



BOARD OF SUPERVISORS AGENDA ITEM REPORT (BOSAIR)

All fields are required. Enter N/A if not applicable. For number fields, enter 0 if not applicable.

Award Type:	Agenda Item
BOSAIR Activity:	Board Meeting Request
Requested Board Meeting Date:	07/28/2026
Project Title / Description:	P26CU00005 TORRES BLANCAS HOLDINGS LLC - S. ABREGO DRIVE

Agenda Item Report

Introduction / Background:	Torres Blancas Holdings LLC, represented by Todd Daoust with Pacific Coast Towers, requests a Type III Conditional Use Permit for a wireless communication facility in accordance with Section 18.07.030.H of the Pima County Zoning Code, in the RH (GC) (Rural Homestead - Golf Course) zone, addressed as 3233 S. Abrego Drive.
Discussion:	The owner requests a Type III Conditional Use Permit to construct a wireless communication facility.
Conclusion:	Approval of the conditional use permit would allow the owner to build a wireless communication facility.
Recommendation:	The Hearing Administrator and the Planning and Zoning Commission recommend APPROVAL of the Type III Conditional Use Permit subject to standard and special conditions.
Fiscal Impact:	None
Support of Prosperity Initiative:	9. Expand Broadband Services and Address Barriers to Digital Inclusion
Provide information that explains how this activity supports the selected Prosperity Initiative	Approval of this conditional use permit will expand broadband services and will provide improved access to modern wireless communication networks.
Board of Supervisor District:	4
Department:	Development Services - Planning
Name:	Spencer Hickman
Telephone:	(520) 724-6498

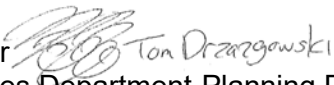
Department Director Signature: Lauren A. Ortega Date: 7/9/2026 | 4:10 PM MST

Deputy County Administrator Signature:  Date: 7/13/2026 | 10:30 AM MST

County Administrator Signature:  Date: 7/13/2026 | 10:34 AM MST



TO: Honorable Steve Christy, District 4

FROM: Tom Drzazgowski, Deputy Director 
Public Works-Development Services Department-Planning Division

DATE: July 7, 2026

SUBJECT: **P26CU00005 TORRES BLANCAS HOLDINGS LLC – S. ABREGO DRIVE**
(Conditional Use Type III – Wireless Communication Facility)

The above referenced Conditional Use Permit is within your district and is scheduled for the Board of Supervisors' **TUESDAY, JULY 28, 2026** hearing.

REQUEST: For a **Type III Conditional Use Permit for a wireless communication facility** in accordance with Section 18.07.030.H of the Pima County Zoning Code, in the RH (GC) (Rural Homestead - Golf Course) zone located east of N. I19 Frontage Road, approximately 300 feet southeast of the intersection of N. I19 Frontage Road and W. Pecan Valley Drive, addressed as **3233 S. Abrego Drive**

OWNER: WG Torres Blancas Golf LLC
14 Steuben Lane
Jackson, NJ 08527

DISTRICT: 4

STAFF CONTACT: Spencer Hickman, Planner II

PUBLIC COMMENT TO DATE: As of July 7, 2026, staff received two letters of protest and four letters in support of the proposal.

HEARING ADMINISTRATOR RECOMMENDATION: **APPROVAL SUBJECT TO STANDARD AND SPECIAL CONDITIONS**

MAEVEEN MARIE BEHAN CONSERVATION LANDS SYSTEM (CLS): The subject property is located outside the Maeveen Marie Behan Conservation Land System.

TD/SH/ds
Attachments



BOARD OF SUPERVISORS MEMORANDUM

SUBJECT: P26CU00005

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FOR JULY 28, 2026 MEETING OF THE BOARD OF SUPERVISORS

TO: HONORABLE BOARD OF SUPERVISORS

FROM: Tom Drzazgowski, Deputy Director 
Public Works-Development Services Department-Planning Division

DATE: July 7, 2026

ADVERTISED ITEM FOR PUBLIC HEARING

CONDITIONAL USE PERMIT

P26CU00005 TORRES BLANCAS HOLDINGS LLC – S. ABREGO DRIVE

Torres Blancas Holdings LLC, represented by Todd Daoust with Pacific Coast Towers, requests a **Type III Conditional Use Permit for a wireless communication facility** in accordance with Section 18.07.030.H of the Pima County Zoning Code, in the RH (GC) (Rural Homestead - Golf Course) zone located east of N. I19 Frontage Road, approximately 300 feet southeast of the intersection of N. I19 Frontage Road and W. Pecan Valley Drive, addressed as **3233 S. Abrego Drive**. Staff and the Planning and Zoning Commission recommend **APPROVAL SUBJECT TO STANDARD AND SPECIAL CONDITIONS**. (District 4)

Summary of Planning and Zoning Commission Hearing (June 24, 2026)

The public hearing was held in person and virtually. Some commissioners were present while others attended virtually and through the telephonic option. Staff and the applicant attended and presented in person. Staff and the applicant's representative presented the proposed tower and fielded the Commissioners' questions. Staff explained that subsequent to issuance of the Hearing Administrator's staff report, the County's Flood Control District had reviewed the case and was recommending additional conditions to ensure compliance with the Flood Control District's regulations.

The hearing was opened to the public and there were no members of the public that attended the hearing either in person or online to speak on the case.

The public hearing was closed.

The Commission's discussion on the case was brief. Staff and the Commission discussed what happened to the structures and infrastructure associated with cell towers once the cell tower was no longer in operation.

P26CU00005

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Commissioner Hanna made a motion to recommend **APPROVAL SUBJECT TO STANDARD AND SPECIAL CONDITIONS**; Commissioner Truitt gave second.

The commission voted to recommend **APPROVAL** of the Conditional Use Permit 5 – 1; Commissioner Lane voted NAY (Commissioners Hook, Maese, Matter and Tronsdal were absent).

Standard Conditions & Requirements pre the Pima County Zoning Code

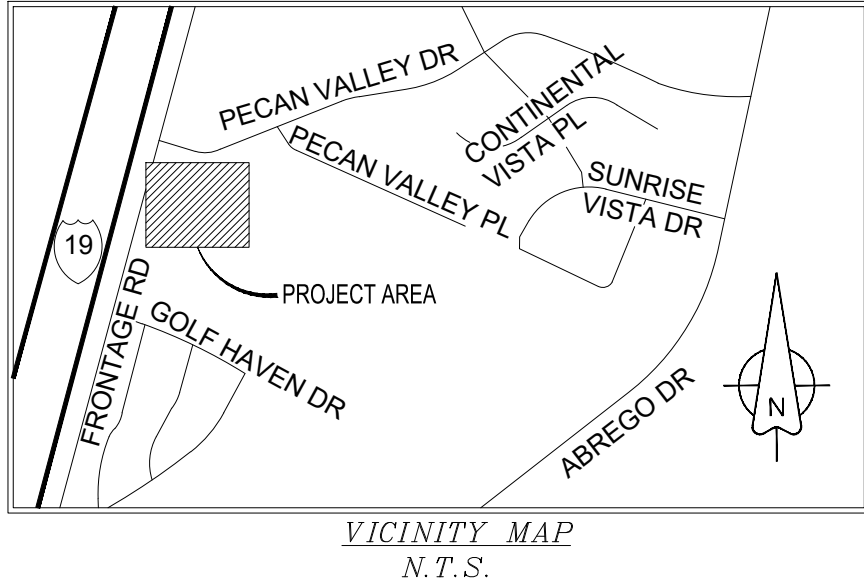
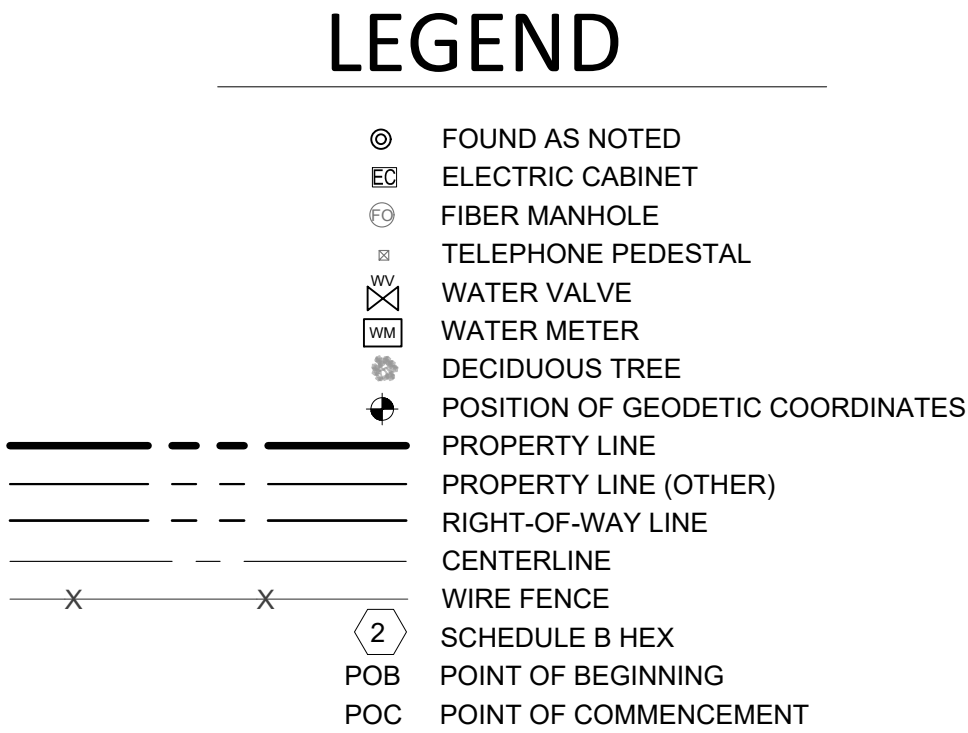
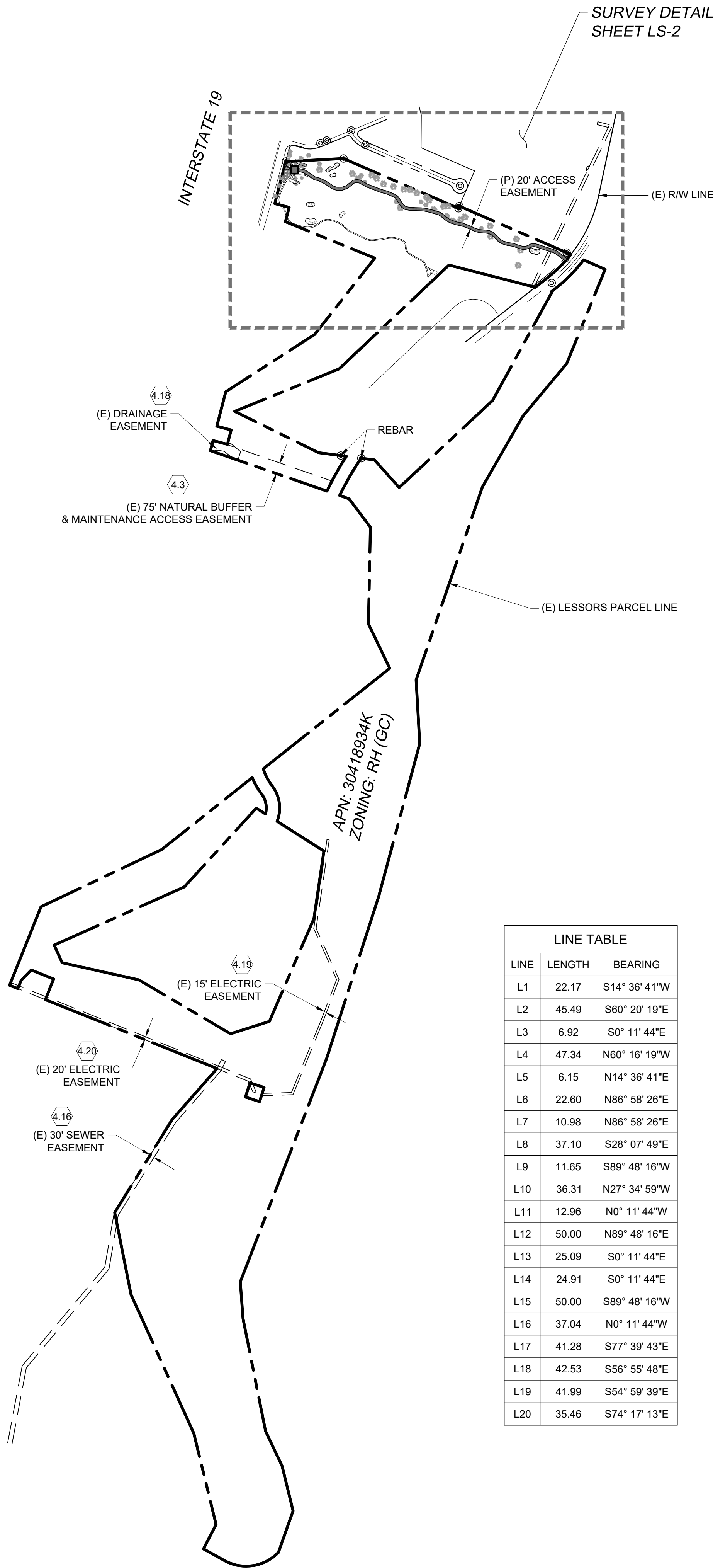
1. Obtaining an approved Development Plan.
2. Adherence to all requirements of Section 18.07.030.H (General Regulations and Exceptions) of the Pima County Zoning Code.

Special Conditions

1. The monopole tower shall be limited to its requested height of seventy-five feet (65') to the top of the actual metal structure, as shown on the submitted preliminary development plan.
2. The tower shall be camouflaged as a faux eucalyptus tree rather than the applicant's proposal of a "broadleaf tree". All cabling associated with the proposed antennae arrays shall be concealed within the "trunk" of the faux tree. The branches of the faux tree may extend to a top height of eighty feet (70').
3. The on-the-ground equipment compound shall be located as shown on the submitted preliminary Development Plan and shall be secured within an 8' tall masonry wall. The masonry wall and gates shall be painted a desert brown or tan color.
4. Regional Flood Control District review and approval are required at the time of permitting.
5. The proposed improvements must be located fully outside of the local regulatory floodplain.
6. If the improvements are located within the erosion hazard setback, an engineering analysis prepared by an Arizona registered civil engineer shall be submitted to the District for review and approval to fully address any impacts of scour and/or erosion on the proposed tower's foundation(s).

TD/SH/ds
Attachments

C: Catherine M. Romo (Owner)
Todd Daoust; Commsapes, LLC (Applicant)



SURVEYOR NOTES

- ALL TITLE INFORMATION IS BASED UPON A COMMITMENT FOR TITLE INSURANCE PREPARED BY U.S. TITLE SOLUTIONS, ORDER NO.: UST79594 EFFECTIVE DATE: 02/19/2025.
- SURVEYOR HAS NOT PERFORMED A SEARCH OF PUBLIC RECORDS TO DETERMINE ANY DEFECT IN TITLE.
- THE BOUNDARY SHOWN HEREON IS PLOTTED FROM RECORD INFORMATION AND DOES NOT CONSTITUTE A BOUNDARY SURVEY OF THE PROPERTY.
- SURVEYOR DOES NOT GUARANTEE THAT ALL UTILITIES ARE SHOWN OR THEIR LOCATIONS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR AND DEVELOPER TO CONTACT BLUE STAKE AND ANY OTHER INVOLVED AGENCIES TO LOCATE ALL UTILITIES PRIOR TO CONSTRUCTION. REMOVAL, RELOCATION AND/ OR REPLACEMENT IS THE RESPONSIBILITY OF THE CONTRACTOR.

PROJECT META DATA

- ELEVATIONS SHOWN HEREON ARE REPRESENTED IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVDS88) ESTABLISHED FROM GPS DERIVED ELLIPSOID HEIGHTS, APPLYING GEOID 12B SEPARATIONS CONSTRAINING TO NGS CORS STATIONS PROVIDED IN THE "ONLINE POSITIONING USER SERVICE" (OPUS) SOLUTION FOR THIS SPECIFIC SITE.
- BEARINGS SHOWN HEREON ARE BASED UPON U.S. STATE PLANE NAD83 COORDINATE SYSTEM ARIZONA STATE PLANE COORDINATE ZONE CENTRAL, DETERMINED BY GPS OBSERVATIONS.
- FIELD WORK FOR THIS PROJECT WAS PERFORMED ON 04/01/25.

FLOOD ZONE DESIGNATION

THE PROPOSED LEASE PREMISES SHOWN HEREON APPEAR TO BE WITHIN FLOOD ZONE "X" AS DELINEATED ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY FIRM MAP NO. 04019C3955L DATED 08/16/2011.

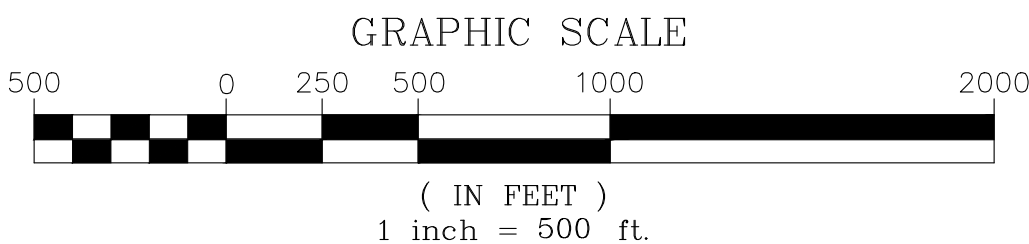
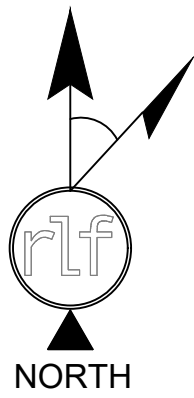
FLOOD ZONE "X" IS DEFINED AS: AREAS DETERMINED TO BE OUTSIDE 500-YEAR FLOODPLAIN; DETERMINED TO BE OUTSIDE THE 1% AND 0.2% ANNUAL CHANCE FLOODPLAINS.

LINE TABLE		
LINE	LENGTH	BEARING
L1	22.17	S14° 36' 41"W
L2	45.49	S60° 20' 19"E
L3	6.92	S0° 11' 44"E
L4	47.34	N60° 16' 19"W
L5	6.15	N14° 36' 41"E
L6	22.60	N86° 58' 26"E
L7	10.98	N86° 58' 26"E
L8	37.10	S28° 07' 49"E
L9	11.65	S89° 48' 16"W
L10	36.31	N27° 34' 59"W
L11	12.96	N0° 11' 44"W
L12	50.00	N89° 48' 16"E
L13	25.09	S0° 11' 44"E
L14	24.91	S0° 11' 44"E
L15	50.00	S89° 48' 16"W
L16	37.04	N0° 11' 44"W
L17	41.28	S77° 39' 43"E
L18	42.53	S56° 55' 48"E
L19	41.99	S54° 59' 39"E
L20	35.46	S74° 17' 13"E

LINE TABLE		
LINE	LENGTH	BEARING
L21	40.73	S64° 09' 18"E
L22	66.25	S56° 52' 25"E
L23	22.78	S71° 41' 50"E
L24	38.55	N90° 00' 00"E
L25	33.46	N69° 57' 44"E
L26	34.49	N51° 45' 20"E
L27	24.07	N51° 45' 20"E
L28	22.71	N80° 14' 36"E
L29	19.23	S79° 54' 25"E
L30	58.10	S61° 03' 27"E
L31	97.31	S69° 11' 28"E
L32	45.36	S74° 10' 25"E
L33	46.28	S66° 58' 42"E
L34	21.10	S59° 55' 54"E
L35	18.00	S37° 57' 27"E
L36	27.52	S30° 27' 05"E
L37	27.58	S36° 10' 35"E
L38	23.70	S53° 37' 04"E
L39	27.97	S78° 43' 24"E
L40	37.83	S86° 39' 50"E

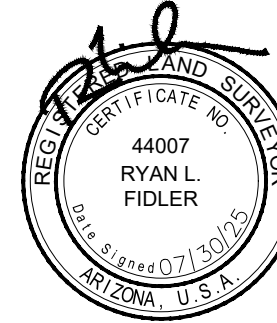
LINE TABLE		
LINE	LENGTH	BEARING
L41	41.50	S88° 31' 25"E
L42	22.29	S83° 57' 07"E
L43	17.59	S78° 25' 26"E
L44	29.74	S76° 10' 36"E
L45	56.60	S73° 44' 40"E
L46	16.03	S56° 56' 21"E
L47	15.95	S51° 45' 35"E
L48	19.91	S49° 41' 25"E
L49	22.97	S56° 03' 37"E
L50	12.76	S60° 46' 33"E
L51	23.57	S69° 03' 31"E
L52	19.89	S70° 37' 43"E
L53	41.02	S78° 43' 13"E
L54	34.91	S70° 30' 08"E
L55	29.99	S66° 29' 32"E
L56	26.74	S65° 14' 35"E
L57	11.78	S69° 27' 02"E
L58	22.87	S75° 46' 57"E
L59	26.54	S83° 48' 12"E
L60	19.37	S88° 20' 17"E

LINE TABLE		
LINE	LENGTH	BEARING
L61	20.07	S79° 34' 50"E
L62	23.80	S65° 15' 23"E
L63	68.25	S45° 43' 34"E
L64	25.21	S60° 53' 36"E
L65	34.29	S72° 50' 02"E
L66	36.67	S81° 30' 42"E
L67	26.13	S70° 34' 45"E
L68	28.53	S72° 03' 11"E
L69	18.14	S77° 48' 22"E
L70	15.48	N85° 27' 28"E
L71	15.96	N73° 50' 01"E
L72	23.72	N62° 06' 44"E
L73	20.50	N81° 41' 29"E
L74	23.16	S76° 13' 43"E
L75	63.02	S71° 35' 41"E
L76	44.85	S72° 59' 44"E
L77	29.65	S66° 13' 53"E
L78	10.21	S45° 17' 05"E
L79	64.37	S53° 46' 28"E
L80	7.61	S50° 43' 49"E



FIELD BY:	TG
DRAWN BY:	GAC
CHECKED BY:	RLF

REVISIONS		
3	07/30/25	REVISION
2	05/23/25	FINAL
1	04/24/25	TITLE REVIEW
0	04/15/25	PRELIMINARY
NO.	DATE	DESCRIPTION



REUSE OF DOCUMENT
THE IDEAS & DESIGN INCORPORATED HEREON, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF RLF CONSULTING, LLC & IS NOT TO BE USED FOR ANY OTHER PROJECT WITHOUT WRITTEN AUTHORIZATION OF RLF CONSULTING, LLC.

PROJECT No.
2500300

SITE NAME:
AZ6001 ABREGO

SITE ADDRESS:
**3233 S ABREGO DR
GREEN VALLEY, AZ 85614**

SHEET TITLE:
BOUNDARY DETAIL

SHEET NO. LS-1	REVISION: 3
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**PIMA COUNTY
DEVELOPMENT SERVICES DEPARTMENT**

201 N. Stone Avenue, 1st Floor
Tucson, Arizona 85701-1207

LAUREN ORTEGA
Director

Phone: (520) 724-9000

MEMORANDUM

TO: Members of the Pima County Planning & Zoning Commission

FROM: Jim Portner, Pima County Hearing Administrator

SUBJECT: **P26CU00005 – TORRES BLANCAS HOLDINGS – S. ABREGO DRIVE; Type III Conditional Use Permit Request for a Sixty-Five Foot (65') Tall Communications Tower**

DATE: May 11, 2026

This memorandum is intended to assist the members of the Planning & Zoning Commission in its evaluation of the above-referenced Type III request for a new communications tower. Per the Federal Telecommunications Act of 1996, twenty-one (21) criteria were established which can be considered by the local zoning authority in its decision to approve or deny such requests.

These twenty-one criteria are listed below (in *italics*), with a brief commentary on each for the Commission's consideration:

1. *Amount of compliance with permit requirements.* A Type III CUP is required because this is a request for a new, free-standing communications tower that exceeds fifty feet (50').
2. *Staff approval or disapproval.* Not applicable; the Type III CUP process calls for a recommendation by the Hearing Administrator to the P&Z, then a recommendation by the P&Z to the Board of Supervisors, who then render a final decision of approval or denial. The Hearing Administrator's recommendation has been provided via a separate staff report memorandum to the Planning & Zoning Commission.
3. *Zoning approval or disapproval.* Not applicable; same comment as Item No. 2 above. This site is zoned RH (Rural Homestead).

Memorandum to the Planning & Zoning Commission
P26CU00005 — Torres Blancas Holdings, LLC -- S. Abrego Drive
 May 11, 2026

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4. *Other towers in the same zoning classification.* Prior towers have been approved in the RH zoning district.
5. *Other towers in other zoning classifications.* Pima County has previously approved towers in the SH, GR-1, RH, SR, CR-1, and CR-4 residential zones, in the SP (Specific Plan) zone, in the CB-1 and CB-2 business zones, and in the CPI industrial zone.
6. *Amount of neighborhood opposition and whether it is substantial and supported by factual evidence.* As of the writing of this memorandum, staff has received no separate letters, emails, or any public comment of opposition nor support. An opportunity for public testimony will be provided at the P&Z public hearing.
7. *Type of neighborhood opposition.* See Item #6 above. None received to date.
8. *Nature of neighborhood opposition, whether aesthetic, etc.* See Item Nos. 6 & 7 above.
9. *Amount, type, and nature of evidence offered by wireless provider.* Extensive materials are contained within application packet; additional information may be sought by the Commission at hearing.
10. *Expert testimony.* None to date given by any separate parties.
11. *Height of tower.* The height of the proposed monopole tower is sixty-five feet (65') to the top of the metal structure.
12. *Color of tower.* The applicant proposes to camouflage the tower as a faux eucalyptus tree.
13. *Possibilities of camouflage.* See Item No. 12 above. The Hearing Administrator concurs with the applicant's approach, given the height of the tower and the treatment of similar past tower cases. Available species of eucalyptus achieve heights of 65' to 70' and so a faux version of same would not be particularly unusual.
14. *Service coverage issues; such as whether a gap would be created that would impede emergency service.* The applicant has provided pre- and post-coverage maps. In evaluating same, it is demonstrated that the proposed tower will materially improve signal strengths within an existing region of poor and spotty coverage.
15. *Alternative sites explored.* The applicant's narrative provides little discussion of alternative sites, stressing primarily that no other towers or significant verticality exist within the search area nor within one (1) mile of the proposed site. In the end, this site was chosen and the tower's height prescribed to best meet the RF and coverage requirements needed.

Memorandum to the Planning & Zoning Commission
P26CU00005 — Torres Blancas Holdings, LLC -- S. Abrego Drive
May 11, 2026

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16. *Possibilities for co-location on an existing tower.* The applicant's narrative indicates that existing verticality within the search ring was not of sufficient height to that satisfy RF signal requirements.
17. *Possibilities for more, shorter towers.* The applicant's narrative did not speak specifically to this topic. Pima County supports the idea of co-location for multiple wireless carriers rather than a proliferation of new single-service towers dedicated to individual carriers.
18. *Provision for tower removal.* The applicant's narrative did not speak to this topic.
19. *Possibilities for this tower serving as a co-location site for other providers.* The proposed tower's initial wireless carrier is Verizon Wireless. The tower is structurally designed to accommodate additional co-location for up to three wireless carriers in total. Pima County policy supports and encourages such co-location.
20. *Time taken to make the decision (by the local zoning authority).* This item is before the Commission for the first time at its May 27, 2026 public hearing. Federal law encourages a timely response by the local zoning authority. It is recommended that the Commission renders its formal recommendation to the Board of Supervisors at its May 27, 2026 meeting.
21. *Government contracts with the wireless provider.* All such towers are required by federal law to facilitate emergency communication antennae to local providers, if requested.

PIMA COUNTY DEVELOPMENT SERVICES REPORT TO THE PIMA COUNTY PLANNING & ZONING COMMISSION

CASE: **P26CU00005**
TORRES BLANCAS HOLDINGS, LLC – S. ABREGO DRIVE

OWNERSHIP: Torres Blancas Holdings, LLC (Golf Course)
5800 S. Camino Del Sol
Green Valley, AZ 85622

APPLICANT: Todd Daoust
Commscapes, LLC
109 E. Tuckey Lane
Phoenix, AZ 85012

LOCATION: The proposed tower site is located on the grounds of the existing Torres Blancas Golf Course. The property has vehicular access off of S. Abrego Drive. The actual tower site, however, is located on the far west portion of this fairway parcel, much nearer to the I-19 east-side Frontage Road than to Abrego Drive. The common area of the existing Sunset Point residential neighborhood (its main entry monument off of the I-19 Frontage Road) lies to the immediate north.

REQUEST: This is a Conditional Use Permit request (Type III) for a **new sixty-five foot (65') tall monopole communications tower** on the grounds of the existing Torres Blancas Golf Course and Country Club. The initial wireless carrier on the tower will be Verizon, whose antennae array will occupy the highest position. The tower is designed for the future co-location of up to two (2) additional wireless carriers. The tower will be camouflaged as a faux eucalyptus tree, with the “branches” of the tree extending to a total height of seventy feet (70'). A 50' x 50' walled compound will house the required on-the-ground equipment, surrounded by an eight foot (8') tall masonry wall.

PETITIONER'S STATEMENT REGARDING THE TYPE OF USE PROPOSED

“Proposed 65' stealth monoecalyptus multi-tenant communications tower in a 50' x 50' CMU-walled compound.”

PETITIONER'S STATEMENT REGARDING NEED AND COMPATIBILITY

“The proposed use is passive in nature and compatible with surrounding golf course and residential use. The site setback and stealth design mitigate its visual impact while addressing gap in coverage.”

The petitioner has provided a complete submittal package, including a lengthy narrative, the required coverage/propagation plots, a detailed set of preliminary construction drawings, and an extensive series of post-development photo simulations depicting the proposed tower.

HEARING ADMINISTRATOR'S CONSIDERATIONS

This request proposes to construct a new 65' monopole communications tower. The petitioner proposes to camouflage the tower as a faux eucalyptus tree. The Hearing Administrator finds this approach to be appropriate, given that there is existing residential and golf course development throughout the general area and along the entire east side of Interstate 19. An assortment of both native and non-native landscaping and tree specimens populates the area. A faux eucalyptus tree is preferable to an uncamouflaged tower of this height, and will not be significantly out of place within the established landscape context.

Wireless Service Coverage and "Gap" Considerations

The Federal Telecommunications Act of 1996 encourages all new wireless installations that introduce or enhance reliable wireless coverage in those areas where a "gap" in coverage or service-quality presently exists.

The applicant's submitted before-and-after propagation plots indicate that the proposed site is currently within an area that has cell signals with noise levels greater than -95 dBm and, in many cases, exceeding -105 dBm (a lower negative dBm number means less noise and therefore better signal strengths). With the new wireless antennae in place, the majority of the surrounding coverage area is indicated as being upgraded to a signal strength (noise level) of -85 dBm or better. Based on the approach used in evaluating all past communication tower cases, it is found that a gap in current coverage (weak signals) does exist, and that this proposed tower shall serve to effectively fill it.

Comprehensive Plan Considerations

The Pima County Comprehensive Plan designates this property as *Medium Intensity Urban (MIU)* category, the primary purpose of which is, "to designate areas for a mix of medium density housing types, such as attached dwellings, garden apartment, and single family, as well as non-residential uses such as offices, medical offices, and hotels."

As the entire east side of Interstate 19 is fully developed with multiple residential subdivisions and the existing Torres Blancas Golf Course, the proposed addition of a new tower will not markedly change the established character of the area. Many past towers have been approved within the same *MIU* comprehensive plan category. With the above in mind, the request is found to be generally compatible with its context and not in conflict with the goals and purpose of the site's *MIU* comprehensive plan designation.

Zoning and Land Use Considerations

The subject parcel is zoned RH (Rural Homestead) and is part of an existing golf course. To the immediate north is the existing Sunset Point residential neighborhood, zoned CR-5. The actual tower location adjoins a portion of the subdivision's common area (not the private residences) containing its main entry, together with its monument signage and amenity landscaping.

Hearing Administrator's Required Standards and Findings

Following are the Hearing Administrator's findings relative to the standards set by Pima County Code Sec. 18.97.030.F.3.c. These Sections stipulate that the following standards be met by the proposed use:

- 1. It will not be in serious conflict with the objectives of the general land use plan or the area plan in which situated.**

See Comprehensive Plan Considerations heading above. The Hearing Administrator finds the proposed use to not be in conflict with the stated goals of the Comprehensive Plan, nor with its *MIU* designation.

- 2. It will provide safeguards for the protection of adjacent developed property, or if the adjacent property is undeveloped, for the legal permitted uses of such property.**

The Hearing Administrator finds that the proposed new tower will not have a significant impact upon any of the surrounding properties in a way that prohibits any of their legal or permitted uses.

- 3. It has adequate accessibility to the County road network.**

The site is served by S. Abrego Drive, which is a paved and well-maintained public street. Beyond that, a new access easement shall be established through the golf course, following the existing cart path, to the tower itself. Access needs for such wireless facilities are minimal at best. With the above in mind, access is found to be adequate.

- 4. It has sufficient off-street parking and loading facilities, that will be developed in accordance with County engineering standards.**

Parking sufficiency and compliance with the Zoning Code in this regard is a matter verified at the time of permitting and development plan review.

- 5. It will meet County standards in terms of control of noise, smoke, glare or heat, odors, vibrations, fly, ash, dust, fumes, vapors, gasses, and other forms of air pollution, liquids and solid wastes.**

The Hearing Administrator finds that proposed use is found to not threaten the surrounding properties in any of the above ways.

- 6. Hours of operation will not be detrimental to adjoining residents.**

This is an unmanned facility; hours of operation do not apply.

7. Landscaping will be fully in conformance with zoning code regulations.

Landscaping requirements, if any, are a matter enforced at the time of permitting.

HEARING ADMINISTRATOR'S RECOMMENDATION

After visiting the subject property and after considering all of the above and reviewing the applicant's submitted materials, the Hearing Administrator finds the proposed **communications tower**, together with a new on-the-ground equipment area, to be an acceptable use on the subject property and within the surrounding context.

It is therefore the recommendation of the Hearing Administrator that the Planning & Zoning Commission recommend **APPROVAL** of this Type III conditional use permit to the Board of Supervisors, subject to the following Standard and Special Conditions:

Standard Conditions

1. Obtaining an approved Development Plan.
2. Adherence to all requirements of Section 18.07.030.H (General Regulations and Exceptions) of the Pima County Zoning Code.

Special Conditions

1. The monopole tower shall be limited to its requested height of sixty-five feet (65') to the top of the actual metal structure, as shown on the submitted preliminary development plan.
2. The tower shall be camouflaged as a faux eucalyptus tree. All cabling associated with the proposed antennae arrays shall be concealed within the "trunk" of the faux tree. The branches of the faux tree may extend to a top height of seventy feet (70').
3. The on-the-ground equipment compound shall be located as shown on the submitted preliminary Development Plan and shall be secured within an 8' tall masonry wall. The masonry wall and gates shall be painted a color that substantially matches the monuments and walls of the nearby Sunset Point residential subdivision entrance.

SONORAN DESERT CONSERVATION CONCEPT PLAN/ENVIRONMENTAL ISSUES

Comprehensive Plan Regional Environmental Policies — Conservation Lands System

In December, 2001 the Board of Supervisors incorporated the Maeveen Marie Behan Conservation Lands System (MMB-CLS) into the Comprehensive Plan 2001 Update as the Regional Environmental Policies. The MMB-CLS is the heart of the Sonoran Desert Conservation Plan (SDCP). On June 21, 2005, the Board of Supervisors amended the Comprehensive Plan Regional Environmental Policies and the MMB-CLS to reflect

recommendations from the SDCP Science Technical Advisory Committee that were based on new scientific and technical data. As adopted, Conservation Guidelines associated with the MMB-CLS establish conservation objectives for a variety of projects (e.g. rezoning actions, comprehensive plan amendments, Type II and Type III conditional use permits, etc.) that require a discretionary decision by the Board of Supervisors. Conservation objectives include:

- Important Riparian Areas — 95% undisturbed natural open space
- Biological Core Management Areas — 80% undisturbed natural open space
- Special Species Management Areas — 80% undisturbed natural open space
- Multiple Use Management Areas — 66-2/3% undisturbed natural open space

The subject site is located **OUTSIDE OF** the Maeveen Marie Behan Conservation Lands System.

Biological Impacts Report

On July 17, 2001, the Board of Supervisors adopted Ordinance No. 2001-103, which requires the applicant's notice to the US Fish and Wildlife Service (USFWS) staff regarding the pending matter, and staff commentary on biological resources and development impacts of the subject site and proposal.

Staff Commentary on Biological Impacts

Staff has reviewed this application and finds that: 1) its approval is not expected to affect any resources essential to Pima County's biological conservation priorities; and 2) that it would not be in conflict with the Regional Environmental Policies of the 2001 Comprehensive Plan Update. The site in question has already been disturbed by past development activity (golf course). A minimal amount of desert scrub vegetation will be disturbed, much of which is regenerated invasive species. Compliance with applicable Native Plan Preservation requirements, if any, will be verified at the time of permitting.

Facts Confirmed by the Pima County Geographic Information System (GIS)

The following facts are confirmed by the Pima County GIS and the Sonoran Desert Conservation Plan maps with respect to this conditional use permit request:

Cactus Ferruginous Pygmy Owl. The subject property is not located within an area that is designated as Proposed or Former Critical Habitat, nor Draft Recovery Area. It is not located within the Priority Conservation Area (PCA) for this species.

Western Burrowing Owl. The subject property is not within the Priority Conservation Area (PCA) for this species.

STAFF REPORT FOR MAY 27, 20256P & Z MEETING
P26CU00005 --- TORRES BLANCAS HOLDINGS, LLC – S. ABREGO DRIVE
May 11, 2026

Page 6 of 6

Pima Pineapple Cactus. The subject property is located within an area that is outside the known range of the Pima Pineapple cactus. It is not within the Priority Conservation Area (PCA) for this species.

Needle-Spined Pineapple Cactus. The subject property is located within an area that is outside of the known range for Needle-Spine cactus. It is not within the Priority Conservation Area (PCA) for this species.

**REVIEW BY DEPT. OF TRANSPORTATION AND THE REGIONAL FLOOD
CONSTROL DISTRICT**

The Department of Transportation and the Flood Control District will review this project as need be during the Development Plan and/or permitting process.

Respectfully Submitted:



-

Jim Portner,
Pima County Hearing Administrator

May 11, 2026

Date

attachments

cc: Lauren Ortega, Director, Pima County Development Services Departmentg
Tom Drzazgowski, Pima County Planning Official
Rob Donaldson, Deputy Planning Official
Dan Ice, Chief Building Official
Torres Blancas Holdings, LLC, Property Owner
Todd Daoust, Commscapes, LLC; Applicant on Behalf Verizon Wireless



MEMORANDUM

DATE: May 11, 2026

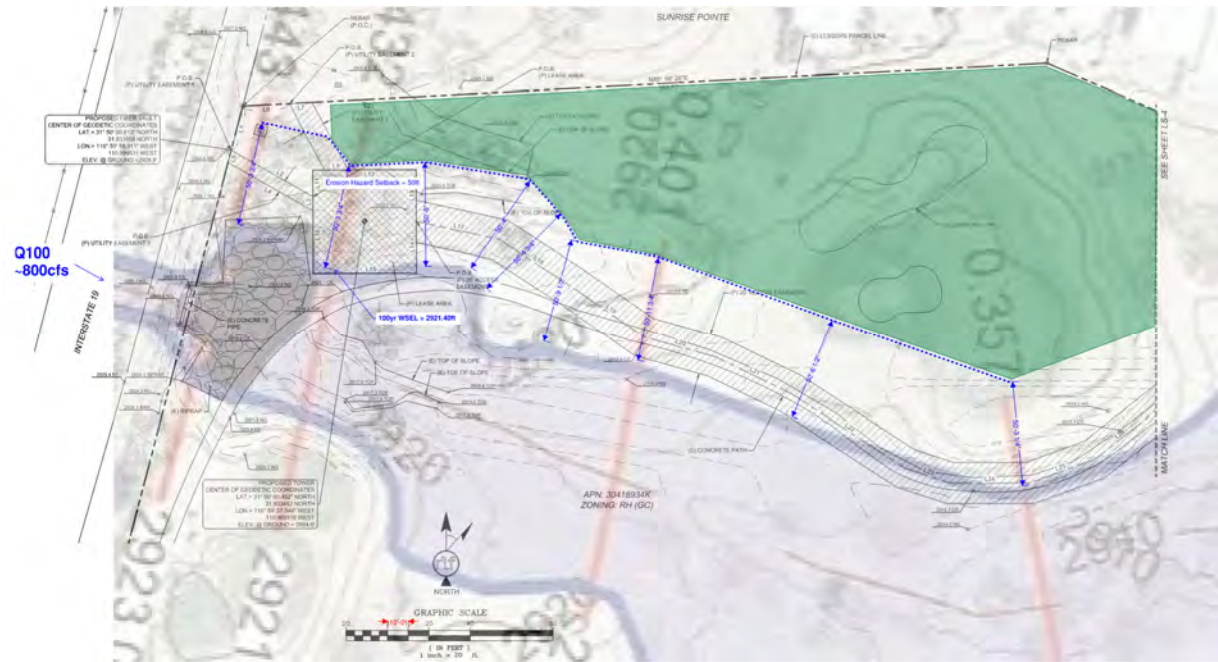
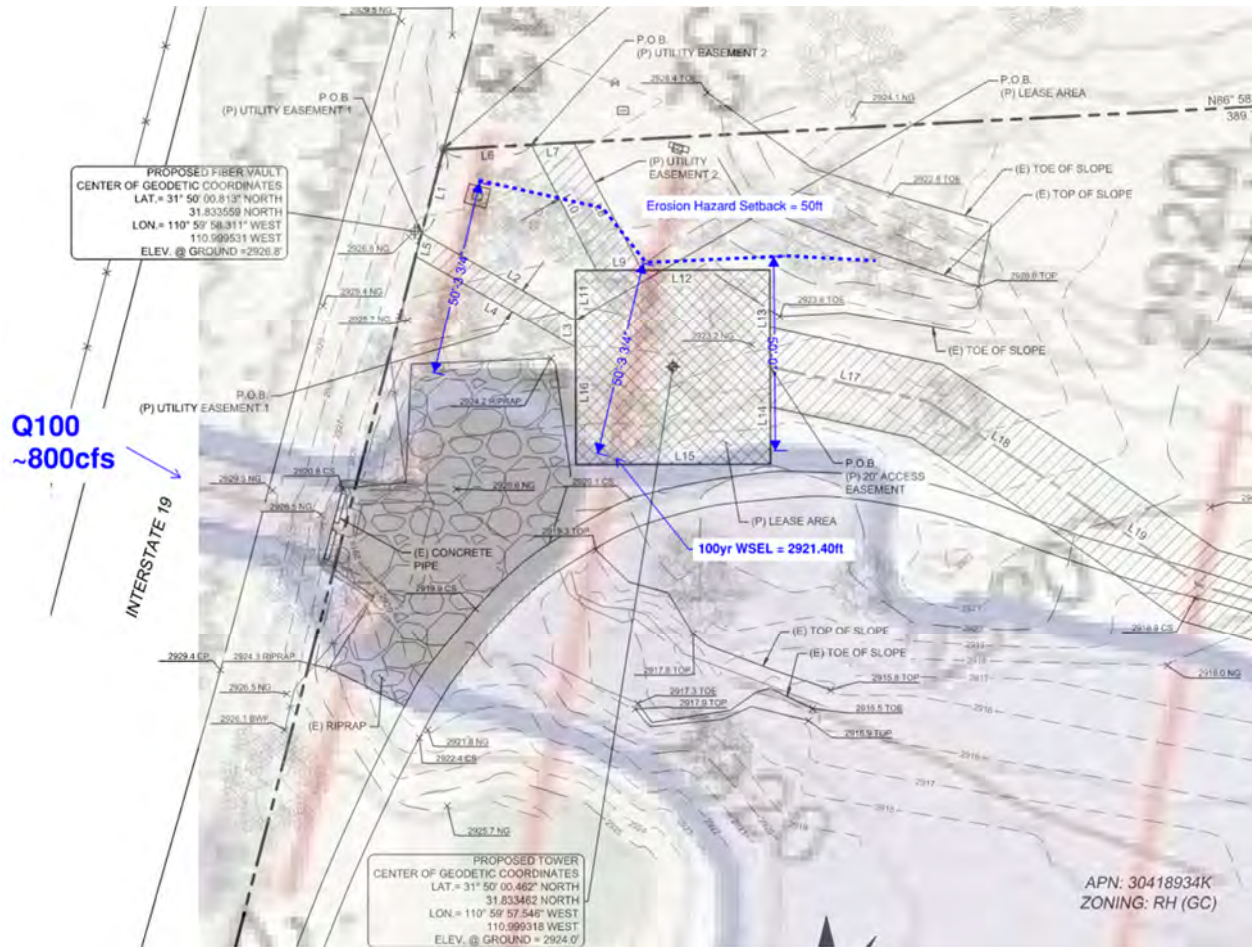
TO: Spencer Hickman
Planner II
Planning and Zoning

Haley Erickson
FROM: Haley Erickson
Engineer II

SUBJECT: P26CU00005 (3233 S Abrego Dr, Green Valley, AZ)

The District has reviewed the site conditions and offers the following information and comments:

1. The project is not impacted by a federal floodplain. Therefore, the designated Special Flood Hazard Area is Zone X.
2. The project is impacted by a local floodplain as identified in the effective [2014 Green Valley Drainageways Basin Management Study](#). The Study results are shown below overlain onto the provided site plan. The Study provides an estimated 100-year peak discharge of 800 cubic feet per second that flows within the subject property and adjacent to the proposed tower, with flow depths up to 2.8ft in the channel.
 - a. Based on the Study results, the current proposed improvements are in a location that avoids the most concentrated flows on the site.
 - i. However, the southern edge of the improvements appear to be within the floodplain. It is the District's expectation that the improvements will not be located within the floodplain. At the time of permitting, ensure that the improvements are fully located outside of the effective floodplain extents.
 - ii. Additionally, the improvements are located within the 50ft erosion hazard setback (EHS). To avoid having to provide an engineering analysis that addresses scour, the District recommends to move the improvements outside of the EHS.
 1. If the improvements are located within the EHS, at the time of permitting the project will need to submit an engineering analysis prepared by an Arizona registered civil engineer to address the impact of scour and erosion on the proposed foundations. Technical Policy TECH-012, found [here](#), outlines the District's accepted methods to determine the maximum anticipated scour depth.



3. There is no mapped Regulated Riparian Habitat (RRH) within the subject parcel.
4. At the time of permitting, a site plan will be required for review and approval. Refer to the following link from the Regional Flood Control District web site for the information that is required to be on the site plan for permitting; [Site Plans | Pima County, AZ](#)
 - a. The information that at minimum should be provided on the site plan:
 - i. Regulatory wash lines and effective floodplain boundary,
 - ii. Erosion hazard setbacks, where the EHS is measured from, and
 - iii. Show and label all existing and proposed improvements, to scale and provide dimensions..

The District **has no objection** to the conditional use permit, subject to the following conditions.

- a. Regional Flood Control District review and approval are required at the time of permitting.
- b. The proposed improvements must be located fully outside of the local regulatory floodplain.
- c. If the improvements are located within the erosion hazard setback to address the impact of scour and erosion on the proposed foundation(s), an engineering analysis prepared by an Arizona registered civil engineer shall be submitted to the District for review and approval.

HE/pg

Cc: File

Environmental Planning Comments

This proposed project is located on parcel no. 304-18-934k, which is partially within the Maeveen Marie Behan Conservation Lands System (CLS), with approx. 45.25 acres or 27.6% of the parcel in the Multi-use Management Area designation and approx. 15.40 acres or 9.4% of the parcel in the Important Riparian Area designation. However, the location of the proposed communications tower and associated infrastructure is fully outside the CLS and no impacts to the CLS are expected to result from this proposed use. In light of this, CLR-Environmental Planning has no comments on, or objections to, this request.

