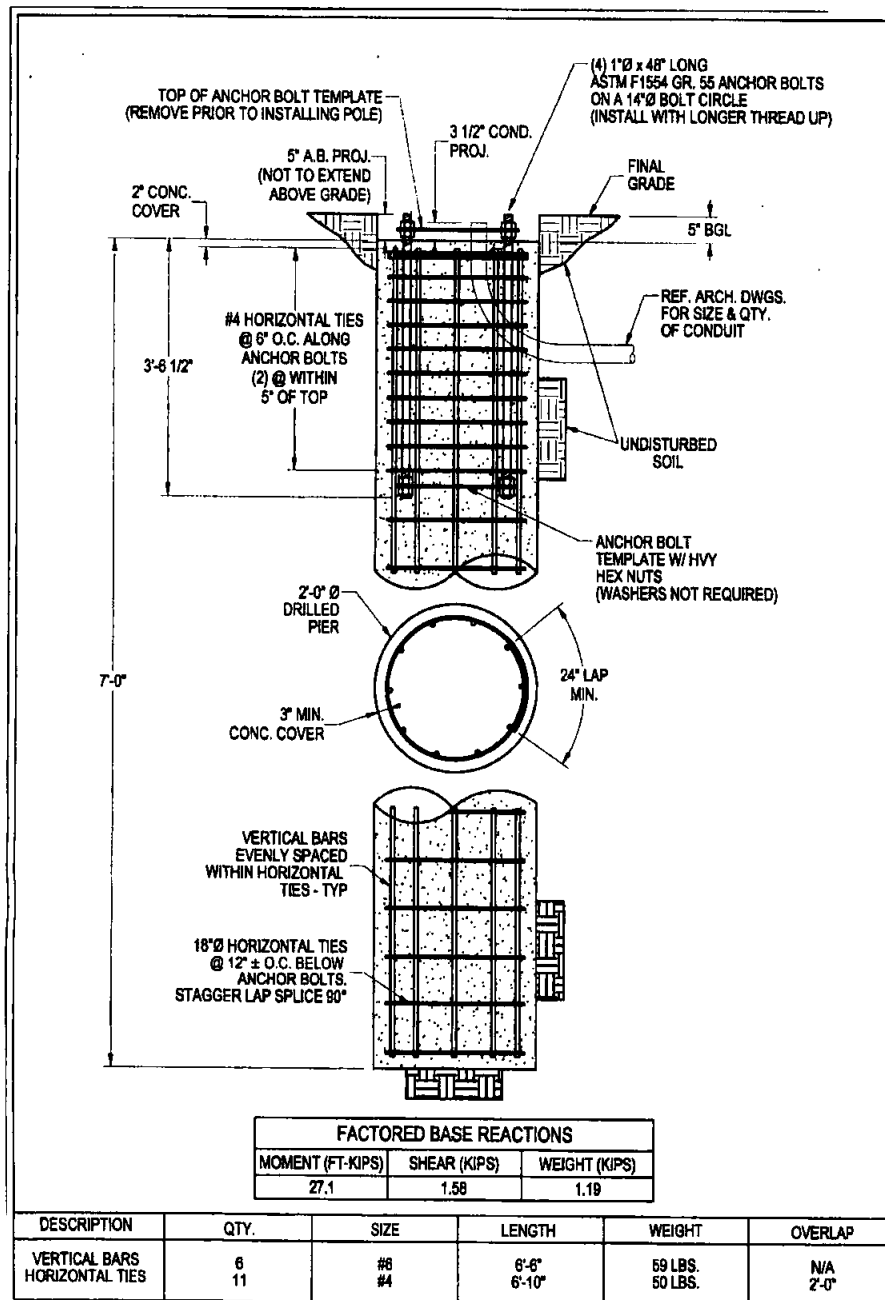
18-0570

DRAWING NUMBER

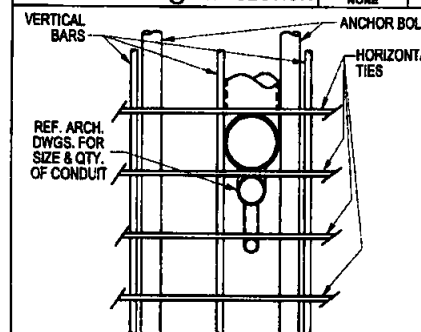
18570-APP

PAGE NUMBER

25 OF 31

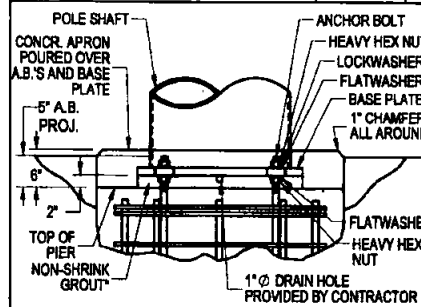


CONDUIT DETAIL @ PIER SECTION



* ADJUST REBAR AS NEEDED TO ACCOMMODATE CONDUIT. SEE REINFORCEMENT SUMMARY FOR SIZE, QUANTITY, AND LOCATION OF VERTICAL BARS AND HORIZONTAL TIES.

CONDUIT DETAIL



* NON-SHRINK GROUT SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 8,000 PSI.