Case #: P26CU00005

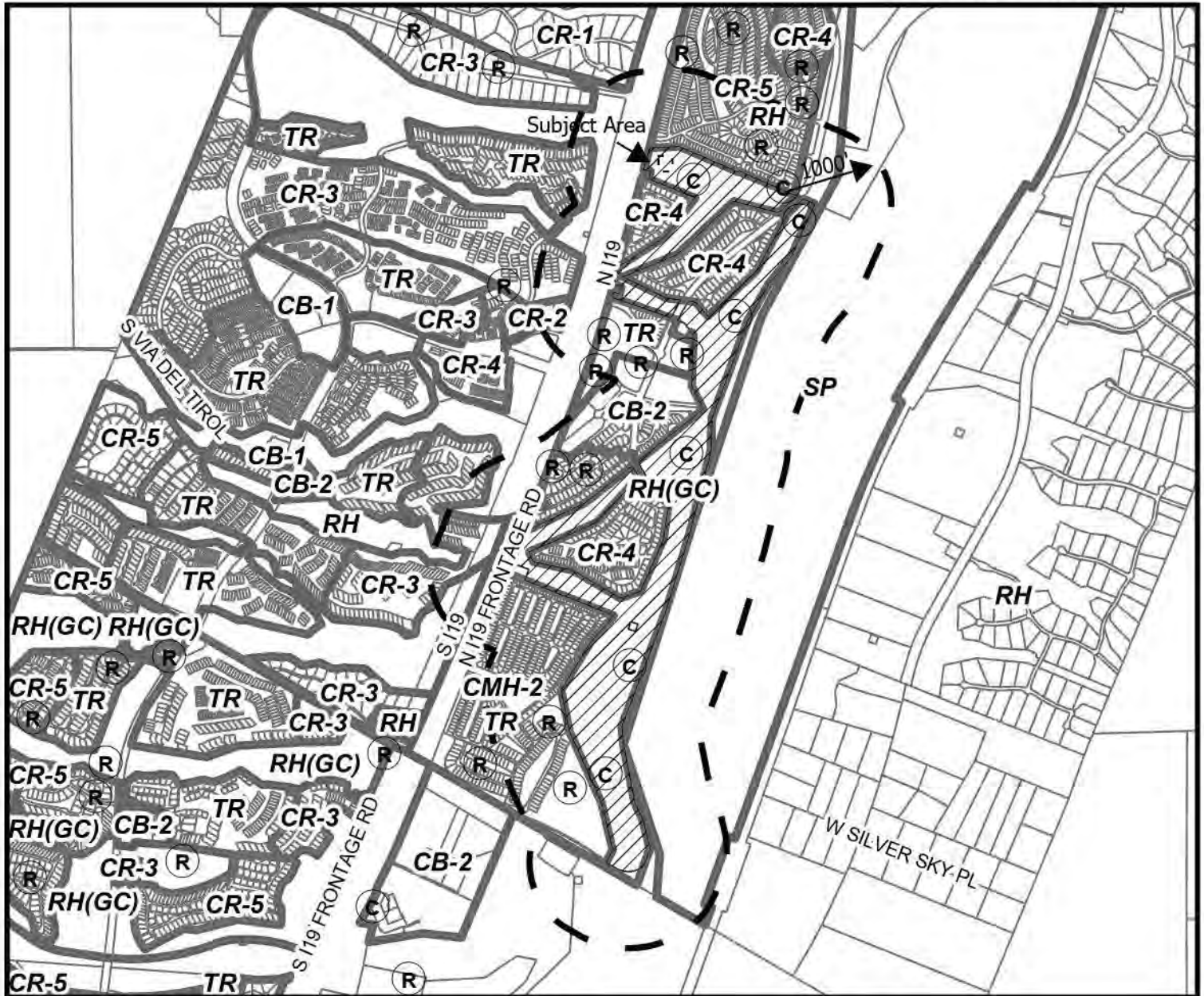
Case Name: TORRES BLANCAS HOLDINGS LLC - S. ABREGO DRIVE

Tax Code(s): Portion of 304-18-934K

 Zoning Boundary

 1000' Notification Area

 Subject Property



0 850 1,700 3,400 Feet

**PIMA COUNTY DEVELOPMENT SERVICES DEPARTMENT
PLANNING DIVISION**



Notes: **CONDITIONAL USE PERMIT - TYPE III**

Wireless Communication Facility

Map Scale: 1:24,000

Map Date: 5/4/2026 - ds



Case #: P26CU00005
Case Name: TORRES BLANCAS HOLDINGS LLC - S. ABREGO DRIVE
Tax Code(s): Portion of 304-18-934K

AERIAL EXHIBIT



0 850 1,700 3,400 Feet

PIMA COUNTY DEVELOPMENT SERVICES DEPARTMENT
PLANNING DIVISION



Notes: **CONDITIONAL USE PERMIT - TYPE III**

Wireless Communication Facility

Map Scale: 1:24,000

Map Date: 5/4/2026 - ds





201 N. Stone Avenue, Tucson, AZ 85701

(520) 724-9000

www.pima.gov/developmentservices

BIOLOGICAL IMPACT REPORT

(Not applicable for rezonings that require a site analysis)

The Biological Impact Report assists staff in assessing a proposed project's potential to impact sensitive biological resources and is required by the Pima County Zoning Code Chapter 18.91. A project's design should conserve these important resources.

The report will include information provided by both Pima County Planning staff (Part I) and the Applicant (Part II).

INSTRUCTIONS FOR SAVING FORM: 1) Download form to computer. 2) Fill out form as applicable. 3) Save completed form to computer. 4) Submit completed form to Pima County Development Services. **If you fill out the form before you download it, the info you entered will not be saved.**

Project ID (case no., APN no., address, or other identifying info):

Part I. Information Provided by Pima County Staff

Pima County Planning staff will provide the following information for the project site, as applicable:

1. Is the project located within any Maeveen Marie Behan Conservation Lands System (CLS) designation(s)? (Hold SHIFT for multiple selections) **NA**
Important Riparian Area
Biological Core
Multi-Use Management Area
2. Is the project within a CLS Special Species Management Area? **SELECT**
3. Is the project in the vicinity of any of the six Critical Landscape Linkages? **SELECT**
4. Is the project designated for acquisition as a Habitat Protection or Community Open Space property? **SELECT**
5. Is the project located within a Priority Conservation Area for any of the following species?
 - a. Cactus ferruginous pygmy-owl: **SELECT**
 - b. Western burrowing owl: **SELECT**
 - c. Pima pineapple cactus: **SELECT**
 - d. Needle-spined pineapple cactus: **SELECT**

Part II. Information Provided by the Applicant

The Applicant will provide the following information to the best of their knowledge, as applicable:

1. Has the owner of the project site had any communications with County staff about Pima County potentially acquiring the property? No
If yes, provide a summary of those communications:

2. The following species are of particular interest to Pima County conservation efforts; please fill out the following table to the best of your knowledge:

Species	Ever found on project site?	If yes, date of last observation/survey?	Future surveys planned?
Cactus ferruginous pygmy owl	No		No
Western burrowing owl	No		No
Pima pineapple cactus	No		No
Needle-spined pineapple cactus	No		No

Questions about this form?

Contact the Office of Sustainability and Conservation at (520) 724-6940.



Conditional Use Permit Application

Property Owner: Torres Blancas Holdings, LLC Phone: (303)885-2729
Owner's Mailing Address, City, State & Zip: 5800 S Camino Del Sol Green Valley, AZ 85622
Applicant (if different from owner): Commscapes, LLC Phone: (602)549-9054
Applicant's Mailing Address, City, State & Zip: 109 East Tuckey Lane, Phoenix, AZ 85012
Applicant's or Owner's Email Address: tdaoust@commscapesllc.com
Property Address or Tax Code: 3233 S. Abrego Dr. Green Valley, AZ 85614 APN 304-18-93
Type of Use Proposed for the Property: Proposed 65' stealth monoecalyptus multi-tenant communications tower in a 50'X50' CMU-walled equipment compound.

Discuss the proposed use and it's compatibility with the surrounding area: The proposed use is passive in nature and compatible with surrounding golf course and residential use. The site setback and stealth design mitigate its visual impact while addressing gap in coverage

☒ The applicant agrees to contact the [Regional Flood Control District](#) to discuss the proposal prior to application submittal.

☒ The applicant agrees to contact United States Fish and Wildlife Service at scott_richardson@fws.gov and provide a written notice that an application for a conditional use permit has been submitted a minimum of 15 days prior to the public hearing date.

This application is for a (Select one):

☐ Type I Conditional Use ☐ Type II Conditional Use ☒ Type III Conditional Use

Terms and Conditions

☒ I confirm the information provided is true and accurate to the best of my knowledge. I am the owner of the above described property or have been authorized by the owner to make this application. (By checking the box, I am electronically signing this application.)

Date: 4/10/2026

VERIZON SITE #:	AZ6001
SITE ADDRESS:	2492 S ORCHARD VIEW DR GREEN VALLEY, AZ 85614
COUNTY:	PIMA COUNTY
SITE TYPE:	MONOEUCALYPTUS TOWER
TOWER HEIGHT:	65'-0"



126 W GEMINI DR
TEMPE, AZ 85283



2600 W GERONIMO PL, STE 100
CHANDLER, AZ 85224

VERIZON SITE ID:
AZ6001

VERIZON SITE NAME:
TUC ABREGO

2492 S ORCHARD VIEW DR
GREEN VALLEY, AZ 85614
(PIMA COUNTY)

PROPOSED 65'-0"
MONOEUCALYPTUS TOWER

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	QA
D	11-05-25	MEW	ZONING	HMM
E	11-21-25	MEW	ZONING	HMM
F	11-24-25	MEW	ZONING	HMM
G	12-22-25	MEW	ZONING	HMM
H	04-10-26	XAO	ZONING	HMM

SEAL:



IT IS A VIOLATION OF LAW FOR ANY PERSON,
UNLESS THEY ARE ACTING UNDER THE DIRECTION
OF A LICENSED PROFESSIONAL ENGINEER,
TO ALTER THIS DOCUMENT.

SHEET TITLE:

TITLE SHEET

SHEET NUMBER:

T-1

REVISION:

H

TEP #: 347943.1086845

SITE INFORMATION

VERIZON SITE NAME:	TUC ABRIGO
SITE ADDRESS:	2492 S ORCHARD VIEW DR GREEN VALLEY, AZ 85614
COUNTY:	PIMA COUNTY
MAP/PARCEL #:	30418934K
LEGAL DESCRIPTION:	TBD
AREA OF CONSTRUCTION:	EXISTING
LATITUDE:	N 31° 50' 0.0888" (31.833358)
LONGITUDE:	W 110° 59' 58.1892" (-110.999497)
LAT/LONG TYPE:	NAD83
GROUND ELEVATION:	2,921'±
CURRENT ZONING:	RH (GC)
JURISDICTION:	PIMA COUNTY
OCCUPANCY CLASSIFICATION:	U
TYPE OF CONSTRUCTION:	IIB
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION
PROPERTY OWNER:	TORRES BLANCAS HOLDINGS LLC 5800 S CAMINO DEL SOL GREEN VALLEY, AZ 85622
TOWER OWNER:	PACIFIC COAST TOWERS 6947 COAL CREEK PKWY NEWCASTLE, WA 98059
CARRIER/APPLICANT:	VERIZON 126 W GEMINI DR TEMPE, AZ 85283
ELECTRIC PROVIDER:	TBD
TELCO PROVIDER:	TBD

PROJECT TEAM

PACIFIC COAST TOWERS	PACIFIC COAST TOWERS
CONTACT:	6947 COAL CREEK PKWY
	NEWCASTLE, WA 98059
TEP PROJECT TEAM:	TEP
	3600 E UNIVERSITY DR, F-1150
	PHOENIX, AZ 85034
SITE ACQUISITION CONTACT:	CAROL KINCHELOE
	CKINCHELOE@TEPGROUP.NET
	(619) 488-0933
CIVIL ENGINEER:	DOUGLAS LAWRENCE, PE
	DLAWRENCE@TEPGROUP.NET
	(480) 750-9062
ELECTRICAL ENGINEER:	MARK QUAKENBUSH, PE
	MQUAKENBUSH@TEPGROUP.NET
	(919) 661-6351

DRAWING INDEX

[illegible]

ALL DRAWINGS CONTAINED HEREIN ARE FORMATTED FOR 24x36.
CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS
AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY
THE ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE
PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

PROJECT DESCRIPTION

THE PURPOSE OF THIS PROJECT IS TO ENHANCE BROADBAND CONNECTIVITY AND CAPACITY TO THE EXISTING ELIGIBLE WIRELESS FACILITY.

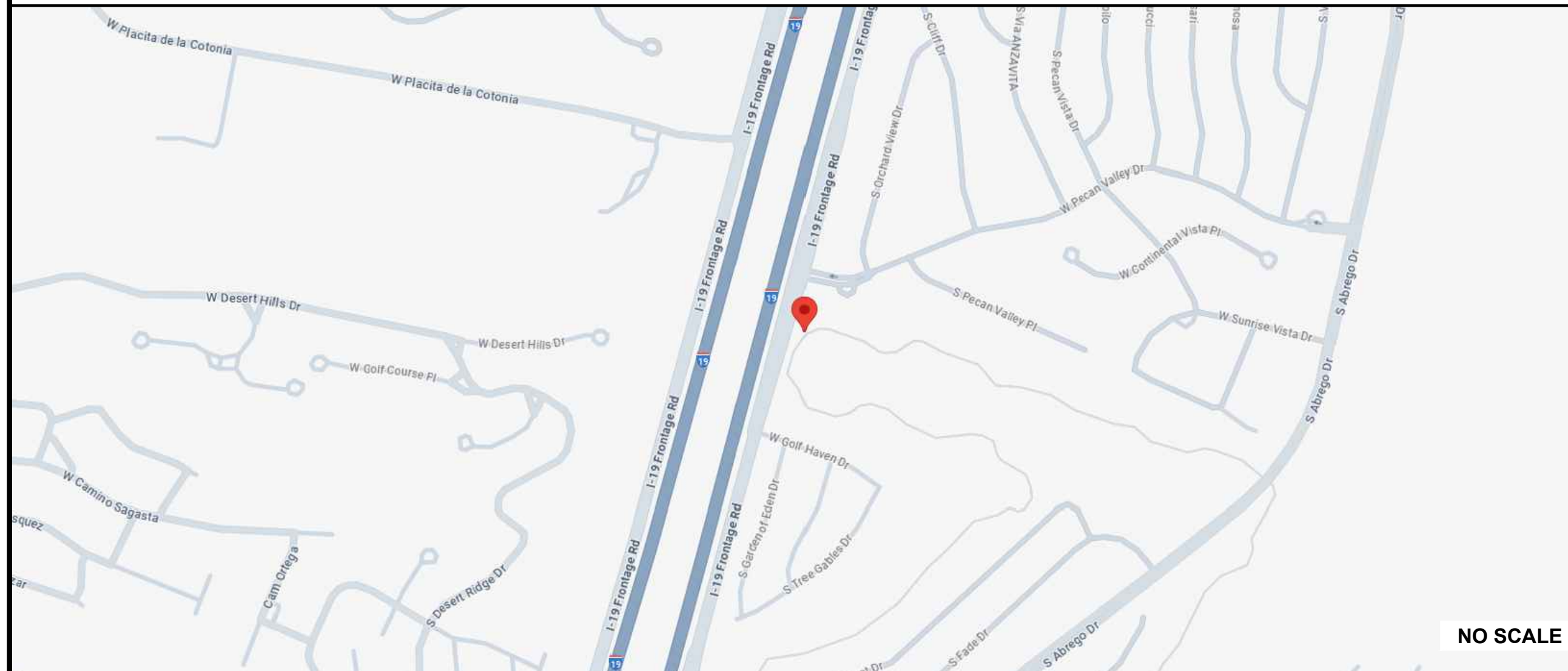
TOWER SCOPE OF WORK

- ☐ INSTALL 65'-0" MONOEUCALYPTUS TOWER
- ☐ INSTALL (12) ANTENNAS
- ☐ INSTALL (1) RADIOS
- ☐ INSTALL (1) OVP 12
- ☐ INSTALL (2) 6X12 HYBRID CABLES
- ☐ INSTALL (3) SECTOR MOUNTS

GROUND SCOPE OF WORK

- INSTALL (1) OVP 12
- INSTALL (1) EQUIPMENT CABINET
- INSTALL (1) BATTERY CABINET
- INSTALL (1) 6672 BBU
- INSTALL (1) H-FRAME
- INSTALL 48'-0"X48'-0" CMU WALLED COMPOUND

LOCATION MAP



DIRECTIONS FROM TUCSON INTERNATIONAL AIRPORT: GET ON I-19 S FROM E VALENCIA RD, HEAD SOUTH ON S TUCSON BLVD, SLIGHT LEFT TOWARD S TUCSON BLVD, SHARP LEFT ONTO S TUCSON BLVD, TURN LEFT ONTO E VALENCIA RD, TURN LEFT TO MERGE WITH I-19 S TOWARD NOGALES, FOLLOW I-19 S TO W CONTINENTAL RD IN GREEN VALLEY. TAKE EXIT 63 FROM I-19 S, TAKE EXIT 63 FOR CONTINENTAL RD, DRIVE TO I-19 FRONTAGE RD, TURN LEFT ONTO W CONTINENTAL RD, TURN RIGHT AT THE 1ST CROSS STREET ONTO I-19 FRONTAGE RD, TURN LEFT ONTO W CALLE TORRES BLANCAS, TURN LEFT ONTO S ROYAL ABERDEEN LOOP. TURN RIGHT ONTO W CALLE TORRES BLANCAS. TURN RIGHT ONTO I-19 FRONTAGE RD.

APPLICABLE CODES/REFERENCE DOCUMENTS

ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES. NOTHING IN THESE PLANS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES:

<u>CODE TYPE</u>	<u>CODE</u>
BUILDING	2018 IBC
MECHANICAL	2018 IMC
ELECTRICAL	2017 NEC
STRUCTURAL	EIA/TIA-222-H



**CALL ARIZONA ONE CALL
(800) 782-5348
CALL 3 WORKING DAYS
BEFORE YOU DIG!**

PROJECT NOTES:

1. ALL REFERENCES MADE TO OWNER IN THESE DOCUMENTS SHALL BE CONSIDERED PACIFIC COAST TOWERS OR ITS DESIGNATED REPRESENTATIVE.
2. ALL WORK PRESENTED ON THESE DRAWINGS MUST BE COMPLETED BY THE CONTRACTOR UNLESS NOTED OTHERWISE. THE CONTRACTOR MUST HAVE CONSIDERABLE EXPERIENCE IN THE PERFORMANCE OF WORK SIMILAR TO THAT DESCRIBED HEREIN. BY ACCEPTANCE OF THIS ASSIGNMENT, THE CONTRACTOR IS ATTESTING TO HAVE SUFFICIENT EXPERIENCE AND ABILITY, IS KNOWLEDGEABLE OF THE WORK TO BE PERFORMED AND THAT IS PROPERLY LICENSED AND PROPERLY REGISTERED TO DO THIS WORK IN THE STATE THE TOWER IS LOCATED.
3. THE STRUCTURE SHALL BE DESIGNED IN ACCORDANCE WITH ANSI/TIA-222-H AND CONFORM TO THE REQUIREMENTS OF THE 2022 ARIZONA BUILDING CODE.
4. WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE 2022 ARIZONA BUILDING CODE.
5. UNLESS SHOWN OR NOTED OTHERWISE ON THE CONTRACT DRAWINGS, OR IN THE SPECIFICATIONS, THE FOLLOWING NOTES SHALL APPLY TO THE MATERIALS LISTED HEREIN, AND TO THE PROCEDURES TO BE USED ON THIS PROJECT.
6. ALL HARDWARE ASSEMBLY MANUFACTURER’S INSTRUCTION SHALL BE FOLLOWED EXACTLY AND SHALL SUPERSEDE ANY CONFLICTING NOTES ENCLOSED HEREIN.
7. IT IS THE CONTRACTOR’S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION AND/OR FIELD MODIFICATIONS. THIS INCLUDES, BUT NOT LIMITED TO, THE ADDITION OF TEMPORARY BRACING, GUYS OR TIE DOWNS THAT MAY BE NECESSARY. SUCH MATERIAL SHALL BE REMOVED AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR AFTER THE COMPLETION OF THE PROJECT.
8. ALL DIMENSIONS, ELEVATIONS, AND EXISTING CONDITIONS SHOWN ON THE DRAWINGS SHALL BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO BEGINNING ANY MATERIALS ORDERING, FABRICATION OF CONSTRUCTION WORK ON THIS PROJECT. CONTRACTOR SHALL NOT SCALE CONTRACT DRAWINGS IN LIEU OF FIELD VERIFICATION. ANY DISCREPANCIES SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTIONS OF THE OWNER AND THE OWNER’S ENGINEER. THE DISCREPANCIES MUST BE RESOLVED BEFORE THE CONTRACTOR IS TO PROCEED WITH THE WORK. THE CONTRACT DOCUMENTS DO NOT INDICATE THE METHOD OF CONSTRUCTION THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. OBSERVATION VISITS TO THE SITE BY THE OWNER AND/OR THE ENGINEER SHALL NOT INCLUDE INSPECTION OF THE PROTECTIVE MEASURES OR THE PROCEDURES.
9. ALL MATERIALS AND EQUIPMENT FURNISHED SHALL BE NEW AND OF GOOD QUALITY, FREE FROM FAULTS AND DEFECTS AND IN CONFORMANCE WITH THE CONTRACT DOCUMENTS. ANY AND ALL SUBSTITUTIONS MUST BE PROPERLY APPROVED AND AUTHORIZED IN WRITING BY THE OWNER AND ENGINEER PRIOR TO INSTALLATION. THE CONTRACTOR SHALL FURNISH SATISFACTORY EVIDENCE AS TO THE KIND AND QUALITY OF THE MATERIALS AND EQUIPMENT BEING SUBSTITUTED.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTAINING, AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT THIS PROJECT AND RELATED WORK COMPLIES WITH ALL APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY CODES AND REGULATIONS GOVERNING THIS WORK. RENTAL CHARGES, SAFETY, PROTECTION, AND MAINTENANCE OF RENTED EQUIPMENT SHALL BE THE CONTRACTOR’S RESPONSIBILITY.
11. ACCESS TO THE PROPOSED WORK SITE MAY BE RESTRICTED. THE CONTRACTOR SHALL COORDINATE INTENDED CONSTRUCTION ACTIVITY, INCLUDING WORK SCHEDULE AND MATERIALS ACCESS, WITH THE OWNER PROJECT MANAGER. THIS INCLUDES ALL SPECIFIC MILITARY INSTALLATION INSTRUCTIONS INCLUDING STAFF ACCESS AND GATE SPECIFIC INSTRUCTIONS.
12. BILL OF MATERIALS AND PART NUMBERS LISTED ON CONSTRUCTION DRAWINGS ARE INTENDED TO AID CONTRACTOR/OWNER. CONTRACTOR/OWNER SHALL VERIFY PARTS AND QUANTITIES WITH MANUFACTURER PRIOR TO BIDDING AND/OR ORDERING MATERIALS.
13. ALL PERMITS THAT MUST BE OBTAINED ARE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE RESPONSIBLE FOR ABIDING BY ALL CONDITIONS AND REQUIREMENTS OF THE PERMITS.
14. 24 HOURS PRIOR TO THE BEGINNING OF ANY CONSTRUCTION, THE CONTRACTOR MUST NOTIFY THE APPLICABLE JURISDICTIONAL (STATE, COUNTY OR CITY) ENGINEER AS WELL AS ANY REQUIRED NOTICES SPECIFIC TO THE MILITARY INSTITUTION.
15. THE CONTRACTOR SHALL REWORK (DRY, SCARIFY, ETC.) ALL MATERIAL NOT SUITABLE FOR SUBGRADE IN ITS PRESENT STATE. AFTER REWORKING, IF THE MATERIAL REMAINS UNSUITABLE, THE CONTRACTOR SHALL UNDERCUT THIS MATERIAL AND REPLACE WITH APPROVED MATERIAL. ALL SUBGRADES SHALL BE PROOFROLLED WITH A FULLY LOADED TANDEM AXLE DUMP TRUCK PRIOR TO PAVING. ANY SOFT MATERIALS HALL BE REWORKED OR REPLACED.
16. THE CONTRACTOR IS REQUIRED TO MAINTAIN ALL PIPES, DITCHES, AND OTHER DRAINAGE STRUCTURES FREE FROM OBSTRUCTION UNTIL WORK IS ACCEPTED BY THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGES CAUSED BY FAILURE TO MAINTAIN DRAINAGE STRUCTURE IN OPERABLE CONDITION.
17. THE OWNER OR OWNERS REPRESENTATIVE SHALL HAVE A SET OF APPROVED PLANS AVAILABLE AT THE SITE AT ALL TIMES WHILE WORK IS BEING PERFORMED. A DESIGNATED RESPONSIBLE EMPLOYEE SHALL BE AVAILABLE FOR CONTACT BY GOVERNING AGENCY INSPECTORS.

18. ANY BUILDINGS ON THIS SITE ARE INTENDED TO SHELTER EQUIPMENT WHICH WILL ONLY BE PERIODICALLY MAINTAINED AND ARE NOT INTENDED FOR HUMAN OCCUPANCY.
19. TEMPORARY FACILITIES FOR PROTECTION OF TOOLS AND EQUIPMENT SHALL CONFORM TO LOCAL REGULATIONS AND SHALL BE THE CONTRACTOR’S RESPONSIBILITY.
20. THE CONTRACTOR AND ITS SUBCONTRACTORS SHALL CARRY LIABILITY INSURANCE IN THE AMOUNTS AND FORM IN ACCORDANCE WITH OWNER SPECIFICATIONS. CERTIFICATES DEMONSTRATING PROOF OF COVERAGE SHALL BE PROVIDED TO OWNER PRIOR TO THE START OF THE WORK ON THE PROJECT.
21. THE CONTRACTOR SHALL CONTACT ALL APPLICABLE UTILITY SERVICES TO VERIFY LOCATIONS OF EXISTING UTILITIES AND REQUIREMENTS FOR NEW UTILITY CONNECTIONS PRIOR TO EXCAVATING.
22. THE CONTRACTOR SHALL MAINTAIN THE JOB CLEAR OF TRASH AND DEBRIS. ALL WASTE MATERIALS SHALL BE REMOVED FROM THE SITE PRIOR TO THE SUBSTANTIAL COMPLETION AND PRIOR TO FINAL ACCEPTANCE. THE CONTRACTOR SHALL FURNISH ONE 55 GALLON BARREL OR EQUIVALENT, AND TRASH BAGS, AND SHALL REMOVE TRASH, DEBRIS, ETC., ON A DAILY BASIS.
23. THE CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH ALL CONDITIONS PRIOR TO SUBMITTING THE PROPOSAL. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS SHOWN ON THESE DRAWINGS WITH THOSE AT THE SITE. ANY VARIATION WHICH REQUIRES PHYSICAL CHANGE SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER PROJECT ENGINEER FOR FACILITIES/CONSTRUCTION.
24. THE CONTRACTOR SHALL GUARANTEE THE WORK PERFORMED ON THE PROJECT BY THE CONTRACTOR AND ANY OR ALL OF THE SUBCONTRACTORS WHO PERFORMED WORK FOR THE CONTRACTOR ON THIS PROJECT. THE GUARANTEE SHALL BE FOR A FULL YEAR FOLLOWING ISSUANCE OF THE FINAL PAYMENT OF RETAINAGE. ALL MATERIALS AND WORKMANSHIP SHALL BE WARRANTED FOR ONE YEAR FROM ACCEPTANCE DATE.
25. THE CONTRACTOR SHALL PROVIDE DAILY UPDATES IN THE FORM OF WRITTEN NOTIFICATION VIA EMAIL OR APP PHOTOS TO THE BOINGO CONSTRUCTION MANAGER.

UTILITY NOTES:

1. APPLY FOR THE UTILITY SERVICE (ELECTRIC) NO LATER THAN THE NEXT BUSINESS DAY FOLLOWING AWARD OF CONTRACT. COORDINATE WITH THE ELECTRIC UTILITY COMPANY FOR EXACT TRANSFORMER LOCATION, METERING REQUIREMENTS, AND THE SERVICE ROUTING. COORDINATE WITH THE TELEPHONE UTILITY COMPANY FOR EXACT TELEPHONE REQUIREMENTS AND ROUTING OF SERVICE.
2. ALL UTILITY RELATED WORK SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE UTILITY REQUIREMENTS. FIELD TO VERIFY EXISTING UTILITY LOCATIONS PRIOR TO CONSTRUCTION.
3. THE CONTRACTOR SHALL CONTACT UTILITIES AND LOCATOR SERVICE A MINIMUM OF 72 HOURS PRIOR TO THE START OF CONSTRUCTION.
4. CONTRACTOR SHALL PROVIDE TRENCHING AND CONDUITS AS SHOWN OR AS REQUIRED BY LOCAL UTILITY.
5. NO PENETRATIONS TO THE TOWER FOUNDATION OF ANY KIND.



126 W GEMINI DR
TEMPE, AZ 85283



2600 W GERONIMO PL, STE 100
CHANDLER, AZ 85224

VERIZON SITE ID:
AZ6001

VERIZON SITE NAME:
TUC ABREGO

2492 S ORCHARD VIEW DR
GREEN VALLEY, AZ 85614
(PIMA COUNTY)

PROPOSED 65'-0"
MONOEUCALYPTUS TOWER

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	QA
D	11-05-25	MEW	ZONING	HMM
E	11-21-25	MEW	ZONING	HMM
F	11-24-25	MEW	ZONING	HMM
G	12-22-25	MEW	ZONING	HMM
H	04-10-26	XAO	ZONING	HMM

SEAL:



IT IS A VIOLATION OF LAW FOR ANY PERSON,
UNLESS THEY ARE ACTING UNDER THE DIRECTION
OF A LICENSED PROFESSIONAL ENGINEER,
TO ALTER THIS DOCUMENT.

SHEET TITLE:

GENERAL NOTES

SHEET NUMBER:

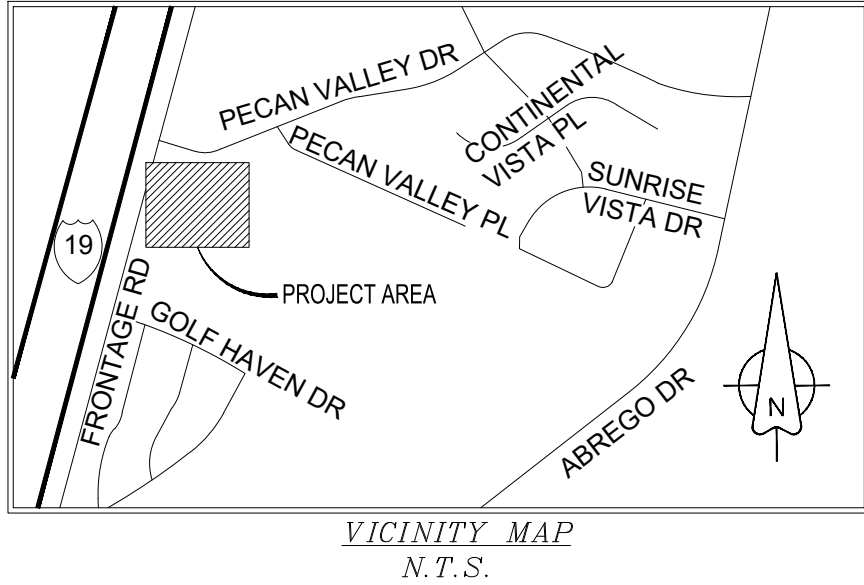
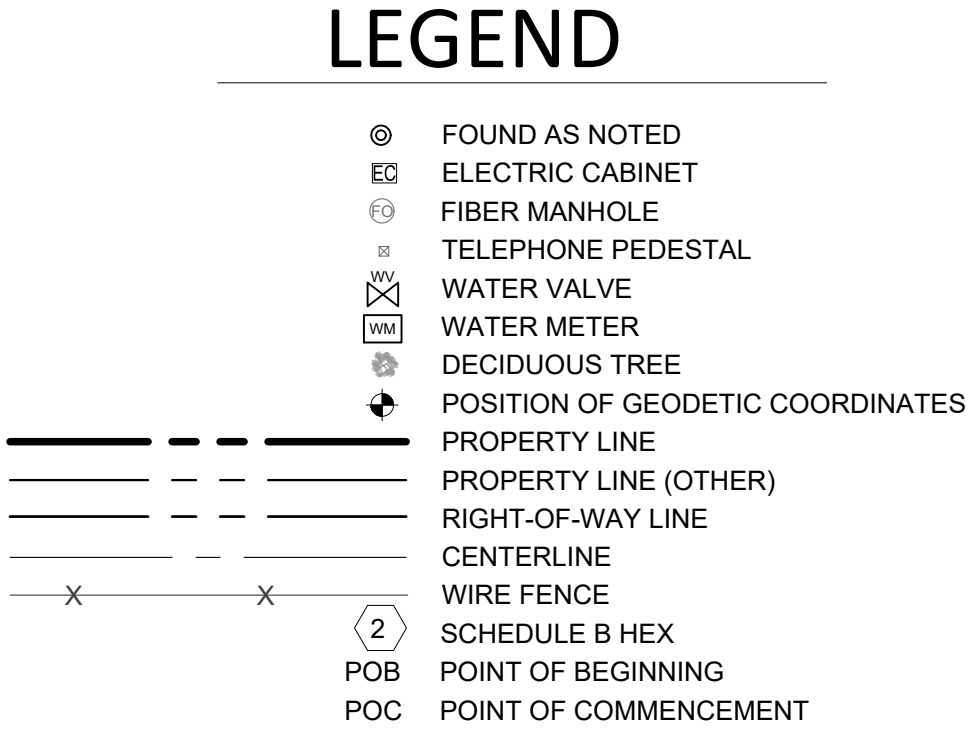
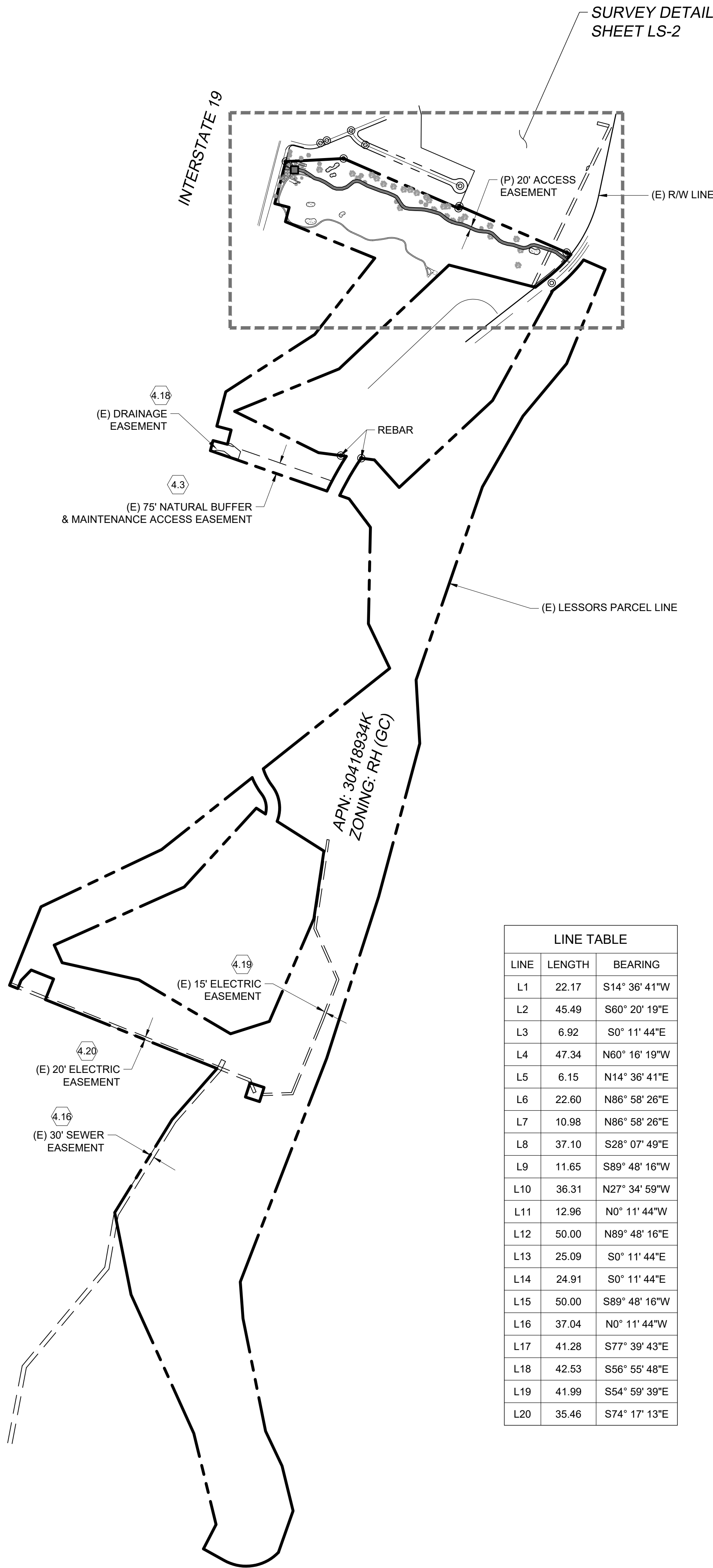
GN-1

REVISION:

H

TEP #:

347943.1086845



SURVEYOR NOTES

- ALL TITLE INFORMATION IS BASED UPON A COMMITMENT FOR TITLE INSURANCE PREPARED BY U.S. TITLE SOLUTIONS, ORDER NO.: UST79594 EFFECTIVE DATE: 02/19/2025.
- SURVEYOR HAS NOT PERFORMED A SEARCH OF PUBLIC RECORDS TO DETERMINE ANY DEFECT IN TITLE.
- THE BOUNDARY SHOWN HEREON IS PLOTTED FROM RECORD INFORMATION AND DOES NOT CONSTITUTE A BOUNDARY SURVEY OF THE PROPERTY.
- SURVEYOR DOES NOT GUARANTEE THAT ALL UTILITIES ARE SHOWN OR THEIR LOCATIONS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR AND DEVELOPER TO CONTACT BLUE STAKE AND ANY OTHER INVOLVED AGENCIES TO LOCATE ALL UTILITIES PRIOR TO CONSTRUCTION. REMOVAL, RELOCATION AND/ OR REPLACEMENT IS THE RESPONSIBILITY OF THE CONTRACTOR.

PROJECT META DATA

- ELEVATIONS SHOWN HEREON ARE REPRESENTED IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVDS88) ESTABLISHED FROM GPS DERIVED ELLIPSOID HEIGHTS, APPLYING GEOID 12B SEPARATIONS CONSTRAINING TO NGS CORS STATIONS PROVIDED IN THE "ONLINE POSITIONING USER SERVICE" (OPUS) SOLUTION FOR THIS SPECIFIC SITE.
- BEARINGS SHOWN HEREON ARE BASED UPON U.S. STATE PLANE NAD83 COORDINATE SYSTEM ARIZONA STATE PLANE COORDINATE ZONE CENTRAL, DETERMINED BY GPS OBSERVATIONS.
- FIELD WORK FOR THIS PROJECT WAS PERFORMED ON 04/01/25.

FLOOD ZONE DESIGNATION

THE PROPOSED LEASE PREMISES SHOWN HEREON APPEAR TO BE WITHIN FLOOD ZONE "X" AS DELINEATED ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY FIRM MAP NO. 04019C3955L DATED 08/16/2011.

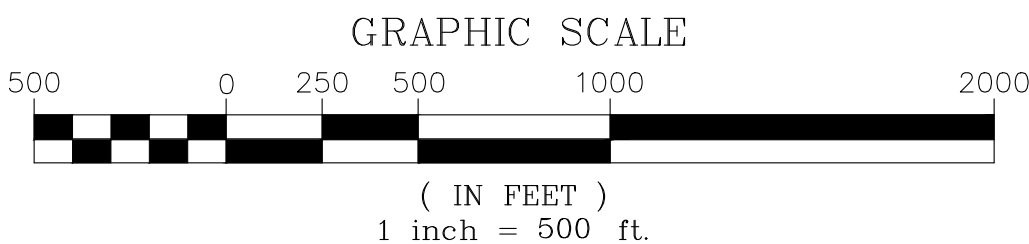
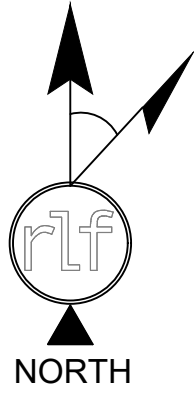
FLOOD ZONE "X" IS DEFINED AS: AREAS DETERMINED TO BE OUTSIDE 500-YEAR FLOODPLAIN; DETERMINED TO BE OUTSIDE THE 1% AND 0.2% ANNUAL CHANCE FLOODPLAINS.

LINE TABLE		
LINE	LENGTH	BEARING
L1	22.17	S14° 36' 41"W
L2	45.49	S60° 20' 19"E
L3	6.92	S0° 11' 44"E
L4	47.34	N60° 16' 19"W
L5	6.15	N14° 36' 41"E
L6	22.60	N86° 58' 26"E
L7	10.98	N86° 58' 26"E
L8	37.10	S28° 07' 49"E
L9	11.65	S89° 48' 16"W
L10	36.31	N27° 34' 59"W
L11	12.96	N0° 11' 44"W
L12	50.00	N89° 48' 16"E
L13	25.09	S0° 11' 44"E
L14	24.91	S0° 11' 44"E
L15	50.00	S89° 48' 16"W
L16	37.04	N0° 11' 44"W
L17	41.28	S77° 39' 43"E
L18	42.53	S56° 55' 48"E
L19	41.99	S54° 59' 39"E
L20	35.46	S74° 17' 13"E

LINE TABLE		
LINE	LENGTH	BEARING
L21	40.73	S64° 09' 18"E
L22	66.25	S56° 52' 25"E
L23	22.78	S71° 41' 50"E
L24	38.55	N90° 00' 00"E
L25	33.46	N69° 57' 44"E
L26	34.49	N51° 45' 20"E
L27	24.07	N51° 45' 20"E
L28	22.71	N80° 14' 36"E
L29	19.23	S79° 54' 25"E
L30	58.10	S61° 03' 27"E
L31	97.31	S69° 11' 28"E
L32	45.36	S74° 10' 25"E
L33	46.28	S66° 58' 42"E
L34	21.10	S59° 55' 54"E
L35	18.00	S37° 57' 27"E
L36	27.52	S30° 27' 05"E
L37	27.58	S36° 10' 35"E
L38	23.70	S53° 37' 04"E
L39	27.97	S78° 43' 24"E
L40	37.83	S86° 39' 50"E

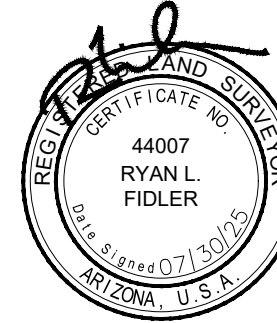
LINE TABLE		
LINE	LENGTH	BEARING
L41	41.50	S88° 31' 25"E
L42	22.29	S83° 57' 07"E
L43	17.59	S78° 25' 26"E
L44	29.74	S76° 10' 36"E
L45	56.60	S73° 44' 40"E
L46	16.03	S56° 56' 21"E
L47	15.95	S51° 45' 35"E
L48	19.91	S49° 41' 25"E
L49	22.97	S56° 03' 37"E
L50	12.76	S60° 46' 33"E
L51	23.57	S69° 03' 31"E
L52	19.89	S70° 37' 43"E
L53	41.02	S78° 43' 13"E
L54	34.91	S70° 30' 08"E
L55	29.99	S66° 29' 32"E
L56	26.74	S65° 14' 35"E
L57	11.78	S69° 27' 02"E
L58	22.87	S75° 46' 57"E
L59	26.54	S83° 48' 12"E
L60	19.37	S88° 20' 17"E

LINE TABLE		
LINE	LENGTH	BEARING
L61	20.07	S79° 34' 50"E
L62	23.80	S65° 15' 23"E
L63	68.25	S45° 43' 34"E
L64	25.21	S60° 53' 36"E
L65	34.29	S72° 50' 02"E
L66	36.67	S81° 30' 42"E
L67	26.13	S70° 34' 45"E
L68	28.53	S72° 03' 11"E
L69	18.14	S77° 48' 22"E
L70	15.48	N85° 27' 28"E
L71	15.96	N73° 50' 01"E
L72	23.72	N62° 06' 44"E
L73	20.50	N81° 41' 29"E
L74	23.16	S76° 13' 43"E
L75	63.02	S71° 35' 41"E
L76	44.85	S72° 59' 44"E
L77	29.65	S66° 13' 53"E
L78	10.21	S45° 17' 05"E
L79	64.37	S53° 46' 28"E
L80	7.61	S50° 43' 49"E



FIELD BY:	TG
DRAWN BY:	GAC
CHECKED BY:	RLF

REVISIONS		
3	07/30/25	REVISION
2	05/23/25	FINAL
1	04/24/25	TITLE REVIEW
0	04/15/25	PRELIMINARY
NO.	DATE	DESCRIPTION



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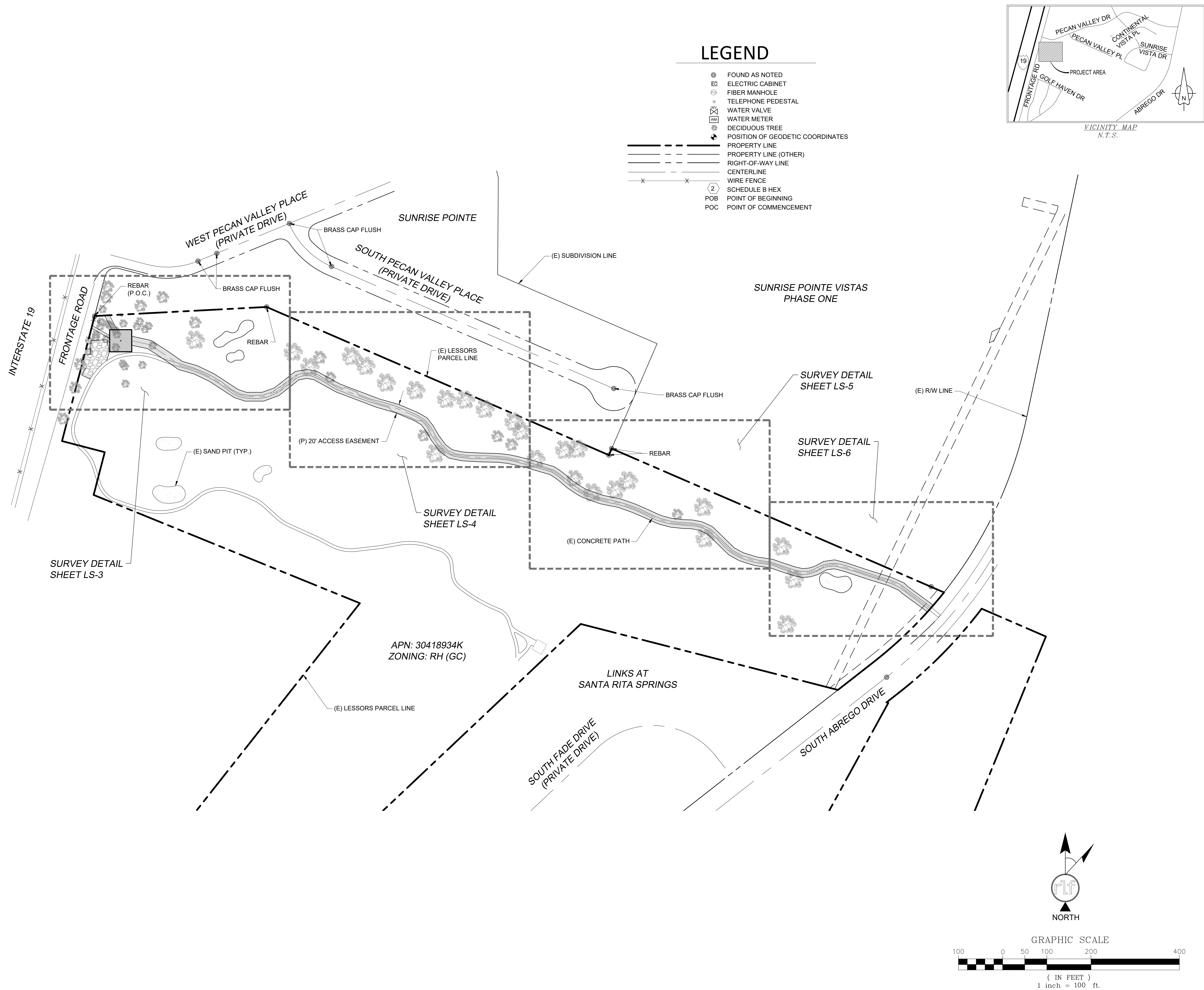
PROJECT No.
2500300

SITE NAME:
AZ6001 ABREGO

SITE ADDRESS:
**3233 S ABREGO DR
GREEN VALLEY, AZ 85614**

SHEET TITLE:
BOUNDARY DETAIL

SHEET NO. LS-1	REVISION: 3
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FIELD BY:	TG
DRAWN BY:	GAC
CHECKED BY:	RLF

REVISIONS		
NO.	DATE	DESCRIPTION
3	07/30/25	REVISION
2	05/23/25	FINAL
1	04/24/25	TITLE REVIEW
0	04/15/25	PRELIMINARY



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PROJECT No.
2500300
SITE NAME:
AZ6001 ABREGO