BASE PLATE SHALL NOT BE GROUTED UNTIL AFTER THE STRUCTURE HAS BEEN INSTALLED AND PLUMBED.

BASE GROUTING DETAIL

GENERAL NOTES

- THE CONTRACTOR 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 (COSH) REQUIREMENTS.
- 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 REQUIREMENTS, AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.
- CONTRACTOR SHALL VERIFY, COORDINATE, AND PROVIDE ALL NECESSARY BLOCKING, BRACING, FRAMING, SHORING, OR OTHER SUPPORTS FOR ALL TIE-INS 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.
- IT IS THE INTENT OF THESE DRAWINGS TO SHOW THE COMPLETED INSTALLATION OF THE STRUCTURE SHOWN.
- 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. CONTRACTOR TO HOLD HIMSELF HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT.
- 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 ON OTHER PROPERTY DAMAGED IN CONNECTION WITH THE EXECUTION OF WORK ON THIS PROJECT.
- CONTRACTOR IS RESPONSIBLE FOR CHECKING AREA FOR UNDERGROUND FACILITIES PRIOR TO EXCAVATING ANY MATERIAL.
- CONTRACTOR SHALL REFER TO SOIL REPORT IF AVAILABLE FOR SITE CONDITIONS AND FURTHER CONSTRUCTION INFORMATION.
- IF NO SOIL REPORT, THE STRUCTURE(S) WILL BE LOCATED ENTIRELY ON UNDISTURBED NATIVE SOIL.
- ALL A CALIFORNIA LICENSED ARCHITECT/ENGINEER HAVE CLASSIFIED THE UNDISTURBED NATIVE SOILS TO BE CLASS B AND PER TABLE 1803.3 OF THE 2013 2018 CBC I HAVE ASSIGNED A FOUNDATION PRESSURE OF 1500 PSF. FOR THE DESIGN OF FOUNDATIONS RELATED TO THIS PROJECT.

SCALE: NONE 1

CONCRETE DETAIL

- CONTRACTOR SHALL INSPECT AND REMOVE ALL DEBRIS FROM BOTTOM OF EXCAVATION.
- CONTRACTOR SHALL VERIFY ANCHOR BOLT LAYOUT PRIOR TO, AND IMMEDIATELY AFTER PLACING CONCRETE. ANCHOR BOLT LAYOUT IS CRITICAL FOR MONOPIRE INSTALLATION.
- CONTRACTOR SHALL USE AND PROVIDE DEFORMED REINFORCING BARS CONFORMING TO ASTM A615 GR. 60 (60,000 PSI MIN. YIELD). CONTRACTOR SHALL USE ETEE WIRE TO HOLD REINFORCING BARS TOGETHER. IF WELDING REBAR IS PREFERRED, SUBSTITUTION USING A708 GR. 80 DEFORMED BARS.
- CONTRACTOR SHALL USE AND PROVIDE CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI. CONCRETE SHALL USE 1" MAXIMUM STONE AGGREGATE. MIX DESIGN IS 102 BAGS OF CEMENT MINIMUM PER CUBIC YARD. IF MINIMUM 4000 PSI MAXIMUM CONCRETE SLUMP.
- CONCRETE SHALL BE CONSOLIDATED USING VIBRATORY METHODS THROUGHOUT DEPTH OF FOUNDATION. VIBRATING LOWER DEPTHS MAY BE ACCOMPLISHED BY TOUCHING REBAR CAUSE WITH VIBRATOR.
- 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 BE PLACED USING CONVENTIONAL METHODS TO MINIMIZE SEGREGATION OF CONCRETE AND AGGREGATE. CONCRETE SHALL NOT FREE FALL MORE THAN 8 FT. CONCRETE MAY BE PLACED BELOW WATER USING TREMIE METHOD.
- CONCRETE SHALL BE PLACED TO THE DEPTH INDICATED, AND THE ABOVE DRAIN PORTION SHALL BE FORMED. THE REBAR CASE, ANCHOR BOLTS, AND CONCRETE SHALL BE PLACED WITHIN 24 HOURS OF COMPLETING THE EXCAVATION. COLD JOINTS ARE NOT ALLOWED.
- THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ADEQUATE CONCRETE COVERAGE OVER REINFORCING BARS TO MINIMIZE CORROSION POTENTIAL. UNLESS OTHERWISE NOTED, CONTRACTOR SHALL USE 3" CONCRETE COVER OVER REBAR. TOP OF FOOTING SHALL BE TROWELED LEVEL AND SMOOTH.
- DRILLED PIER FOUNDATION DESIGN PER 2013/2018 CBC, TABLE 1803.3, CLASS B MATERIAL.
- TOTAL VOLUME OF CONCRETE REQUIRED FOR THIS FOUNDATION IS APPROXIMATELY 0.8 CUY YDS.

SCALE: NONE 2

SPECIAL INSPECTIONS

SPECIAL INSPECTION: THE FOLLOWING ELEMENTS OF CONSTRUCTION SHALL REQUIRE SPECIAL INSPECTION PER 2018 CBC, SECTION 1704

ITEM	DESCRIPTION	INSPECTION BY	MATERIAL
1	PIER EXCAVATION LATERAL BEARING CAPACITY	SOILS ENGINEER	300 PSF/FT LATERAL
2	PIER CONSTRUCTION REINFORCING STEEL BAR SIZES AND INSTALLATION	SPECIAL INSPECTOR	ASTM A615 GR. 60
3	ANCHOR BOLTS BOLT SIZE AND LENGTHS INSTALLATION	SPECIAL INSPECTOR	ASTM F1554 GR. 55
4	CONCRETE TEST SPECIMENS PLACEMENT OF CONCRETE	SPECIAL INSPECTOR	f _c = 4,000 PSI TYPE II CEMENT

CONSULTANT

WESTERN
UTILITY / TELECOM, INC.

5032 SALEM DALLAS HWY
SALEM, OR 97304
Ph: 503-587-0101 Fx: 503-316-1864
WesternUtilityTelecom.com

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CLIENT

CROWN CASTLE

PROJECT

38'-0" (MAX. HT.)
ANTENNA/STREET LIGHT POLE

LOCATION

SAN DIEGO

NOTES IN & AROUND
SAN DIEGO, CA
SAN DIEGO COUNTY

ISSUED FOR

APPROVAL

DATE BY CHECKED DATE BY

BS AM 04/JAN/19

REVISIONS

REV.	CHANGES	DATE	BY
A	UPDATE SHROUD KIT	04/18/18	BS
B	DISCONNECT, WAS 32"	04/18/18	RM

ENGINEER SEAL

REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA
EXP. 9/30/2019
CIVIL

SHEET TITLE

PIER FOUNDATION DETAILS

WAT PROJECT NUMBER

18-0570

DRAWING NUMBER

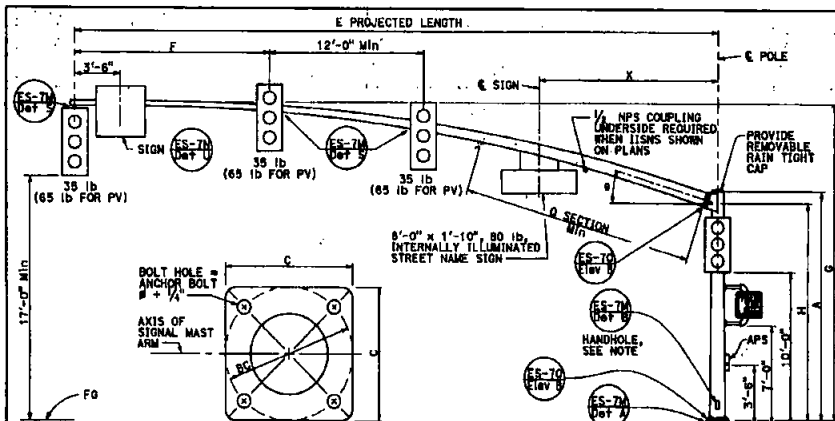
18570-APP

PAGE NUMBER

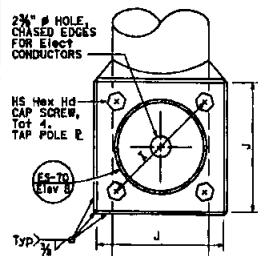
26 OF 31

MASTER STRUCTURAL PLANS AND CALCULATIONS FOR EXISTING STEEL TRAFFIC / CROSSING SIGNAL CONFIGURATIONS

CITY OF SAN DIEGO, CA DEVELOPMENT SERVICES DEPARTMENT			
MASTER STRUCTURAL PLANS & CALCULATIONS			
PTS # 626751			
DEVELOPER			
 CROWN CASTLE 10301 MEANLEY DR, SUITE 250 SAN DIEGO, CA 92131 www.crownccs.com			
PREPARED BY			
 SUPDESIGN GROUP, LLC 10151 PACIFIC MESA BLVD, SUITE 104 SAN DIEGO, CA 92186 www.supdesign.com			
STAMP			
I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE ASSUMED RESPONSIBILITY CHARGE OVER THE DESIGN OF THIS PROJECT AS REQUIRED IN SECTION 9103 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.			
I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS LIMITED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS ENGINEER OF WORK OF MY RESPONSIBILITY FOR PROJECT DESIGN.			
			
 DATE: 12/11/18 RCE #: C42590 EXP: 03/31/20			
DRAWN BY: MK CHECKED BY: BY DATE: 12/11/18			
REVISIONS			
REV	DATE	DESCRIPTION	BY
1	01/25/18	MONOPOLE CONFIG. REMOVED	MK
2	04/19/18	REMOVED PER REVIEW COMMENTS	MK
3	08/14/18	REMOVED GROUND KIT & DOTS	MK
SHEET TITLE			
MASTER STRUCTURAL PLANS AND CALCULATIONS FOR EXISTING STEEL TRAFFIC / CROSSING SIGNAL POLE CONFIGURATIONS			
LOCATION			
VARIES			
SCALE			
NOT TO SCALE			
SHEET NUMBER			
27 OF 31			