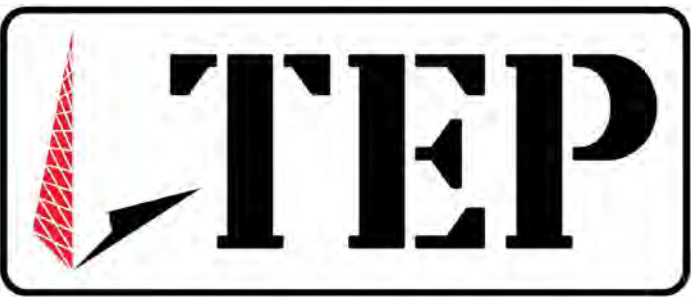
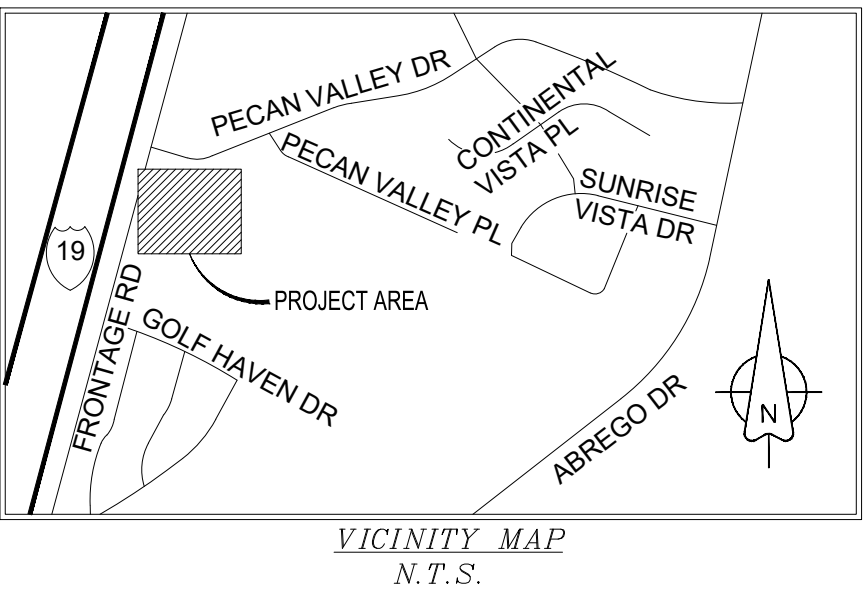
SITE ADDRESS:
3233 S ABREGO DR
GREEN VALLEY, AZ 85614

SHEET TITLE:
TOPOGRAPHIC SURVEY

SHEET NO. LS-2	REVISION: 3
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LEGEND

- ⊙ FOUND AS NOTED
- ⊞ ELECTRIC CABINET
- ⊞ FIBER MANHOLE
- ⊞ TELEPHONE PEDESTAL
- ⊞ WATER VALVE
- ⊞ WATER METER
- ⊞ DECIDUOUS TREE
- ⊞ POSITION OF GEODETIC COORDINATES
- PROPERTY LINE
- - - PROPERTY LINE (OTHER)
- - - RIGHT-OF-WAY LINE
- - - CENTERLINE
- x - x - WIRE FENCE
- ⬢ SCHEDULE B HEX
- ⬢ POB POINT OF BEGINNING
- ⬢ POC POINT OF COMMENCEMENT



FIELD BY:	TG
DRAWN BY:	GAC
CHECKED BY:	RLF

REVISIONS

NO.	DATE	DESCRIPTION
3	07/30/25	REVISION
2	05/23/25	FINAL
1	04/24/25	TITLE REVIEW
0	04/15/25	PRELIMINARY



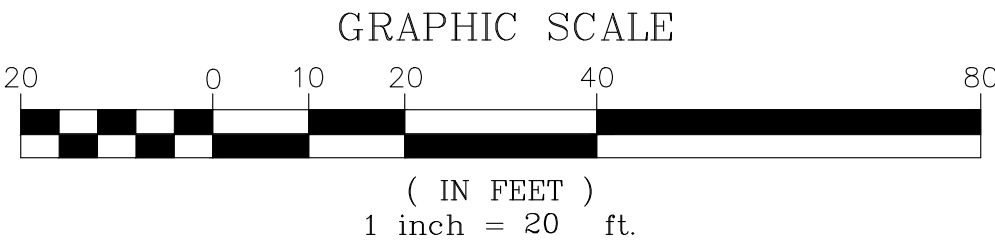
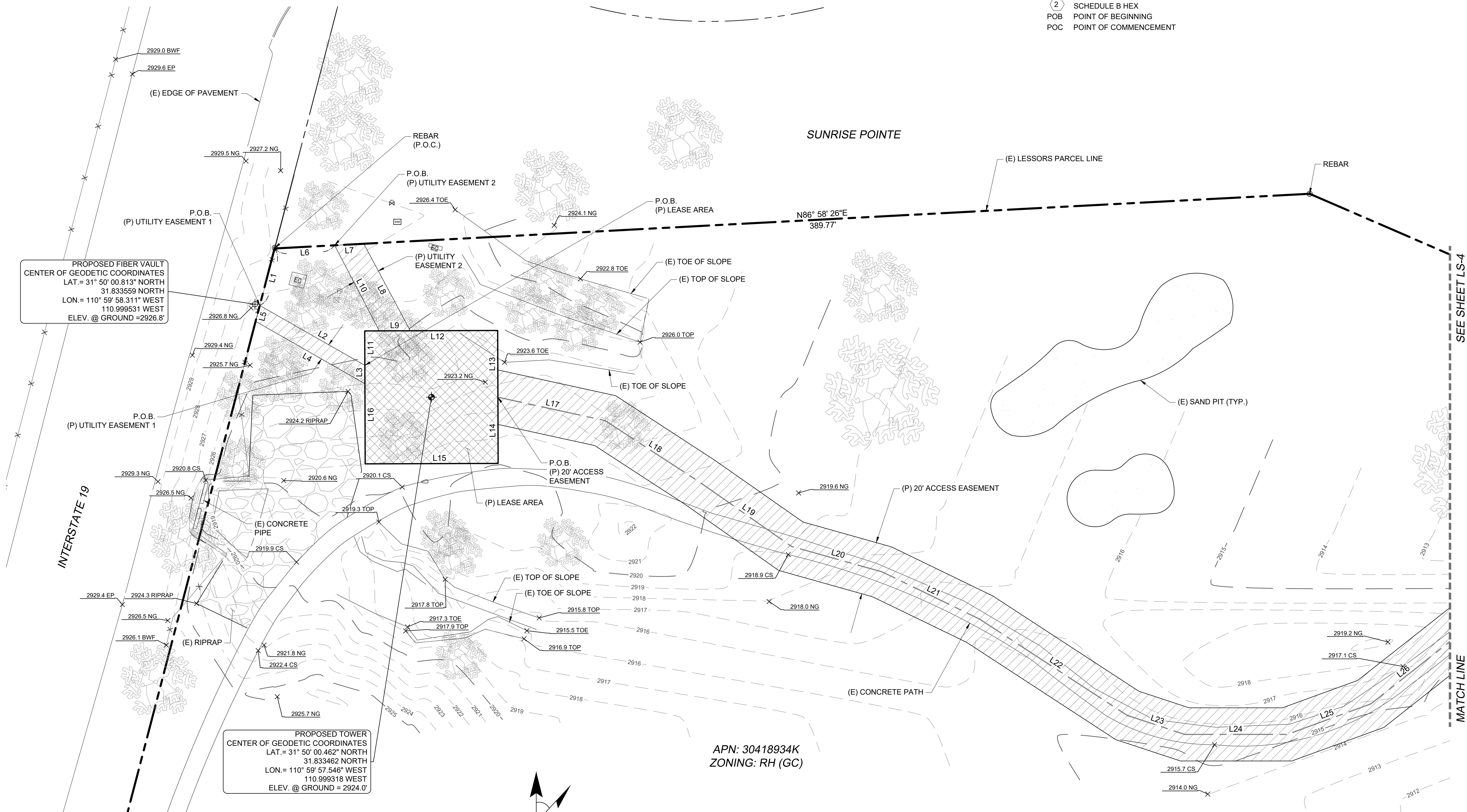
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PROJECT No.
2500300
SITE NAME:
AZ6001 ABREGO

SITE ADDRESS:
**3233 S ABREGO DR
GREEN VALLEY, AZ 85614**

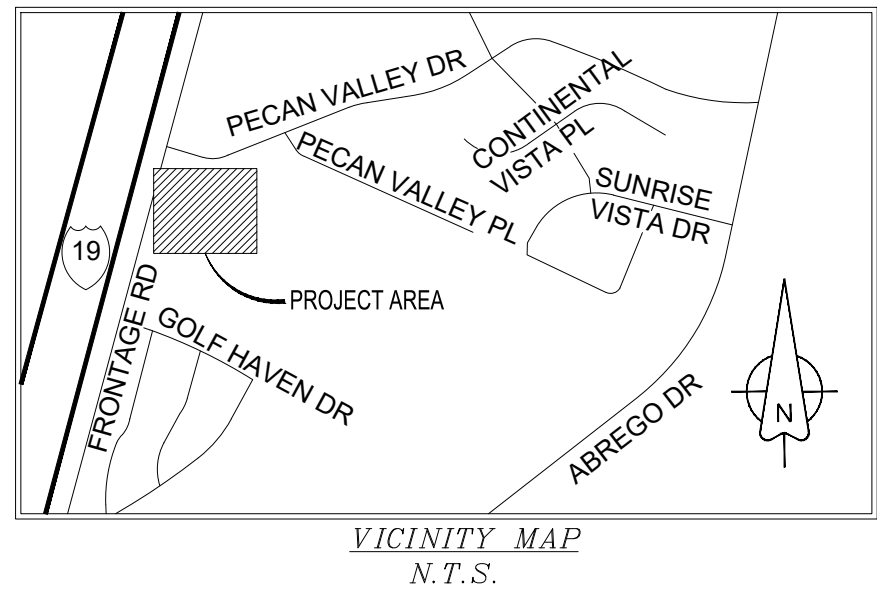
SHEET TITLE:
TOPOGRAPHIC SURVEY

SHEET NO. LS-3	REVISION: 3
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LEGEND

- | | |
|---|----------------------------------|
|  | FOUND AS NOTED |
|  | ELECTRIC CABINET |
|  | FIBER MANHOLE |
|  | TELEPHONE PEDESTAL |
|  | WATER VALVE |
|  | WATER METER |
|  | DECIDUOUS TREE |
|  | POSITION OF GEODETIC COORDINATES |
|  | PROPERTY LINE |
|  | PROPERTY LINE (OTHER) |
|  | RIGHT-OF-WAY LINE |
|  | CENTERLINE |
|  | WIRE FENCE |
|  | SCHEDULE B HEX |
|  | POINT OF BEGINNING |
|  | POINT OF COMMENCEMENT |



FIELD BY:	TG
DRAWN BY:	GAC
CHECKED BY:	RLF

REVISIONS

3	07/30/25	REVISION
2	05/23/25	FINAL
1	04/24/25	TITLE REVIEW
0	04/15/25	PRELIMINARY
NO.	DATE	DESCRIPTION



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PROJECT No.
2500300

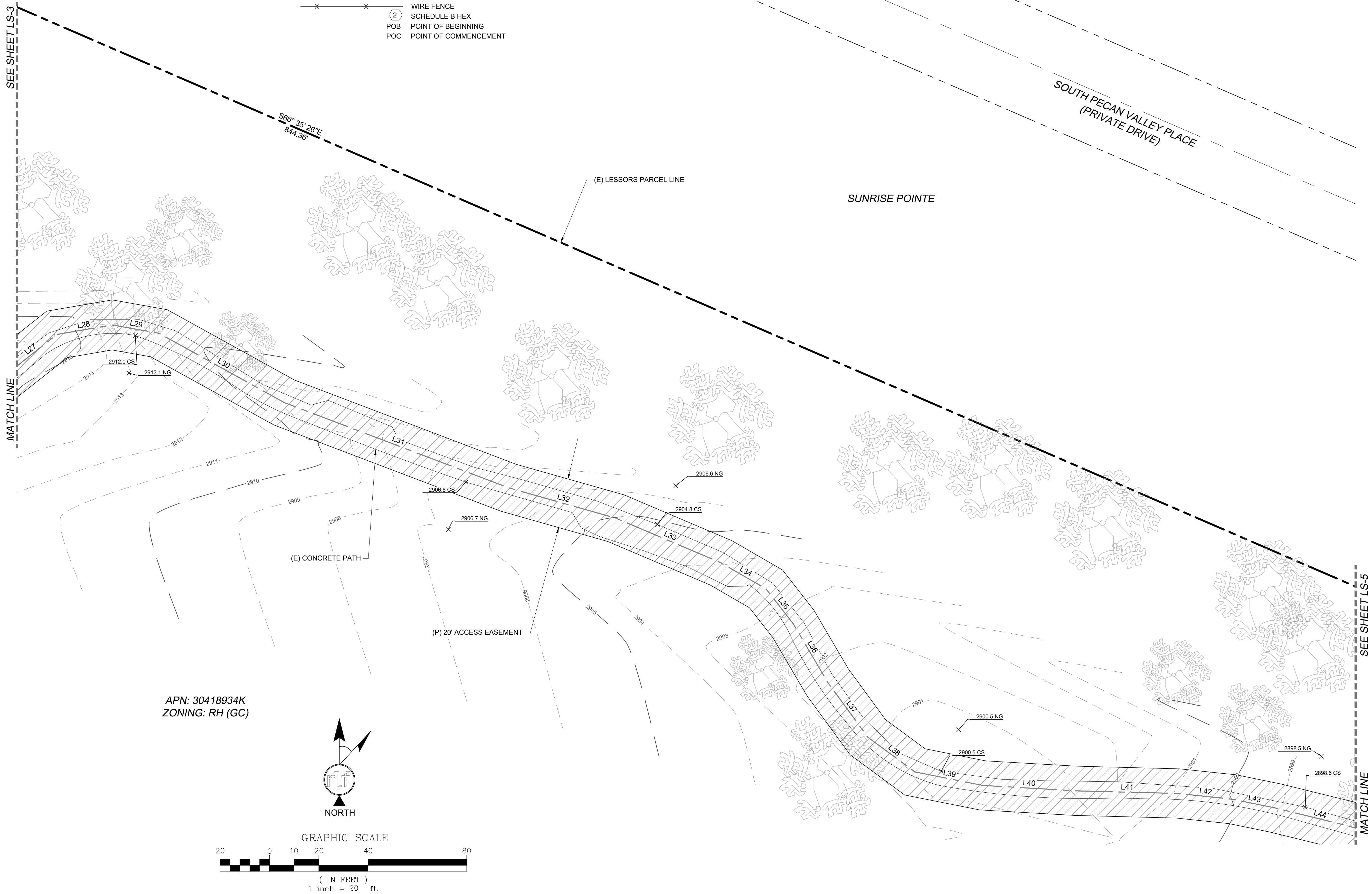
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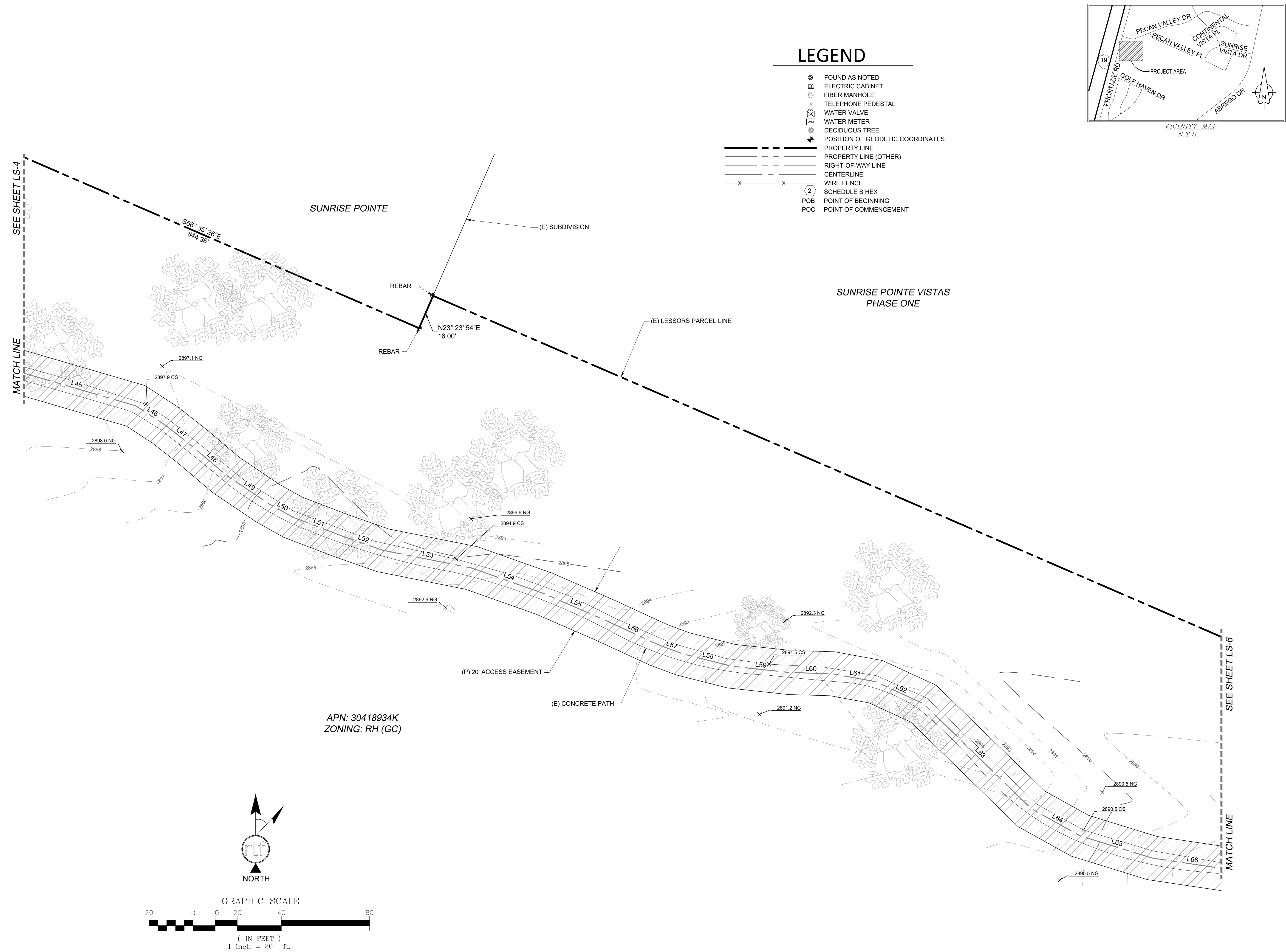
SITE ADDRESS:
3233 S ABREGO DR
GREEN VALLEY, AZ 85614

SHEET TITLE:

TOPOGRAPHIC SURVEY

SHEET NO. LS-4	REVISION: 3
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REVISIONS		
NO.	DATE	DESCRIPTION
3	07/30/25	REVISION
2	05/23/25	FINAL
1	04/24/25	TITLE REVIEW
0	04/15/25	PRELIMINARY



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PROJECT No.
2500300

SITE NAME:
AZ6001 ABREGO

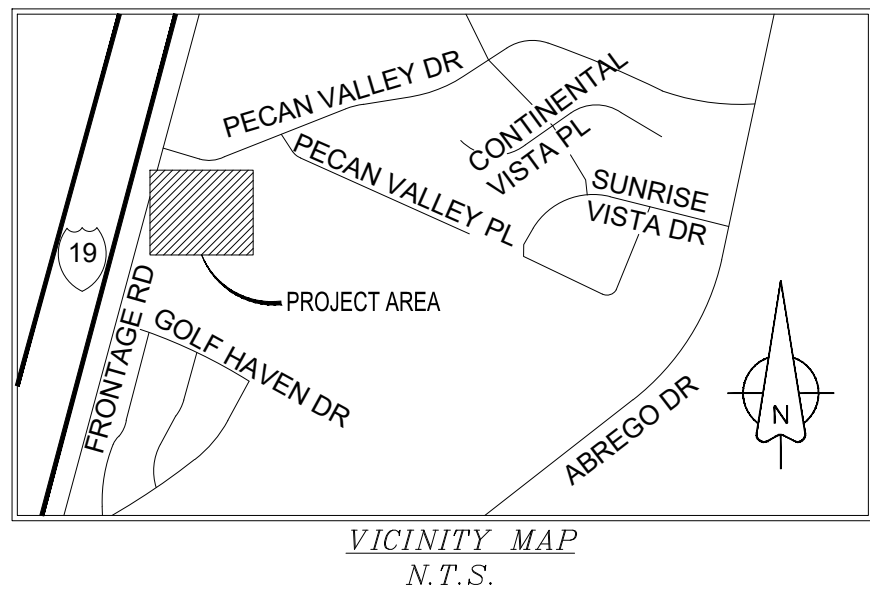
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**3233 S ABREGO DR
GREEN VALLEY, AZ 85614**

SHEET TITLE:
TOPOGRAPHIC SURVEY

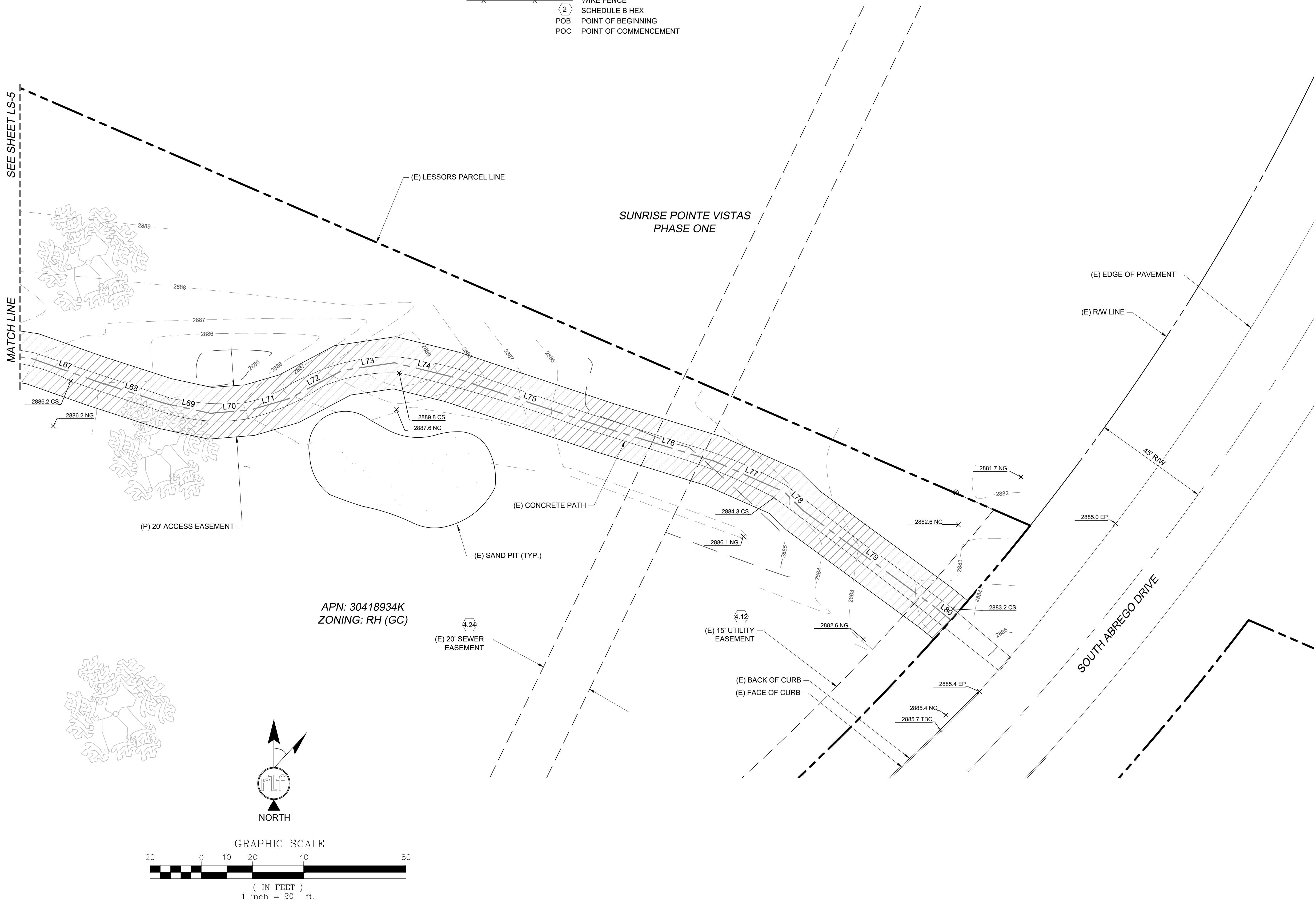
SHEET NO. LS-5	REVISION: 3
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LEGEND

	FOUND AS NOTED
	ELECTRIC CABINET
	FIBER MANHOLE
	TELEPHONE PEDESTAL
	WATER VALVE
	WATER METER
	DECIDUOUS TREE
	POSITION OF GEODETIC COORDINATES
	PROPERTY LINE
	PROPERTY LINE (OTHER)
	RIGHT-OF-WAY LINE
	CENTERLINE
	WIRE FENCE
	SCHEDULE B HEX
	POINT OF BEGINNING
	POINT OF COMMENCEMENT



VICINITY MAP
N.T.S.



FIELD BY:	TG
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REVISIONS

NO.	DATE	DESCRIPTION
3	07/30/25	REVISION
2	05/23/25	FINAL
1	04/24/25	TITLE REVIEW
0	04/15/25	PRELIMINARY



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PROJECT No.
2500300
SITE NAME:
AZ6001 ABREGO

SITE ADDRESS:
**3233 S ABREGO DR
GREEN VALLEY, AZ 85614**

SHEET TITLE:
TOPOGRAPHIC SURVEY

SHEET NO. LS-6	REVISION: 3
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LESSOR'S LEGAL DESCRIPTION (APN: 30418934K)

PARCEL 1:

THAT CERTAIN PARCEL OF LAND SITUATED IN THE SAN IGNACIO DE LA CANOA PRIVATE LAND GRANT, ACCORDING TO THE SURVEY OF SAID LAND GRANT MADE BY THE UNITED STATES SURVEYOR GENERAL ON MARCH 10, 1901, AND WHICH SAID SURVEY IS NOW ON FILE IN THE UNITED STATES GENERAL'S OFFICE AT PHOENIX, IN THE STATE OF ARIZONA, AND WHICH REFERENCE IS BEING MADE, WITHIN PIMA COUNTY, ARIZONA, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT A POINT ON THE SOUTH LINE OF THE NORTH HALF OF SAID LAND GRANT, SAID POINT BEING ON THE EAST RIGHT OF WAY LINE OF I-19, TUCSON-NOGALES HIGHWAY;

THENCE SOUTH 59 DEGREES 12 MINUTES 42 SECONDS EAST ALONG SAID SOUTH LINE OF SAID LAND GRANT, A DISTANCE OF 2650.00 FEET TO THE POINT OF BEGINNING;

THENCE NORTH 28 DEGREES 00 MINUTES 46 SECONDS EAST, A DISTANCE OF 230.84 FEET; THENCE NORTH 13 DEGREES 06 MINUTES 41 SECONDS WEST, A DISTANCE OF 632.05 FEET; THENCE NORTH 23 DEGREES 44 MINUTES 38 SECONDS WEST, A DISTANCE OF 1026.57 FEET;

THENCE NORTH 10 DEGREES 38 MINUTES 41 SECONDS WEST, A DISTANCE OF 563.54 FEET TO A POINT ON THE EAST LINE OF ROADHAVEN RESORTS, INC., OF GREEN VALLEY, A SUBDIVISION OF PIMA COUNTY, ARIZONA, ACCORDING TO THE MAP OR PLAT THEREOF OF RECORD IN THE OFFICE OF THE COUNTY RECORDER OF PIMA COUNTY, ARIZONA, IN BOOK 37 OF MAPS AND PLATS AT PAGE 4 THEREOF;

THENCE NORTH 32 DEGREES 18 MINUTES 39 SECONDS EAST, A DISTANCE OF 735.30 FEET ALONG SAID EAST LINE OF ROADHAVEN RESORTS, INC. ; THENCE NORTH 41 DEGREES 57 MINUTES 08 SECONDS EAST, A DISTANCE OF 459.37 FEET ALONG SAID EAST LINE OF ROADHAVEN RESORTS, INC. ; THENCE NORTH 67 DEGREES 32 MINUTES 29 SECONDS WEST, A DISTANCE OF 1247.08 FEET ALONG SAID NORTH LINE OF SAID ROADHAVEN RESORTS, INC. ; THENCE NORTH 22 DEGREES 27 MINUTES 31 SECONDS EAST, A DISTANCE OF 150.00 FEET; THENCE NORTH 67 DEGREES 32 MINUTES 29 SECONDS WEST, A DISTANCE OF 162.50 FEET; THENCE SOUTH 45 DEGREES 04 MINUTES 42 SECONDS WEST, A DISTANCE OF 97.50 FEET; THENCE SOUTH 22 DEGREES 27 MINUTES 31 SECONDS WEST, A DISTANCE OF 60.00 FEET; THENCE NORTH 67 DEGREES 32 MINUTES 29 SECONDS WEST, A DISTANCE OF 60.00 FEET TO A POINT ON THE EASTERLY RIGHT OF WAY LINE OF I-19 TUCSON-NOGALES HIGHWAY, SAID POINT HEREINAFTER REFERRED TO A POINT NO. 1;

THENCE NORTH 22 DEGREES 27 MINUTES 31 SECONDS EAST ALONG SAID RIGHT OF WAY LINE, A DISTANCE OF 570.00 FEET;

THENCE DEPARTING SAID RIGHT OF WAY LINE AT A BEARING OF NORTH 65 DEGREES 15 MINUTES 00 SECONDS EAST, A DISTANCE OF 900.00 FEET;

THENCE NORTH 52 DEGREES 10 MINUTES 00 SECONDS EAST, A DISTANCE OF 790.00 FEET; THENCE NORTH 52 DEGREES 08 MINUTES 54 SECONDS EAST, A DISTANCE OF 1173.57 FEET, SAID POINT HEREINAFTER REFERRED TO AS POINT NO. 2;

THENCE NORTH 24 DEGREES 58 MINUTES 42 SECONDS WEST, A DISTANCE OF 332.68 FEET; THENCE NORTH 01 DEGREES 50 MINUTES 00 SECONDS EAST, A DISTANCE OF 650.00 FEET; THENCE NORTH 36 DEGREES 10 MINUTES 00 SECONDS WEST, A DISTANCE OF 80.25 FEET; THENCE SOUTH 24 DEGREES 02 MINUTES 41 SECONDS WEST, A DISTANCE OF 115.75 FEET; THENCE NORTH 65 DEGREES 57 MINUTES 19 SECONDS WEST, A DISTANCE OF 225.00 FEET; THENCE NORTH 24 DEGREES 02 MINUTES 41 SECONDS EAST, A DISTANCE OF 122.59 FEET TO A POINT OF A TANGENT CURVE CONCAVE TO THE EAST, WITH A RADIUS OF 1955.00 FEET;

THENCE NORTHEASTERLY 77.41 FEET ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 2 DEGREES 16 MINUTES 07 SECONDS TO A POINT OF NON-TANGENCY; THENCE NORTH 70 DEGREES 15 MINUTES 00 SECONDS WEST, A DISTANCE OF 922.33 FEET TO A POINT OF INTERSECTION WITH A CURVE CONCAVE TO THE WEST FROM WHICH A RADIAL LINE BEARS NORTH 74 DEGREES 25 MINUTES 48 SECONDS WEST, A DISTANCE OF 11584.16 FEET TO THE CENTER, SAID POINT BEING ON THE EASTERLY RIGHT OF WAY LINE OF I-19, TUCSON-NOGALES HIGHWAY;

THENCE NORTHEASTERLY ALONG THE ARC OF SAID CURVE CONCAVE TO THE WEST ALONG SAID RIGHT OF WAY LINE, A DISTANCE OF 70.00 FEET THROUGH A CENTRAL ANGLE OF 00 DEGREES 20 MINUTES 46 SECONDS TO A POINT OF TANGENCY, SAID POINT HEREIN AFTER REFERRED TO AS POINT NO. 3;

THENCE SOUTH 74 DEGREES 46 MINUTES 34 SECONDS EAST, A DISTANCE OF 100.00 FEET; THENCE NORTH 15 DEGREES 13 MINUTES 26 SECONDS EAST, A DISTANCE OF 100.00 FEET; THENCE NORTH 74 DEGREES 46 MINUTES 34 SECONDS WEST, A DISTANCE OF 100.00 FEET TO A POINT ON THE EASTERLY RIGHT OF WAY LINE OF I-19, TUCSON-NOGALES HIGHWAY; THENCE NORTH 15 DEGREES 13 MINUTES 26 SECONDS EAST ALONG SAID RIGHT OF WAY LINE, A DISTANCE OF 240.00 FEET; THENCE DEPARTING SAID RIGHT OF WAY LINE AT A BEARING OF NORTH 57 DEGREES 50 MINUTES 24 SECONDS EAST, A DISTANCE OF 713.05 FEET;

THENCE NORTH 38 DEGREES 50 SECONDS WEST, A DISTANCE OF 654.87 FEET;

THENCE NORTH 67 DEGREES 14 MINUTES 57 SECONDS WEST, A DISTANCE OF 650.75 FEET; THENCE NORTH 15 DEGREES 13 MINUTES 26 SECONDS EAST, A DISTANCE OF 100.00 FEET; THENCE NORTH 74 DEGREES 46 MINUTES 34 SECONDS WEST, A DISTANCE OF 100.00 FEET TO A POINT ON SAID EASTERLY RIGHT OF WAY LINE OF I-19;

THENCE NORTH 15 DEGREES 13 MINUTES 26 SECONDS EAST ALONG SAID RIGHT OF WAY LINE, A DISTANCE OF 292.61 FEET; THENCE DEPARTING SAID RIGHT OF WAY LINE AT A BEARING OF NORTH 87 DEGREES 35 MINUTES 11 SECONDS EAST, A DISTANCE OF 389.77 FEET;

THENCE SOUTH 65 DEGREES 58 MINUTES 41 SECONDS EAST, A DISTANCE OF 844.36 FEET TO A POINT;

THENCE NORTH 24 DEGREES 00 MINUTES 39 SECONDS EAST, A DISTANCE OF 16.00 FEET; THENCE SOUTH 65 DEGREES 58 MINUTES 41 SECONDS WEST, A DISTANCE OF 1071.15 FEET, SAID POINT HEREINAFTER REFERRED TO AS POINT NO. 4;

THENCE SOUTH 22 DEGREES 50 MINUTES 00 SECONDS WEST, A DISTANCE OF 686.42 FEET; THENCE SOUTH 40 DEGREES 25 MINUTES 00 SECONDS WEST, A DISTANCE OF 460.00 FEET; THENCE SOUTH 30 DEGREES 25 MINUTES 00 SECONDS WEST, A DISTANCE OF 550.00 FEET; THENCE SOUTH 19 DEGREES 35 MINUTES 00 SECONDS WEST, A DISTANCE OF 1375.00 FEET; THENCE SOUTH 02 DEGREES 40 MINUTES 00 SECONDS WEST, A DISTANCE OF 430.00 FEET; THENCE SOUTH 15 DEGREES 40 MINUTES 00 SECONDS WEST, A DISTANCE OF 1067.48 FEET; THENCE SOUTH 18 DEGREES 26 MINUTES 38 SECONDS WEST, A DISTANCE OF 1144.54 FEET; THENCE SOUTH 21 DEGREES 45 MINUTES 00 SECONDS WEST, A DISTANCE OF 1615.02 FEET; THENCE SOUTH 03 DEGREES 38 MINUTES 41 SECONDS EAST, A DISTANCE OF 247.69 FEET; THENCE SOUTH 10 DEGREES 42 MINUTES 46 SECONDS WEST, A DISTANCE OF 773.72 FEET; THENCE SOUTH 24 DEGREES 45 MINUTES 00 SECONDS EAST, A DISTANCE OF 280.00 FEET; THENCE SOUTH 13 DEGREES 10 MINUTES 00 SECONDS EAST, A DISTANCE OF 380.00 FEET;

THENCE SOUTH 20 DEGREES 00 MINUTES 00 SECONDS WEST, A DISTANCE OF 510.00 FEET TO THE SOUTH LINE OF SAID LAND GRANT; THENCE NORTH 59 DEGREES 12 MINUTES 41 SECONDS WEST ALONG THE SAID SOUTH LINE OF SAID LAND GRANT, A DISTANCE OF 500.00 FEET TO THE TRUE POINT OF BEGINNING.

EXCEPT THE FOLLOWING PARCEL "B": BEGINNING AT A POINT HERETOFORE DESCRIBED AS POINT 1: THENCE NORTH 22 DEGREES 27 MINUTES 31 SECONDS EAST ALONG THE EAST RIGHT OF WAY OF

EXCEPT THE FOLLOWING PARCEL "B": BEGINNING AT A POINT HERETOFORE DESCRIBED AS POINT 1: THENCE NORTH 22 DEGREES 27 MINUTES 31 SECONDS EAST ALONG THE EAST RIGHT OF WAY OF INTERSTATE 19, A DISTANCE OF 363.33 FEET; THENCE DEPARTING SAID RIGHT OF WAY SOUTH 67 DEGREES 32 MINUTES 29 SECONDS EAST, A DISTANCE OF 178.88 FEET TO A POINT, SAID POINT BEING THE TRUE POINT OF BEGINNING;

THENCE NORTH 66 DEGREES 32 MINUTES 04 SECONDS EAST, A DISTANCE OF 960.00 FEET; THENCE NORTH 43 DEGREES 02 MINUTES 04 SECONDS EAST, A DISTANCE OF 720.00 FEET; THENCE SOUTH 56 DEGREES 57 MINUTES 56 SECONDS EAST, A DISTANCE OF 540.00 FEET; THENCE SOUTH 9 DEGREES 02 MINUTES 04 SECONDS WEST, A DISTANCE OF 460.00 FEET; THENCE SOUTH 24 DEGREES 02 MINUTES 04 SECONDS WEST, A DISTANCE OF 735.00 FEET; THENCE SOUTH 73 DEGREES 02 MINUTES 04 SECONDS WEST, A DISTANCE OF 275.00 FEET; THENCE NORTH 58 DEGREES 57 MINUTES 30 SECONDS WEST, A DISTANCE OF 716.79 FEET; THENCE NORTH 76 DEGREES 47 MINUTES 56 SECONDS WEST, A DISTANCE OF 530.00 FEET; THENCE NORTH 23 DEGREES 27 MINUTES 56 SECONDS WEST, A DISTANCE OF 130.00 FEET TO A POINT, SAID POINT BEING THE TRUE POINT OF BEGINNING; AND EXCEPT THE FOLLOWING PARCEL "D":

BEGINNING AT A POINT HERETOFORE DESCRIBED AS POINT 3: THENCE NORTH 37 DEGREES 07 MINUTES 49 SECONDS EAST, A DISTANCE OF 245.00 FEET TO THE TRUE POINT OF BEGINNING;

THENCE NORTH 68 DEGREES 30 MINUTES 00 SECONDS EAST, A DISTANCE OF 760.00 FEET; THENCE NORTH 47 DEGREES 15 MINUTES 00 SECONDS EAST, A DISTANCE OF 1018.61 FEET; THENCE SOUTH 75 DEGREES 00 MINUTES 00 SECONDS EAST, A DISTANCE OF 718.77 FEET; THENCE SOUTH 29 DEGREES 19 MINUTES 56 SECONDS WEST, A DISTANCE OF 837.08 FEET; THENCE SOUTH 47 DEGREES 40 MINUTES 00 SECONDS WEST, A DISTANCE OF 860.00 FEET; THENCE NORTH 41 DEGREES 20 MINUTES 00 SECONDS WEST, A DISTANCE OF 250.00 FEET TO A POINT, SAID POINT HEREINAFTER REFERRED TO AS POINT NO. 5;

THENCE NORTH 82 DEGREES 00 MINUTES 00 SECONDS WEST, A DISTANCE OF 380.00 FEET; THENCE NORTH 63 DEGREES 10 MINUTES 00 SECONDS WEST, A DISTANCE OF 630.00 FEET TO THE TRUE POINT OF BEGINNING.

THENCE NORTH 67 DEGREES 14 MINUTES 57 SECONDS WEST, A DISTANCE OF 650.75 FEET; THENCE NORTH 15 DEGREES 13 MINUTES 26 SECONDS EAST, A DISTANCE OF 100.00 FEET; THENCE NORTH 74 DEGREES 46 MINUTES 34 SECONDS WEST, A DISTANCE OF 100.00 FEET TO A POINT ON SAID EASTERLY RIGHT OF WAY LINE OF I-19;

THENCE NORTH 15 DEGREES 13 MINUTES 26 SECONDS EAST ALONG SAID RIGHT OF WAY LINE, A DISTANCE OF 292.61 FEET; THENCE DEPARTING SAID RIGHT OF WAY LINE AT A BEARING OF NORTH 87 DEGREES 35 MINUTES 11 SECONDS EAST, A DISTANCE OF 389.77 FEET;

THENCE SOUTH 65 DEGREES 58 MINUTES 41 SECONDS EAST, A DISTANCE OF 844.36 FEET TO A POINT;

THENCE NORTH 24 DEGREES 00 MINUTES 39 SECONDS EAST, A DISTANCE OF 16.00 FEET; THENCE SOUTH 65 DEGREES 58 MINUTES 41 SECONDS WEST, A DISTANCE OF 1071.15 FEET, SAID POINT HEREINAFTER REFERRED TO AS POINT NO. 4;

THENCE SOUTH 22 DEGREES 50 MINUTES 00 SECONDS WEST, A DISTANCE OF 686.42 FEET; THENCE SOUTH 40 DEGREES 25 MINUTES 00 SECONDS WEST, A DISTANCE OF 460.00 FEET; THENCE SOUTH 30 DEGREES 25 MINUTES 00 SECONDS WEST, A DISTANCE OF 550.00 FEET; THENCE SOUTH 19 DEGREES 35 MINUTES 00 SECONDS WEST, A DISTANCE OF 1375.00 FEET; THENCE SOUTH 02 DEGREES 40 MINUTES 00 SECONDS WEST, A DISTANCE OF 430.00 FEET; THENCE SOUTH 15 DEGREES 40 MINUTES 00 SECONDS WEST, A DISTANCE OF 1067.48 FEET; THENCE SOUTH 18 DEGREES 26 MINUTES 38 SECONDS WEST, A DISTANCE OF 1144.54 FEET; THENCE SOUTH 21 DEGREES 45 MINUTES 00 SECONDS WEST, A DISTANCE OF 1615.02 FEET; THENCE SOUTH 03 DEGREES 38 MINUTES 41 SECONDS EAST, A DISTANCE OF 247.69 FEET; THENCE SOUTH 10 DEGREES 42 MINUTES 46 SECONDS WEST, A DISTANCE OF 773.72 FEET; THENCE SOUTH 24 DEGREES 45 MINUTES 00 SECONDS EAST, A DISTANCE OF 280.00 FEET; THENCE SOUTH 13 DEGREES 10 MINUTES 00 SECONDS EAST, A DISTANCE OF 380.00 FEET;

THENCE SOUTH 20 DEGREES 00 MINUTES 00 SECONDS WEST, A DISTANCE OF 510.00 FEET TO THE SOUTH LINE OF SAID LAND GRANT; THENCE NORTH 59 DEGREES 12 MINUTES 41 SECONDS WEST ALONG THE SAID SOUTH LINE OF SAID LAND GRANT, A DISTANCE OF 500.00 FEET TO THE TRUE POINT OF BEGINNING.

EXCEPT THE FOLLOWING PARCEL "B": BEGINNING AT A POINT HERETOFORE DESCRIBED AS POINT 1: THENCE NORTH 22 DEGREES 27 MINUTES 31 SECONDS EAST ALONG THE EAST RIGHT OF WAY OF

AND EXCEPT THE FOLLOWING DESCRIBED WELL SITE W-11 PARCEL:

BEGINNING AT SAID POINT ON THE SOUTH LINE OF THE NORTH HALF OF SAN IGNACIO DE LA CANOA PRIVATE LAND GRANT, SAID CORNER BEING ON THE EAST RIGHT OF WAY LINE OF I-19 TUCSON-NOGALES HIGHWAY;

THENCE NORTH 22 DEGREES 27 MINUTES 31 SECONDS EAST ALONG SAID RIGHT OF WAY LINE, A DISTANCE OF 2692.64 FEET; THENCE DEPARTING SAID RIGHT OF WAY LINE SOUTH 67 DEGREES 32 MINUTES 29 SECONDS EAST, A DISTANCE OF 1749.36 FEET TO THE NORTHWEST CORNER OF WELL SITE W-11, SAID POINT ALSO BEING THE TRUE POINT OF BEGINNING;

THENCE SOUTH 71 DEGREES 33 MINUTES 22 SECONDS EAST, A DISTANCE OF 100.00 FEET; THENCE SOUTH 18 DEGREES 26 MINUTES 38 SECONDS WEST, A DISTANCE OF 100.00 FEET; THENCE NORTH 71 DEGREES 33 MINUTES 22 SECONDS WEST, A DISTANCE OF 100.00 FEET; THENCE NORTH 18 DEGREES 26 MINUTES 38 SECONDS EAST, A DISTANCE OF 100.00 FEET TO THE TRUE POINT OF BEGINNING.

EXCEPT THE FOLLOWING PARCEL:

BEGINNING AT A POINT HERETOFORE DESCRIBED AS POINT NO. 4; THENCE NORTH 65 DEGREES 58 MINUTES 41 SECONDS WEST, A DISTANCE OF 158.47 FEET TO A POINT, SAID POINT BEING THE TRUE POINT OF BEGINNING, SAID POINT ALSO BEING A POINT OF A NON-TANGENT CURVE CONCAVE TO THE NORTHWEST HAVING A RADIUS OF 1045.00 FEET AND FROM WHICH A RADIAL LINE BEARS NORTH 52 DEGREES 09 MINUTES 14 SECONDS WEST;

THENCE SOUTHWESTERLY 268.18 FEET ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 14 DEGREES 42 MINUTES 14 SECONDS TO A POINT OF TANGENCY; THENCE SOUTH 52 DEGREES 33 MINUTES 00 SECONDS WEST, A DISTANCE OF 35.18 FEET; THENCE NORTH 15 DEGREES 13 MINUTES 26 SECONDS WEST, A DISTANCE OF 113.52 FEET; THENCE NORTH 52 DEGREES 33 MINUTES 00 SECONDS EAST, A DISTANCE OF 104.36 FEET TO A POINT OF A TANGENT CURVE, CONCAVE TO THE NORTHWEST, WITH A RADIUS OF 955.00 FEET;

THENCE NORTHEASTERLY 222.87 FEET ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 13 DEGREES 22 MINUTES 16 SECONDS TO A POINT OF NON-TANGENCY; THENCE SOUTH 65 DEGREES 58 MINUTES 41 SECONDS EAST, A DISTANCE OF 92.95 FEET TO A POINT, SAID POINT BEING THE TRUE POINT OF BEGINNING.

EXCEPT THE FOLLOWING PARCEL:

BEGINNING AT A POINT HERETOFORE DESCRIBED AS POINT NO. 5: THENCE NORTH 82 DEGREES 00 MINUTES 00 SECONDS WEST, A DISTANCE OF 90.20 FEET TO A POINT OF A NON-TANGENT CURVE, CONCAVE TO THE SOUTHEAST WITH A RADIUS OF 1955.00 FEET FROM WHICH A RADIAL LINE BEARS SOUTH 55 DEGREES 09 MINUTES 31 SECONDS EAST, SAID POINT BEING THE TRUE POINT OF BEGINNING;

THENCE SOUTHWESTERLY 290.99 FEET ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 8 DEGREES 31 MINUTES 42 SECONDS TO A POINT OF NON-TANGENCY; THENCE NORTH 70 DEGREES 15 MINUTES 00 SECONDS WEST, A DISTANCE OF 90.57 FEET TO A POINT OF A NON-TANGENCY CURVE, CONCAVE TO THE SOUTHEAST, WITH A RADIUS OF 2045.00 FEET AND FROM WHICH A RADIAL LINE BEARS SOUTH 63 DEGREES 58 MINUTES 37 SECONDS EAST; THENCE NORTHEASTERLY 268.81 FEET ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 7 DEGREES 31 MINUTES 53 SECONDS TO A POINT OF NON-TANGENCY; THENCE SOUTH 82 DEGREES 00 MINUTES 00 SECONDS EAST, A DISTANCE OF 102.03 FEET TO A POINT, SAID POINT BEING THE TRUE POINT OF BEGINNING.

EXCEPT THE FOLLOWING PARCEL:

BEGINNING AT A POINT HERETOFORE DESCRIBED AS POINT NO. 2: THENCE SOUTH 52 DEGREES 08 MINUTES 54 SECONDS WEST, A DISTANCE OF 1088.41 FEET TO A POINT OF A NON-TANGENT CURVE, CONCAVE TO THE NORTHEAST WITH A RADIUS OF 355.00 FEET AND FROM WHICH A RADIAL LINE BEARS NORTH 73 DEGREES 39 MINUTES 59 SECONDS EAST, SAID POINT BEING THE TRUE POINT OF BEGINNING;

THENCE SOUTHEASTERLY 125.14 FEET ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 20 DEGREES 11 MINUTES 48 SECONDS TO A POINT OF TANGENCY;

THENCE SOUTH 36 DEGREES 31 MINUTES 49 SECONDS EAST, A DISTANCE OF 6.65 FEET TO A POINT OF A TANGENT CURVE, CONCAVE TO THE SOUTHWEST, WITH A RADIUS OF 245.00 FEET;

THENCE SOUTHEASTERLY 251.04 FEET ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 58 DEGREES 42 MINUTES 29 SECONDS TO A POINT OF NON-TANGENCY;

THENCE NORTH 56 DEGREES 57 MINUTES 54 SECONDS WEST, A DISTANCE OF 92.64 FEET TO A POINT OF A NON-TANGENT CURVE, CONCAVE TO THE SOUTHWEST, WITH A RADIUS OF 155.00 FEET, FROM WHICH A RADIAL LINE BEARS NORTH 74 DEGREES 17 MINUTES 08 SECONDS WEST;

THENCE NORTHWESTERLY 141.36 FEET ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 52 DEGREES 14 MINUTES 41 SECONDS TO A POINT OF TANGENCY;

THENCE NORTH 36 DEGREES 31 MINUTES 49 SECONDS WEST, A DISTANCE OF 6.65 FEET TO A POINT OF A TANGENT CURVE CONCAVE TO THE NORTHEAST, WITH A RADIUS OF 445.00 FEET;

THENCE NORTHWESTERLY 121.89 FEET ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 15 DEGREES 41 DEGREES 38 SECONDS TO A POINT OF NON-TANGENCY;

THENCE NORTH 52 DEGREES 10 MINUTES 00 SECONDS EAST, A DISTANCE OF 10.11 FEET;

THENCE NORTH 52 DEGREES 08 MINUTES 54 SECONDS EAST, A DISTANCE OF 85.16 FEET TO A POINT, SAID POINT BEING THE TRUE POINT OF BEGINNING.

EXCEPT ANY PORTION DESCRIBED IN DEED RECORDED IN DOCKET 10104 AT PAGE 2135, RECORDS OF PIMA COUNTY, ARIZONA.

EXCEPT ANY PORTION DESCRIBED IN GIFT DEED TO PIMA COUNTY RECORDED IN DOCKET 12412, PAGE 737, RECORDS OF PIMA COUNTY, ARIZONA, AND LESS AND EXCEPT LANDS DESCRIBED WITHIN DEED BOOK 13781, PAGE 2401 AND DEED INSTRUMENT NO. 20151740364.

*NO SURVEY MAP SHOWING ENTIRETY OF GOLF COURSE FOUND OF RECORD. A SURVEY MAY BE REQUIRED FOR A CURRENT METES AND BOUNDS DESCRIPTION.

SCHEDULE B EXCEPTIONS

- 4.3

EASEMENT BY TORRES BLANCAS HOLDINGS, LLC, AN ARIZONA LIMITED LIABILITY COMPANY TO DE ANZA LINKS, L.L.C., AN ARIZONA LIMITED LIABILITY COMPANY, DATED APRIL 28, 2005, RECORDED JULY 08, 2005, IN BOOK 12590, PAGE 2121. NOTES: ACCESS AND LANDSCAPE
- 4.12

EASEMENT BY FARMERS INVESTMENT CO., AN ARIZONA CORPORATION TO FARMERS WATER CO., TUSCON ELECTRIC POWWER COMPANY, U.S. WEST COMMUNICATIONS, SOUTHWEST GAS CORPORATION AND CABLE TELEVISION, THEIR SUCCESSORS AND ASSIGNS, DATED AUGUST 20, 1996, RECORDED OCTOBER 04, 1996, IN BOOK 10394, PAGE 366. NOTES: UTILITY
- 4.16

EASEMENT BY FARMERS INVESTMENT CO. TO PIMA COUNTY, A BODY POLITIC, DATED MAY 15, 1995, RECORDED SEPTEMBER 06, 1995, IN BOOK 10122, PAGE 1719. NOTES: SEWER
- 4.19

EASEMENT BY ROADHAVEN RESORTS, INC., AN ARIZONA CORPORATION TO TUCSON ELECTRIC POWER COMPANY, AN ARIZONA CORPORATION, DATED SEPTEMBER 11,1984, RECORDED SEPTEMBER 18, 1984, IN BOOK 7370, PAGE 747. NOTES: ELECTRIC
- 4.20

EASEMENT BY FARMERS INVESTMENT CO., AN ARIZONA CORPORATION TO ROADHAVEN RESORTS, INC., AN ARIZONA CORPORATION, DATED APRIL 11, 1984, RECORDED MAY 03, 1984, IN BOOK 7275, PAGE 946. NOTES: ELECTRIC
- 4.24

AGREEMENT BY FARMERS INVESTMENT CO. TO PIMA COUNTY, ARIZONA DEPARTMENT OF SANITATION, DATED JULY 13, 1977, RECORDED JULY 25, 1977, IN BOOK 5574, PAGE 488. NOTES: SEWER LINE
- ITEMS 4.1-4.2, 4.4-4.11, 4.13-4.15, 4.17, 4.214-2.13, 4.25-4.28 OF THE CLIENT PROVIDED TITLE REPORT DO NOT CONTAIN GRAPHICALLY PLOTTABLE EASEMENTS, SETBACKS, RESTRICTIONS OR OTHER ENCUMBRANCES. THE SURVEYOR CANNOT GUARANTEE THAT NON-PLOTTABLE ENCUMBRANCES DO NOT EXIST THAT MAY AFFECT THE SUBJECT LEASED PREMISES.

LESSEE UTILITY EASEMENT 1 LEGAL DESCRIPTION

A PORTION OF PARCEL 1 AS DESCRIBED IN THE SPECIAL WARRANTY DEED RECORDED AT SEQUENCE NO. 20050460141 OF PIMA COUNTY RECORDS, STATE OF ARIZONA, RECORDED IN THE OFFICE OF THE CLERK OF SAID COUNTY ON MARCH 9, 2005, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT A REBAR LOCATED AT A NORTHWESTERLY CORNER OF SAID PARCEL, FROM WHICH A REBAR LOCATED AT THE MOST NORTHERLY CORNER OF SAID PARCEL BEARS NORTH 86°58'26" EAST, A DISTANCE OF 389.77 FEET; THENCE ALONG THE WEST BOUNDARY LINE OF SAID PARCEL SOUTH 14°36'41" WEST, A DISTANCE OF 22.17 FEET TO THE POINT OF BEGINNING;

THENCE DEPARTING SAID LINE SOUTH 60°20'19" EAST, A DISTANCE OF 45.49 FEET; THENCE SOUTH 00°11'44" EAST, A DISTANCE OF 6.92 FEET; THENCE NORTH 60°16'19" WEST, A DISTANCE OF 47.34 FEET; THENCE NORTH 14°36'41" EAST, A DISTANCE OF 6.15 FEET TO THE POINT OF BEGINNING.

LESSEE UTILITY EASEMENT 2 LEGAL DESCRIPTION

A PORTION OF PARCEL 1 AS DESCRIBED IN THE SPECIAL WARRANTY DEED RECORDED AT SEQUENCE NO. 20050460141 OF PIMA COUNTY RECORDS, STATE OF ARIZONA, RECORDED IN THE OFFICE OF THE CLERK OF SAID COUNTY ON MARCH 9, 2005, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT A REBAR LOCATED AT A NORTHWESTERLY CORNER OF SAID PARCEL, FROM WHICH A REBAR LOCATED AT THE MOST NORTHERLY CORNER OF SAID PARCEL BEARS NORTH 86°58'26" EAST, A DISTANCE OF 389.77 FEET; THENCE ALONG THE NORTH BOUNDARY LINE OF SAID PARCEL NORTH 86°58'26" EAST, A DISTANCE OF 22.60 FEET TO THE POINT OF BEGINNING;

THENCE CONTINUING NORTH 86°58'26" EAST, A DISTANCE OF 10.98 FEET; THENCE DEPARTING SAID LINE SOUTH 28°07'49" EAST, A DISTANCE OF 37.10 FEET; THENCE SOUTH 89°48'16" WEST, A DISTANCE OF 11.65 FEET; THENCE NORTH 27°34'59" WEST, A DISTANCE OF 36.31 FEET TO THE POINT OF BEGINNING.

LESSEE LEASE AREA LEGAL DESCRIPTION

A PORTION OF PARCEL 1 AS DESCRIBED IN THE SPECIAL WARRANTY DEED RECORDED AT SEQUENCE NO. 20050460141 OF PIMA COUNTY RECORDS, STATE OF ARIZONA, RECORDED IN THE OFFICE OF THE CLERK OF SAID COUNTY ON MARCH 9, 2005, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT A REBAR LOCATED AT A NORTHWESTERLY CORNER OF SAID PARCEL, FROM WHICH A REBAR LOCATED AT THE MOST NORTHERLY CORNER OF SAID PARCEL BEARS NORTH 86°58'26" EAST, A DISTANCE OF 389.77 FEET; THENCE ALONG THE WEST BOUNDARY LINE OF SAID PARCEL SOUTH 14°36'41" WEST, A DISTANCE OF 22.17 FEET; THENCE DEPARTING SAID LINE SOUTH 60°20'19" EAST, A DISTANCE OF 45.49 FEET TO THE POINT OF BEGINNING;

THENCE NORTH 00°11'44" WEST, A DISTANCE OF 12.96 FEET; THENCE NORTH 89°48'16" EAST, A DISTANCE OF 50.00 FEET; THENCE SOUTH 00°11'44" EAST, A DISTANCE OF 25.09 FEET; THENCE CONTINUING SOUTH 00°11'44" EAST, A DISTANCE OF 24.91 FEET; THENCE SOUTH 89°48'16" EAST, A DISTANCE OF 50.00 FEET; THENCE NORTH 00°11'44" WEST, A DISTANCE OF 37.04 FEET TO THE POINT OF BEGINNING

LESSEE ACCESS EASEMENT LEGAL DESCRIPTION

A PORTION OF PARCEL 1 AS DESCRIBED IN THE SPECIAL WARRANTY DEED RECORDED AT SEQUENCE NO. 20050460141 OF PIMA COUNTY RECORDS, STATE OF ARIZONA, RECORDED IN THE OFFICE OF THE CLERK OF SAID COUNTY ON MARCH 9, 2005, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT A REBAR LOCATED AT A NORTHWESTERLY CORNER OF SAID PARCEL, FROM WHICH A REBAR LOCATED AT THE MOST NORTHERLY CORNER OF SAID PARCEL BEARS NORTH 86°58'26" EAST, A DISTANCE OF 389.77 FEET; THENCE ALONG THE WEST BOUNDARY LINE OF SAID PARCEL SOUTH 14°36'41" WEST, A DISTANCE OF 22.17 FEET; THENCE DEPARTING SAID LINE SOUTH 60°20'19" EAST, A DISTANCE OF 45.49 FEET; THENCE NORTH 00°11'44" WEST, A DISTANCE OF 12.96 FEET; THENCE NORTH 89°48'16" EAST, A DISTANCE OF 50.00 FEET; THENCE SOUTH 00°11'44" EAST, A DISTANCE OF 25.09 FEET TO THE POINT OF BEGINNING;

THENCE SOUTH 77°39'43" EAST, A DISTANCE OF 41.28 FEET; THENCE SOUTH 56°55'48" EAST, A DISTANCE OF 42.53 FEET; THENCE SOUTH 54°59'39" EAST, A DISTANCE OF 41.99 FEET; THENCE SOUTH 74°17'13" EAST, A DISTANCE OF 35.46 FEET; THENCE SOUTH 64°09'18" EAST, A DISTANCE OF 40.73 FEET; THENCE SOUTH 56°52'25" EAST, A DISTANCE OF 66.25 FEET; THENCE SOUTH 71°41'50" EAST, A DISTANCE OF 22.78 FEET; THENCE NORTH 90°00'00" EAST, A DISTANCE OF 38.55 FEET; THENCE NORTH 89°57'44" EAST, A DISTANCE OF 33.46 FEET; THENCE NORTH 51°45'20" EAST, A DISTANCE OF 34.49 FEET; THENCE NORTH 51°45'20" EAST, A DISTANCE OF 24.07 FEET; THENCE NORTH 80°14'36" EAST, A DISTANCE OF 19.21 FEET; THENCE SOUTH 79°54'25" EAST, A DISTANCE OF 12.23 FEET; THENCE SOUTH 61°03'27" EAST, A DISTANCE OF 58.10 FEET; THENCE SOUTH 69°11'28" EAST, A DISTANCE OF 97.31 FEET; THENCE SOUTH 74°10'25" EAST, A DISTANCE OF 45.36 FEET; THENCE SOUTH 66°58'42" EAST, A DISTANCE OF 46.28 FEET; THENCE SOUTH 59°55'54" EAST, A DISTANCE OF 21.10 FEET; THENCE SOUTH 37°57'27" EAST, A DISTANCE OF 18.00 FEET; THENCE SOUTH 30°27'05" EAST, A DISTANCE OF 27.52 FEET; THENCE SOUTH 36°10'35" EAST, A DISTANCE OF 27.58 FEET; THENCE SOUTH 53°37'04" EAST, A DISTANCE OF 23.70 FEET; THENCE SOUTH 78°43'24" EAST, A DISTANCE OF 27.97 FEET; THENCE SOUTH 86°39'50" EAST, A DISTANCE OF 37.83 FEET; THENCE SOUTH 88°31'25" EAST, A DISTANCE OF 41.50 FEET; THENCE SOUTH 83°57'07" EAST, A DISTANCE OF 22.29 FEET; THENCE SOUTH 78°25'26" EAST, A DISTANCE OF 17.59 FEET; THENCE SOUTH 78°10'36" EAST, A DISTANCE OF 29.74 FEET; THENCE SOUTH 73°44'40" EAST, A DISTANCE OF 56.80 FEET; THENCE SOUTH 56°56'21" EAST, A DISTANCE OF 16.03 FEET; THENCE SOUTH 51°45'35" EAST, A DISTANCE OF 15.95 FEET; THENCE SOUTH 49°41'25" EAST, A DISTANCE OF 19.91 FEET; THENCE SOUTH 56°03'37" EAST, A DISTANCE OF 12.97 FEET; THENCE SOUTH 60°46'33" EAST, A DISTANCE OF 12.76 FEET; THENCE SOUTH 69°03'31" EAST, A DISTANCE OF 23.57 FEET; THENCE SOUTH 70°37'43" EAST, A DISTANCE OF 19.89 FEET; THENCE SOUTH 78°43'13" EAST, A DISTANCE OF 41.02 FEET; THENCE SOUTH 70°30'08" EAST, A DISTANCE OF 34.91 FEET; THENCE SOUTH 86°29'32" EAST, A DISTANCE OF 29.99 FEET; THENCE SOUTH 65°14'35" EAST, A DISTANCE OF 28.74 FEET; THENCE SOUTH 69°27'02"

NOTES:

1. ANTENNAS NOT SHOWN FOR CLARITY.
2. FIBER AND POWER ROUTES SHOWN ARE PRELIMINARY AND TO BE VERIFIED BY COORDINATION WITH THE UTILITY COMPANY PRIOR TO CONSTRUCTION.

PROPOSED 20' WIDE CONSTRUCTION EASEMENT

EXISTING J-2 CABINET TO BE UTILIZED

PROPOSED POWER ROUTE. SEE NOTE 2 THIS SHEET.

PROPOSED FIBER MMP

PROPOSED 6'-0" WIDE UTILITY EASEMENT

EXISTING RIP RAP

EXISTING FIBER HANDHOLE

EXISTING TEE BOX

PROPOSED 10'-0" WIDE UTILITY EASEMENT

PROPOSED 65'-0" MONOEUCALYPTUS TOWER
SEE SHEET C-2 FOR ELEVATIONS DETAILS.

PROPOSED 20'-0" WIDE ACCESS EASEMENT

PROPOSED 48'-0" x 48'-0" CMU WALL COMPOUND. SEE SHEET C-4.2 FOR DETAILS

EXISTING BUILDING BY OTHERS (TYP)

N/F:
TORRES BLANCAS
HOLDINGS LLC
APN: 30418934K
ZONING: RESIDENTIAL

LEGEND

- EXIST. PROPERTY LINE
- ADJ. PROPERTY LINE
- EXIST. UTILITY POLE
- EXIST. TELCO PEDESTAL
- PROPERTY CORNER
- EXIST. CONTOUR LINE
- EDGE OF PAVEMENT
- OVERHEAD WIRE
- RIGHT-OF-WAY
- CHAIN LINK FENCE
- EXISTING TREE LINE

1 OVERALL SITE PLAN

SCALE: 1" = 80' (24x36)

SCALE: 1" = 160' (11x17)

0 80 160
SCALE IN FEET



126 W GEMINI DR
TEMPE, AZ 85283



2600 W GERONIMO PL, STE 100
CHANDLER, AZ 85224

VERIZON SITE ID:
AZ6001

VERIZON SITE NAME:
TUC ABREGO

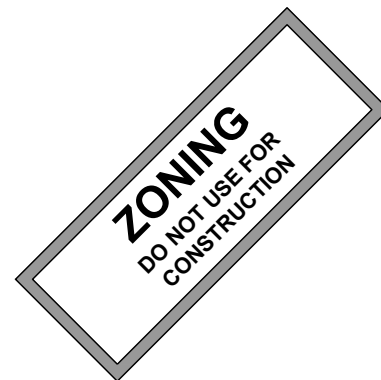
2492 S ORCHARD VIEW DR
GREEN VALLEY, AZ 85614
(PIMA COUNTY)

PROPOSED 65'-0"
MONOEUCALYPTUS TOWER

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	QA
D	11-05-25	MEW	ZONING	HMM
E	11-21-25	MEW	ZONING	HMM
F	11-24-25	MEW	ZONING	HMM
G	12-22-25	MEW	ZONING	HMM
H	04-10-26	XAO	ZONING	HMM

SEAL:



IT IS A VIOLATION OF LAW FOR ANY PERSON,
UNLESS THEY ARE ACTING UNDER THE DIRECTION
OF A LICENSED PROFESSIONAL ENGINEER,
TO ALTER THIS DOCUMENT.

SHEET TITLE:

OVERALL SITE PLAN

SHEET NUMBER:

C-1.1

REVISION:

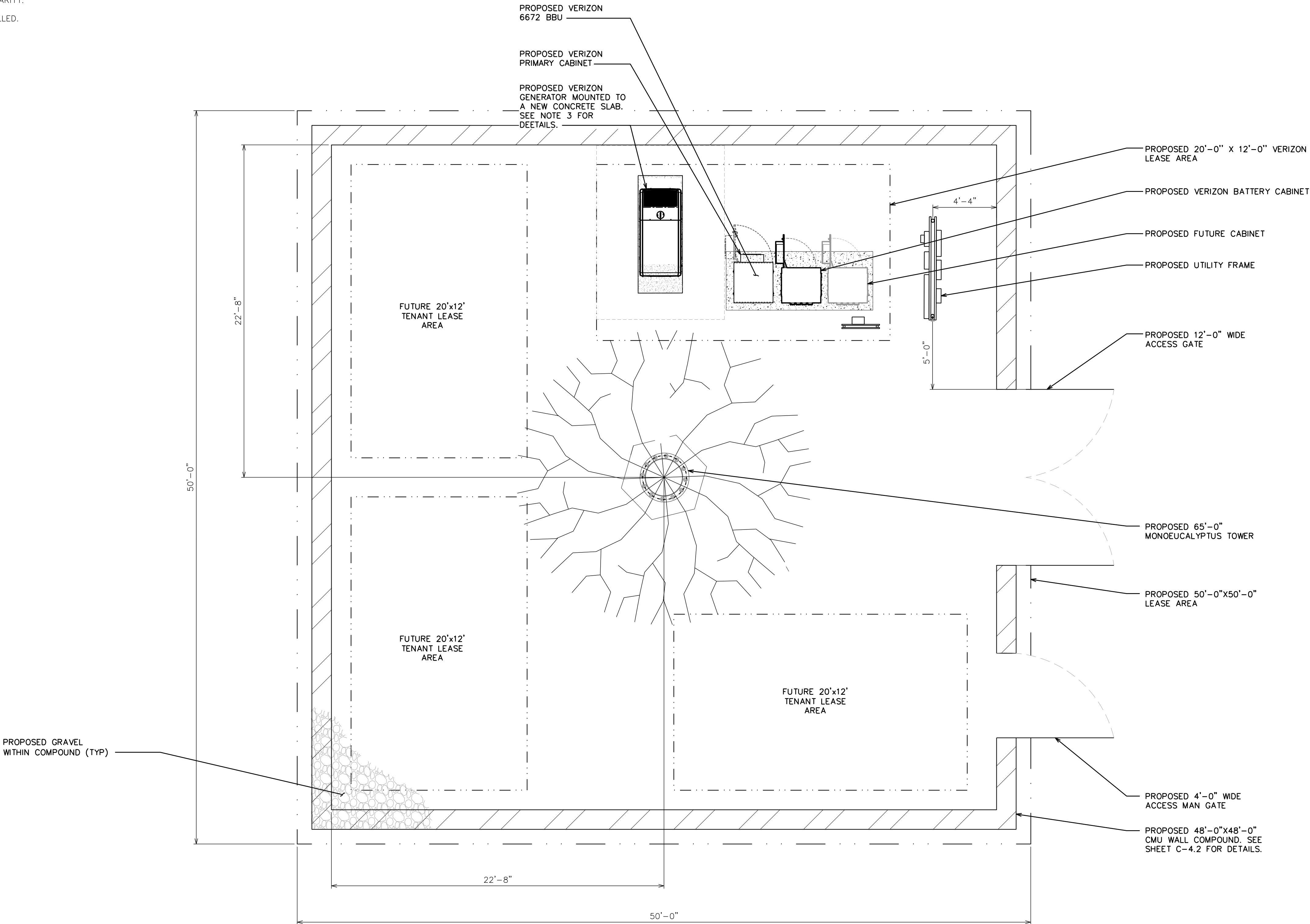
H

TEP #:

347943.1086845

NOTES:

1. CONTRACTOR TO VERIFY ALL EXISTING INFORMATION IS AS INDICATED ON SITE PLAN. CONTRACTOR IS TO ESTABLISH THE EXISTENCE AND LOCATION OF ALL EXISTING OVERHEAD AND UNDERGROUND UTILITIES. IMMEDIATELY NOTIFY THE CONSTRUCTION MANAGER OF ANY DISCREPANCIES.
2. ANTENNAS NOT SHOWN FOR CLARITY.
3. GENERATOR TO BE DOUBLE WALLED.



126 W GEMINI DR
TEMPE, AZ 85283



2600 W GERONIMO PL, STE 100
CHANDLER, AZ 85224

VERIZON SITE ID:
AZ6001

VERIZON SITE NAME:
TUC ABREGO

2492 S ORCHARD VIEW DR
GREEN VALLEY, AZ 85614
(PIMA COUNTY)

PROPOSED 65'-0"
MONOEUCALYPTUS TOWER

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	QA
D	11-05-25	MEW	ZONING	HMM
E	11-21-25	MEW	ZONING	HMM
F	11-24-25	MEW	ZONING	HMM
G	12-22-25	MEW	ZONING	HMM
H	04-10-26	XAO	ZONING	HMM

SEAL:



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OF A LICENSED PROFESSIONAL ENGINEER,
TO ALTER THIS DOCUMENT.

SHEET TITLE:

COMPOUND LAYOUT

SHEET NUMBER:

C-1.2

REVISION:

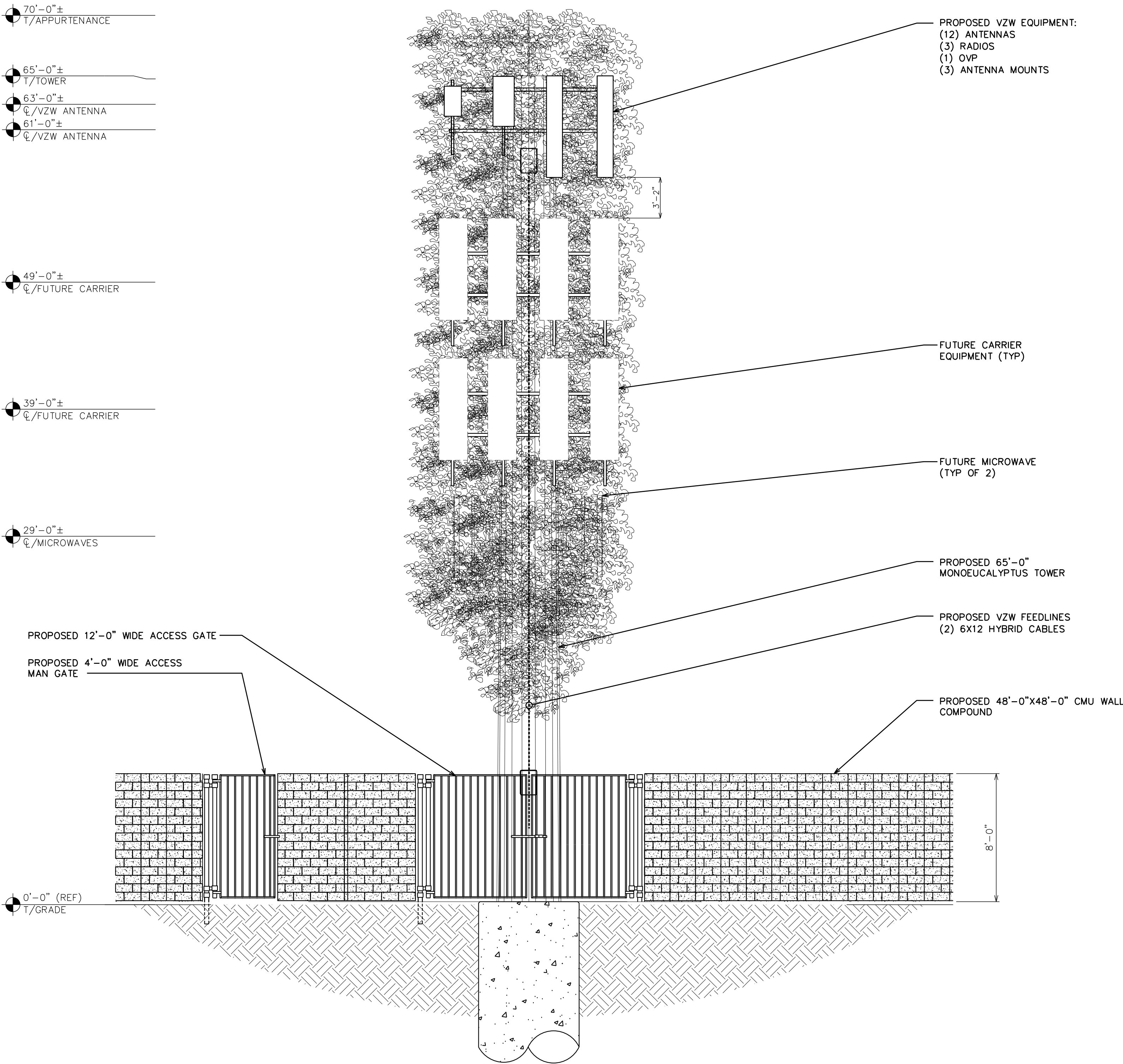
H

TEP #:

347943.1086845

NOTES:

1. PROPOSED CABLES TO BE ROUTED PER SPECIFICATIONS OF PASSING STRUCTURAL ANALYSIS.
2. TOWER ELEVATION IS FOR SCHEMATIC PURPOSES ONLY. TEP DID NOT CONFIRM EXISTING SITE CONDITIONS INCLUDING, BUT NOT LIMITED TO ANTENNA HEIGHTS, ANTENNA AZIMUTHS, AND MOUNT CONFIGURATIONS.
3. CONTRACTOR TO VERIFY PROPOSED LOADING WITH PASSING STRUCTURAL ANALYSIS PRIOR TO CONSTRUCTION. CONTRACTOR TO CONTACT EOR IMMEDIATELY IN THE EVENT OF ANY DISCREPANCIES.



126 W GEMINI DR
TEMPE, AZ 85283



2600 W GERONIMO PL, STE 100
CHANDLER, AZ 85224

VERIZON SITE ID:
AZ6001

VERIZON SITE NAME:
TUC ABREGO

2492 S ORCHARD VIEW DR
GREEN VALLEY, AZ 85614
(PIMA COUNTY)

PROPOSED 65'-0"
MONOEUCALYPTUS TOWER

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	QA
D	11-05-25	MEW	ZONING	HMM
E	11-21-25	MEW	ZONING	HMM
F	11-24-25	MEW	ZONING	HMM
G	12-22-25	MEW	ZONING	HMM
H	04-10-26	XAO	ZONING	HMM

SEAL:



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SHEET TITLE:

TOWER ELEVATION

SHEET NUMBER:

C-2

REVISION:

H

TEP #:

347943.1086845

1

PROPOSED TOWER ELEVATION

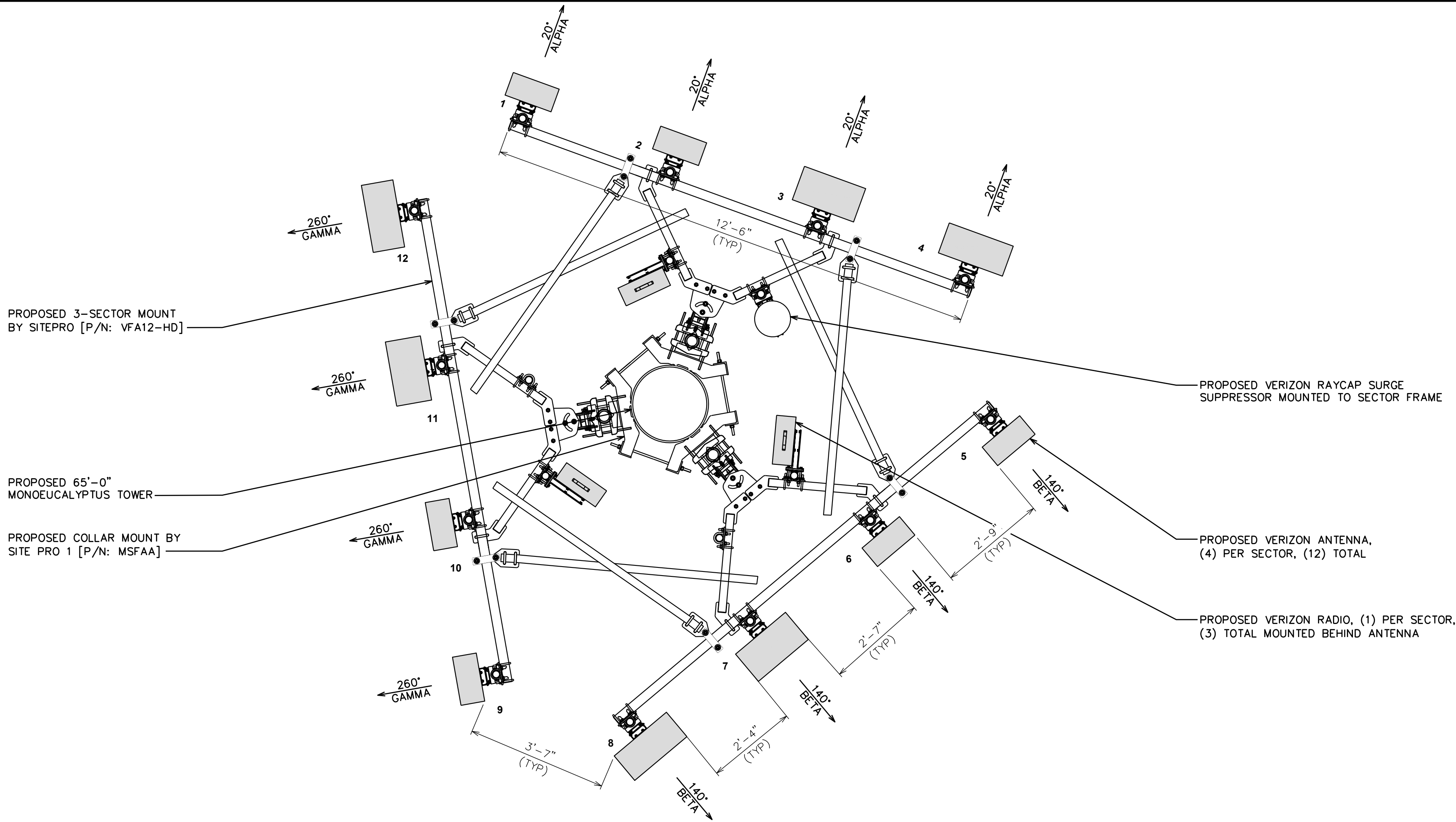
SCALE: 3/16" = 1'-0" (24x36)

SCALE: 3/32" = 1'-0" (11x17)

0 4 8
SCALE IN FEET

NOTE:

TEP DID NOT ANALYZE THE PROPOSED MOUNT SHOWN.



1 ANTENNA LAYOUT

SCALE: 1/2" = 1'-0" (24x36)
SCALE: 1/4" = 1'-0" (11x17)

0 2 4
SCALE IN FEET

FINAL ANTENNA/FEEDLINE SCHEDULE

SECTOR	POS.	MANUFACTURER (MODEL #)	MOUNTING HEIGHT	AZIMUTH (TN)	CABLE SIZE	CABLE LENGTH	OVP/RRH/TMA/DIPLEXER [MODEL #]
ALPHA	1	JMA WIRELESS (MX10FRO860-03)	61'-0"±	20°	(2) 6X12 HYBRID CABLES	120'±	(1) RADIO 4490 (1) OVP 12
ALPHA	2	JMA WIRELESS (MX10FRO860-03)	61'-0"±	20°			
ALPHA	3	(ERICSSON) AIR3283 B25/B66	63'-0"±	20°			(1) RADIO 4490
ALPHA	4	(ERICSSON) AIR6419 B77D	61'-0"±	20°			
BETA	5	JMA WIRELESS (MX10FRO860-03)	61'-0"±	140°			
BETA	6	JMA WIRELESS (MX10FRO860-03)	61'-0"±	140°			
BETA	7	(ERICSSON) AIR3283 B25/B66	63'-0"±	140°			(1) RADIO 4490
BETA	8	(ERICSSON) AIR6419 B77D	61'-0"±	140°			
GAMMA	9	JMA WIRELESS (MX10FRO860-03)	61'-0"±	260°			
GAMMA	10	JMA WIRELESS (MX10FRO860-03)	61'-0"±	260°			
GAMMA	11	(ERICSSON) AIR3283 B25/B66	63'-0"±	260°			(1) RADIO 4490
GAMMA	12	(ERICSSON) AIR6419 B77D	61'-0"±	240°			

*NOTE: EQUIPMENT IS PRELIMINARY AND SUBJECT TO CHANGE

2 ANTENNA SCHEDULE



126 W GEMINI DR
TEMPE, AZ 85283



2600 W GERONIMO PL, STE 100
CHANDLER, AZ 85224

VERIZON SITE ID:
AZ6001

VERIZON SITE NAME:
TUC ABREGO

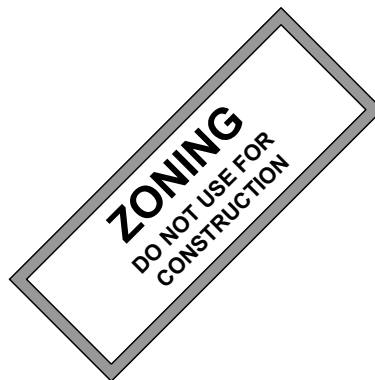
2492 S ORCHARD VIEW DR
GREEN VALLEY, AZ 85614
(PIMA COUNTY)

PROPOSED 65'-0"
MONOEUCALYPTUS TOWER

ISSUED FOR:

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G	12-22-25	MEW	ZONING	HMM
H	04-10-26	XAO	ZONING	HMM

SEAL:



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SHEET TITLE:

ANTENNA LAYOUT

SHEET NUMBER:

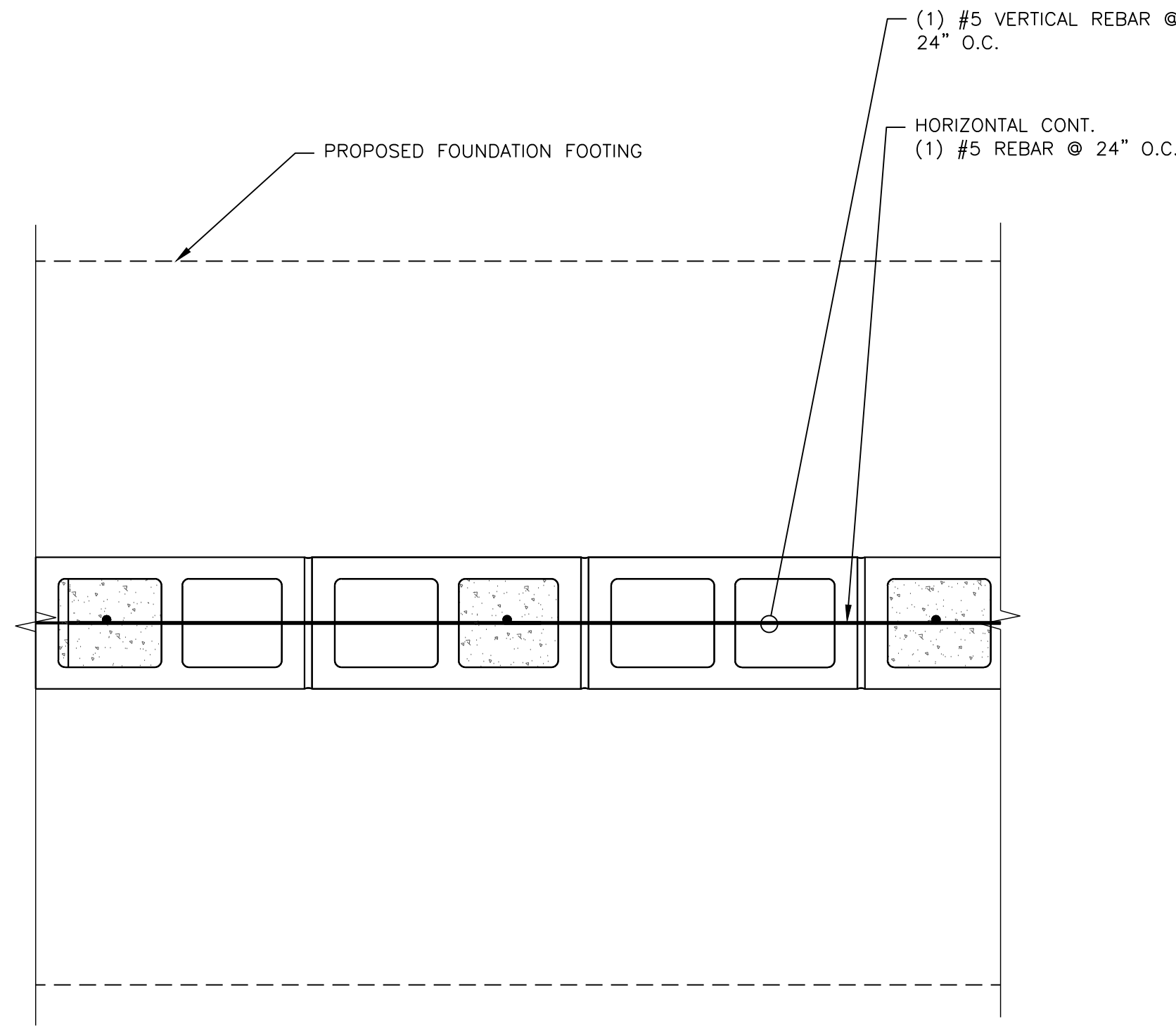
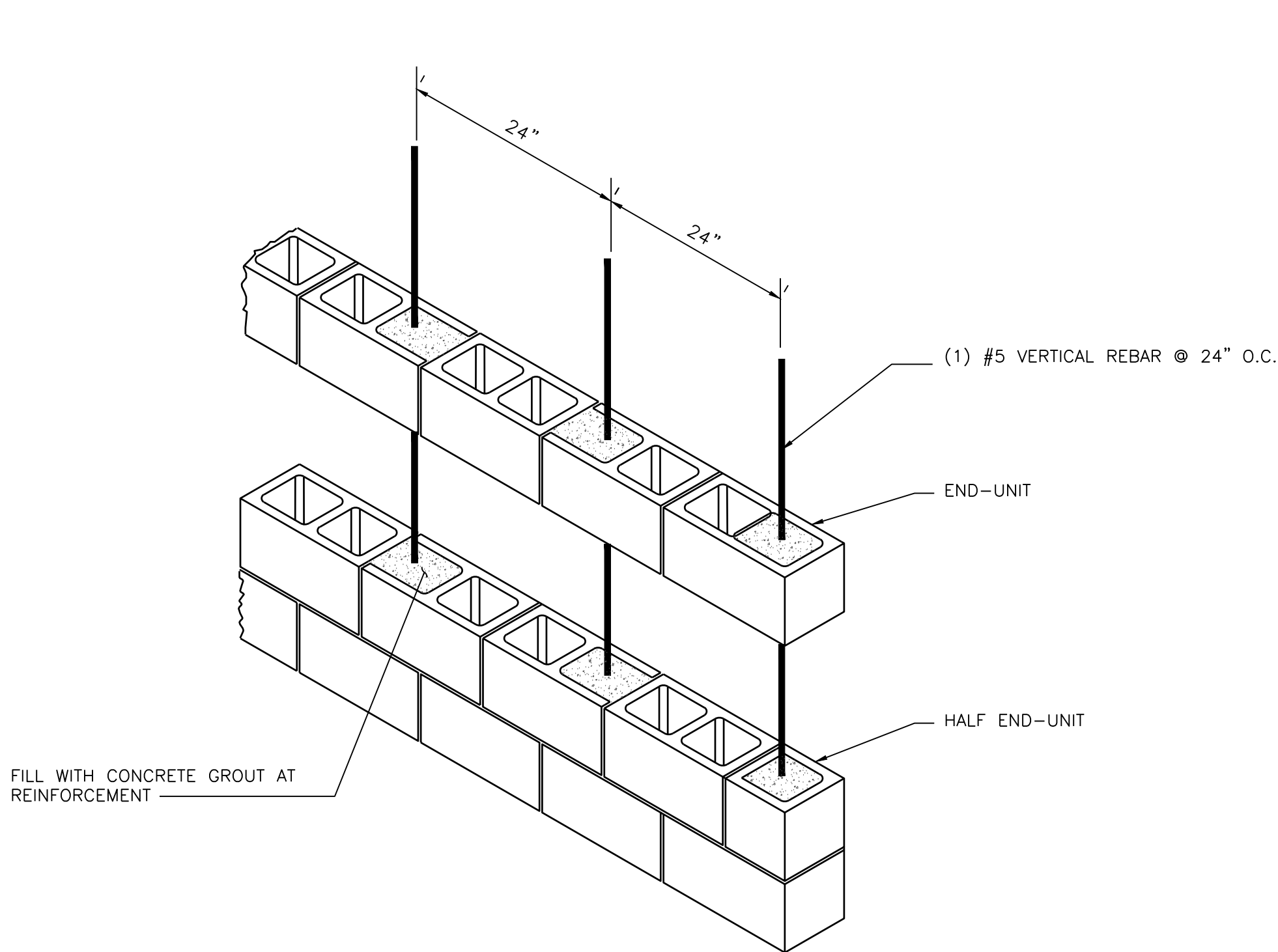
C-3

REVISION:

H

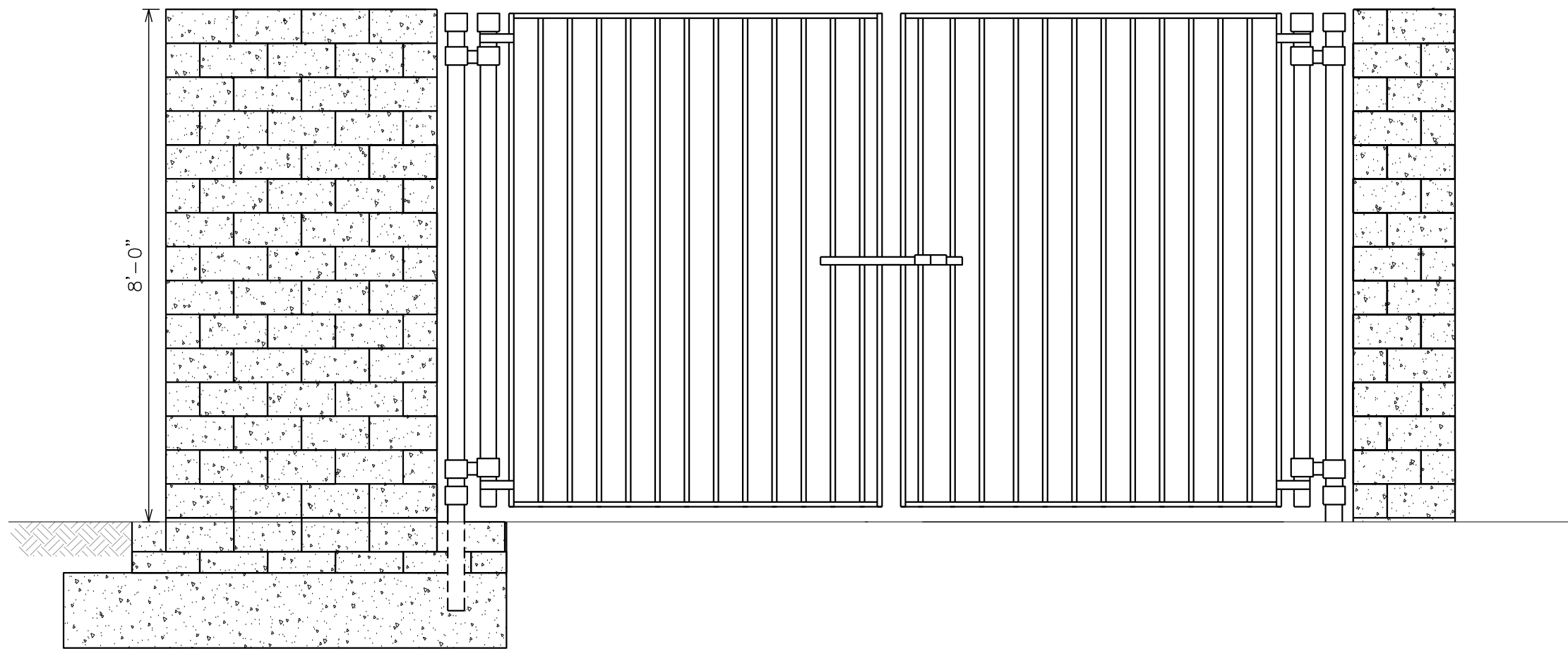
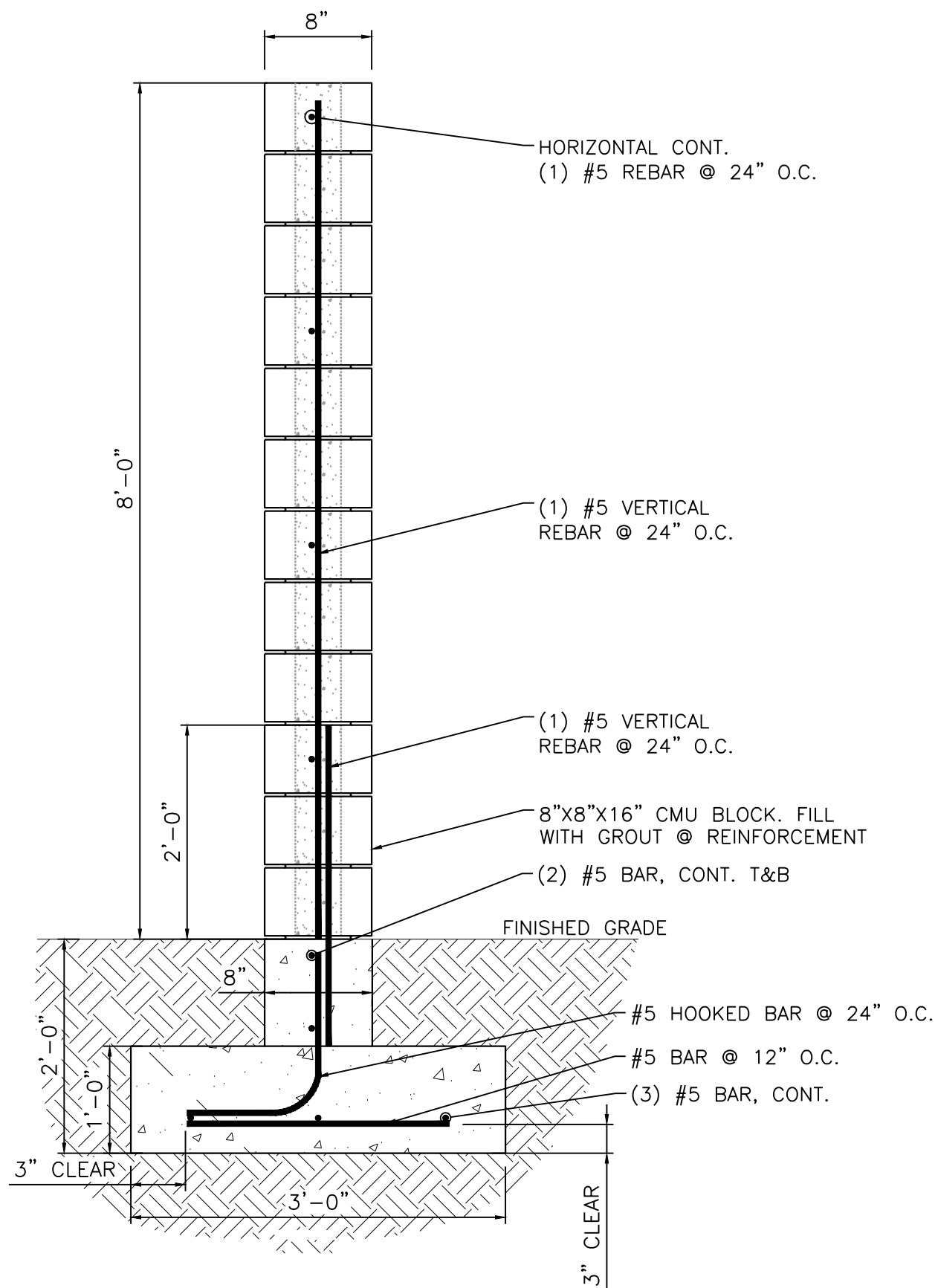
TEP #:

347943.1086845



1 **CMU GROUTING AND REINFORCEMENT DETAIL**
SCALE: N.T.S.