**BASE PLATE
DETAIL B**

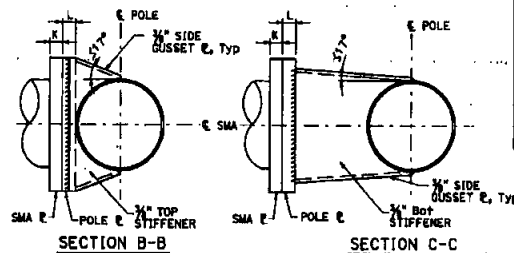


**SECTION A-A
SIGNAL MAST ARM CONNECTION
DETAIL A**

SIGNAL MAST ARM DATA										
E PROJECTED LENGTH	F MIN SPACING	G MOUNTING HEIGHT	H	MIN OD AT POLE	THICKNESS	BOLT CIRCLE	HS CAP SCREWS	PLATE SIZE	MAST ARM THICKNESS	POLE THICKNESS
50'-0"	15'-0"	23'-7 1/2" TO 28'-7 1/2"	16'-0"	11 1/4"	0.1793"	16"	1 1/2" - 6NC - 3/4"	1'-8"	1 3/4"	1 3/4"
55'-0"				11 1/4"						

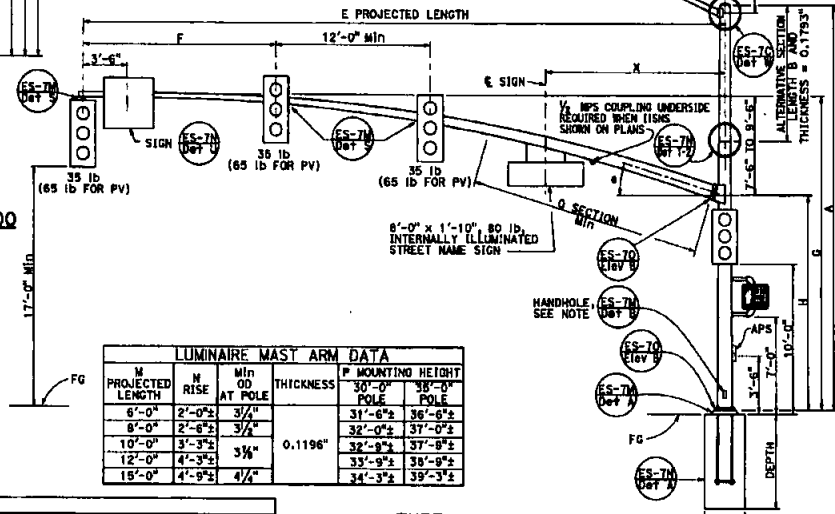
POLE DATA				BASE PLATE DATA				LUMINAIRE MAST ARM DATA			
POLE TYPE	LOAD CASE	WIND VELOCITY (mph)	A HEIGHT	MIN OD BASE	THICKNESS	ALTERNATIVE SECTION B LENGTH	ANCHOR BOLT SIZE	MIN OD AT POLE	THICKNESS	POLE MOUNTING HEIGHT	CIDH PILE FOUNDATION
28-5-100	5	100	17'-0"	22"	0.375"	10'-0"	2 1/4" x 42"	11 1/4"	0.1196"	30'-0"	MIN
29-5-100			30'-0"	22"		10'-0"				36'-0"	
29A-5-100			35'-0"	22"		15'-0"				37'-0"	

INDICATES MAST ARM LENGTH TO BE USED UNLESS OTHERWISE NOTED ON PLANS.



SECTION B-B

SECTION C-C



**TYPE 29-5-100, 29A-5-100
ELEVATION B**

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
**ELECTRICAL SYSTEMS
(SIGNAL AND LIGHTING STANDARD,
CASE 5 SIGNAL MAST ARM LOADING,
WIND VELOCITY=100 MPH AND SIGNAL
MAST ARM LENGTHS 50' TO 55')**
NO SCALE

ES-7G

Dist	COUNTY	ROUTE	POST MILES	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER
May 31, 2018
PLANS APPROVAL DATE
THE STATE OF CALIFORNIA ON ITS OFFICIAL SEAL OF OFFICE SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTE:
Handhole shall be located on the downstream side of traffic.

CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT
**MASTER STRUCTURAL
PLANS & CALCULATIONS**

PTS # 628751

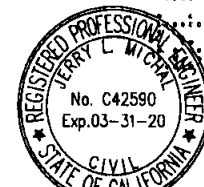
DEVELOPER
**CROWN
CASTLE**

10001 MEANLEY DR, SUITE 250
SAN DIEGO, CA 92121
www.crowncastle.com

PREPARED BY
**SUPDESIGN
GROUP, LLC**

10151 PACIFIC MESA BLVD, SUITE 100
SAN DIEGO, CA 92121
www.supdesignllc.com

STAMP
I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT. THAT I HAVE EXERCISED MY PROFESSIONAL JUDGMENT IN THE DESIGN OF THE PROJECT AND PROFESSIONAL CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.
I UNDERTAKE THAT THIS CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AN ENGINEER OF WORK, OF MY RESPONSIBILITY FOR PROJECT DESIGN.