2 **CMU WALL PLAN**
SCALE: N.T.S.



3 **CMU WALL DETAIL**
SCALE: N.T.S.

4 **TYPICAL FENCE ELEVATION**
SCALE: N.T.S.



VERIZON SITE ID:
AZ6001

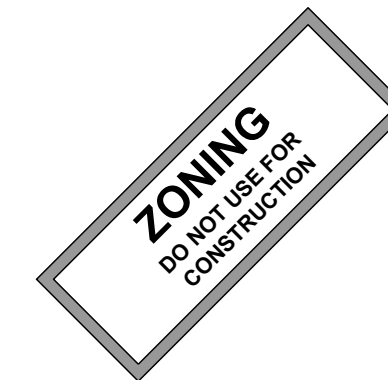
VERIZON SITE NAME:
TUC ABREGO

2492 S ORCHARD VIEW DR
GREEN VALLEY, AZ 85614
(PIMA COUNTY)

PROPOSED 65'-0"
MONOEUCALYPTUS TOWER

ISSUED FOR:				
REV	DATE	DRWN	DESCRIPTION	QA
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E	11-21-25	MEW	ZONING	HMM
F	11-24-25	MEW	ZONING	HMM
G	12-22-25	MEW	ZONING	HMM
H	04-10-26	XAO	ZONING	HMM

SEAL:



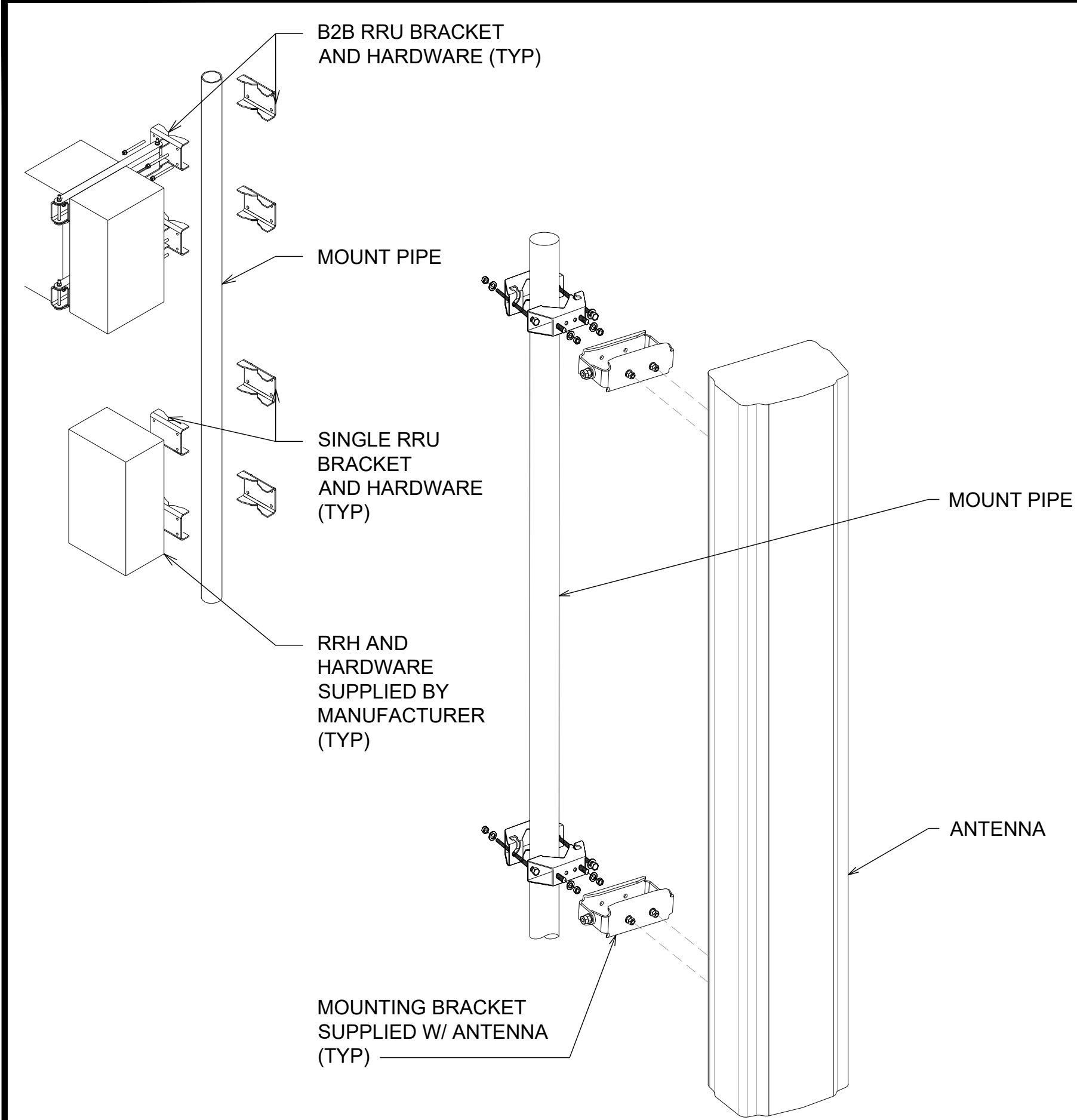
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SHEET TITLE:
CONSTRUCTION DETAILS

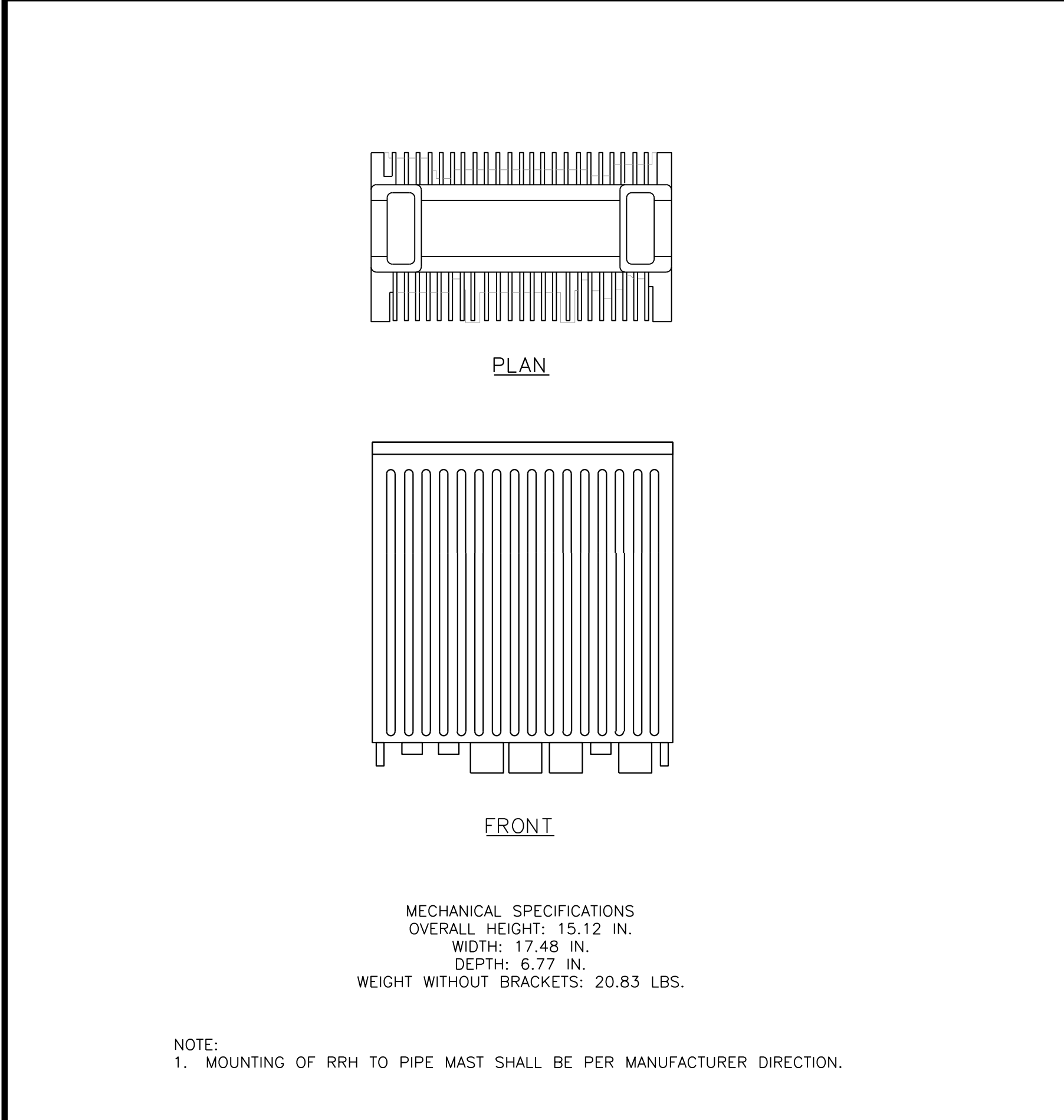
SHEET NUMBER:
C-4

REVISION:
H

TEP #: 347943.1086845

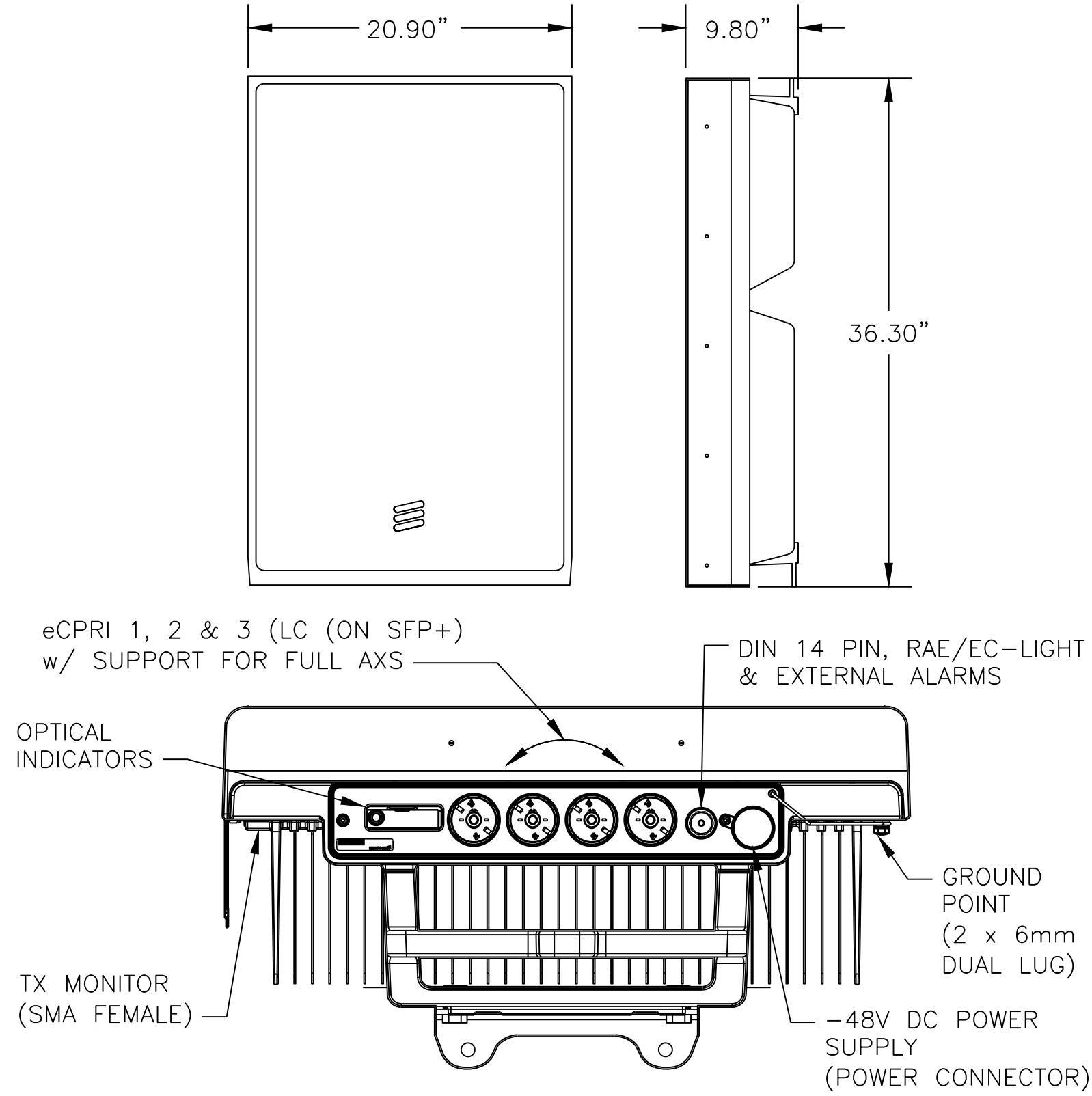


1 EQUIPMENT MOUNTING DETAIL
SCALE: N.T.S.



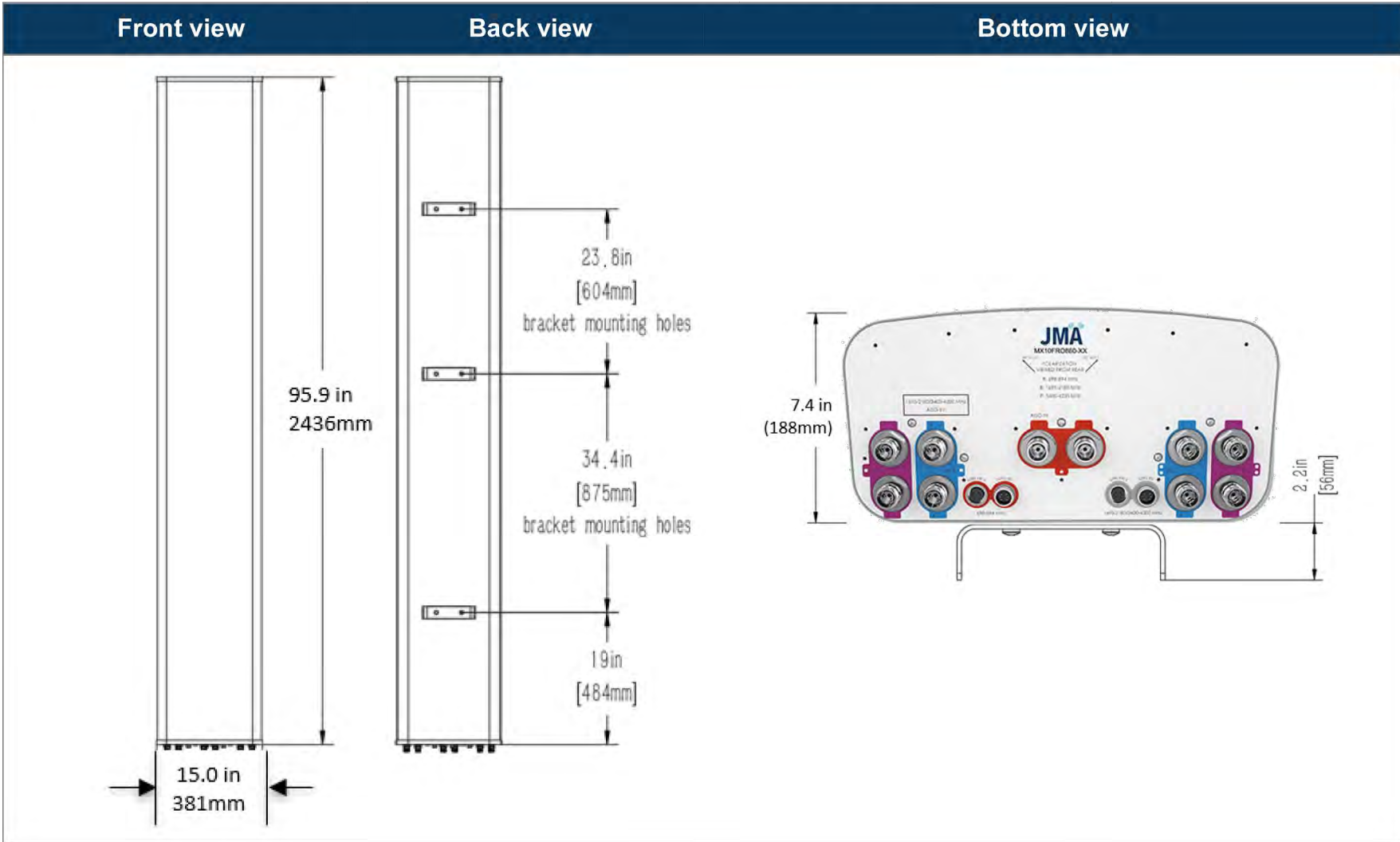
4 PROPOSED ERICSSON 4490 RADIO DETAIL
SCALE: N.T.S.

MANUFACTURER:	ERICSSON
MODEL:	AIR 6419
DIMENSIONS:	36.30" x 20.90" x 9.80" (H x W x D)
WEIGHT:	83.00 LBS (EXCLUDING MOUNTING KIT)
MOUNT WEIGHT:	13.01 LBS (NTB1010063/9)



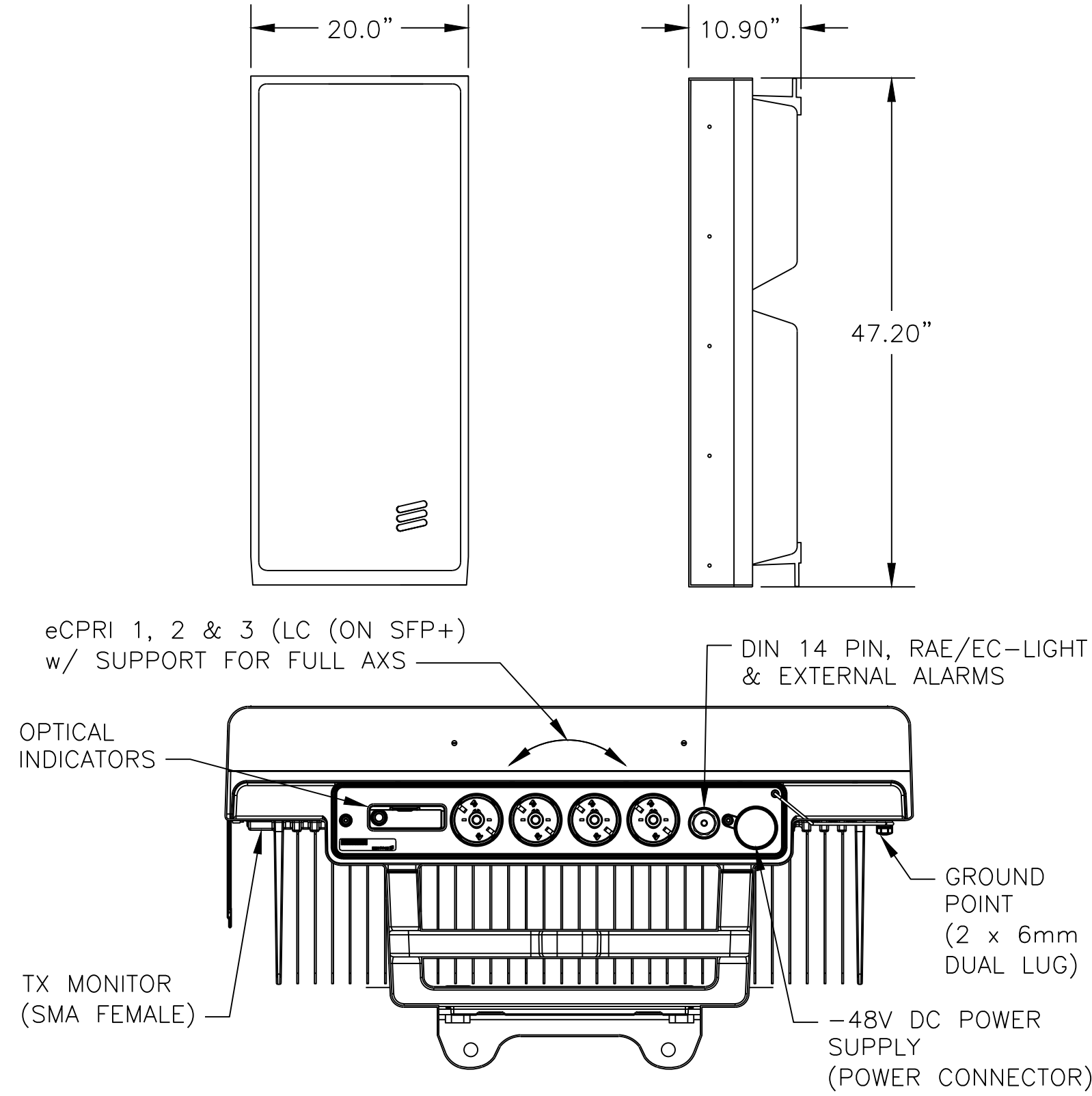
2 PROPOSED ERICSSON AIR 6419 B77D ANTENNA DETAIL
SCALE: N.T.S.

Mechanical specifications	
Dimensions height/width/depth, inches (mm)	95.9/ 15.0/ 7.4 (2436/ 381.0/ 188.0)
Shipping dimensions length/width/height, inches (mm)	105/ 20/ 14.5 (2692/ 508/ 368)
No. of RF input ports, connector type, and location	10 x 4.3-10 female, bottom
RF connector torque	96 lbf in (10.85 N·m or 8 lbf·ft)
Net antenna weight, lb (kg)	66.0 (29.9)
Shipping weight, lb (kg)	115.5 (52.4)
Antenna mounting and downtilt kit included with antenna	91900318, 91900319 (middle bracket)
Net weight of the mounting and downtilt kit, lb (kg)	26 (11.82)
Range of mechanical up/down tilt	-2° to 12°
Rated wind survival speed, mph (km/h)	150 (241)
Frontal and lateral wind loading @ 150 km/h, lbf (N)	212.8 (946.6), 77.0 (342.5)
Equivalent flat plate @ 100 mph and Cd=2, sq ft	2.63
EPA frontal and lateral, ft², (m²)	9.6 (0.89), 3.5 (0.33)

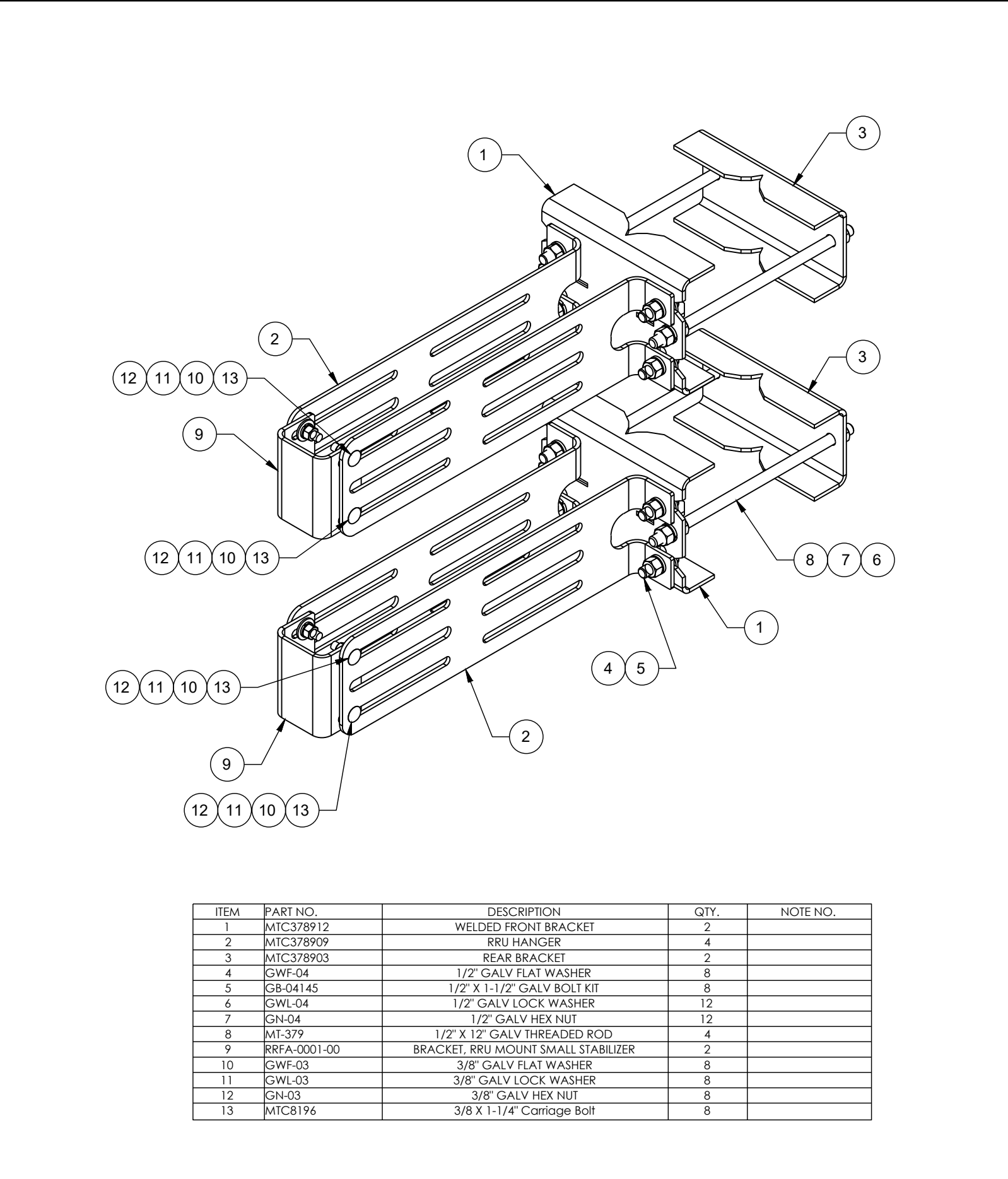


5 PROPOSED JMA WIRELESS MX10FRO860-03 ANTENNA DETAIL
SCALE: N.T.S.

MANUFACTURER:	ERICSSON
MODEL:	AIR 3283
DIMENSIONS:	47.20" x 20" x 10.90" (H x W x D)
WEIGHT:	<110 LBS (EXCLUDING MOUNTING KIT)
MOUNT WEIGHT:	13.01 LBS (NTB1010063/9)



3 PROPOSED ERICSSON AIR 3283 ANTENNA DETAIL
SCALE: N.T.S.



6 PROPOSED RRU MOUNT DETAIL
SCALE: N.T.S.



126 W GEMINI DR
TEMPE, AZ 85283



2600 W GERONIMO PL, STE 100
CHANDLER, AZ 85224

VERIZON SITE ID:
AZ6001

VERIZON SITE NAME:
TUC ABREGO

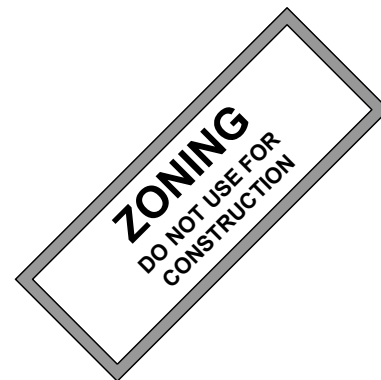
2492 S ORCHARD VIEW DR
GREEN VALLEY, AZ 85614
(PIMA COUNTY)

PROPOSED 65'-0"
MONOEUCALYPTUS TOWER

ISSUED FOR:

REV	DATE	DRWN	DESCRIPTION	QA
D	11-05-25	MEW	ZONING	HMM
E	11-21-25	MEW	ZONING	HMM
F	11-24-25	MEW	ZONING	HMM
G	12-22-25	MEW	ZONING	HMM
H	04-10-26	XAO	ZONING	HMM

SEAL:



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SHEET TITLE:

EQUIPMENT DETAILS

SHEET NUMBER:

C-5.1

REVISION:

H

TEP #:

347943.1086845



126 W GEMINI DR
TEMPE, AZ 85283



2600 W GERONIMO PL, STE 100
CHANDLER, AZ 85224

VERIZON SITE ID:
AZ6001

VERIZON SITE NAME:
TUC ABREGO

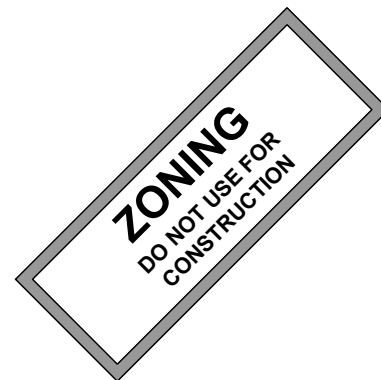
2492 S ORCHARD VIEW DR
GREEN VALLEY, AZ 85614
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PROPOSED 65'-0"
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REV	DATE	DRWN	DESCRIPTION	QA
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G	12-22-25	MEW	ZONING	HMM
H	04-10-26	XAO	ZONING	HMM

SEAL:



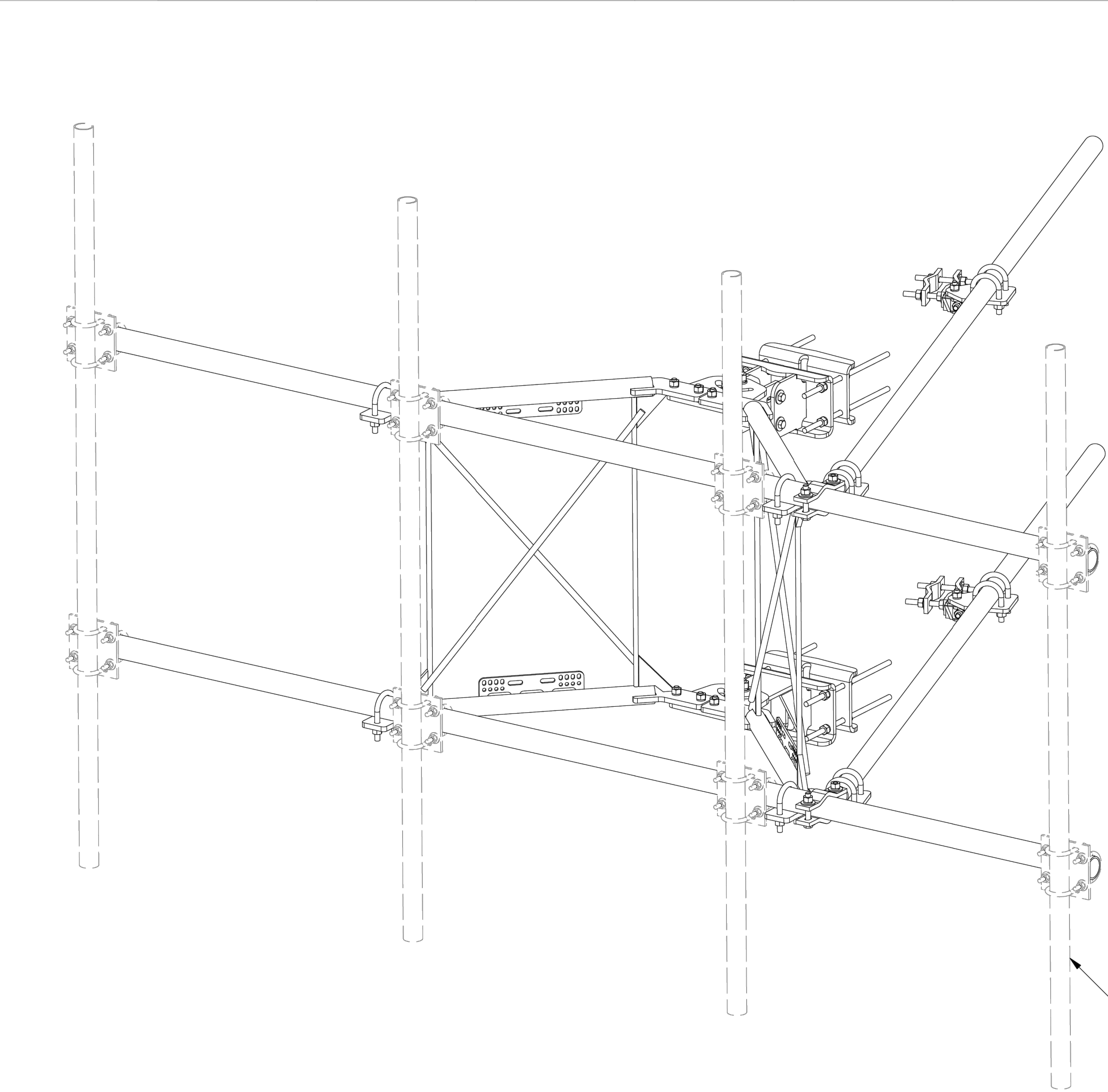
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SHEET TITLE:
EQUIPMENT DETAILS

SHEET NUMBER:
C-5.2

REVISION:
H

TEP #: 347943.1086845



PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	2	X-VFAW	SUPPORT ARM		71.41	142.81
2	1	X-HDCAMTBW	CLAMP WELDMENT FOR BCAM-HD		33.86	33.86
3	1	X-MHTPHD	MULTI-HOLE TAPER PLATE WELDMENT		36.24	36.24
4	2	X-VFAPL4	VFA-HD PIVOT PLATE	12 in	15.88	31.77
5	2	X-LCBP4	BENT BACKING PLATE	13 in	20.04	40.09
6	1	X-HDCAMSS	ANGLE ADJUSTMENT WELDMENT FOR BCAM-HD		16.39	16.39
7	4	X-SPTB	SLIDING PIPE TIE BACK PLATE	5 1/2 in	5.87	23.49
8	1	X-HDCAMSP	POSITIONING PLATE WELDMENT FOR BCAM-HD		2.58	2.58
9	4	X-TBCA	TIE BACK CLIP ANGLE		2.01	8.02
10	4	MCP	CLAMP HALF 1/2" THICK, 11-5/8" LONG	12 1/16 in	3.59	14.37
11	8	DCP	1/2" THICK, 5-3/4" CNTR TO CENTER CLAMP HALF	8 1/8 in	2.36	18.90
12	2	P2126	2-3/8" X 126" (2" SCH. 40) GALVANIZED PIPE	126 in	40.75	81.50
13	2	P30150	2-7/8" X 150" (2-1/2" SCH. 40) GALVANIZED PIPE	150 in	76.94	153.87
14	4	A34212	3/4" x 2-1/2" UNC HEX BOLT (A325)	2 1/2 in	0.48	1.92
15	4	G34FW	3/4" HDG USS FLATWASHER		0.06	0.24
16	4	G34LW	3/4" HDG LOCKWASHER		0.04	0.17
17	4	G34NUT	3/4" HDG HEAVY 2H HEX NUT		0.21	0.85
18	8	G58R-18	5/8" x 18" THREADED ROD (HDG.)		1.57	12.54
19	4	G58R-12	5/8" x 12" THREADED ROD (HDG.)		1.05	4.18
20	4	G58R-8	5/8" x 8" THREADED ROD (HDG.)		0.70	2.79
21	4	X-UB5300	5/8" X 3" X 5-1/4" X 2-1/2" U-BOLT (HDG.)		1.15	4.60
22	8	X-UB5258	5/8" X 2-5/8" X 4-1/2" X 2" U-BOLT (HDG.)		1.00	8.00
23	2	G5807	5/8" x 7" HDG HEX BOLT GR5 FULL THREAD	7 in	0.70	1.41
24	1	G5806	5/8" x 6" HDG HEX BOLT GR5 FULL THREAD	6 in	0.62	0.62
25	8	G5804	5/8" x 4" HDG HEX BOLT GR5		0.44	3.55
26	4	G5802	5/8" x 2" HDG HEX BOLT GR5		0.27	1.08
27	8	A582114	5/8" x 2-1/4" HDG A325 HEX BOLT	2 1/4 in	0.31	2.50
28	25	G58FW	5/8" HDG USS FLATWASHER	1/8 in	0.07	1.76
29	66	G58LW	5/8" HDG LOCKWASHER		0.03	1.72
30	71	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	9.22
TOTAL WT. #						661.04

MOUNT PIPES AND HARDWARE NOT INCLUDED
(ORDER SEPARATELY)

TOLERANCE NOTES
TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES ($\pm 0.030"$)
DRILLED AND GAS CUT HOLES ($\pm 0.030"$) - NO CONING OF HOLES
LASER CUT EDGES AND HOLES ($\pm 0.010"$) - NO CONING OF HOLES
BENDS ARE $\pm 1/2$ DEGREE
ALL OTHER MACHINING ($\pm 0.030"$)
ALL OTHER ASSEMBLY ($\pm 0.060"$)

PROPRIETARY NOTE:
THE DATA AND TECHNIQUES CONTAINED IN THIS DRAWING ARE PROPRIETARY INFORMATION OF VALMONT INDUSTRIES AND CONSIDERED A TRADE SECRET. ANY USE OR DISCLOSURE WITHOUT THE CONSENT OF VALMONT INDUSTRIES IS STRICTLY PROHIBITED.

DESCRIPTION
12' 6" HEAVY DUTY V-FRAME ASSEMBLY
WITH TWO STIFF ARMS
(NO MOUNT PIPES OR HARDWARE)

CPD NO.	DRAWN BY CMFL 5/26/2022	ENG. APPROVAL
CLASS 87	SUB 02	DRAWING USAGE CUSTOMER
	CHECKED BY BMC	



A valmont COMPANY

Engineering
Support Team:
1-888-753-7446

Locations:
New York, NY
Atlanta, GA
Los Angeles, CA
Plymouth, IN
Salem, OR
Dallas, TX

PART NO.	VFA12-HD-NPNH	PAGE 1 OF 5
DWG. NO.	VFA12-HD-NPNH	



**Narrative Report
For
Type 3 Conditional Use Permit Application**

**Pacific Coast Towers/Verizon Wireless
"TUC Abrego"**

**Proposed 65' stealth broadleaf tree in 50' X 50' compound
Torres Blancas Golf Club, Green Valley, AZ**

**PROJECT STATEMENT
FOR
NEW WIRELESS COMMUNICATION 65' STEALTH BORADLEAF TREE**

**Submitted to Pima County
Planning & Development**

April 2026

1. GENERAL INFORMATION

Applicant: Pacific Coast Towers
c/o Todd Daoust of Commsapes, LLC
109 East Tuckey Lane
Phoenix, AZ 85012

Site Address: 3233 S. Abrego Drive
Green Valley, AZ 85614

Assessor's Parcel No.: **304-18-934K**

Zoning: RH (GC)

Parcel Size: 165 Acres, +/-

CUP/Lease Area Size: 2500 square feet

Pacific Coast Towers/Verizon Site: TUC Abrego

Property Owner: Torres Blancas Holdings, an Arizona Limited Liability Company

Request: Approval of a new 65' stealth broadleaf tree (70' top of branch) within a 50' X 50' compound

2. INTRODUCTION AND NEED FOR THE PROPOSED FACILITY

Wireless technology has become an integral part of our daily lives. This technology relies on infrastructure (Cell Sites) to create the coverage and capacity to meet bandwidth demand. In 2020, wireless traffic topped 42 trillion MBs- a 208% increase since 2016. Current estimates indicate there are as many as 329 million mobile users (88 percent of regional population), up from 313 million (86 percent of regional population) in 2018 (Source: Cisco Networking).

High speed mobile broadband is available to nearly all consumers in the U.S., and those broadband speeds keep increasing. Faster speeds mean better connections and more advanced applications. Wireless is increasingly the preferred way to access the internet. Wireless data use will continue to

grow. In 2025, people interacted with connected devices every 18 seconds. 5G networks will be 100 times faster, connect 100 times more devices and be five times more responsive.

Connecting everyone and everything will unlock innovation across every part of our lives-powering breakthroughs in healthcare, energy, and manufacturing.

Wireless industry innovation will enable truly smart cities and is critical to the emerging Internet of Things, connecting watches, clothing, drones, homes, offices, cars and more- creating new industries and jobs, improving safety, reducing waste, and enhancing our environment.

3. PURPOSE OF REQUEST

This application requests Pima County approve a Type 3 Conditional Use Permit for a new Wireless Communications Facility (“WCF”). The proposed WCF would feature a 65’ stealth broadleaf tree (70’ top of branch), and therefore exceed the maximum 40’ and 50’ height requirements as outlined in Pima County Zoning Code for WCFs. Additionally, the stealth broadleaf tree would feature an antenna array exceeding the 30-inch standoff (“non-flush mounted”) from the pole.

4. DESCRIPTION OF PROPOSAL

The proposed 65’ stealth site is located within the RH (GC) zone on the Torres Blancas Golf Course. The Applicant is proposing to build a 50’ X 50’X 8’ CMU wall around the 65’ stealth broadleaf tree (70’ top of branch) and the proposed Verizon Wireless equipment cabinets to screen from public view. The CMU wall will be painted to match the existing adjacent entryway (Sunrise Point) to integrate the proposed wireless communications facility into the prevailing architecture. The proposed stealth broadleaf tree will accommodate two additional wireless carriers on the structure to deliver high-capacity wireless services and create a centralized location for future wireless providers to deploy quickly, effectively, and efficiently in the future.

The proposed site is located within a larger 165 Acre parcel zoned RH (GC) utilized as a golf course.

5. CUP COMPARISON CHART

Development Standards	Base Standards	Proposed Standards (WCF in RH (GC) CUP)
Max. Height	40’ (stealth) or 50’ with flush-mounted antennas (Type1)	65’ (up to 80’ for faux tree branches)
Max. Antenna Array standoff	30”	As approved
Max. Tower Diameter	36”	36”
Min. WCF Setback from Rural/Residential Zoning	65’ (for 65’ tower)	North: 58’-5” (CR5- Sunrise Point Open Space) South: 357’-8” (CR-4) West: 73’-3” (RH-I-19 ROW) East: 333’-7” (RH (GC)-Golf Course)

As shown above, the proposed site varies from the standards set forth in the Pima County Zoning Code for WCFs. Below is a justification for the deviation(s) from those standards:

- Max Antenna Array (> 30" standoff)- The size and number of antennas impact the width and corresponding standoff of the antenna array. The anchor tenant, Verizon Wireless, will be transmitting and receiving a variety of frequencies from this site, including CMRS (Cellular), LTE, AWS, PCS, L-Sub 6, and CBRS to support 4G and 5G technologies. These antennas require horizontal separation from one another to address interference with one another. In addition, a wider antenna array (mount) provides for a wider aperture for faux branches to extend through the array to increase antenna screening.
- Setbacks 2:1 vs > 2:1)- The site observes a 2:1 setback from the south and east, and a 1:1 from west, and > 1:1 to the north. However, the parcel to the north is utilized as open space.
- Max. Tower Diameter (36")- The site is designed to accommodate 3 wireless carriers. We are proposing all carrier cabling to be routed through the tower caisson (foundation) into the pole. The increased diameter more easily accommodates the internal cabling structurally and spatially.

6. RELATIONSHIP TO SURROUNDING PROPERTIES

The Proposed Site is zoned RH (GC), where stealth freestanding Wireless Communication Facilities are allowed both with and without a Conditional Use Permit.

In this particular case, a Type 3 Conditional Use Permit is required as:

- 1.) The proposed site is located in an RH zone
- 2.) The proposed site exceeds the maximum 40' (stealth) or 50' with flush-mounted antennas (Type1)
- 3.) The proposed antenna array exceeds the maximum 30" standoff, primarily due to the faux branches used to screen the structure

The 165 +/- Acre parent parcel is currently utilized as a golf course. The placement of the site within the overall larger parcel seeks to maximize setbacks from privately-owned residential and RH uses to the south and east, while utilizing the I-19 ROW as a buffer to the west. It is worth noting that the parcel to the north, while zoned CR-5, is utilized as open space/ common area of the Sunrise Point HOA.

Generally speaking, the parent parcel and proposed site are situated in an area bordered by Sunrise Point HOA Common Area to the north, Torres Blancas Golf Course to the south and east (parent parcel), and I-19 to the west.

The general area is characterized by residential land to the land to the north (CR-5) and south (CR-4), I-19 ROW to the west, and the Torres Blancas Golf Course to the east (across Anway Road). The area is suburban in nature, and is dominated by RH and CR zoning.

Given the population density and interstate traffic, the area is underserved by wireless communications infrastructure, with the closest tower being located 1.5 miles away (north), occupied by Verizon Wireless.

This site will improve the coverage and capacity for this growing part of the County.

It is also important to note there is a similar existing faux 70’ eucalyptus site along Interstate 19, 6 miles to the north (18105 S. I-19 Frontage Road, APN 303-47-193D, VZW “TUC Santiago”). This stealth application was also utilized at 4201 Camino Del Sol, APN 304-28-991N, VZW “TUC Amulet”)

The site observes in excess of the required 1:1 setback from the south and east property lines. The setbacks from the west property lines are 1:1, with the I-19 ROW providing additional buffering to the west. The proposed site falls shy of a 1:1 setback to the north, but that parcel is vacant open space owned by the Sunrise Point HOA.

Please note the applicant met with members of the Sunrise Point HOA on November 12, 2025 to discuss the proposed site.

The surrounding zoning and land uses are as follows:

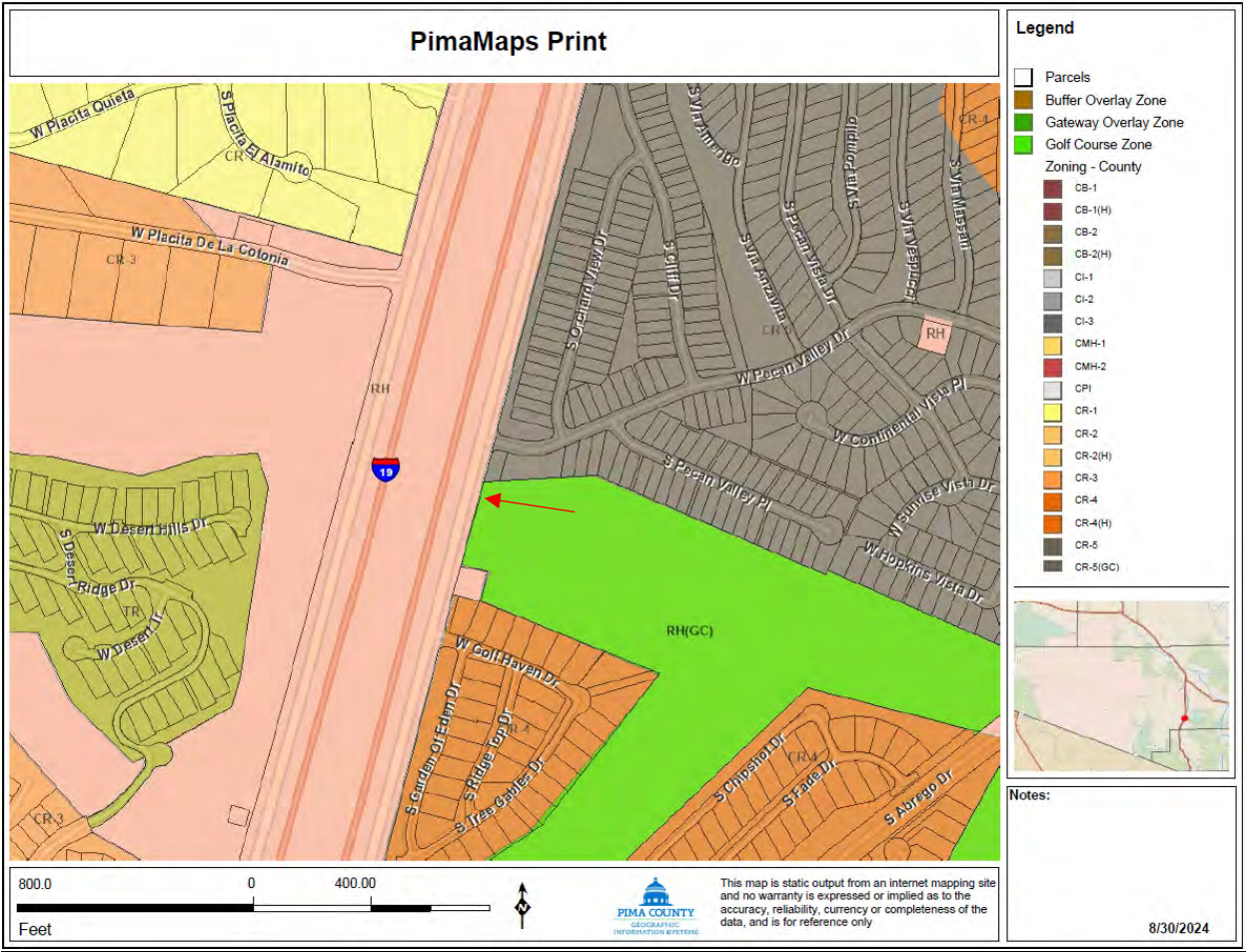
Surrounding Zoning and Land Uses

Direction	Existing Zoning	Existing Use
Site	RH (GC)	Golf Course
North	CR-5	vacant common area
East	RH (GC) & CR-5	Golf Course (CR-5 beyond)
South	RH (GC) & CR-4	Golf Course (CR-4 beyond)
West	RH	I-19 ROW

The proposed site observes the following setbacks (from structure to Property lines:

Direction	Distance	Adjacent Use
North	58’-5”	Vacant HOA common area
East	333’-7”	Golf Course
South	357’-8”	Golf Course (single family residential beyond)
West	73’-3”	I-19 ROW

Zoning Map



7. LOCATION AND ACCESSIBILITY

The proposed site is located in the southern Pima County on the east side of Interstate 19. Access to the proposed site is via an existing drive extending from South Abrego Drive.