Jerry L. Michal
JERRY L. MICHAL
No. C42590
Exp. 03-31-20

REV.	DATE	DESCRIPTION	BY
1	01/25/18	MONOPOLE CONFIG. REMOVED	MK
2	04/15/18	REVISION PER REVIEW COMMENT #8	MK
3	03/14/18	REVISION RE: RUCD KITS CONK & DDTG	MK

SHEET TITLE
**CALTRANS STANDARD PLAN
ES-7G
(AS REFERENCE ONLY)**

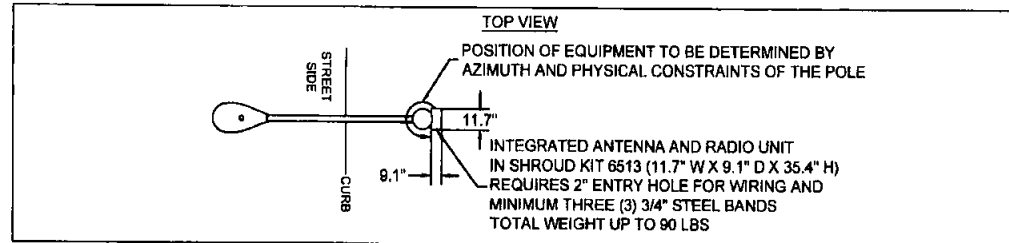
LOCATION
VARIES

SCALE
NOT TO SCALE

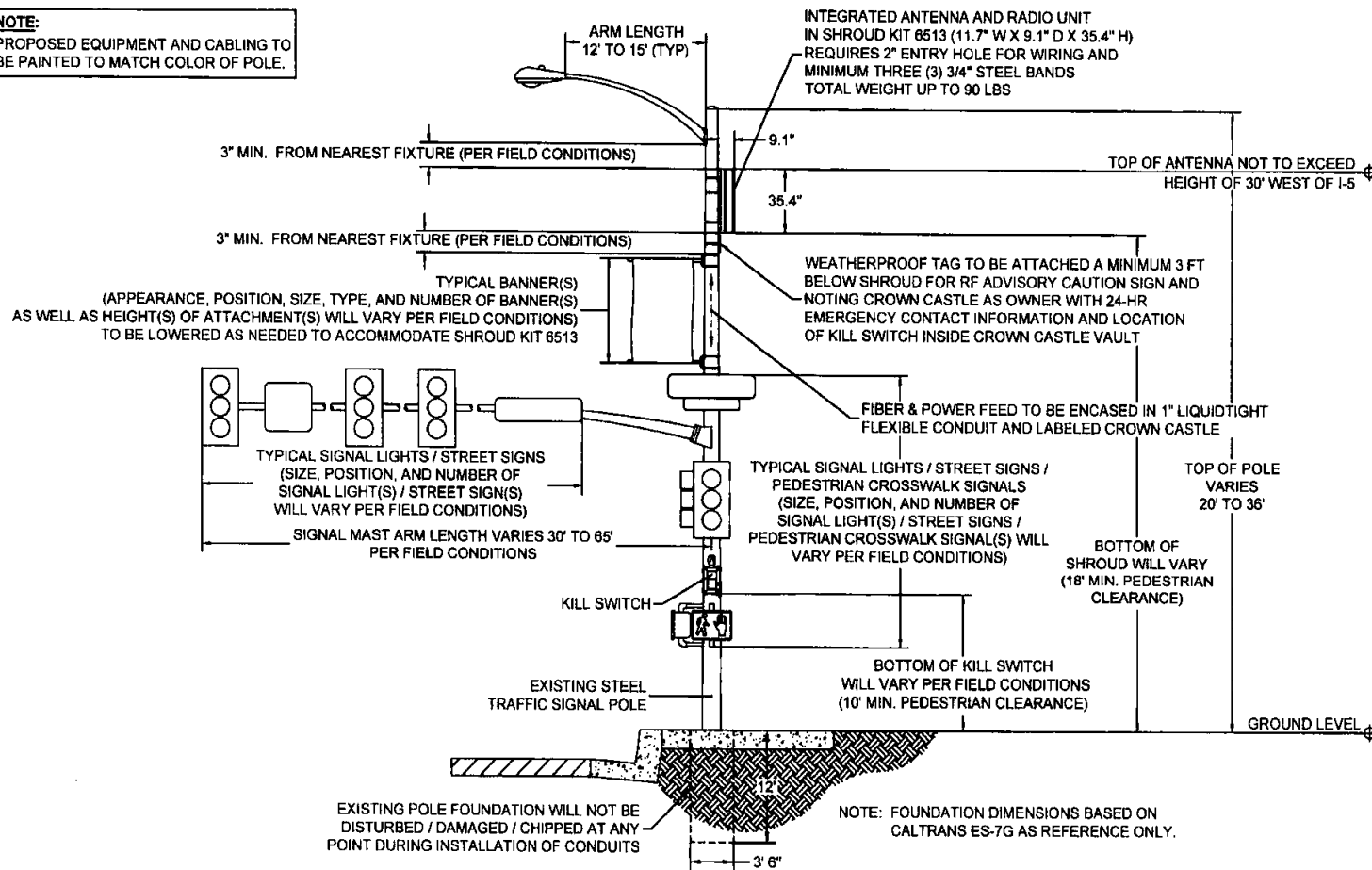
SHEET NUMBER
28 OF 31

DESCRIPTION:

EXISTING STEEL TRAFFIC / CROSSING SIGNAL POLE WITH INTEGRATED ANTENNA AND RADIO UNIT IN EQUIPMENT SHROUD ATTACHED AT 18" MINIMUM ABOVE GROUND LEVEL. TOP OF ANTENNA WILL NOT EXCEED THE HEIGHT OF 30' 0" WEST OF INTERSTATE 5 PER CITY OF SAN DIEGO REQUIREMENTS. HEIGHT OF TRAFFIC / CROSSING SIGNAL POLE MAY VARY PER LOCATION.