8. CIRCULATION SYSTEM

As an unmanned facility, the proposed site will not impact the existing circulation system of the parent parcel.

Once constructed, the access to the site is anticipated to occur approximately once per month for maintenance.

9. DEVELOPMENT SCHEDULE (Phasing)

The initial construction is anticipated to take approximately 8 weeks, including all civil (tower, fiber, power, compound, and access road) and the installation of Verizon Wireless equipment at the site.

Thereafter, construction (installation/collocation), or modification of equipment at the site will only occur once a new Building Permit (including necessary zoning approvals) is obtained from Pima County. The installation of additional carrier equipment (collocation) is anticipated to take approximately 4 weeks per wireless tenant.

10. COMMUNITY FACILITIES AND SERVICES

The proposed site is located in unincorporated Pima County. As such, community facilities and services are limited. Most developed parcels are served by private water/well, septic tank, and trash service. Police Service is provided by PCSO, and fire service is provided by the Green Valley Fire District.

This site is anticipated to serve the wireless voice, data, and internet needs of Verizon wireless customers in the community once developed. Thereafter, the site will be marketed to additional wireless carriers to offer competing services for the community.

11. CARRIER COVERAGE

The need for wireless service is determined by market demand, density of surrounding sites, coverage requirements for a specific geographic area, and the obligation to provide continuous coverage from one site to another in a particular geographic region to avoid call failures, dropped calls and slow data speeds. Approval of this application will allow Verizon Wireless and potentially other wireless carriers to meet the service demands of this area from this particular location.

It is important to note there are no existing sites within 1 mile of the proposed location. The closest tower is located 1.4 miles north of the proposed site. It is important to note Verizon Wireless is currently located on that site.

The proposed WCF's location, stealth design, and placement within the property, together with the property's zoning, surrounding land use, and land tenure to the south and west make this location superior to the other site locations in the area. In addition, the design will accommodate additional wireless carriers, eliminating the need for additional sites in the immediate area. Capitalizing on increased coverage afforded by this superior site will enable less intense WCF uses to be deployed in more sensitive areas with less intrusive impact in the future.

Lastly, this site's technical attributes will clearly address the demonstrated gap in coverage for Verizon Wireless, and other competing wireless carriers, in this area of Pima County.

Wireless coverage provided by communication sites, such as the one at this location, will function as an important link to complete and fortify the overall communications network locally and nationally. The Project will be an essential part of Verizon's, and possibly other wireless carriers', regional wireless network. This site will fill a significant gap in coverage and expand coverage in the area in the least intrusive means possible.

11. SITE JUSTIFICATION

Compliance with 18.07.030 Land Use Regulations

A. Communication towers:

- a. Purpose: To regulate the placement, construction and modification of communications towers and related equipment areas in order to protect the health, safety and welfare of the public in accordance with the guidelines and intent of the Telecommunications Act of 1996 and other applicable federal, state and local ordinances;

The proposed WCF is placed in such a manner as to protect the health, safety and welfare of the public and will comply with applicable federal, state and local ordinances.

- b. To minimize the total number of communication towers throughout unincorporated Pima County by maximizing the use of existing communication towers in order to reduce the number of new towers needed;

The proposed WCF addresses a significant gap in network service due to the lack of existing towers in the area. In addition, the site will be designed for multiple wireless carriers so as to minimize the number of towers in the area.

- c. To maintain and preserve the existing unique attributes of community character including, but not limited to, architecture, historic and cultural features, historic development patterns, landscape, hardscape and the size, scale and spacing of buildings and other structures that define the community identity of rural and residential neighborhoods, and to preserve property values in those neighborhoods;

The proposed WCF takes advantage of the parent property's size, surrounding land tenure and non-residential land uses (vacant), and employs a stealth design so as to preserve property values in the immediate area.

- d. To encourage the location of communication towers in business and industrial zones and in areas of compatible uses;

While the proposed WCF is located on a property zoned RH, it's use is compatible with on-site uses and the uses of adjacent property (namely, vacant).

- e. To minimize the adverse impacts of communications towers and related equipment areas on visually sensitive areas including, but not limited, to skylines, rock outcroppings, foothills, mountain backdrops, unique vegetation, streams and natural drainageways through the careful design, siting, landscape screening and innovative camouflaging techniques utilizing current and future technologies;

The proposed WCF's design employs innovative camouflaging techniques utilizing current and future technologies to minimize its adverse effect on the surrounding area.

- f. To promote and encourage shared use or co-location of communication towers and antenna support structures;

The proposed WCF will be designed to accommodate a minimum of three wireless carriers on the stealth structure and within the equipment compound.

- g. To protect the aesthetic quality of neighborhoods by encouraging the siting of communication towers to minimize negative aesthetic impacts and ensure to the extent possible that communications towers and related equipment areas are compatible with surrounding land uses;

The site selection of the proposed WCF and its corresponding stealth design seeks to protect the aesthetic quality of the neighborhood and insure compatibility with the surrounding area and land uses. The 50' X 50' equipment area will be enclosed with a solid 8' C.M.U. block wall to screen the equipment from offsite views and attenuate noise generated by the carrier equipment.

- h. To allow unincorporated Pima County access to the latest in wireless technologies by collaborating with the wireless industry in developing sound siting policy.

The proposed WCF will facilitate the delivery of the latest in wireless technologies to this unincorporated area of Pima County. Verizon Wireless will deploy initially at the site as the anchor tenant, and the site will be marketed to other wireless carriers to enable carrier competition and consumer choice. Moreover, this WCF, once developed, will allow carriers to deploy on the site rapidly and cost effectively, eliminating the need for additional towers in the area.

Compliance with Conditional Use 18.97.030 Procedures and Requirements (A.3.C)

- 1) It will not be in serious conflict with the objectives of the general land use plan or the area plan in which situated;

The proposed site is consistent with Pima Prospers as it will provide technology encouraging infill and development and preserves Open Space. As an unmanned passive use, it does not require water and sewer, and utilizes the latest energy efficient equipment to deliver the latest wireless technology.

- 2) It will provide safeguards for the protection of adjacent developed property, or if the adjacent property is undeveloped, the legal permitted uses of such property,

The setbacks of the proposed site will provide safeguards for the legal permitted uses of adjacent undeveloped property.

- 3) It has adequate accessibility to the county road network,

The parent property of the proposed WCF has existing ingress/egress onto South Abrego Drive. Nevertheless, as an unmanned facility, the site is not expected to generate a substantial amount of vehicle trips once constructed, typically 1X/month.

- 4) It has sufficient off-street parking and loading facilities, that will be developed in accordance with county engineering standards,

The proposed WCF will provide parking within the proposed 50' X 50' equipment compound, eliminating the need for off-street parking or loading facilities.

- 5) It will meet county standards in terms of control of noise, smoke, glare or heat, odors, vibrations, fly, ash, dust, fumes, vapors, gasses and other forms of air pollution, liquids and solid wastes,

As an unmanned facility, the proposed site will not generate any noise, smoke, glare or heat, odors, vibrations, fly, ash, dust, fumes, vapors, gasses and other forms of air pollution, liquids and solid wastes exceeding Pima County standards.

- 6) Hours of operation will not be detrimental to adjoining residents,

As an unmanned facility, the hours of operation of the proposed WCF will not be detrimental to adjoining residents.

- 7) Landscaping will be fully in conformance with zoning code regulations;

The site's design as a faux tree is intended to blend the facility in with the existing landscaping on the golf course. The site, as proposed, does not include landscaping.

Federal Telecommunications Act of 1996

A. Least Intrusive Means to Fill a Significant Gap in Coverage.

Section 332(c)(7)(B)(i)(II) of the Federal Telecom Act of 1996 bars local governmental decisions from precluding the provision of wireless services:

The regulation of the placement, construction, and modification of personal wireless service facilities by any State or Local government or instrumentality thereof—

(II) shall not prohibit or have the effect of prohibiting the provision of personal wireless services.

The areas in which wireless communication facilities can be relocated is geographically limited because each site is a “link” in a chain or honeycomb of sites and cannot move very far in any direction once the network has been established. Moving too far one way or another would cause interference or create a gap in coverage. Further, the Proposed Site’s height, placement, color and screening mechanism renders this site the least intrusive means of addressing this gap.

The direct and indirect financial benefits of reliable wireless service to the growing area surrounding the proposed site in Pima County are supported by the overwhelming use by the public and private sector. In a recent report, the “National 911 Program,” which is an office housed within the National Highway Traffic Safety Administration, found that “76 percent of consumers are using cellular phones to make 911 calls.” Today, just over half – 50.8% - of American households only have a mobile voice connection and 90% of US households use wireless service. For Millennials (those born between 1982 and 2004), that increases to over two-thirds who live in mobile-only households. Wireless may also be the only connection available to access 911 and reverse 911. A 2015 survey found that cellular service is of major importance to homebuyers. It was more important than schools when looking for a home (cellular service ranked 76% versus 60% for schools). Cellular coverage trailed only crime rates (96%), local taxes (90%), and amenities (84%). Among Millennials, 83% said cell service was the most important fact in purchasing a home. (RootMetrics & Money, June 2, 2015). In 2016, wireless data traffic reached yet another record high. In all, traffic totaled 13.72 trillion megabytes – the equivalent of 1.58 million years of streaming HD video – an increase of 4.07 trillion megabytes over 2015. Over the past two years, data use has increased 238 percent. (2017 CTIA Wireless Snapshot, May 2017).

With this increase in demand from users in vehicles, at home, and those who work from home, there is a need for facilities to meet the customer needs.

12. ANALYSIS OF FEDERAL LAW

In addition to local and state law, this application is governed by the Federal Communications Act, 47 U.S.C. § 332(c)(7)(B). In the Telecommunications Act of 1996, Pub. L. No 104-104, 110 Stat. 56 (“Telecom Act”) Congress added Section 332(c)(7)(B), which provides rights to wireless service providers and establishes limitations upon state and local zoning authorities with respect to applications for permits to construct wireless service facilities. The express purpose of the Act is “to promote competition and reduce regulation in order to secure lower prices and higher quality services for American telecommunications consumers.” Pub. L. No. 104-104, 110 Stat. 56, 56 (1996); see also *City of Rancho Palos Verdes v. Abrams*, 544 U.S. 113, 115 (2005). It also is intended to “encourage the rapid deployment of new telecommunications technologies.” *Id.*; see also H.R. Conf. Rep. No. 104-458, at 113 (1996) (purpose of the 1996 Act is “to provide for a pro-competitive, deregulatory national policy framework designed to accelerate rapidly private sector deployment of advanced telecommunications and information technologies and services . . . by opening all telecommunications markets to competition”).

Recognizing that wireless service can bring enormous benefits to communities and can boost jobs and economic productivity, this important law and subsequent regulations applicable to wireless facilities were enacted to remove impediments to and promote the rapid deployment of wireless technology on a national basis.

The applicable limitations and directives include the following:

- (a) State and local governments may not unreasonably discriminate among providers of functionally equivalent services (§332(c)(7)(B)(i)(I)).
- (b) State and local governments may not regulate the placement, construction or modification of wireless service facilities in a manner that prohibits, or has the effect of prohibiting, the provision of personal wireless services (better known as the “effective prohibition clause”) (§332(c)(7)(B)(i)(II)).
- (c) State and local governments must act on requests for authorization to construct or modify wireless service facilities within a reasonable period of time (§332(c)(7)(B)(ii)).
- (d) Any decision by a state or local government to deny a request for construction or modification of personal wireless service facilities must be in writing and supported by substantial evidence contained in a written record (§332(c)(7)(B)(iii)).
- (e) Finally, no state or local government or instrumentality thereof may regulate the placement, construction or modification of personal wireless service facilities on the basis of the perceived environmental effects of radio frequency emissions to the extent that such facilities comply with federal communications commission’s regulations concerning such emissions (§332(c)(7)(B)(iv)).

Rapid deployment of wireless facilities is an important national issue, especially given the trend of Americans eliminating traditional landline telephone and content delivery services in favor of wireless communications. The Center for Disease Control and Prevention (“CDC”) tracks “wireless substitution” rates as part of its National Health Interview Survey and publishes the findings every six months in its Wireless Substitution reports. The December of 2019 report estimate that more than one-half (57%) of American homes have only wireless phones.

Reliable and robust wireless communication is essential, considering over half of Americans do not have a landline and rely on wireless service to conduct personal and business communications, to access the internet or to reach emergency responders. Ensuring access in the event of an emergency is critical, be it communications between emergency service personnel or for people calling for help.

13. CONCLUSION

The Proposed Site will support Verizon Wireless and other potential wireless carriers and therefore help reduce the number of towers needed to serve the community within this service area. The proposed 65’ stealth broadleaf tree will take advantage of the site’s superior geographic location and land use attributes to improve coverage in the area in the least intrusive means possible. In addition, the location of the proposed site will allow multiple carriers to locate within the heart of the growing portion of the County and deploy services quickly, effectively, and efficiently.

Appendix A

Photo Simulations



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
PROPOSED 65'-0" MONOEUCALYPTUS TOWER

3233 S ABREGO DR
GREEN VALLEY, AZ 85614
(PIMA COUNTY)



EXISTING VIEW: VIEW 1



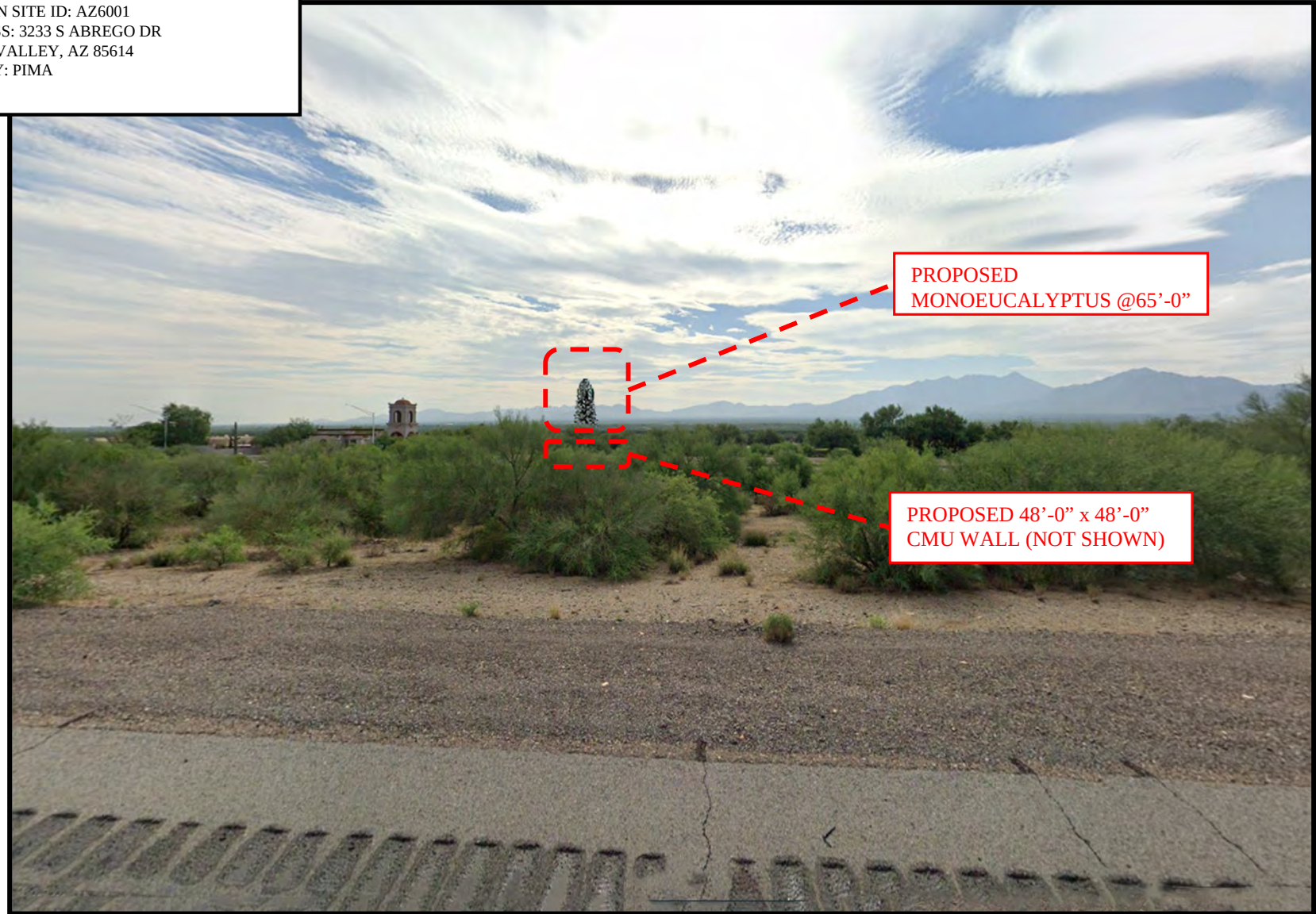
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VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA



PROPOSED VIEW: VIEW 1



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA



PROPOSED
MONOEUCALYPTUS @65'-0"

PROPOSED 48'-0" x 48'-0"
CMU WALL (NOT SHOWN)

EXISTING VIEW: VIEW 2



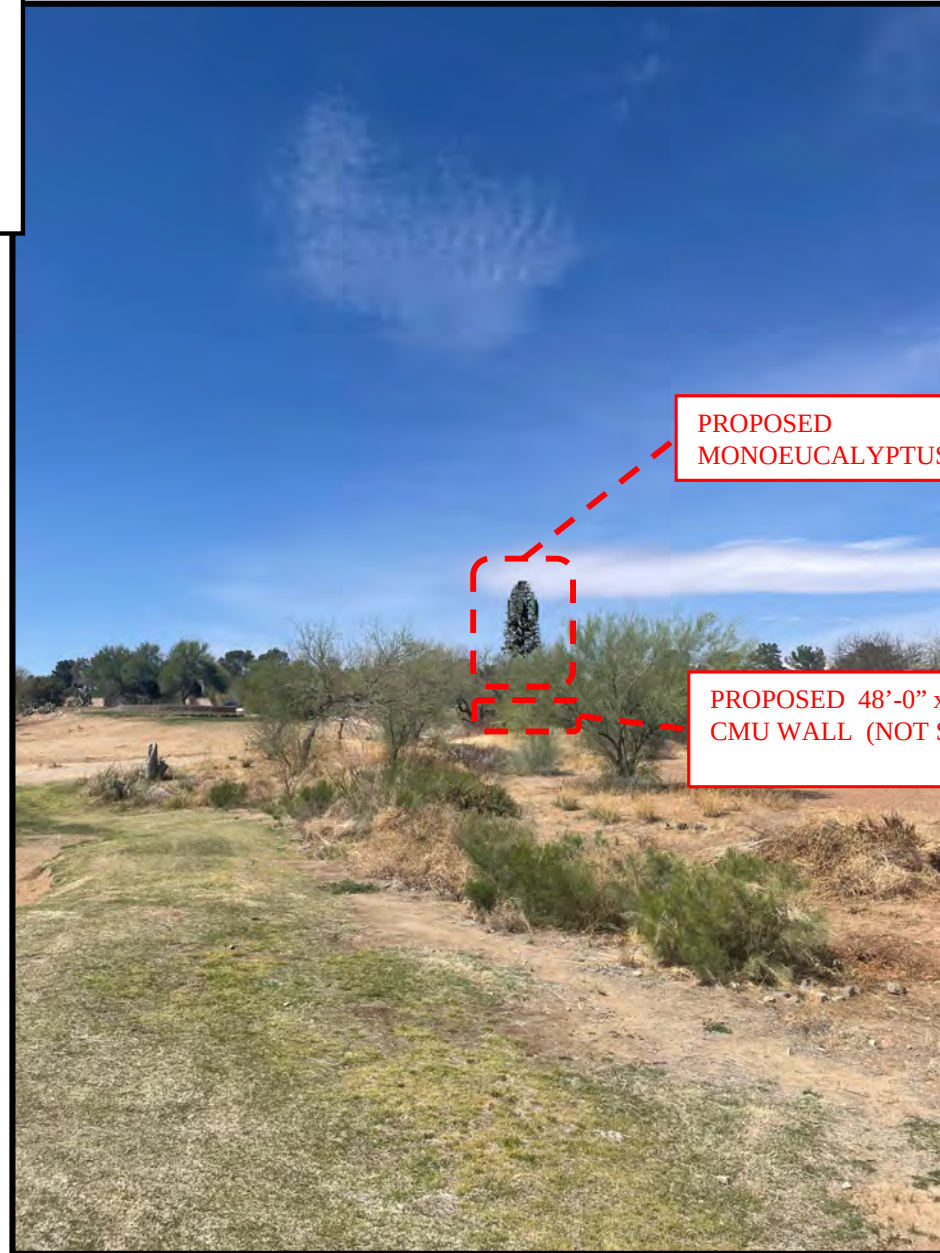
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VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA



PROPOSED VIEW: VIEW 2



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA



EXISTING VIEW: VIEW 3



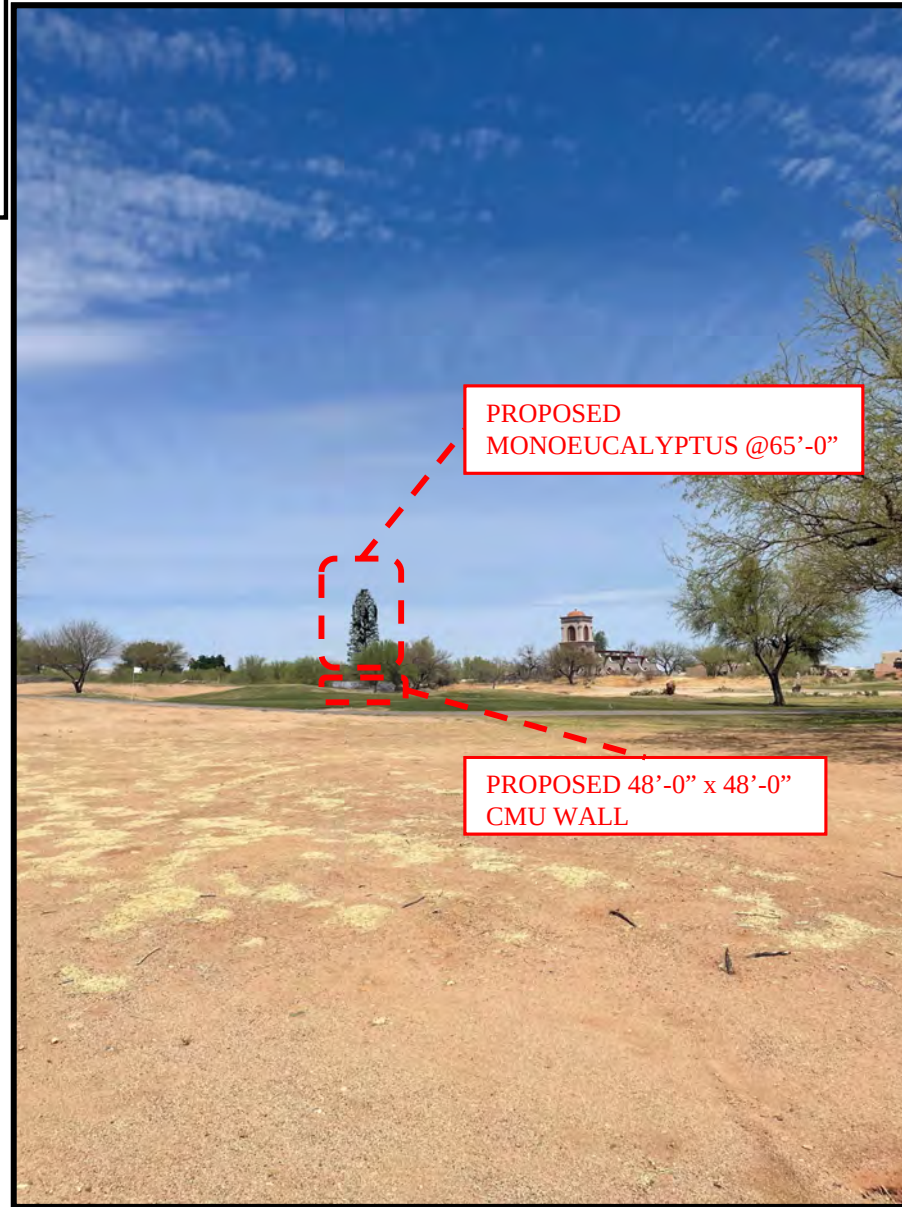
SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA



PROPOSED VIEW: VIEW 3



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA



PROPOSED
MONOEUCALYPTUS @65'-0"

PROPOSED 48'-0" x 48'-0"
CMU WALL

EXISTING VIEW: VIEW 4



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:26:46 PM
431-473 W Pecan Valley Dr
Green Valley AZ 85614
United States



PROPOSED VIEW: VIEW 4



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:26:46 PM
431-473 W Pecan Valley Dr
Green Valley AZ 85614
United States

PROPOSED
MONOEUCALYPTUS @65'-0"

PROPOSED 48'-0" x 48'-0"
CMU WALL (NOT SHOWN)

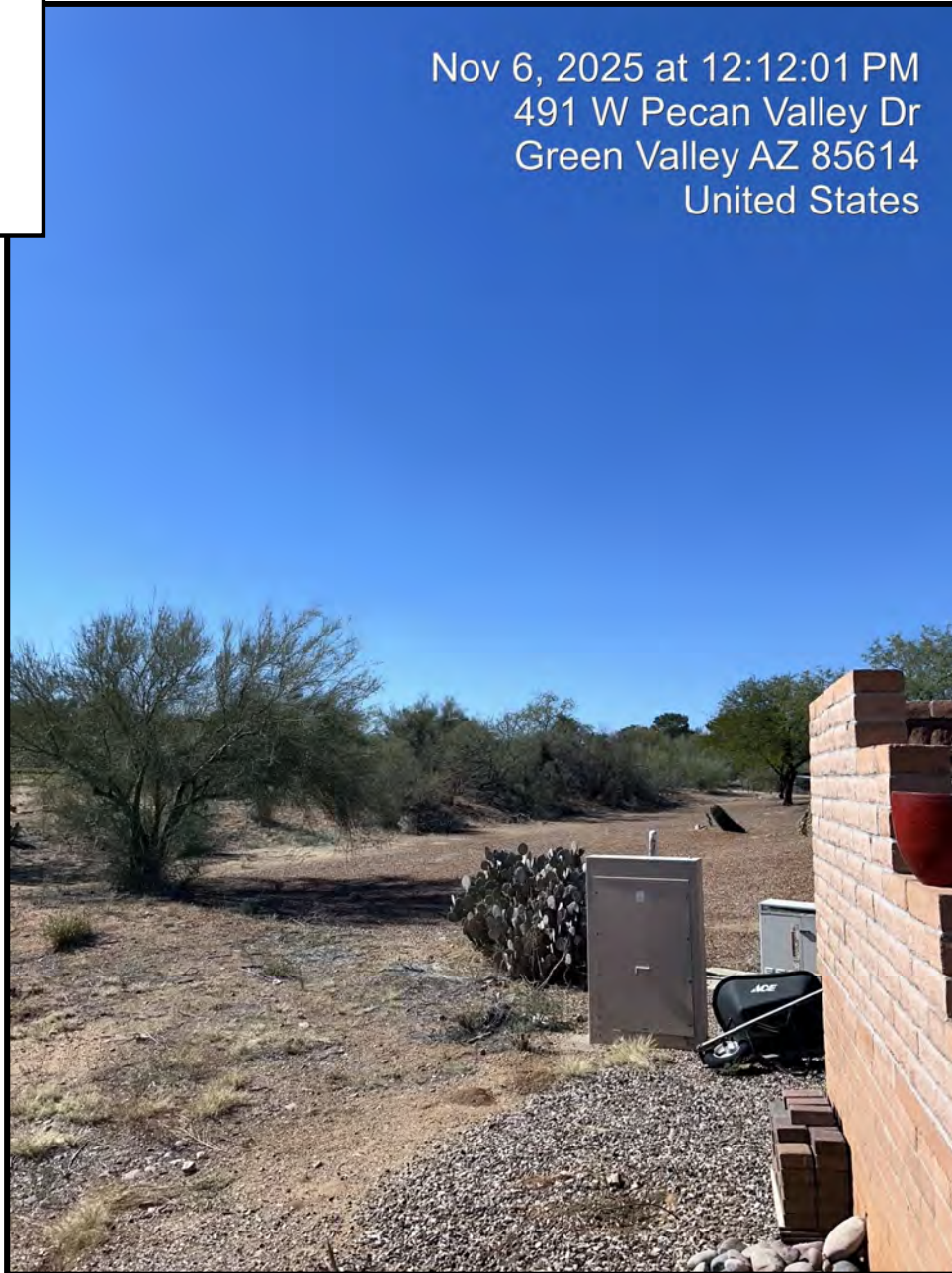


EXISTING VIEW: VIEW 5



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:12:01 PM
491 W Pecan Valley Dr
Green Valley AZ 85614
United States



PROPOSED VIEW: VIEW 5

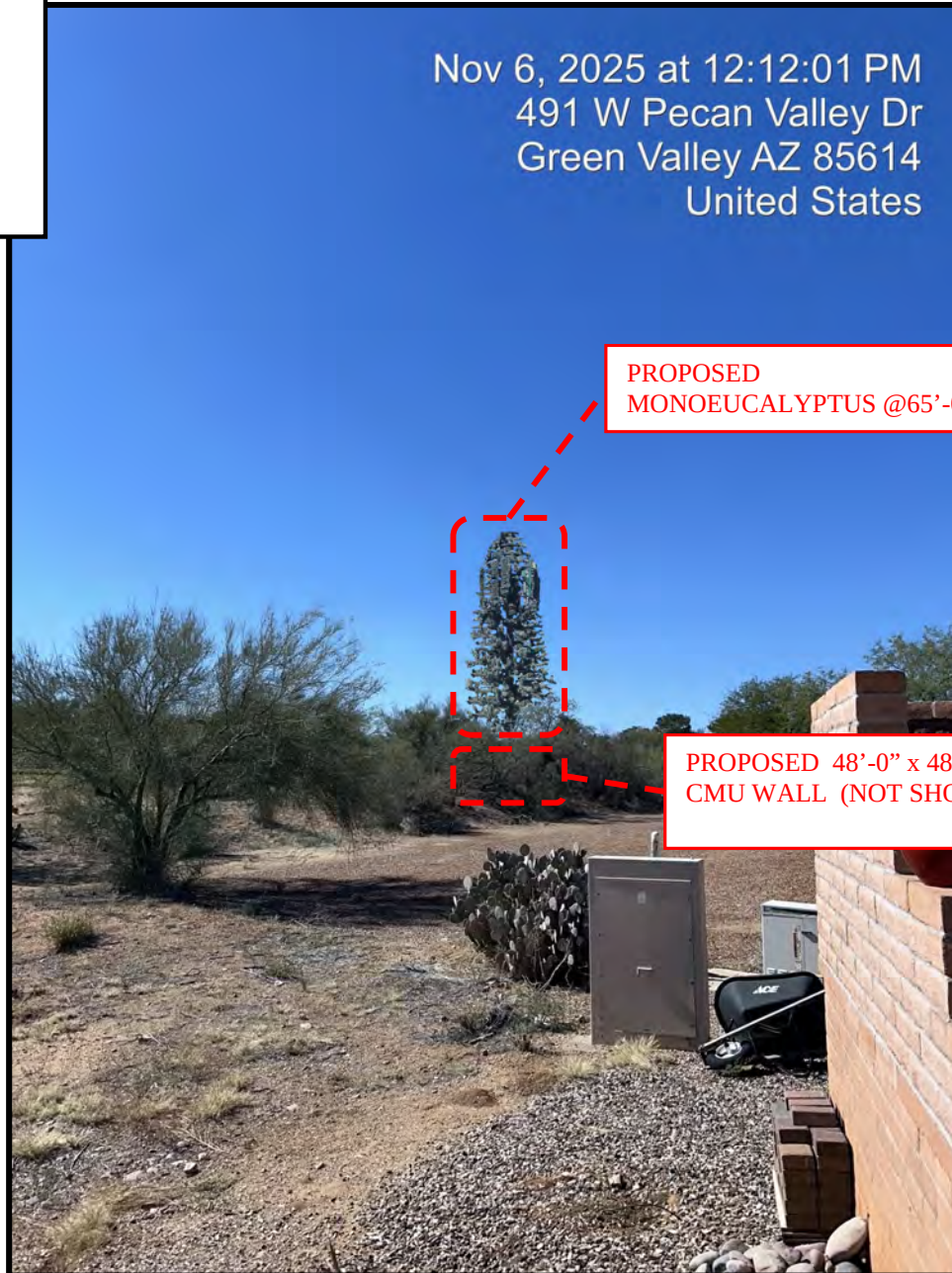


SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:12:01 PM
491 W Pecan Valley Dr
Green Valley AZ 85614
United States

PROPOSED
MONOEUCALYPTUS @65'-0"

PROPOSED 48'-0" x 48'-0"
CMU WALL (NOT SHOWN)

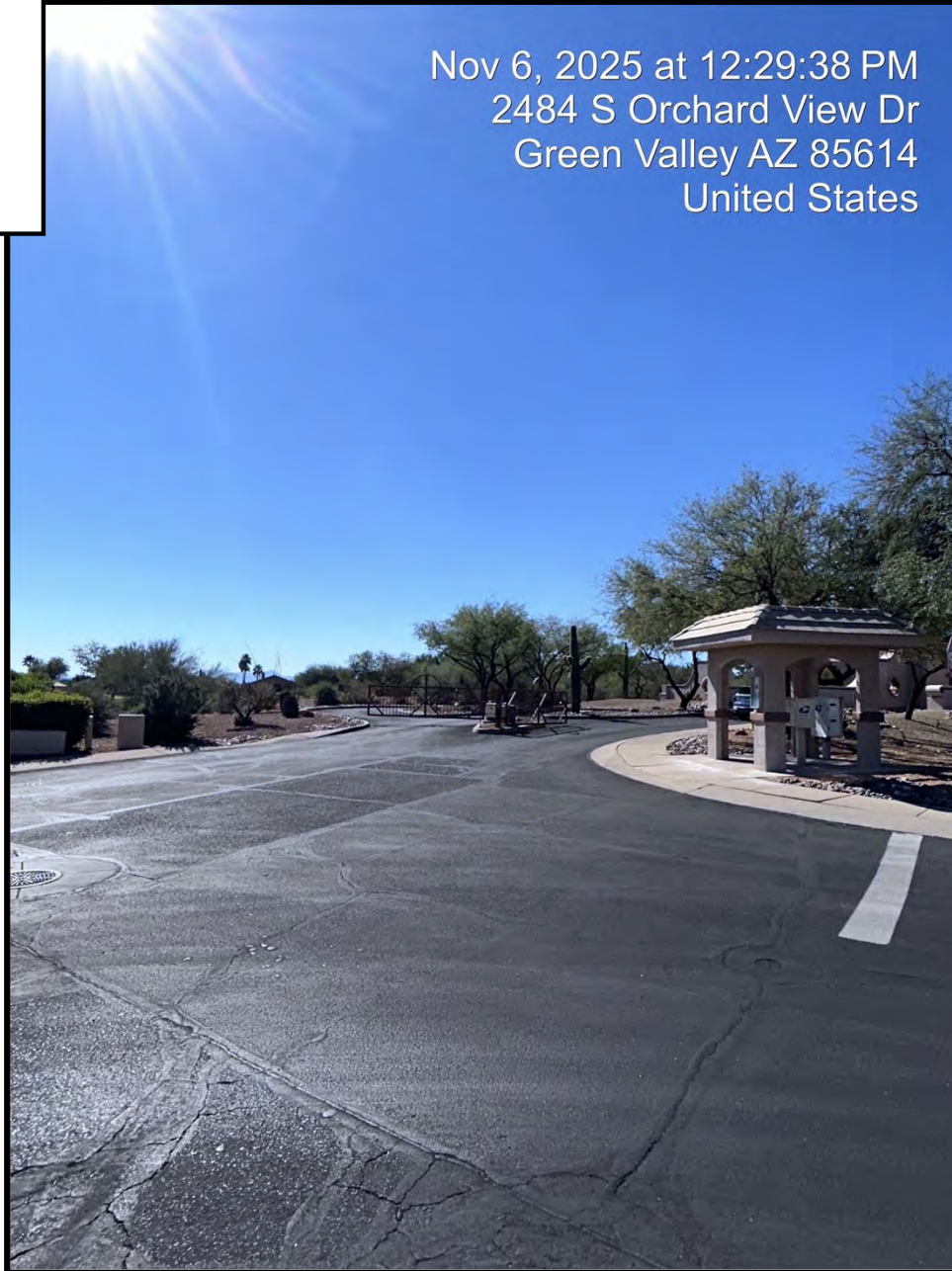


EXISTING VIEW: VIEW 6



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:29:38 PM
2484 S Orchard View Dr
Green Valley AZ 85614
United States



PROPOSED VIEW: VIEW 6



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:29:38 PM
2484 S Orchard View Dr
Green Valley AZ 85614
United States

PROPOSED
MONOEUCALYPTUS @65'-0"

PROPOSED 48'-0" x 48'-0"
CMU WALL (NOT SHOWN)

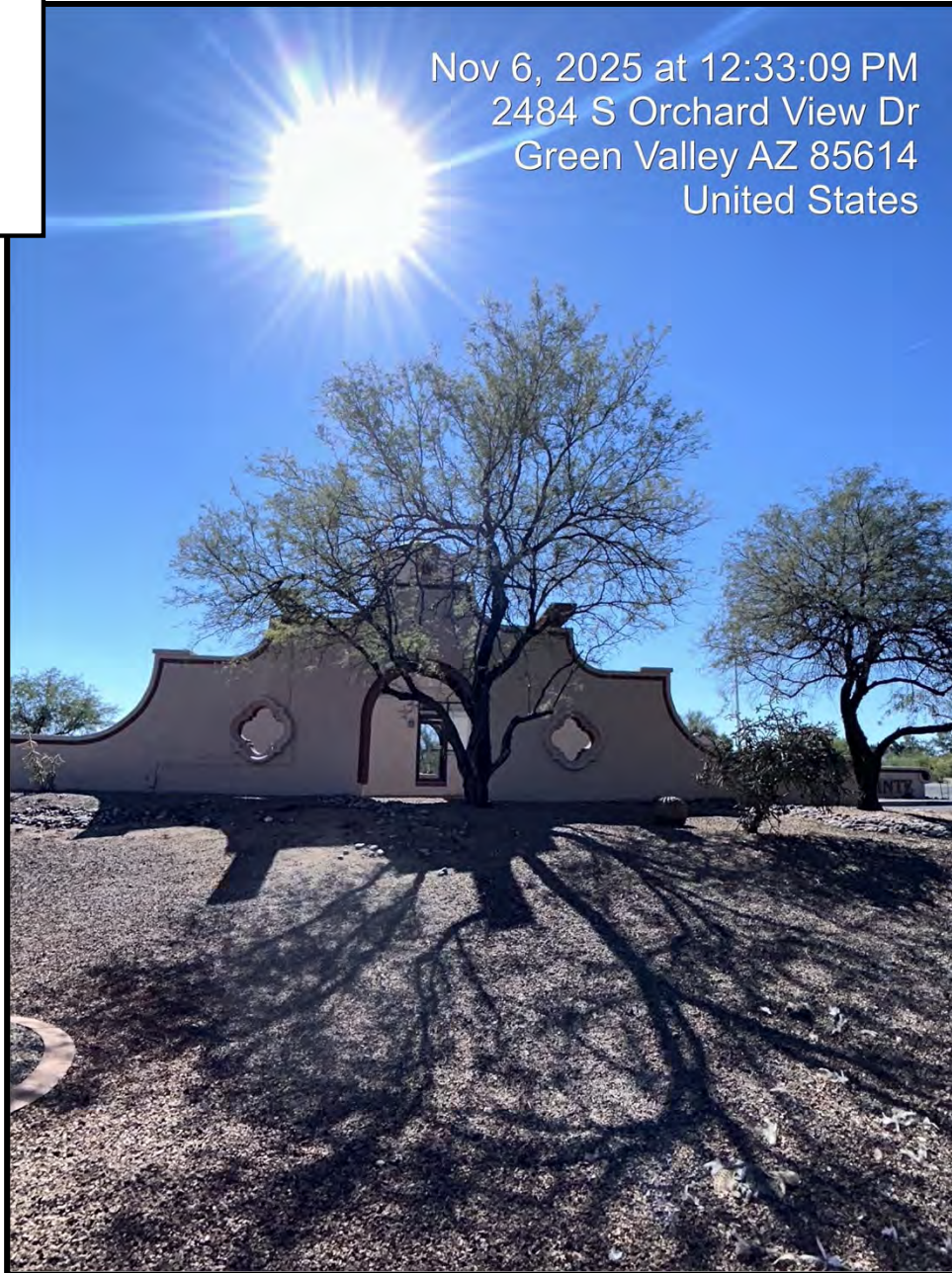


EXISTING VIEW: VIEW 7



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:33:09 PM
2484 S Orchard View Dr
Green Valley AZ 85614
United States



PROPOSED VIEW: VIEW 7

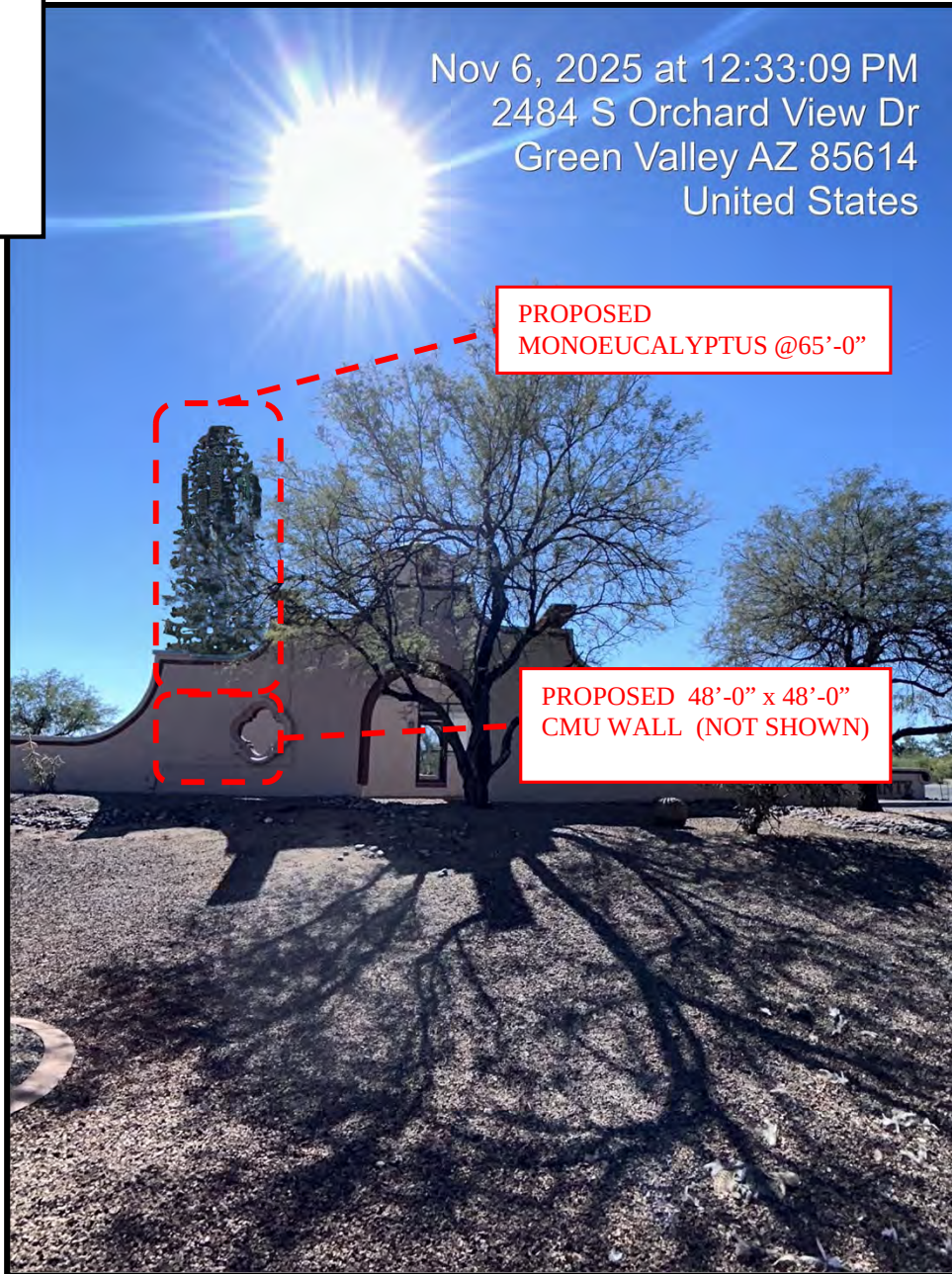


SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:33:09 PM
2484 S Orchard View Dr
Green Valley AZ 85614
United States

PROPOSED
MONOEUCALYPTUS @65'-0"

PROPOSED 48'-0" x 48'-0"
CMU WALL (NOT SHOWN)

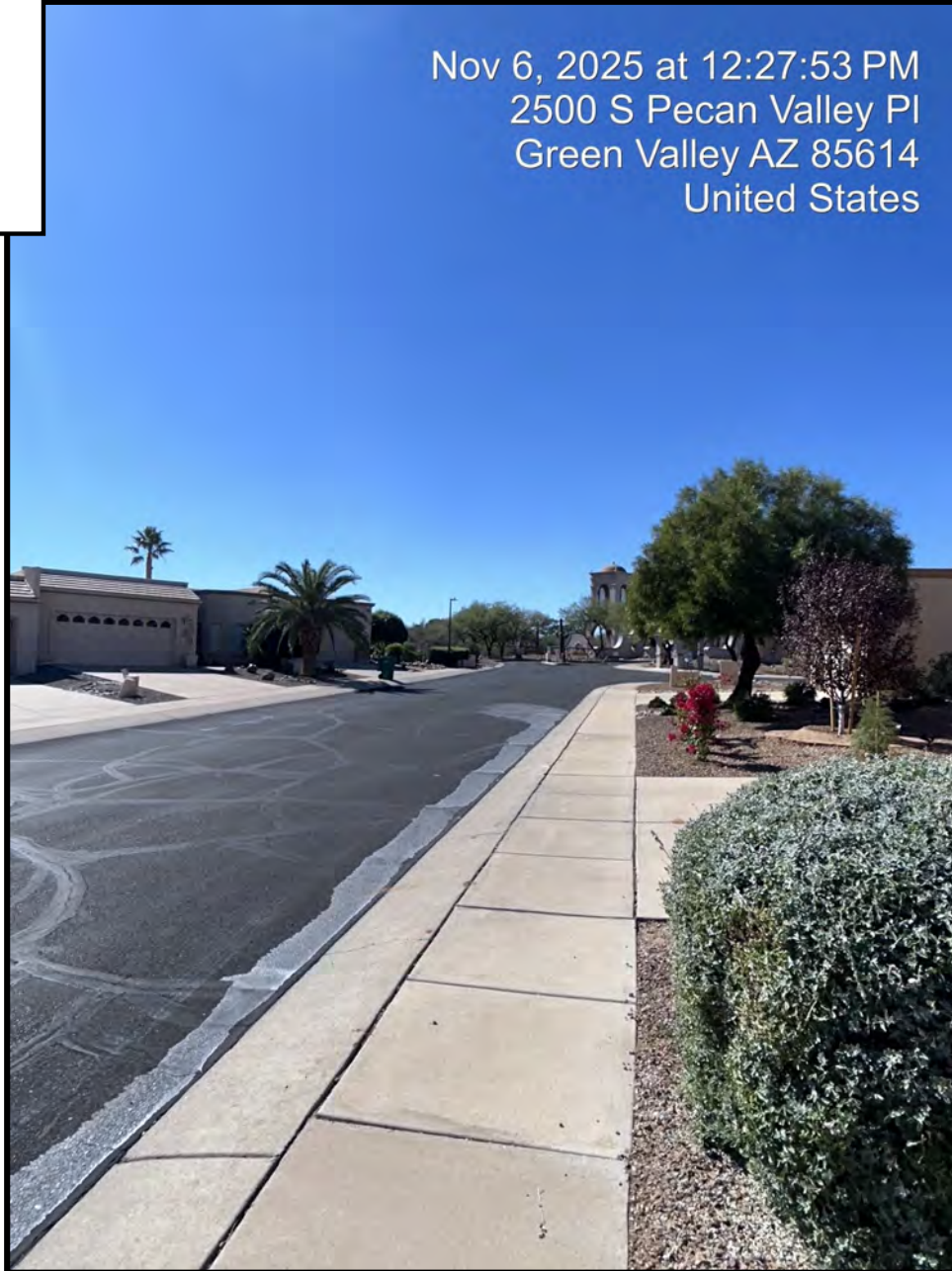


EXISTING VIEW: VIEW 8



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:27:53 PM
2500 S Pecan Valley Pl
Green Valley AZ 85614
United States



PROPOSED VIEW: VIEW 8



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:27:53 PM
2500 S Pecan Valley Pl
Green Valley AZ 85614
United States



PROPOSED
MONOEUCALYPTUS @65'-0"

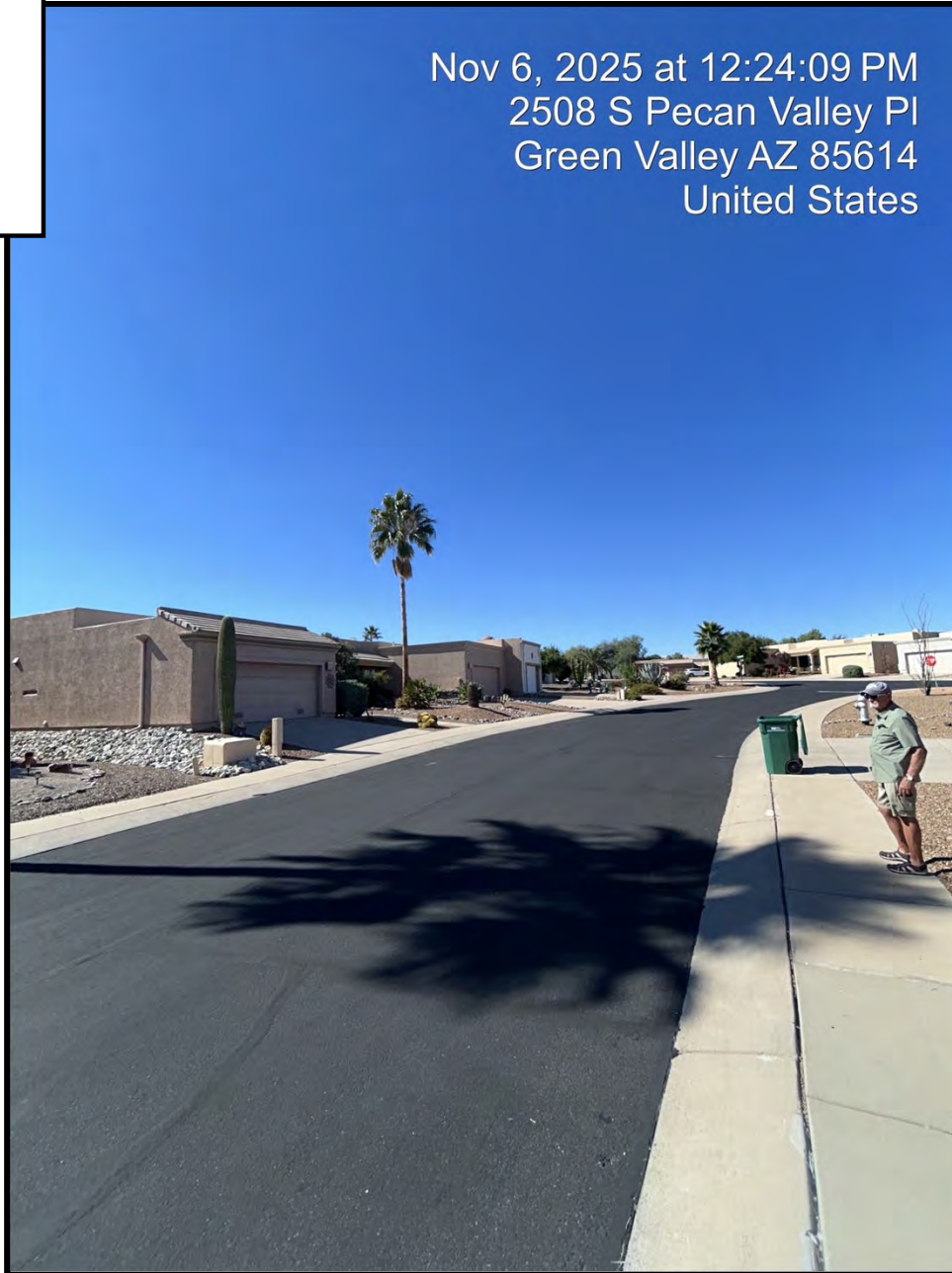
PROPOSED 48'-0" x 48'-0"
CMU WALL (NOT SHOWN)

EXISTING VIEW: VIEW 9



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:24:09 PM
2508 S Pecan Valley Pl
Green Valley AZ 85614
United States



PROPOSED VIEW: VIEW 9



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:24:09 PM
2508 S Pecan Valley Pl
Green Valley AZ 85614
United States

PROPOSED
MONOEUCALYPTUS @65'-0"

PROPOSED 48'-0" x 48'-0"
CMU WALL (NOT SHOWN)

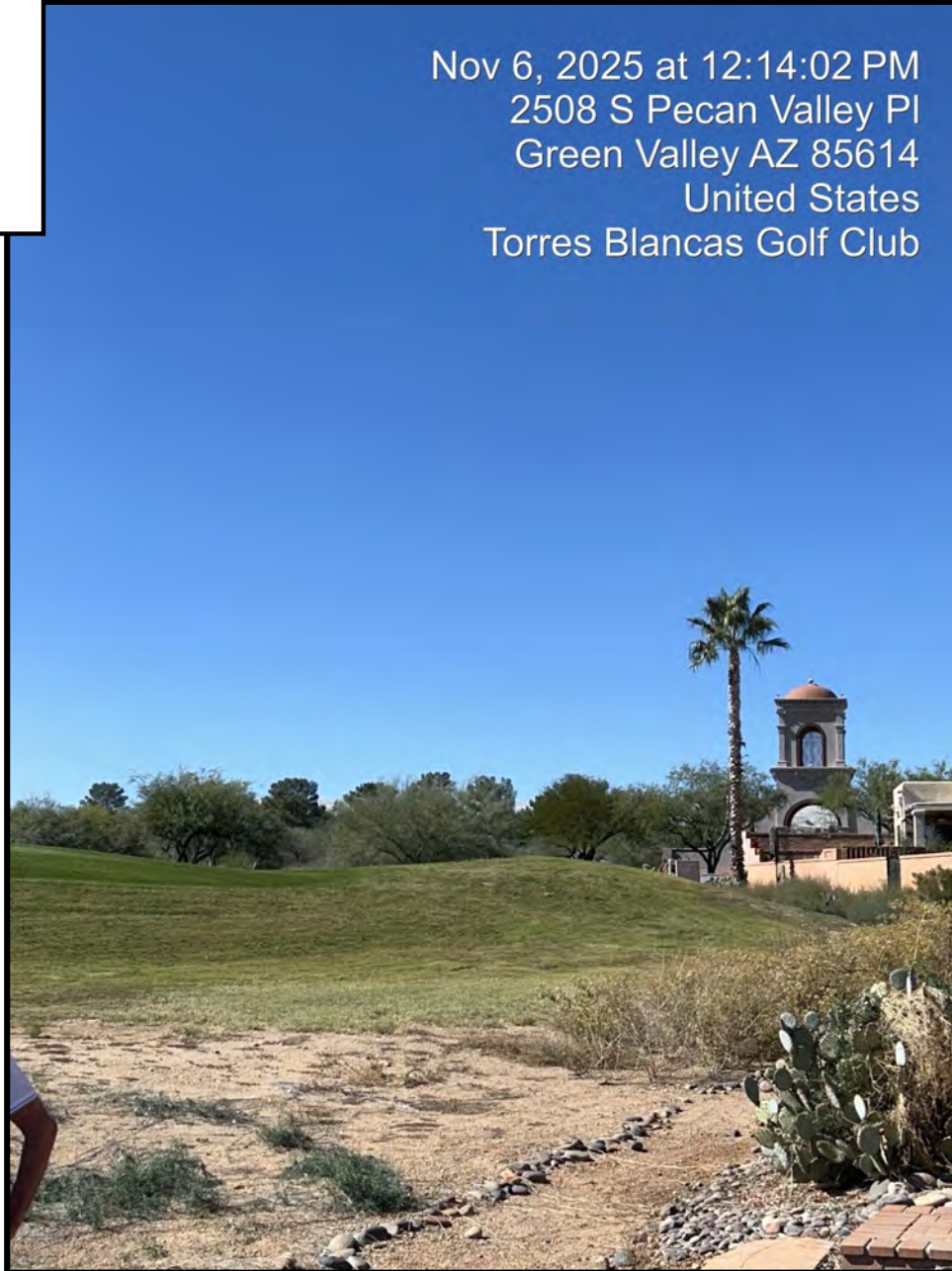


EXISTING VIEW: VIEW 10



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:14:02 PM
2508 S Pecan Valley Pl
Green Valley AZ 85614
United States
Torres Blancas Golf Club



PROPOSED VIEW: VIEW 10

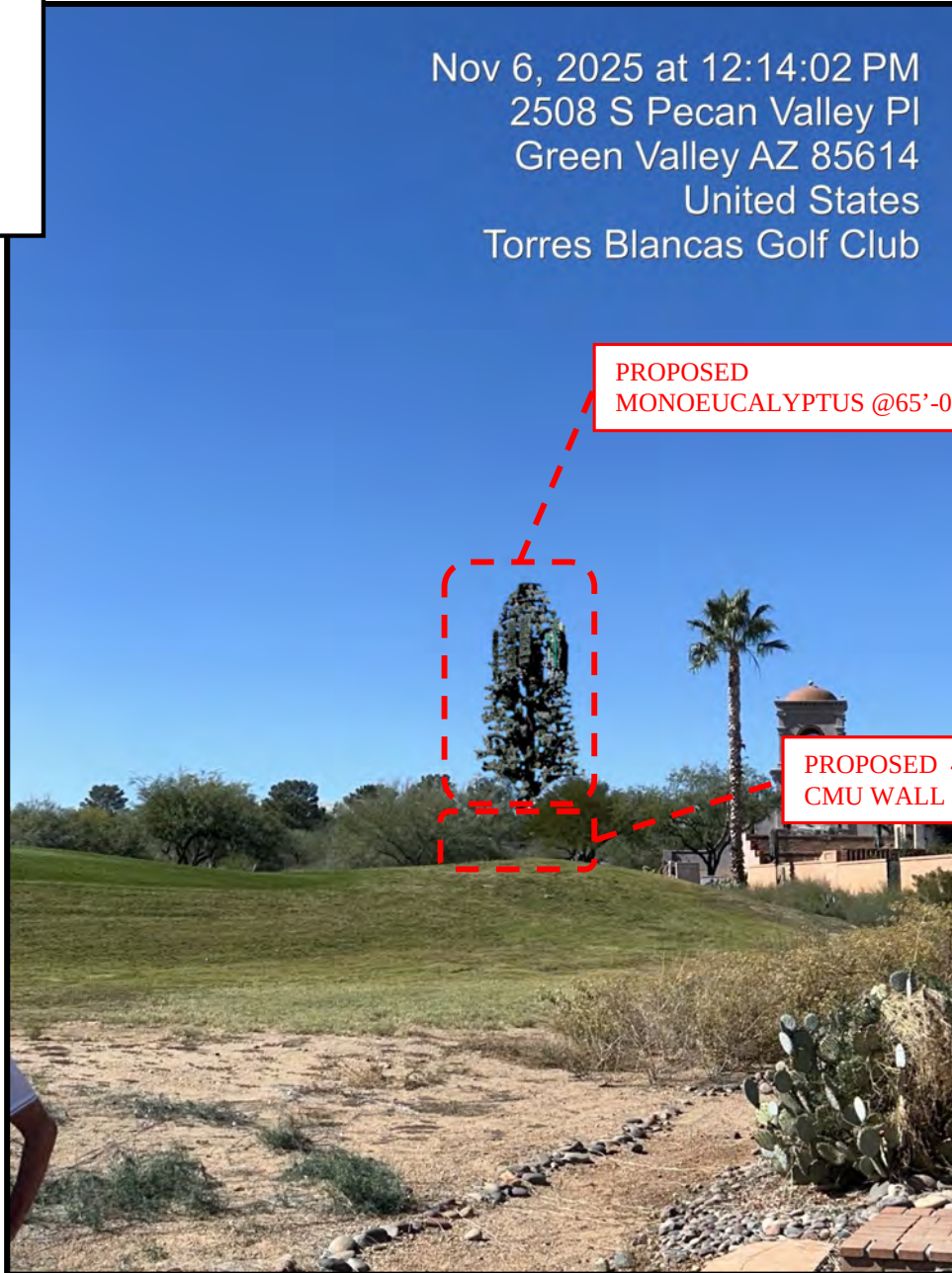


SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:14:02 PM
2508 S Pecan Valley Pl
Green Valley AZ 85614
United States
Torres Blancas Golf Club

PROPOSED
MONOEUCALYPTUS @65'-0"

PROPOSED 48'-0" x 48'-0"
CMU WALL (NOT SHOWN)

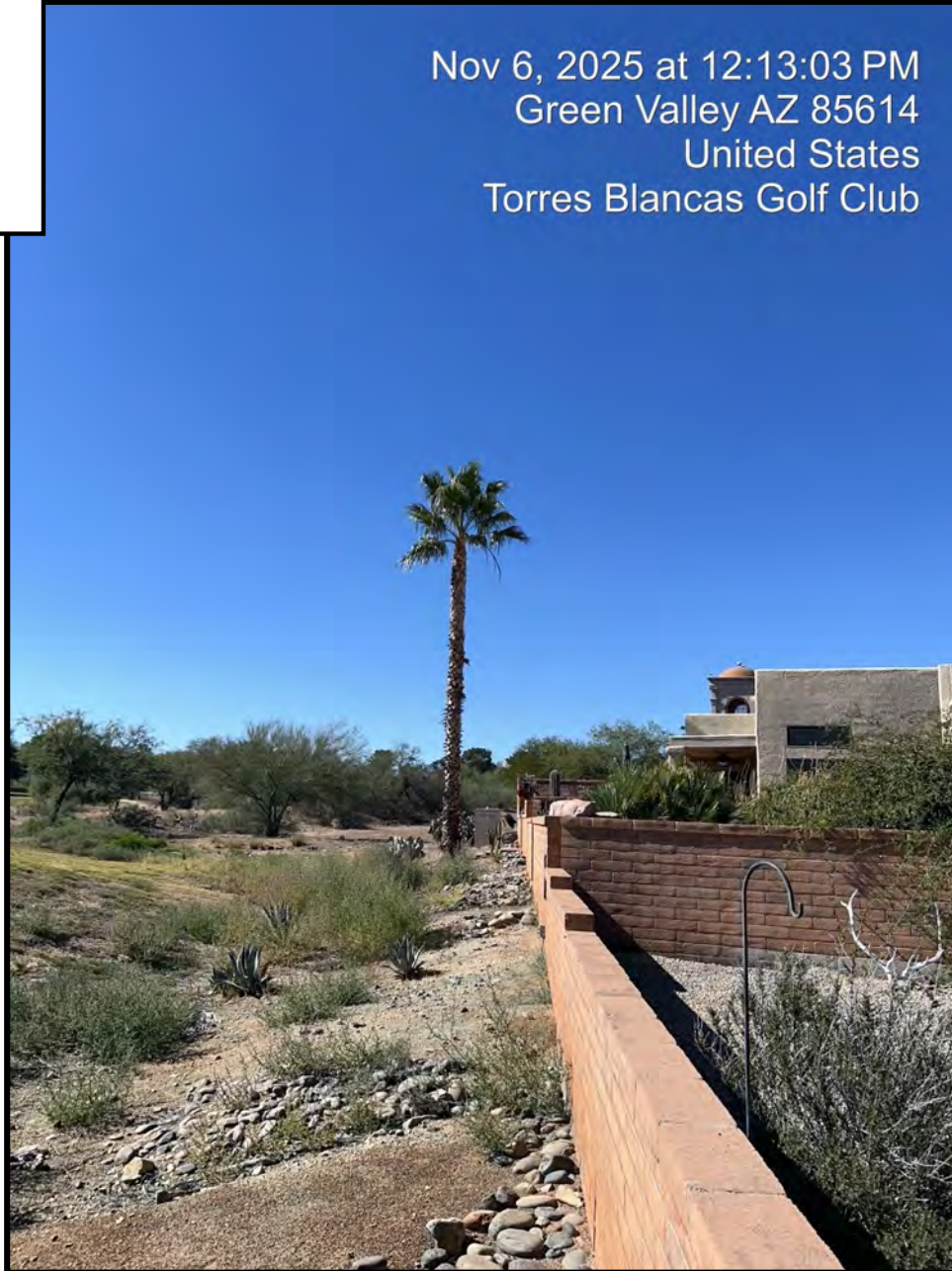


EXISTING VIEW: VIEW 11



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:13:03 PM
Green Valley AZ 85614
United States
Torres Blancas Golf Club



PROPOSED VIEW: VIEW 11

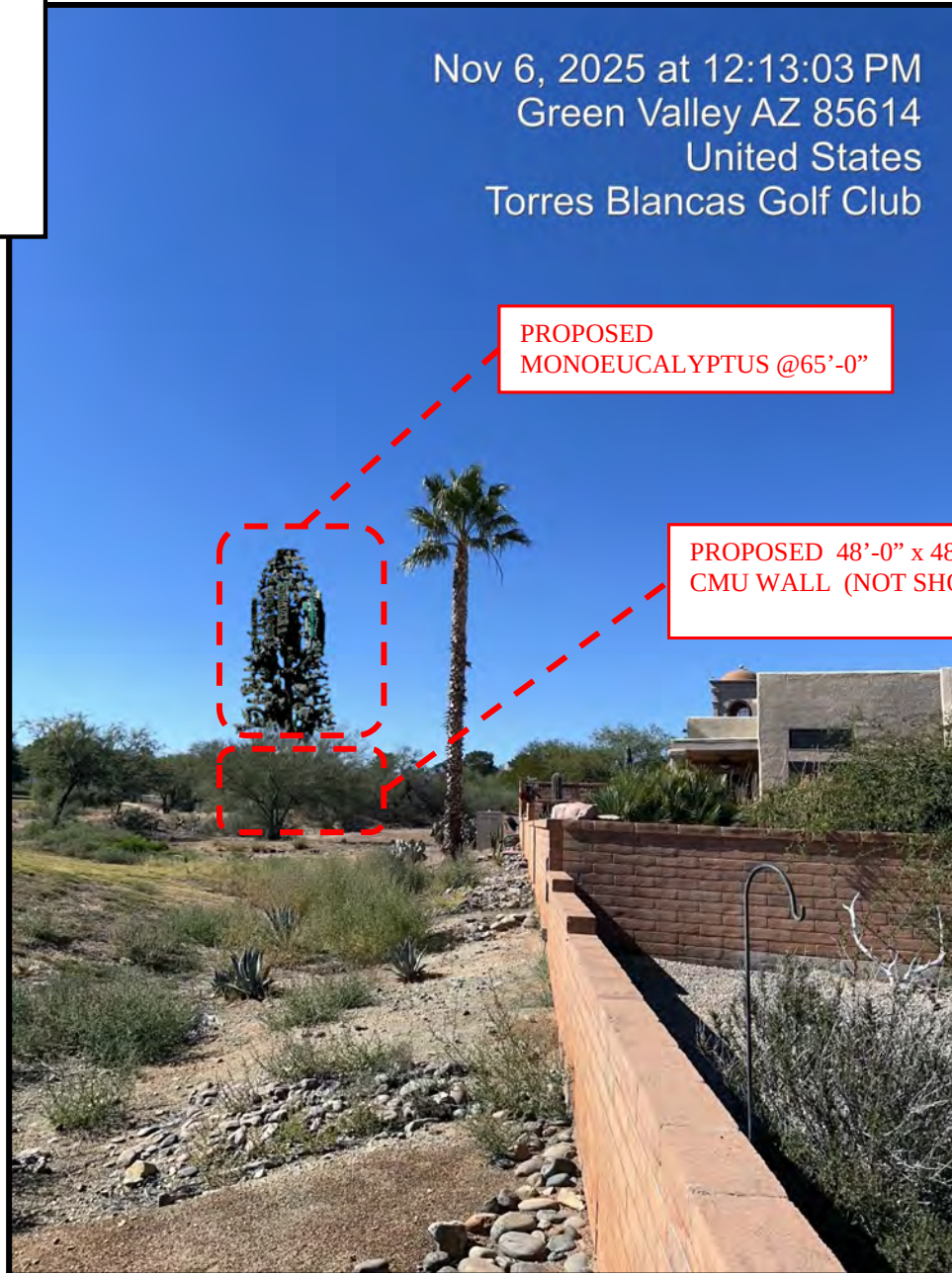


SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:13:03 PM
Green Valley AZ 85614
United States
Torres Blancas Golf Club

PROPOSED
MONOEUCALYPTUS @65'-0"

PROPOSED 48'-0" x 48'-0"
CMU WALL (NOT SHOWN)

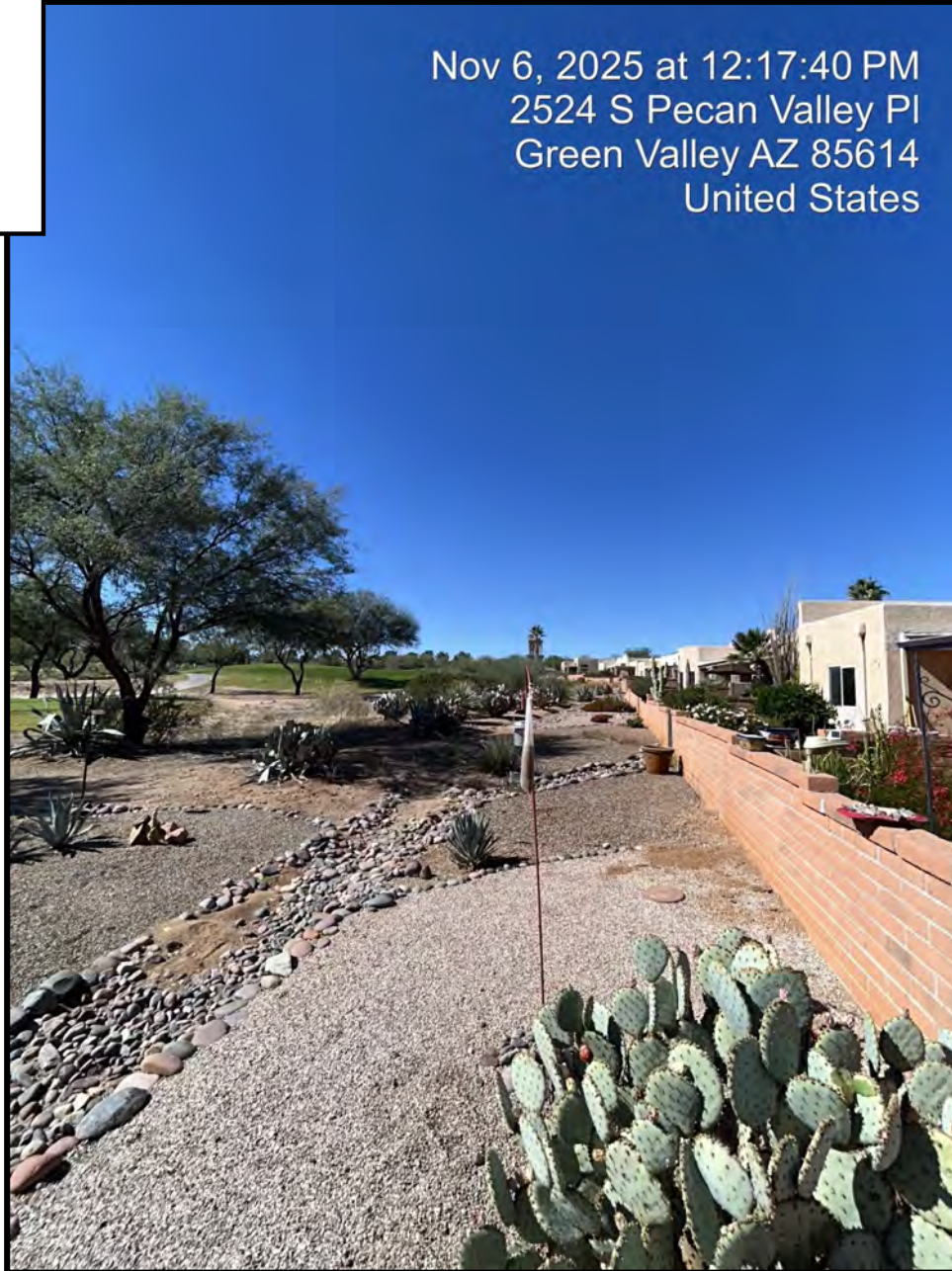


EXISTING VIEW: VIEW 12



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:17:40 PM
2524 S Pecan Valley Pl
Green Valley AZ 85614
United States



PROPOSED VIEW: VIEW 12



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:17:40 PM
2524 S Pecan Valley Pl
Green Valley AZ 85614
United States



PROPOSED
MONOEUCALYPTUS @65'-0"

PROPOSED 48'-0" x 48'-0"
CMU WALL (NOT SHOWN)

EXISTING VIEW: VIEW 13



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:24:29 PM
2513 S Pecan Valley Pl
Green Valley AZ 85614
United States



PROPOSED VIEW: VIEW 13



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:24:29 PM
2513 S Pecan Valley Pl
Green Valley AZ 85614
United States

PROPOSED
MONOEUCALYPTUS @65'-0"

PROPOSED 48'-0" x 48'-0"
CMU WALL (NOT SHOWN)

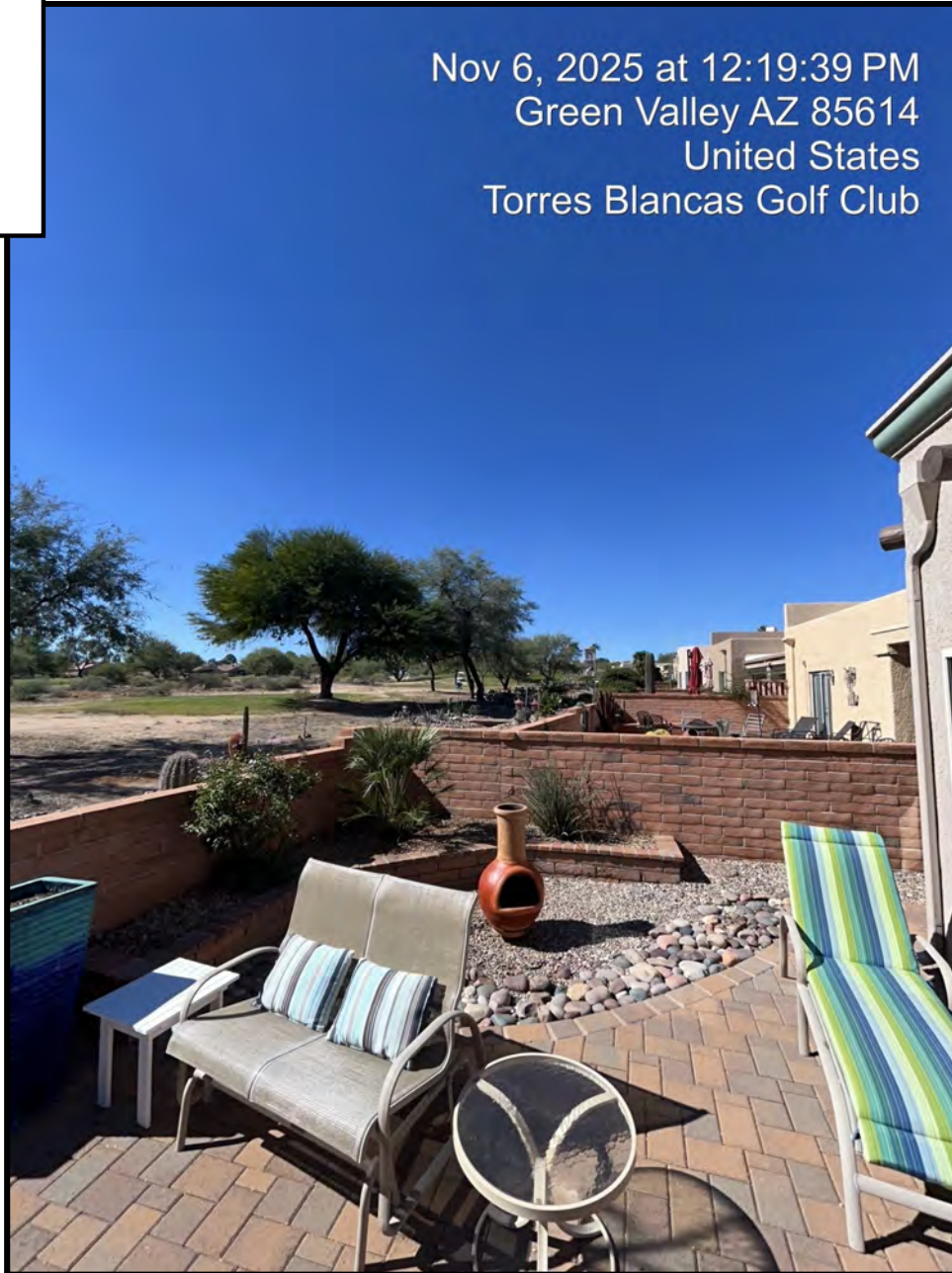


EXISTING VIEW: VIEW 14



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:19:39 PM
Green Valley AZ 85614
United States
Torres Blancas Golf Club



PROPOSED VIEW: VIEW 14



SITE NAME: TUC ABREGO
VERIZON SITE ID: AZ6001
ADDRESS: 3233 S ABREGO DR
GREEN VALLEY, AZ 85614
COUNTY: PIMA

Nov 6, 2025 at 12:19:39 PM
Green Valley AZ 85614
United States
Torres Blancas Golf Club



PROPOSED
MONOEUCALYPTUS
@65'-0"

PROPOSED 48'-0" x 48'-0"
CMU WALL (NOT SHOWN)

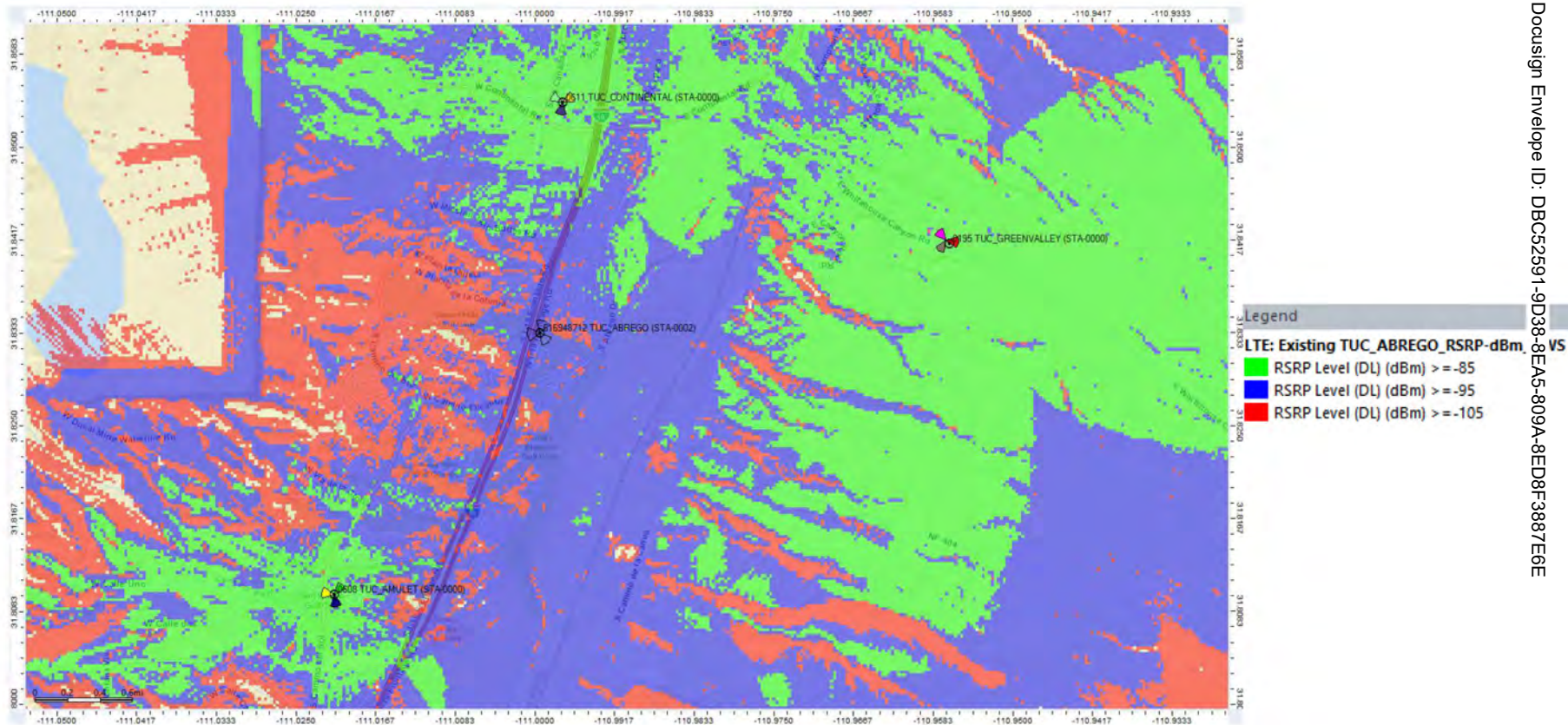
Appendix B

RF Propagation Plots

TUC_ABREGO/16442334

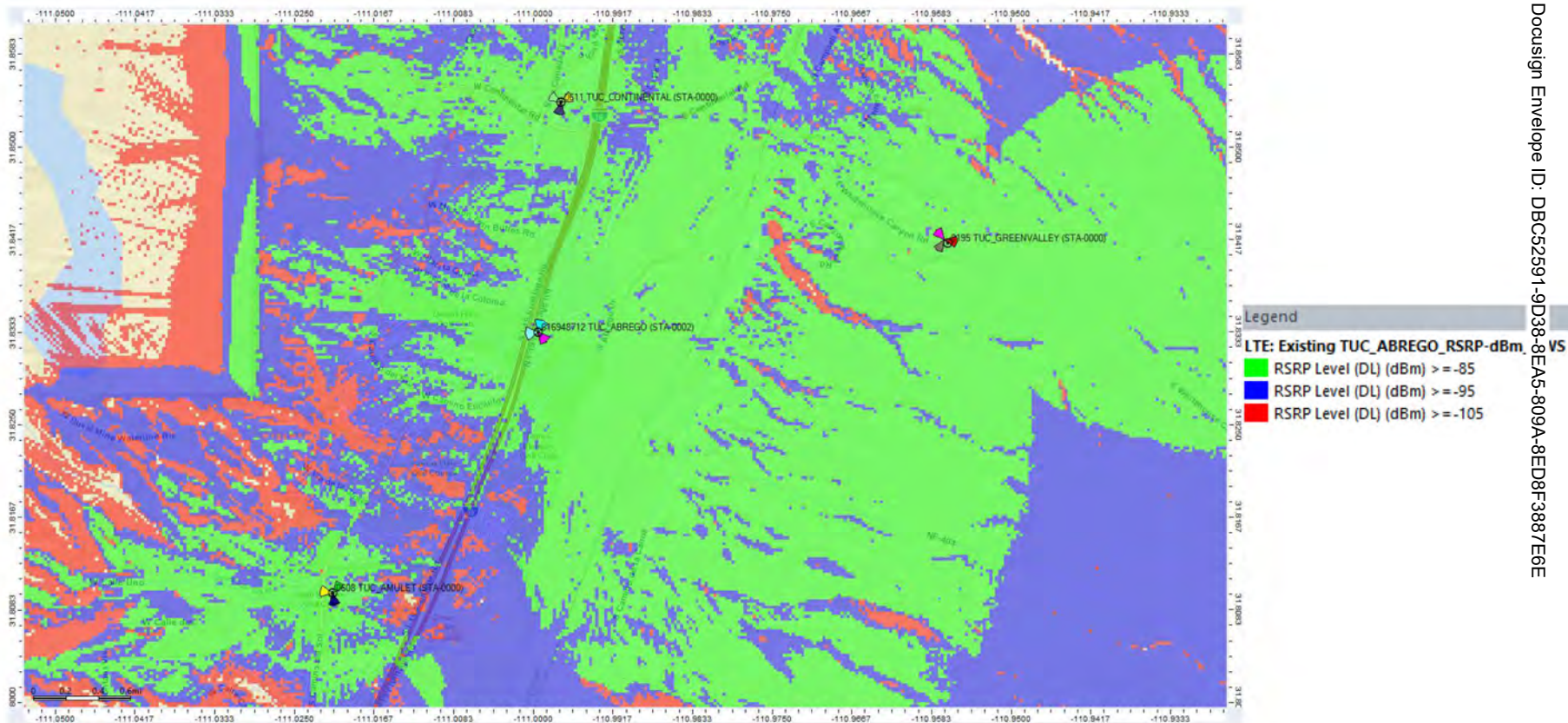
Angelo Ferrer
01/28/2025

verizon



AWS Coverage RSRP dBm Before

Confidential and proprietary materials for authorized Verizon personnel and outside agencies only. Use, disclosure or distribution of this material is not permitted to any unauthorized persons or third parties except by written agreement.



AWS Coverage RSRP dBm After

Confidential and proprietary materials for authorized Verizon personnel and outside agencies only. Use, disclosure or distribution of this material is not permitted to any unauthorized persons or third parties except by written agreement.

Appendix A

Site Photographs





Site Photograph 1 – Looking north at the Site



Site Photograph 2 – Looking south at the Site

Site Photographs

TowerCo – Abrego
3233 South Abrego Drive
Green Valley, AZ 85614

Photographed:
August 24, 2025



Site Photograph 3 – Looking east at the Site



Site Photograph 4 – Looking west at the Site

Site Photographs

TowerCo – Abrego
3233 South Abrego Drive
Green Valley, AZ 85614

Photographed:
August 24, 2025



Site Photograph 5 – Looking north away from the Site



Site Photograph 6 – Looking south away from the Site

Site Photographs

TowerCo – Abrego
3233 South Abrego Drive
Green Valley, AZ 85614

Photographed:
August 24, 2025



Site Photograph 7 – Looking east away from the Site



Site Photograph 8 – Looking west away from the Site

Site Photographs
TowerCo – Abrego
3233 South Abrego Drive
Green Valley, AZ 85614

Photographed:
August 24, 2025



Site Photograph 9 – Looking northwest along the access easement



Site Photograph 10 – Looking southwest along the access easement

Site Photographs

TowerCo – Abrego
3233 South Abrego Drive
Green Valley, AZ 85614

Photographed:
August 24, 2025



Site Photograph 11 – Looking north down the access easement



Site Photograph 12 – Looking west down the access easement

Site Photographs

TowerCo – Abrego
3233 South Abrego Drive
Green Valley, AZ 85614

Photographed:
August 24, 2025

Appendix B

Documentation of Officially Designated Wilderness Areas, Wildlife Preserves, and Endangered Species



Informal Biological Assessment

TowerCo

Project Name: Abrego / AZ6001 - Trileaf #770929

Latitude: 31° 50' 00.462" N, Longitude: 110° 59' 57.546" W

Trileaf performed an Informal Biological Assessment for the subject site. The purpose is to document whether the proposed undertaking will affect listed or proposed threatened or endangered species, designated critical habitats, wetlands, and migratory birds. A project description, site photographs, topographical maps, wetland maps, and soil maps are included in this report.

Proposed Project Description:

The Site is located at 3233 South Abrego Drive, Green Valley, Pima County, Arizona 85614, and consists of the construction of a 75-foot monoeucalyptus communications tower with an overall height of 80 feet, including attachments. Associated equipment will be located within a 48-foot by 48-foot (2,304 square feet) CMU wall compound in an overall 50-foot by 50-foot (2,500 square feet) lease area. The project includes a 20-foot-wide access easement extending generally southeast away from the lease area approximately 0.38 miles toward South Abrego Drive. The project also includes one (1) proposed 6-foot-wide utility easement extending northwest away from the lease area to a proposed fiber MMP and one (1) 10-foot wide utility easement extending north away from the lease area to an existing power source. The proposed structure site is approximately 2,924 feet above mean sea level.

Site and Surrounding Habitat:

The Site is currently located within a golf course. During the area reconnaissance, no trees along the access road, and generally throughout the area were identified to be removed.

The surrounding habitat within a 0.5-mile radius of the proposed site consists predominantly of residential development. To the north is residential development, followed by Interstate 19 Frontage Road, followed by residential development and undeveloped land. To the east is residential development, followed by South Abrego Drive, followed by undeveloped land. To the south is a golf course, followed by residential development. To the west is Interstate 19 Frontage Road, followed by residential development. The current habitat is not mapped as critical habitat, nor does it qualify as sufficient habitat for Federal listed species.

Wetlands:

Trileaf has reviewed the topographic map, soil composition, as well as the National Wetlands Inventory Map to determine if the proposed lease area and easements would have an impact on any wetlands or require significant amounts of fill or grading. Trileaf determined that the site is not located in a recognized national wetland area.

Trileaf performed a field visit and identified surface water bodies. Trileaf noted stormwater drains located southwest of the subject property and directly south of the easement. Using local maps in combination with an area reconnaissance the following water bodies have been identified in the table below:

Abrego
Trileaf# 770929

Water Body Type	Water Body Name	Direction from Structure	Distance from Structure
Riverine	Unnamed	S	79 feet
Riverine	Unnamed	N	0.11 miles
Freshwater Pond	Unnamed	NW	0.14 miles
Freshwater Pond	Unnamed	NW	0.23 miles
Freshwater Pond	Unnamed	W	0.24 miles
Freshwater Pond	Unnamed	SW	0.30 miles
Riverine	Santa Cruz River	SE	0.4 miles

Migratory Birds:

The proposed Site and design process for this project could not conform to all the USFWS recommendations to decrease potential effects on migratory birds. Therefore, it has included mitigating factors such as structure placement within minimally sensitive areas, avoiding placement near wetlands and large water bodies, limiting structure height to 80 feet, and eliminating the need for guy wires or FAA obstruction lighting. While the proposed Site is located near the Pacific flyway, our site investigation has determined that the project area is not located in an NWI mapped wetland, waterway, wildlife refuge, national wilderness area, native grassland or forest area, ridgeline, mountain top, coastline or area commonly known to have high incidences of fog or low clouds, where migratory birds may be found. Based upon the efforts undertaken during this IBA as well as the current data made available, we have concluded that this project will not have a significant effect on migratory birds; however, the presence of migratory birds cannot be ruled out.

Soils:

According to the U.S. Department of Agriculture Natural Resources Conservation Service Web Soil Survey of Tucson-Avra Valley Area, Arizona the Site is underlain by Anthony gravelly sandy loam with a 1 to 3 percent slope, Brazito gravelly loamy sand with a 1 to 3 percent slope, Gravelly alluvial land and Riverwash.

Anthony soils consist of well drained soils that are formed from mixed stream alluvium and are found in flood plains and alluvial fans. The depth to the most restrictive feature is more than 80 inches. The depth to the water table is more than 80 inches. A typical profile of Anthony soil consists of a layer of gravelly sandy loam extending from 0 to 60 inches. Anthony soils have no frequency of ponding and a rare frequency of flooding.

Brazito soils consist of excessively drained soils that are from mixed alluvium and are found in terraces and flood plains. The depth to the most restrictive feature is more than 80 inches. The depth to the water table is more than 80 inches. A typical profile of Brazito soil consists of a surface layer of gravelly loamy sand extending from to 15 inches and sand extending from to 60 inches. Brazito soils have no frequency of ponding and a rare frequency of flooding.

Gravelly alluvial land consists of excessively drained soils that are from gravelly mixed alluvium and are found in flood plains and alluvial fans. A typical profile of gravelly alluvial land consists of a layer of very gravelly loamy sand extending from 0 to 60 inches. Gravelly alluvial land has an occasional frequency of flooding.

Abrego
Trileaf# 770929

Riverwash soils consist of excessively drained soils that are from stratified alluvium and are found in channels and flood plains. A typical profile of riverwash consists of a layer of gravelly sand extending from 0 to 60 inches. Riverwash has a frequency of flooding.

Anthony gravelly sandy loam, 1 to 3 percent slope, Brazito gravelly loamy sand, 1 to 3 percent slope, Gravelly alluvial land and Riverwash are not considered hydric soils, and no hydrophytic vegetation or surface water was observed.

Threatened or Endangered Species:

Trileaf has researched the listed or proposed threatened or endangered species and designated critical habitat for the project area. This includes any such species that have been reported to exist within the action area where the project is located. The list of federally threatened or endangered species was acquired through the U.S. Fish and Wildlife Service's Information, Planning, and Consultation system (IPaC) and is site specific. The lease area is not located within an aquatic environment; therefore, any obligate aquatic species should not be directly impacted by this project and are not included in the table below. A list of remaining species and site observations are summarized in the following table:

Species / Resource Name	Federal / State Status	Habitat Description	Recommendation of Effect	Notes / Documentation
Jaguar (<i>Panthera onca</i>)	Federal Endangered	Tropical rainforests and swamps, arid grasslands and deserts	No effect	Habitat assessment indicated no potential habitat present
Ocelot (<i>Leopardus pardalis</i>)	Federal Endangered	Tropical forests, mangrove swamps, coastal marshes and thornscrub	No effect	Habitat assessment indicated no potential habitat present
Cactus Ferruginous Pygmy-owl (<i>Glaucidium brasilianum cactorum</i>)	Federal Threatened	Sonoran Desert scrub, preferring areas with mature trees and large cacti, such as saguaros	No effect	Habitat assessment indicated no potential habitat present

Abrego
Trileaf# 770929

Species / Resource Name	Federal / State Status	Habitat Description	Recommendation of Effect	Notes / Documentation
California Least Tern (<i>Sternula antillarum browni</i>)	Federal Endangered	Open, sparsely vegetated, sandy or gravelly areas like beaches, estuaries, and bays, near shallow waters	No effect	Habitat assessment indicated no potential habitat present
Southwestern Willow Flycatcher (<i>Empidonax traillii extimus</i>)	Federal Endangered	Dense, moist riparian areas with a significant presence of trees and shrubs	No effect	Habitat assessment indicated no potential habitat present
Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)	Federal Threatened	Wooded habitat with dense cover and water nearby, including woodlands with low, scrubby, vegetation, overgrown orchards, abandoned farmland and dense thickets along streams and marshes	No effect	Habitat assessment indicated no potential habitat present
Gila Topminnow (<i>Poeciliopsis occidentalis</i>)	Federal Endangered	Shallow, warm, quiet waters in the Gila River watershed	No effect	Habitat assessment indicated no potential habitat present
Monarch Butterfly (<i>Danaus plexippus</i>)	Federal Proposed Threatened	Prairies, meadows, grasslands, along roadsides. Species dependent on host plant, milkweed	No effect	Habitat assessment indicated no potential habitat present
Arizona Eryngo (<i>Eryngium sparganophyllum</i>)	Federal Endangered	Open woodlands	No effect	Habitat assessment indicated no potential habitat present
Pima Pineapple Cactus (<i>Coryphantha scheeri</i> var. <i>robustispina</i>)	Federal Endangered	Lower sonoran desert-scrub and desert-grassland transition zones of southern Arizona and northern Sonora, typically in open, flat areas on alluvial soils	No effect	Habitat assessment indicated no potential habitat present

Abrego
Trileaf# 770929

Conclusions:

Based on the efforts undertaken during our IBA, project specifications, and the current data made available, we have concluded that there is no potential for the proposed project to have a significant effect on listed or proposed, threatened and endangered species, their designated critical habitat, or migratory birds.