NOTE:
PROPOSED EQUIPMENT AND CABLING TO BE PAINTED TO MATCH COLOR OF POLE.



CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT

MASTER STRUCTURAL PLANS & CALCULATIONS

PTS # 626751

DEVELOPER

**CROWN
CASTLE**

10301 MEANLEY DR, SUITE 250
SAN DIEGO, CA 92131
WWW.CROWNCASTLE.COM

PREPARED BY

**SUPDESIGN
GROUP, LLC**

10151 PACIFIC MESA BLVD, SUITE 101
SAN DIEGO, CA 92131
WWW.SUPDESIGNLLC.COM

STAMPED BY

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT. THAT I HAVE ASSUMED RESPONSIBILITY FOR THE DESIGN OF THE PROJECT AS OFFERED. IN SECTION 0203 OF THE BUSINESS AND PROFESSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITY FOR THE PROJECT DESIGN.



Jerry L. Michal
JERRY L. MICHAL
REG. # C42590
EXP. 03/31/20

REV.	DATE	DESCRIPTION	BY
1	01/22/19	MICROPOL COMING RELINQUISHED	MM
2	04/18/19	REVISED PER REVIEW COMMENTS	MM
3	05/14/19	REVISED SHROUD KIT 6513 (0071)	MM

SHEET TITLE

CONFIGURATION E:
EXISTING STEEL TRAFFIC / CROSSING
SIGNAL POLE WITH SHROUD KIT 6513
FOR INTEGRATED ANTENNA AND RADIO
UNIT

LOCATION

VARIES

SCALE

NOT TO SCALE

SHEET NUMBER

29 OF 31

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Typical Antenna Installation

CALCULATIONS BY: JLM

PROJECT NAME: Traffic Pole Installation

DATE: 1-15-2019

PROJECT ADDRESS: Various Locations

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 150 psf/ft

Steel Pole Ht. = 20' Ave. Pole Dia. = As Noted, Equipment Weight: 90 pounds

Footing by Design: Dia.=3.5' dia. x 9' deep.

References: 1. 2015 UBC

3. ASCE MINIMUM DESIGN LOADS - 7-16

2. 2016 CBC

4. 2016 Caltrans Standard Plan RSP ES-7C

20 foot steel traffic signal with equipment and signs

1. Wind Loading:

Wind Zone: (Fig. 3-2.3)

V = 100 mph (3 sec. Gust)

Coefficients:

K_z (16) = 0.87

K_z(32) = 0.94

I_r = 0.87

G = 1.142

Wind Pressures: P_z(16) = (0.00256) K_z(16)G_VI_r = 22 psf

P_z(36.0) = (0.00256) K_z(30.0)G_VI_r = 23.8

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 9.86 in. A₁₆ = (16) (9.86/12) = 13.1 sq.ft.
Ave. Dia. (16- 22') = 9.11 in. A₂₂ = (4.0) (9.11/12) = 3.04 sq.ft.

Area of traffic arm: A = (0.47)(30) + (1.0)(2)(2) = 18.3 sq. ft.

Area of pole signals (1): A = (2)(3) = 6 sq. ft.

Area of antenna: A = (10.22/12)(35.4/12) = 2.97 sq.ft

Area of light arm: A = (0.25)(8) + (0.5)(2) = 3 sq. ft.

Area of arm signals: A = (3) (2) (3) = 18 sq. ft.

Area of signs: A = (1)(2) = 2 sq. ft.

Area of Banner: A = (2)(4) = 8 sq. ft.

3. FORCE ON POLE

Force on pole: F = P₁₆P_zH₁₆A + P_{16.33}P_zH_{16.33}A = 360.4 pounds

Force on light arm: F = (23.8)(3) = 70.8 pounds

Force on Antenna: F = P₁₆P_zH₁₆A = 70.7 pounds

Force on Traffic Arm: F = P₁₆P_zH₁₆A = 435.5 pounds

Force on pole Signal: F = (2)(6) = 264 pounds

Force arm signals: F = (18)(23.8) = 428 pounds

Force on signs: F = (16)(2) = 44 pounds

Force on Banner: F = (22)(8) = 176 pounds

Total wind load = 1879.4 pounds

3. Depth Requirement: Typical Standard Depth is 9.0 feet (per reference 4)

D = 0.5A (1 + [1 + (4.36h / A)]^{1/4})

Where A = (2.34 P/S.b) = [(2.34) (1879.4)/(2200) (3.5)] = 0.90

Therefore D_{min} = 4.90ft. < 9.0 feet ok

4. Bearing Capacity

Gross pole wt: 1975 pounds (for pole + equipment)

Q_a = 1500 psf

Pole ftg dia. = 3.5 ft. Footing area = 9.62 sq. ft.

Q_a = 1500 psf > Q = (1975)/(9.62) = 205.3 psf OK

CITY OF SAN DIEGO, CA
DEVELOPMENT SERVICES DEPARTMENT

MASTER STRUCTURAL
PLANS & CALCULATIONS

PTS # 626751

DESIGNER
**CROWN
CASTLE**

10301 MEANLEY DR, SUITE 250
SAN DIEGO, CA 92131
www.crowncastle.com

PREPARED BY
**SUPDESIGN
GROUP, LLC**

10151 PACIFIC MESA BLVD, SUITE 100
SAN DIEGO, CA 92121
www.supdesignllc.com

I HEREBY DECLARE THAT I AM THE ENGINEER OF RECORD FOR THIS PROJECT, THAT I HAVE EXERCISED MY PROFESSIONAL JUDGMENT IN THE DESIGN OF THIS PROJECT AND I AM NOT PROVIDING ANY DESIGN OR SPECIFICATIONS IN THIS PROJECT THAT ARE IN VIOLATION OF ANY CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT (DRAWINGS AND SPECIFICATIONS) BY THE CITY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME AS ENGINEER OF WORK OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

JERRY L. MITCHELL
REGISTERED PROFESSIONAL ENGINEER
No. C42590
Exp. 03-31-20
CIVIL
STATE OF CALIFORNIA

REV	DATE	DESCRIPTION	BY
1	01/23/19	MONOPOLE CONFIG. REMOVED	ML
2	04/15/19	REMOVED PER REVIEW COMMENTS	ML
3	05/14/19	REMOVED BY WOULD KITS WITH A DETD	ML

SHEET TITLE
CONFIGURATION E:
EXISTING STEEL TRAFFIC / CROSSING
SIGNAL POLE WITH SHROUD KIT 6513
FOR INTEGRATED ANTENNA AND RADIO
UNIT (CALCULATIONS)

LOCATION
VARIES

SCALE
NOT TO SCALE

SHEET NUMBER
30 OF 31

STRUCTURAL DESIGN AND CALCULATIONS

PROJECT NO. Typical Antenna Installation

CALCULATIONS BY: JLM

PROJECT NAME: Traffic Pole Installation

DATE: 1-15-2019

PROJECT ADDRESS: Various Locations

San Diego, California

DESIGN PARAMETERS

Bearing Capacity: 1500 psf (per CBC Table 1806.2) Allowable Lateral Pressure: 150 psf/ft

Steel Pole Ht. = 36' Ave. Pole Dia. = As Noted, Equipment Weight: 90 pounds

Footings by Design: Dia. = 3.5' dia. x 12' deep

References: 1. 2015 UBC 3. ASCE MINIMUM DESIGN LOADS - 7-16
2. 2016 CBC 4. 2016 Caltrans Standard Plan RSP ES-7C

36 foot steel traffic signal with equipment and signs

1. Wind Loading:

Wind Zone: (Fig. 3-2.3) V = 110 mph (3 sec. Gust)

Coefficients: Kz (16) = 0.87 Kz(32) = 0.94
I_r = 0.87 G = 1.142

Wind Pressures: Pz(16) = (0.00256) Kz(16)GV²IR = 22 psf

Pz(35.0) = (0.00256) Kz(30.0)GV²IR = 23.8

2. AREA CALCULATIONS

Area of pole: Ave. Dia. (0-16') = 9.62 in. A₁₆ = (16) (9.62/12) = 12.8 sq.ft.
Ave. Dia. (16-36') = 7.65 in. A₃₆ = (20.0) (7.65/12) = 12.8 sq.ft.

Area of traffic arm: A = (0.47)(30) + (1.0)(2)(2) = 18.3 sq. ft.

Area of pole signals (1): A = (2)(3) = 6 sq. ft.

Area of antenna: A = (10.22/12)(35.4/12) = 2.97 sq.ft.

Area of light arm: A = (0.25)(8) + (0.5)(2) = 3 sq. ft.

Area of arm signals: A = (3) (2) (3) = 18 sq. ft.

Area of signs: A = (1)(2) = 2 sq. ft.

Area of Banner: A = (2)(4) = 8 sq. ft.

3. FORCE ON POLE

Force on pole: F = P₁₆PzH₁₆A + P₃₆PzH₃₆A = 585.0 pounds

Force on light arm: F = (23.8)(3) = 70.8 pounds

Force on Antenna: F = P₁₆PzH₁₆A = 70.7 pounds

Force on Traffic Arm: F = P₁₆PzH₁₆A = 435.5 pounds

Force on pole Signal: F = (2)(6) = 264 pounds

Force arm signals: F = (18)(23.8) = 428 pounds

Force on signs: F = (16)(2) = 44 pounds

Force on Banner: F = (22)(8) = 176 pounds

Total wind load = 2052.0 pounds

3. Depth Requirement: Typical Standard Depth is 12 feet (per reference 4)

$$D = 0.5A (1 + [1 + (4.36h / A)]^2)$$

$$\text{Where } A = (2.34 P/S, b) = [(2.34) (2052.0)/(2200) (3.5)] = 0.62$$

$$\text{Therefore } D_m = 5.37\text{ft.} < 12.0\text{ feet ok}$$

4. Bearing Capacity

Gross pole wt: 2105 pounds (for pole + equipment)

Q_a = 1500 psf

Pole fig dia. = 3.5 ft. Footing area = 9.62 sq. ft.

$$Q_b = 1500\text{ psf} > Q = (2105)/(9.62) = 218.8\text{ psf OK}$$

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PREPARED BY
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GROUP, LLC**
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SAN DIEGO, CA 92121
www.supdesignllc.com

STAMP
I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR
THIS PROJECT. THAT I HAVE EXERCISED RESPONSIBILITY
AND SPECIFICATIONS BY THE CITY OF SAN DIEGO IS
COMMITTED TO A REVIEW ONLY AND DOES NOT RELIEVE ME
AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR
PROJECT DESIGN



Jerry L. Mitchell
JERRY L. MITCHELL
DATE: 1/15/19
EXP: 03/31/19

REV.	DATE	DESCRIPTION	BY
1	01/25/19	MONITORING COMING, REMOVED	ML
2	04/15/19	REMOVED PLUS REVIEW COMMENTS	ML
3	05/14/19	REMOVED SHROUD KIT'S DOWNS & DOWNS	ML

SHEET TITLE
CONFIGURATION E:
EXISTING STEEL TRAFFIC / CROSSING
SIGNAL POLE WITH SHROUD KIT 6513
FOR INTEGRATED ANTENNA AND RADIO
UNIT (CALCULATIONS)

LOCATION
VARIES

SCALE
NOT TO SCALE

SHEET NUMBER
31 OF 31

Exhibit C: Interference Protection Requirements

1. Interference. Anytime during the term of this Master Agreement, PERMITTEE may be required to provide an intermodulation report ("Report") to CITY. This Report shall include the calculation parameters used to compile the Report, all intermodulation "hits," a brief description of the results of the intermodulation calculations, a list of possible interference situations that may result from the proposed equipment, transmission frequencies that are currently being operated on-site, and similar or other relevant data from the licensees and/or users operating on-site. The information required to compile this report, including transmit frequencies currently operated on-site, may require collection of data from other licensees operating on-site. A list of other licensees within the Permit Areas can be obtained from CITY. CITY is not responsible for any omitted data provided for the purpose of creating this Report. If required, the Report shall be provided to CITY's General Services Department, Communications Division, and Senior Communications Engineer.
2. Pre-installation Notification. PERMITTEE shall notify all licensees and/or users operating within the Permit Areas of any proposed installation and/or modification at least fourteen (14) calendar days prior thereto. A list of all licensees and/or users operating within the Permit Areas may be obtained from CITY and used to compile a notification list. The notification shall be in the form of a letter to each listed licensee and/or user operating within the Permit Areas, giving a technical data summary of the proposed new and/or modified equipment and/or installation to be installed within the Permit Areas, and shall specify the approximate date of the installation or modification. An additional notification letter shall be sent to CITY's Communication Engineer at CITY's General Services Department, Communications Division. This letter shall include a list of all licensees and/or users notified. PERMITTEE shall make complete arrangements and conduct all tests and operations in accordance with all applicable Federal (including FCC) Rules and Regulations.
3. Radio Frequency Interference to CITY Radio Equipment. The radio equipment use proposed by PERMITTEE shall not directly or indirectly result in degraded technical performance of CITY's existing radio equipment installed within the Permit Areas or used in the general area. Resulting degraded technical performance in this instance includes, but is not limited to: (a) detectable or measurable received intermodulation; (b) audio distortion or noise; and (c) receiver desensitization in excess of 3.0 dB with respect to 12dB SINAD test.
4. Modifications to Equipment. Modifications to transmitting equipment (including, but not limited to, those which change effective radiated power, transmitter frequency, transmitter modulation, and/or transmitter spurious and harmonic emissions) may require re-notification to existing licensees and/or users operating within the Permit Areas, as well as a new Report.
5. Resulting Interference. Should an interference problem occur within the Permit Areas (or surrounding area) as a result of any new and/or modified equipment and/or installation, PERMITTEE shall initiate mutually agreeable actions among the affected parties to mitigate or resolve the interference problem. If harmful interference cannot be resolved, CITY may recognize the right of other authorized users and, in CITY's sole discretion, withhold consent or disallow use of the new and/or modified equipment and/or installation, pending settlement of the interference problems between PERMITTEE and other authorized users.

6. No Obligation by CITY for Loss. CITY shall not be obligated for any loss, financial or otherwise, which may be incurred by PERMITTEE as a result of the foregoing interference protection requirements, and PERMITTEE expressly waives any claim for expense or loss which PERMITTEE might incur as a result of CITY's enforcement thereof.

Exhibit D: Emergency Maintenance Procedures

If PERMITTEE discovers that any of the Communications Equipment is damaged, PERMITTEE shall immediately notify **CITY's Station 38 at (619) 527-7660**.

If CITY discovers that any of the Communications Equipment is damaged, CITY shall immediately notify **PERMITTEE's Network Operation Call Center at (888) 632-0931**.

CITY may require any replacement Communications Equipment to be relocated, as provided for in this Master Agreement.

If the Communications Equipment causes any interference to CITY's telecommunications equipment and/or system, CITY may require such Communications Equipment to be removed permanently and replaced at another location, as provided for in this Master Agreement.

If CITY's telecommunications and/or lighting systems require emergency repair or maintenance by CITY, CITY shall employ use of PERMITTEE's emergency shut off switch, per Section 19.2, and notify PERMITTEE immediately at the number above.

PERMITTEE shall not unreasonably interfere with pedestrian or vehicle traffic while installing or maintaining the Communications Equipment.

If a party changes its emergency contact telephone information, that party shall immediately notify the other party of the new contact information at the telephone number provided above, and, within ten (10) calendar days, provide the other party with written notice of the new contact information, in accordance with this Master Agreement.