It should be noted that this informal biological assessment was conducted in accordance with the Scope of Work and does not constitute a Section 7 Biological Assessment under the Endangered Species Act (50 CFR Part 402.01).



McKayla Ordak
Natural Resource Specialist



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arizona Ecological Services Field Office
9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517
Phone: (602) 242-0210 Fax: (602) 242-2513



In Reply Refer To:
Project Code: 2025-0154026
Project Name: Abrego

01/05/2026 13:21:09 UTC

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The Fish and Wildlife Service (Service) is providing this list under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The list you have generated identifies threatened, endangered, proposed, and candidate species, and designated and proposed critical habitat, that *may* occur within the One-Range that has been delineated for the species (candidate, proposed, or listed) and its critical habitat (designated or proposed) with which your project polygon intersects. These range delineations are based on biological metrics, and do not necessarily represent exactly where the species is located. Please refer to the species information found on ECOS to determine if suitable habitat for the species on your list occurs in your project area.

The purpose of the Act is to provide a means whereby threatened and endangered species and the habitats upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of Federal trust resources and to determine whether projects may affect federally listed species and/or designated critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If the Federal action agency determines that listed species or critical habitat *may be affected* by a federally funded, permitted or authorized activity, the agency must consult with us pursuant to 50 CFR 402. Note that a "may affect" determination includes effects that may not be adverse and that may be beneficial, insignificant, or discountable. An effect exists even if only one individual

or habitat segment may be affected. The effects analysis should include the entire action area, which often extends well outside the project boundary or "footprint." For example, projects that involve streams and river systems should consider downstream affects. If the Federal action agency determines that the action may jeopardize a *proposed* species or may adversely modify *proposed* critical habitat, the agency must enter into a section 7 conference. The agency may choose to confer with us on an action that may affect proposed species or critical habitat.

Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend that they be considered in the planning process in the event they become proposed or listed prior to project completion. More information on the regulations (50 CFR 402) and procedures for section 7 consultation, including the role of permit or license applicants, can be found in our Endangered Species Consultation Handbook at: <https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf>.

We also advise you to consider species protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668 *et seq.*). The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by the Service. The Eagle Act prohibits anyone, without a permit, from taking (including disturbing) eagles, and their parts, nests, or eggs. Currently 1,026 species of birds are protected by the MBTA, including the western burrowing owl (*Athene cunicularia hypugaea*). Protected western burrowing owls can be found in urban areas and may use their nest/burrows year-round; destruction of the burrow may result in the unpermitted take of the owl or their eggs.

If a bald eagle or golden eagle nest occurs in or near the proposed project area, our office should be contacted for Technical Assistance. An evaluation must be performed to determine whether the project is likely to disturb or harm eagles. The National Bald Eagle Management Guidelines provide recommendations to minimize potential project impacts to bald eagles (see <https://www.fws.gov/law/bald-and-golden-eagle-protection-act> and <https://www.fws.gov/program/eagle-management>).

The Division of Migratory Birds (505/248-7882) administers and issues permits under the MBTA and Eagle Act, while our office can provide guidance and Technical Assistance. For more information regarding the MBTA, BGEP, and permitting processes, please visit the following web site: <https://www.fws.gov/program/migratory-bird-permit>. Guidance for minimizing impacts to migratory birds for communication tower projects (e.g. cellular, digital television, radio, and emergency broadcast) can be found at <https://www.fws.gov/media/recommended-best-practices-communication-tower-design-siting-construction-operation>.

The U.S. Army Corps of Engineers (Corps) may regulate activities that involve streams (including some intermittent streams) and/or wetlands. We recommend that you contact the Corps to determine their interest in proposed projects in these areas. For activities within a National Wildlife Refuge, we recommend that you contact refuge staff for specific information about refuge resources, please visit [this link](#) or visit <https://www.fws.gov/program/national->

[wildlife-refuge-system](#) to locate the refuge you would be working in or around.

If your action is on tribal land or has implications for off-reservation tribal interests, we encourage you to contact the tribe(s) and the Bureau of Indian Affairs (BIA) to discuss potential tribal concerns, and to invite any affected tribe and the BIA to participate in the section 7 consultation. In keeping with our tribal trust responsibility, we will notify tribes that may be affected by proposed actions when section 7 consultation is initiated. For more information, please contact our Tribal Coordinator, John Nystedt, at 928/556-2160 or John.Nystedt@fws.gov.

We also recommend you seek additional information and coordinate your project with the Arizona Game and Fish Department. Information on known species detections, special status species, and Arizona species of greatest conservation need, such as the western burrowing owl and the Sonoran desert tortoise (*Gopherus morafkai*) can be found by using their Online Environmental Review Tool, administered through the Heritage Data Management System and Project Evaluation Program (<https://www.azgfd.com/wildlife-conservation/planning-for-wildlife/project-evaluation-program/>).

We appreciate your concern for threatened and endangered species. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office. If we may be of further assistance, please contact our Flagstaff office at 928/556-2118 for projects in northern Arizona, our general Phoenix number 602/242-0210 for central Arizona, or 520/670-6144 for projects in southern Arizona.

Sincerely,
/s/

Heather Whitlaw
Field Supervisor
Attachment

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Arizona Ecological Services Field Office

9828 North 31st Ave

#c3

Phoenix, AZ 85051-2517

(602) 242-0210

PROJECT SUMMARY

Project Code: 2025-0154026

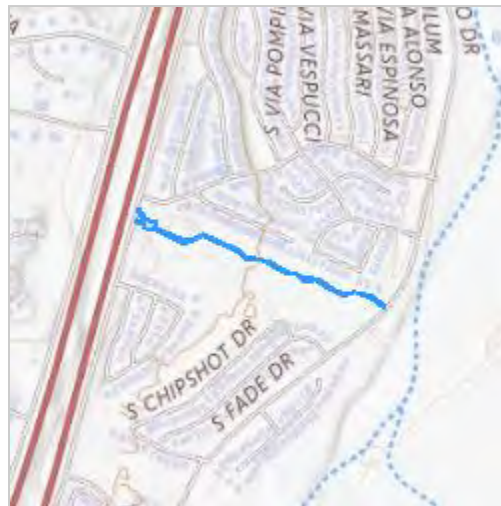
Project Name: Abrego

Project Type: Communication Tower New Construction

Project Description: Our client proposes to construct a 75-foot monoeucalyptus communications tower with an overall height of 80 feet, including attachments. Associated equipment will be located within a 48-foot by 48-foot (2,304 square feet) CMU wall compound in an overall 50-foot by 50-foot (2,500 square feet) lease area. The project includes a 20-foot wide access easement extending generally southeast away from the lease area approximately 0.38 miles toward South Abrego Drive. The project also includes one (1) proposed 6-foot wide utility easement extending northwest away from the lease area to a proposed fiber MMP and one (1) 10-foot wide utility easement extending north away from the lease area to an existing power source. The proposed location is currently undeveloped land.

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@31.8327631,-110.99687417231708,14z>



Counties: Pima County, Arizona

ENDANGERED SPECIES ACT SPECIES

There is a total of 10 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Jaguar <i>Panthera onca</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3944	Endangered
Ocelot <i>Leopardus (=Felis) pardalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4474	Endangered

BIRDS

NAME	STATUS
Cactus Ferruginous Pygmy-owl <i>Glaucidium brasilianum cactorum</i> There is final critical habitat for this species. Species profile: https://ecos.fws.gov/ecp/species/1225	Threatened
California Least Tern <i>Sternula antillarum browni</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8104	Endangered
Southwestern Willow Flycatcher <i>Empidonax traillii extimus</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6749	Endangered
Yellow-billed Cuckoo <i>Coccyzus americanus</i> Population: Western U.S. DPS There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

FISHES

NAME	STATUS
Gila Topminnow (incl. Yaqui) <i>Poeciliopsis occidentalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1116	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> There is proposed critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

FLOWERING PLANTS

NAME	STATUS
Arizona Eryngo <i>Eryngium sparganophyllum</i> Population: There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/10705	Endangered
Pima Pineapple Cactus <i>Coryphantha scheeri</i> var. <i>robustispina</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4919	Endangered

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act ² and the Migratory Bird Treaty Act (MBTA) ¹. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

-
- 1. The [Bald and Golden Eagle Protection Act](#) of 1940.
 - 2. The [Migratory Birds Treaty Act](#) of 1918.
 - 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are Bald Eagles and/or Golden Eagles in your [project](#) area.

Measures for Proactively Minimizing Eagle Impacts

For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the [National Bald Eagle Management Guidelines](#). You may employ the timing and activity-specific distance recommendations in this document when designing your project/

activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to [Bald Eagle Nesting and Sensitivity to Human Activity](#).

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional [Migratory Bird Office](#) or [Ecological Services Field Office](#).

If disturbance or take of eagles cannot be avoided, an [incidental take permit](#) may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the [Do I Need A Permit Tool](#). For assistance making this determination for golden eagles, please consult with the appropriate Regional [Migratory Bird Office](#) or [Ecological Services Field Office](#).

Ensure Your Eagle List is Accurate and Complete

If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the [Supplemental Information on Migratory Birds and Eagles](#), to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to bald or golden eagles on your list, see the "Probability of Presence Summary" below to see when these bald or golden eagles are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Golden Eagle <i>Aquila chrysaetos</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Dec 1 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read ["Supplemental Information on Migratory Birds and Eagles"](#), specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

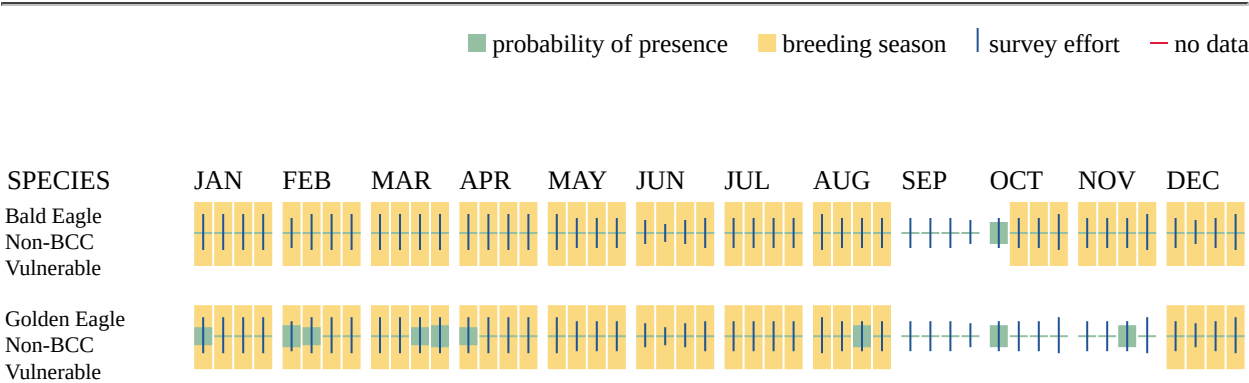
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) ¹ prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Avocet <i>Recurvirostra americana</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11927	Breeds Apr 21 to Aug 10
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black-chinned Sparrow <i>Spizella atrogularis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9447	Breeds Apr 15 to Jul 31
Costa's Hummingbird <i>Calypte costae</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9470	Breeds Jan 15 to Jun 10
Gila Woodpecker <i>Melanerpes uropygialis</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/5960	Breeds Apr 1 to Aug 31
Golden Eagle <i>Aquila chrysaetos</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Dec 1 to Aug 31
Lawrence's Goldfinch <i>Spinus lawrencei</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9464	Breeds Mar 20 to Sep 20
Marbled Godwit <i>Limosa fedoa</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere

NAME	BREEDING SEASON
Western Grebe <i>aechmophorus occidentalis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6743	Breeds Jun 1 to Aug 31
Willet <i>Tringa semipalmata</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10669	Breeds elsewhere

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "[Supplemental Information on Migratory Birds and Eagles](#)", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

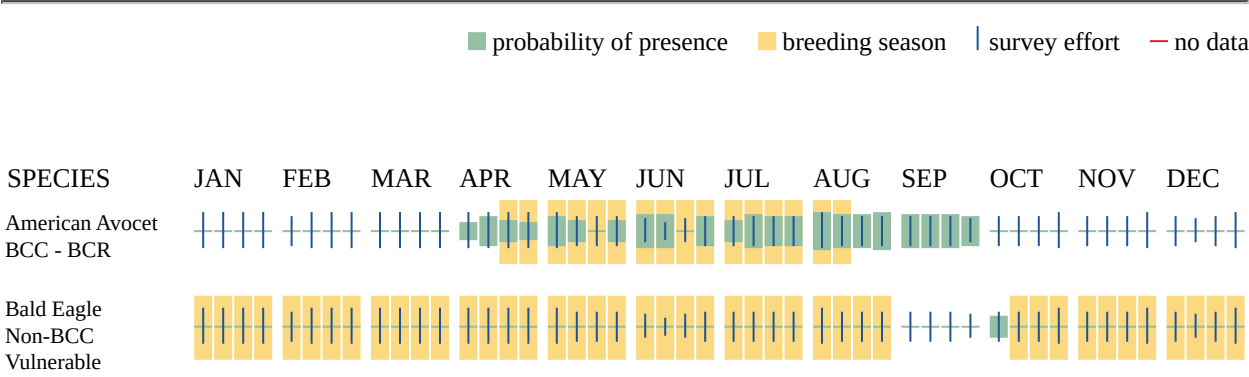
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

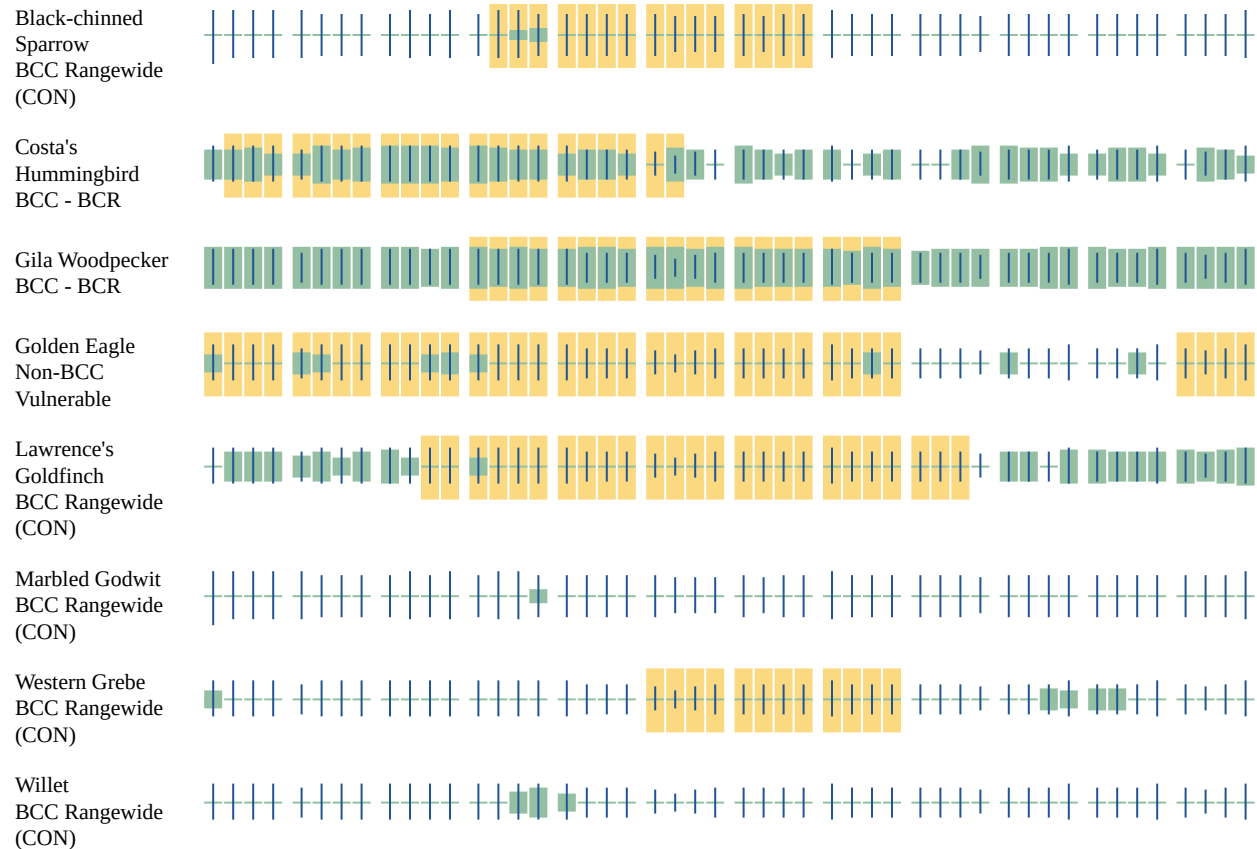
Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.





Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

WETLANDS

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

Project code: 2025-0154026

01/05/2026 13:21:09 UTC

RIVERINE

- R4SBC

IPAC USER CONTACT INFORMATION

Agency: Trileaf Corporation
Name: McKayla Grasham
Address: 303 International Circle, Suite 150
City: Hunt Valley
State: MD
Zip: 21030
Email: m.grasham@trileaf.com
Phone: 4108537128

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Federal Communications Commission

Arizona Environmental Online Review Tool Report



*Arizona Game and Fish Department Mission
To conserve Arizona's diverse wildlife resources and
manage for safe, compatible outdoor recreation
opportunities for current and future generations.*

Based on the project type entered, no further review is needed. Please review the entire report for project type and/or species recommendations for the location information entered. If you have questions about the project/species specific recommendations, please contact the Project Evaluation Program directly at PEP@azgfd.gov.

Project Name:

Abrego

Project Type:

Communication, Cell or communication tower including access roads, New tower within urban/developed lands

Project ID:

HGIS-26342

User Project Number:

770929

Project Description:

Our client proposes to construct a 75-foot monoecalyptus communications tower with an overall height of 80 feet, including attachments. Associated equipment will be located within a 48-foot by 48-foot (2,304 square feet) CMU wall compound in an overall 50-foot by 50-foot (2,500 square feet) lease area. The project includes a 20-foot wide access easement extending generally southeast away from the lease area approximately 0.38 miles toward South Abrego Drive. The project also includes one (1) proposed 6-foot wide utility easement extending northwest away from the lease area to a proposed fiber MMP and one (1) 10-foot wide utility easement extending north away from the lease area to an existing power source. The proposed location is currently undeveloped land.

Contact Person:

McKayla Ordak

Organization:

TRILEAF CORPORATION

On Behalf Of:

OTHER

Disclaimer:

1. This Environmental Review is based on the project study area that was entered. The report must be updated if the project study area, location, or the type of project changes.
2. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area. This review is also not intended to replace environmental consultation (including federal consultation under the Endangered Species Act), land use permitting, or the Departments review of site-specific projects.
3. The Departments Heritage Data Management System (HDMS) data is not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. HDMS data contains information about species occurrences that have actually been reported to the Department. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.
4. Arizona Wildlife Conservation Strategy (AWCS), specifically Species of Greatest Conservation Need (SGCN), represent potential species distribution models for the State of Arizona which are subject to ongoing change, modification and refinement. The status of a wildlife resource can change quickly, and the availability of new data will necessitate a refined assessment.

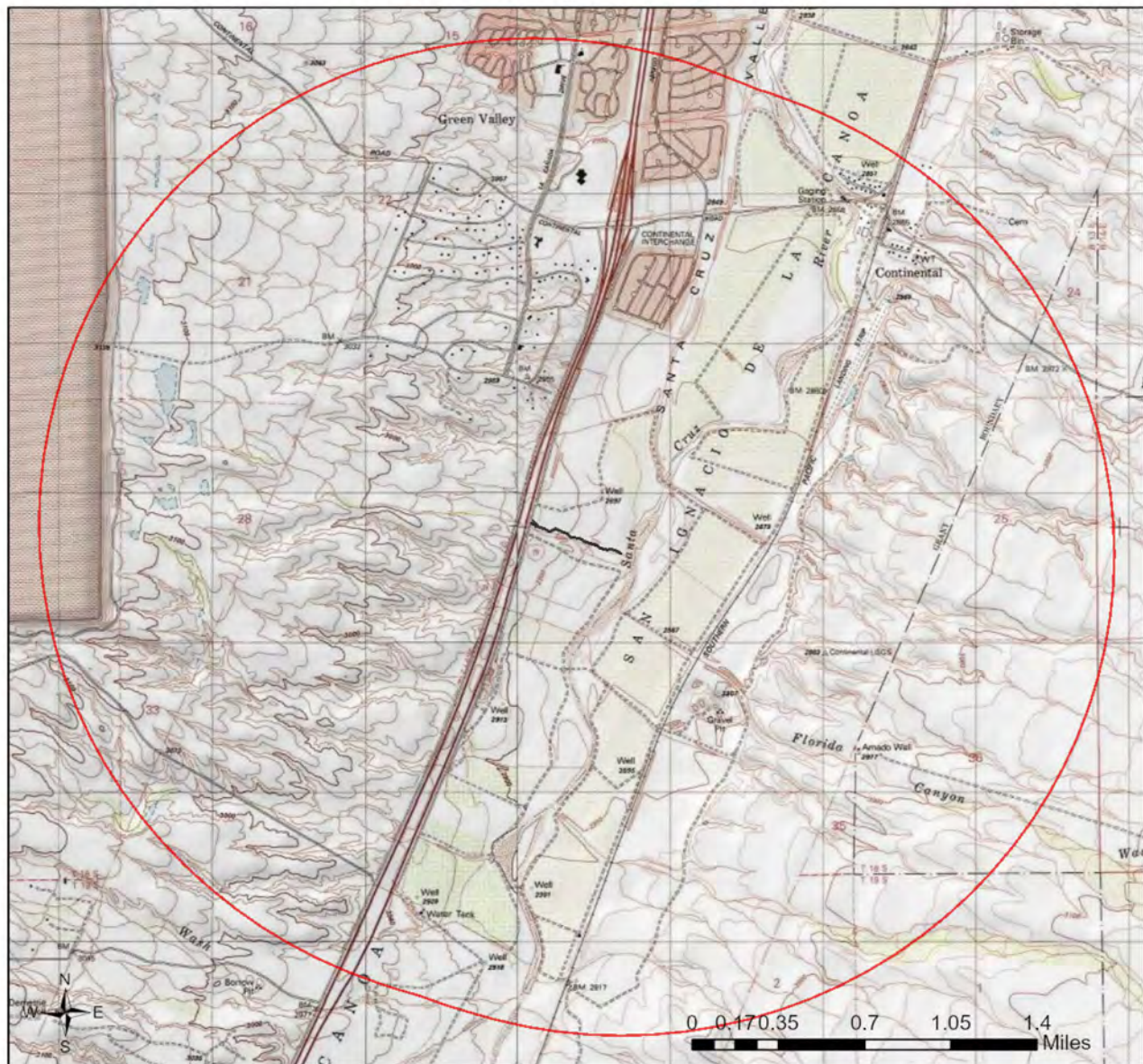
Locations Accuracy Disclaimer:

Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Report is solely responsible for the project location and thus the correctness of the Project Review Report content.

Recommendations Disclaimer:

1. The Department is interested in the conservation of all fish and wildlife resources, including those species listed in this report and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.
2. Recommendations have been made by the Department, under authority of Arizona Revised Statutes Title 5 (Amusements and Sports), 17 (Game and Fish), and 28 (Transportation).
3. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project. These recommendations are preliminary in scope, designed to provide early considerations on all species of wildlife.
4. Making this information directly available does not substitute for the Department's review of project proposals, and should not decrease our opportunity to review and evaluate additional project information and/or new project proposals.
5. Further coordination with the Department requires the submittal of this Environmental Review Report with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map). Once AGFD had received the information, please allow 30 days for completion of project reviews. Send requests to:
Project Evaluation Program, Habitat Branch
Arizona Game and Fish Department
5000 West Carefree Highway
Phoenix, Arizona 85086-5000
Phone Number: (623) 236-7600
Fax Number: (623) 236-7366
Or
PEP@azgfd.gov
6. Coordination may also be necessary under the National Environmental Policy Act (NEPA) and/or Endangered Species Act (ESA). Site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies.

Abrego USA Topo Basemap With Locator Map



- Buffered Project Boundary
- Project Boundary

Project Size (acres): 0.67

Lat/Long (DD): 31.8327 / -110.9965

County(s): Pima

AGFD Region(s): Tucson

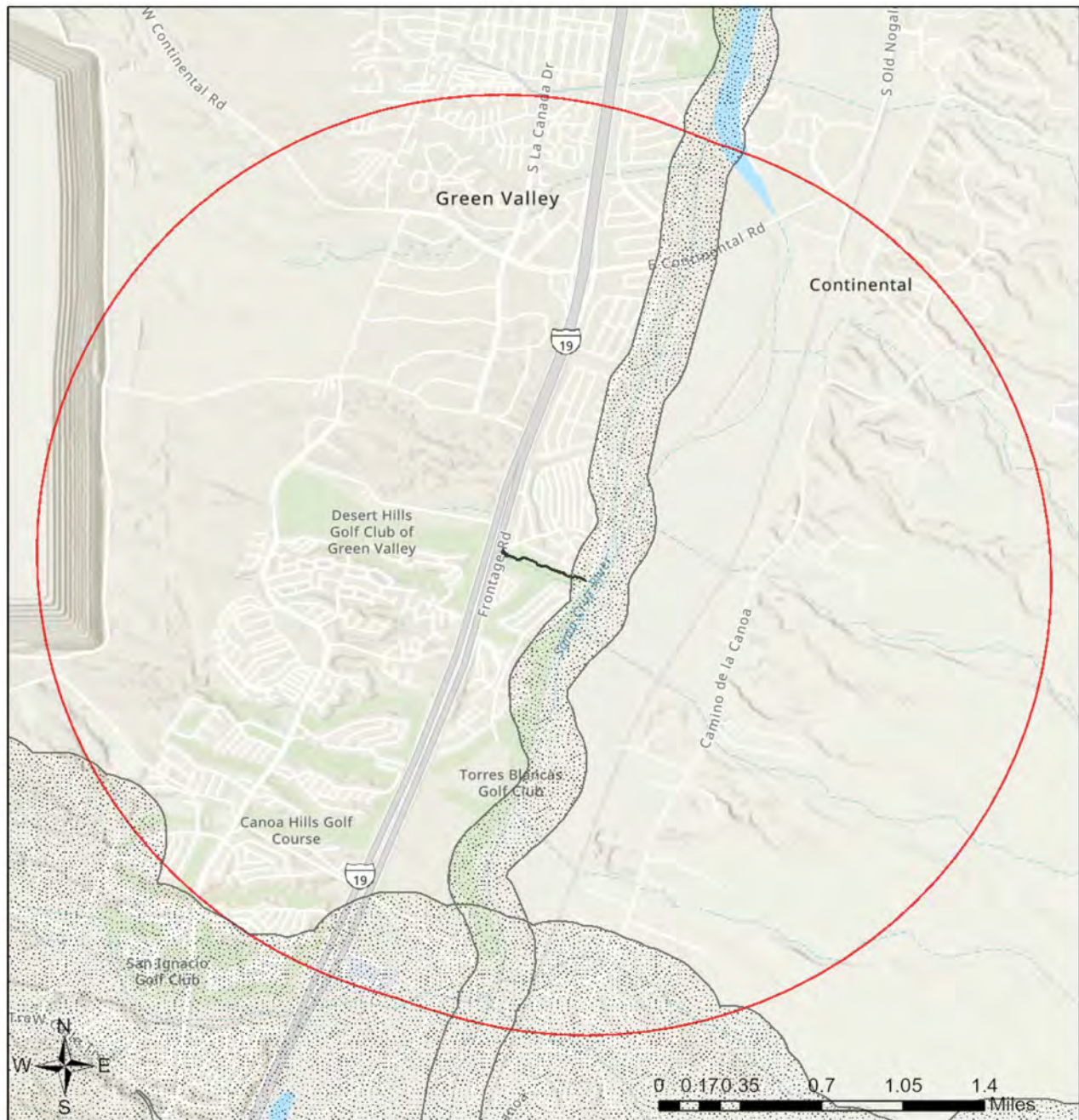
Township/Range(s):

USGS Quad(s): GREEN VALLEY

County of Yavapai, Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS
Copyright:© 2013 National Geographic Society, i-cubed
Esri, USGS



Abrego Important Areas



- Buffered Project Boundary
- Project Boundary
- Important Bird Areas
- Critical Habitat
- Pinal County Riparian
- Wildlife Connectivity

Project Size (acres): 0.67

Lat/Long (DD): 31.8327 / -110.9965

County(s): Pima

AGFD Region(s): Tucson

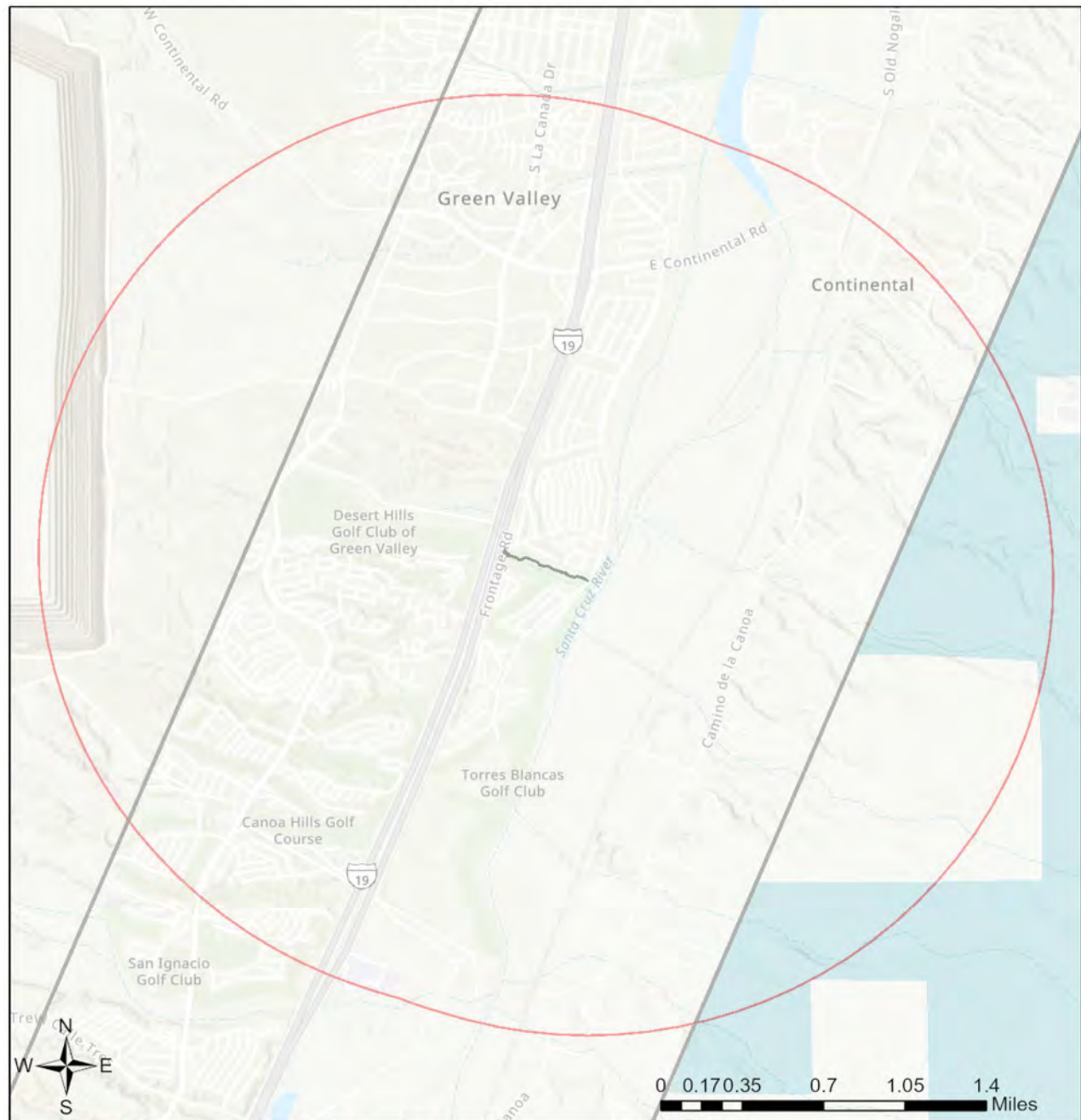
Township/Range(s):

USGS Quad(s): GREEN VALLEY

CONANP, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc., METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA, USFWS, Esri, NASA, NGA, USGS, FEMA

Abrego

Township/Ranges and Land Ownership



- Buffered Project Boundary
- Project Boundary
- AZ Game & Fish Dept.
- BLM
- BOR
- Indian Res.
- Military

- Mixed/Other
- National Park/Mon.
- Private
- State & Regional Parks
- State Trust
- US Forest Service
- Wildlife Area/Refuge
- Township/Ranges

Project Size (acres): 0.67

Lat/Long (DD): 31.8327 / -110.9965

County(s): Pima

AGFD Region(s): Tucson

Township/Range(s):

USGS Quad(s): GREEN VALLEY

CONANP, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA, USFWS
Esri, NASA, NGA, USGS, FEMA

Special Status Species Documented within 2 Miles of Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Chilomeniscus cinctus	Banded Sandsnake					2
Coryphantha scheeri var. robustispina	Pima Pineapple Cactus	LE		S		
Coryphantha scheeri var. robustispina	Pima Pineapple Cactus	LE		S	HS	
Heloderma suspectum	Gila Monster					1
Incilius alvarius	Sonoran Desert Toad					2
Lepus alleni	Antelope Jackrabbit					2
Melospiza aberti	Abert's Towhee		S			2
Micruroides euryxanthus	Sonoran Coralsnake					2
Parabuteo unicinctus	Harris's Hawk					2
Peucaea carpalis	Rufous-winged Sparrow					2
Phrynosoma solare	Regal Horned Lizard					2
Phyllorhynchus browni	Saddled Leaf-nosed Snake					2

Note: Status code definitions can be found at <https://www.azgfd.com/wildlife-conservation/on-the-ground-conservation/state-wildlife-action-plan/state-wildlife-action-plan-status-definitions/>.

Special Areas Documented that Intersect with Project Footprint as Drawn

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Santa Rita - Tumacacori Linkage Design	Wildlife Connectivity					
Santa Rita Wildlife Areas	Conservation Opportunity Area					

Note: Status code definitions can be found at <https://www.azgfd.com/wildlife-conservation/on-the-ground-conservation/state-wildlife-action-plan/state-wildlife-action-plan-status-definitions/>.

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Ammodramus savannarum perpallidus	Western Grasshopper Sparrow					2
Anthus spragueii	Sprague's Pipit					2
Anurostomus ridgwayi	Buff-collared Nightjar		S			2
Aquila chrysaetos	Golden Eagle	BGA		S		2
Asio otus	Long-eared Owl					2
Aspidoscelis sonora	Sonoran Spotted Whiptail					2
Athene cunicularia hypugaea	Western Burrowing Owl		S	S		2
Auriparus flaviceps	Verdin					2
Botaurus lentiginosus	American Bittern					2
Buteo regalis	Ferruginous Hawk			S		2
Buteo swainsoni	Swainson's Hawk					2

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
<i>Buteogallus anthracinus</i>	Common Black Hawk					2
<i>Calcarius ornatus</i>	Chestnut-collared Longspur					2
<i>Callipepla squamata</i>	Scaled Quail					2
<i>Calypte costae</i>	Costa's Hummingbird					2
<i>Camptostoma imberbe</i>	Northern Beardless-Tyrannulet		S			2
<i>Campylorhynchus brunneicapillus</i>	Cactus Wren					2
<i>Catharus ustulatus</i>	Swainson's Thrush					2
<i>Chaetodipus baileyi</i>	Bailey's Pocket Mouse					2
<i>Chilomeniscus cinctus</i>	Variable Sandsnake					2
<i>Choeronycteris mexicana</i>	Mexican Long-tongued Bat		S	S		2
<i>Chordeiles minor</i>	Common Nighthawk					2
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo (Western DPS)	LT	S	S		1
<i>Colaptes chrysoides</i>	Gilded Flicker			S		2
<i>Coluber bilineatus</i>	Sonoran Whipsnake					2
<i>Columbina inca</i>	Inca Dove					2
<i>Corvus cryptoleucus</i>	Chihuahuan Raven					2
<i>Corynorhinus townsendii pallescens</i>	Pale Townsend's Big-eared Bat		S	S		1
<i>Crotalus tigris</i>	Tiger Rattlesnake					2
<i>Cynanthus latirostris</i>	Broad-billed Hummingbird		S			2
<i>Empidonax wrightii</i>	Gray Flycatcher					2
<i>Eumops perotis californicus</i>	Greater Western Bonneted Bat			S		2
<i>Falco mexicanus</i>	Prairie Falcon					2
<i>Falco peregrinus anatum</i>	American Peregrine Falcon		S	S		1
<i>Falco sparverius</i>	American Kestrel					2
<i>Gastrophryne mazatlanensis</i>	Sinoloan Narrow-mouthed Toad			S		2
<i>Glaucidium brasilianum cactorum</i>	Cactus Ferruginous Pygmy-owl	LT	S	S		1
<i>Gopherus morafkai</i>	Sonoran Desert Tortoise	CCA	S	S		1
<i>Haemorhous cassinii</i>	Cassin's Finch					2
<i>Heloderma suspectum</i>	Gila Monster					1
<i>Icterus bullockii</i>	Bullock's Oriole					2
<i>Icterus cucullatus</i>	Hooded Oriole					2
<i>Icterus parisorum</i>	Scott's Oriole					2
<i>Incilius alvarius</i>	Sonoran Desert Toad					2
<i>Kinosternon sonoriense sonoriense</i>	Desert Mud Turtle			S		2
<i>Lanius ludovicianus</i>	Loggerhead Shrike					2
<i>Lasiurus cinereus</i>	Hoary Bat					2
<i>Lasiurus frantzii</i>	Desert Red Bat		S			2
<i>Lasiurus xanthinus</i>	Western Yellow Bat		S			2
<i>Leptonycteris yerbabuenae</i>	Lesser Long-nosed Bat			S		1

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Lepus alleni	Antelope Jackrabbit					2
Megascops kennicottii	Western Screech-owl					2
Melanerpes uropygialis	Gila Woodpecker					2
Melospiza lincolni	Lincoln's Sparrow					2
Melospiza aberti	Abert's Towhee		S			2
Micrathene whitneyi	Elf Owl					3
Micruroides euryxanthus	Sonoran Coralsnake					2
Myadestes townsendi	Townsend's Solitaire					2
Myotis auriculus	Southwestern Myotis					2
Myotis velifer	Cave Myotis			S		2
Myotis yumanensis	Yuma Myotis					2
Notiosorex cockrumi	Cockrum's Desert Shrew					2
Nyctinomops femorosaccus	Pocketed Free-tailed Bat					2
Nyctinomops macrotis	Big Free-tailed Bat					2
Parabuteo unicinctus	Harris's Hawk					2
Passerculus sandwichensis	Savannah Sparrow					2
Perognathus amplus	Arizona Pocket Mouse					2
Peucaea carpalis	Rufous-winged Sparrow					2
Phrynosoma solare	Regal Horned Lizard					2
Phyllorhynchus browni	Saddled Leaf-nosed Snake					2
Poocetes gramineus	Vesper Sparrow					2
Progne subis hesperia	Desert Purple Martin			S		2
Rana yavapaiensis	Lowland Leopard Frog		S	S		1
Sigmodon arizonae cienegae	Arizona Cotton Rat					2
Spizella breweri	Brewer's Sparrow					2
Tadarida brasiliensis	Brazilian Free-tailed Bat					2
Terrapene ornata	Ornate Box Turtle			S		1
Thomomys umbrinus intermedius	Southern Pocket Gopher					2
Toxostoma bendirei	Bendire's Thrasher					2
Troglodytes pacificus	Pacific Wren					2

Species of Economic and Recreation Importance Predicted that Intersect with Project Footprint as Drawn

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Callipepla gambelii	Gambel's Quail					
Odocoileus hemionus	Mule Deer					
Pecari tajacu	Javelina					
Puma concolor	Mountain Lion					
Zenaidura macroura	White-winged Dove					
Zenaidura macroura	Mourning Dove					

Species of Economic and Recreation Importance Predicted that Intersect with Project Footprint as Drawn

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
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Project Type: Communication, Cell or communication tower including access roads, New tower within urban/developed lands

Project Type Recommendations:

Consider impacts of outdoor lighting on wildlife and develop measures or alternatives that can be taken to increase human safety while minimizing potential impacts to wildlife. Artificial lighting could impair the ability of nocturnal animals to navigate (e.g., owls, migratory birds, bats, and other nocturnal mammals) and may affect wildlife behavior and populations. The AZGFD recommends using only the minimum amount of light needed for safety, especially in areas immediately adjacent to open space or undeveloped lands. The AZGFD encourages the use of motion sensing lighting and narrow spectrum lighting (amber or warm tones typically 2700 Kelvin or lower) wherever possible to lower the range of species affected by lighting. Also, please consider shielding, canting, or cutting all lighting, where possible, to ensure that light reaches only areas needing illumination and to minimize impacts to nocturnal wildlife.

Consider tower designs and/or modifications that reduce or eliminate impacts to migratory birds (i.e. free standing with no guy wires, no more than 199 feet above ground level, minimally lighted structures). If the tower will be guyed, install Aircraft Warning Markers (AWMs) near the tops of all outer guy wires to increase visibility to pilots. It is recommended that Bird Flight Diverters (BFDs) are also installed at regular intervals along the full length of all outer guy wires to increase visibility of wires to birds. Please refer to the U.S. Fish and Wildlife Service's (USFWS) [Recommended Best Practices for Communication Tower Design, Siting, Construction, Operation, Maintenance, and Decommissioning](https://www.fws.gov/media/recommended-best-practices-communication-tower-design-siting-construction-operation) (<https://www.fws.gov/media/recommended-best-practices-communication-tower-design-siting-construction-operation>.)

Minimize the potential introduction or spread of exotic invasive species, including aquatic and terrestrial plants, animals, insects and pathogens. Precautions should be taken to wash and/or decontaminate all equipment utilized in the project activities before entering and leaving the site. See the Arizona Department of Agriculture website for a list of prohibited and restricted noxious weeds at <https://www.invasivespeciesinfo.gov/> and the Arizona Native Plant Society <https://aznps.com/invas> for recommendations on how to control these species. To view a list of documented invasive species or to report invasive species in or near your project area visit [iMapInvasives](https://www.invasivespeciesinfo.gov/) - a national cloud-based application for tracking and managing invasive species at <https://imap.natureserve.org/imap/services/page/map.html>.

- To build a list: zoom to your area of interest, use the identify/measure tool to draw a polygon around your area of interest, and select "See What's Here" for a list of reported species. To export the list, you must have an account and be logged in. You can then use the export tool to draw a boundary and export the records in a csv file.

The AZGFD recommends that wildlife surveys are conducted to determine if noise-sensitive species, such as birds or mammals, occur within the project area. Avoidance or minimization measures could include conducting project activities outside of breeding seasons.

The AZGFD recommends that a qualified biologist conduct a survey for nesting birds within the project area prior to removal or trimming of trees/vegetation, if the removal or trimming occurs during the breeding season (the Project Evaluation Program can be contacted at PEP@azgfd.gov or 623-236-7600 to determine the appropriate breeding season within the project area). Trees and/or vegetation within the project area may provide nesting opportunities for avian species that are regulated under the Migratory Bird Treaty Act (MBTA) and protected under state law. If it is anticipated the project will not be in compliance with MBTA, the AZGFD recommends contacting the U.S. Fish and Wildlife Service (<https://www.fws.gov/office/arizona-ecological-services>) for technical assistance. The USFWS will provide options to comply with the MBTA.

The AZGFD recommends revegetating disturbed areas with native drought-tolerant species that represent the natural surrounding landscape. Landscaping with native plants can help support wildlife and pollinator species in the area while reducing dust and erosion. In addition, the applicable land management agencies should be consulted regarding guidelines for revegetation efforts. The AZGFD also recommends the development of a short and long-term monitoring plan, including adaptive management guidelines to address invasive species control and maintain native vegetation.

Project Location and/or Species Recommendations:

Analysis indicates that your project is located in the vicinity of an identified **wildlife habitat linkage corridor**. The **Arizona Missing Linkages** represent ideal connections within or between intact blocks or core habitats. The blocks are currently disconnected or isolated and the linkages should be examined for improving permeability, or are currently intact and in need of preservation and/or enhancement. The reports provide recommendations for opportunities to preserve or enhance permeability. Project planning and implementation efforts should focus on maintaining and improving opportunities for wildlife permeability. For information pertaining to the linkage assessment and wildlife species that may be affected, please refer to: <https://www.azgfd.com/wildlife/planning/habitatconnectivity/identifying-corridors/>. Please contact the Project Evaluation Program (pep@azgfd.gov) for specific project recommendations.

HDMS records indicate that one or more native plants listed on the **Arizona Native Plant Law and Antiquities Act** have been documented within the vicinity of your project area. Please contact:

Arizona Department of Agriculture

1688 W Adams St.

Phoenix, AZ 85007

Phone: 602.542.4373

<https://agriculture.az.gov/sites/default/files/Native%20Plant%20Rules%20-%20AZ%20Dept%20of%20Ag.pdf> starts on page 44

Analysis indicates that your project is located in the vicinity of an identified **Conservation Opportunity Area (COA)**. While there are many areas in Arizona that present abundant conservation opportunities, COAs are specific areas on the landscape that the Department identified as having the greatest potential for conservation efforts. COAs were identified using species and habitat data, the presence of unique landscape features, and Departmental expertise. COAs range in size, scope, and focal species and/or habitats and are strictly a non-regulatory conservation tool for the public and our conservation partners to consider. For more information regarding this particular COA near your project area and the Department's suggestions for potential conservation efforts, please visit the COA profile at <https://awcs.azgfd.com/conservation-opportunity-areas>.



SUNRISE POINTE HOMEOWNERS ASSOCIATION, INC.
P.O. BOX 862
GREEN VALLEY, AZ 85622

May 22, 2026

SUBJECT: Proposed Cell Tower, Case P26CU00005

Dear Pima County Planning Commission Officials:

The purpose of this letter is to document, in the strongest terms possible, Sunrise Pointe HOA support for the proposed cell tower. The Sunrise Pointe Board of Directors has been engaged with Pacific Coast Towers President Jeffrey Langdon and Commscapes, LLC Representative Todd Doust for nearly one year.

At our November 2025 HOA Board Meeting, Mr. Langdon and Mr. Doust provided an informational briefing to our homeowners about the tower, the process and related details, to include an extensive Question and Answer session. They also provided numerous "before and after" photos taken from various vantage points in and around our HOA. Mr. Langdon and Mr. Doust were very forthcoming and transparent about all the details, both at the informational briefing and in subsequent dealings with members of the HOA Board.

As the most affected HOA in the area, we look forward to improved cellular communications in our neighborhood and believe that we have developed a plan for an easement through our property to the tower that will minimize any aesthetic impacts and inconveniences to our homeowners.

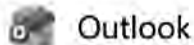
The sale of the small piece of property for the easement will be subject to a two-thirds vote of our homeowners. I am extremely confident that our homeowners see the benefits of this proposal and will vote in favor.

Please contact me directly by email at president@srphoa.com, or by mobile phone at 503-269-9405, should you have any questions or concerns about our support for this important project to improve cellular communications for our Senior Citizen homeowners.

Sincerely,

Cameron A. Crawford

President, Sunrise Pointe Homeowners Association, Inc.



Case #P26CU00005

From judygemail-gvaz@yahoo.com <judygemail-gvaz@yahoo.com>

Date Fri 5/22/2026 2:53 PM

To DSD Planning <DSDPlanning@pima.gov>

You don't often get email from judygemail-gvaz@yahoo.com. [Learn why this is important](#)

CAUTION: This message and sender come from outside Pima County. If you did not expect this message, proceed with caution. Verify the sender's identity before performing any action, such as clicking on a link or opening an attachment.

I am writing in regards to a notice I received about the cell phone tower being considered on Torres Blancas Golf Course.

I think it is important for a meeting to be held in Green Valley. We are a retirement community and many people here do not drive or no longer drive to Tucson.

Many homeowners in Green Valley are only part-time residents and may not have received the notice sent to their Green Valley address in time to participate or make their concerns known.

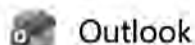
I am not in favor of the cell tower because I feel it will negatively affect the property value of our homes especially for Sunrise Pointe HOA.

Property Devaluation

- **Marketability:** Realtors and studies indicate that visible cell towers can reduce home property values by up to **20% to 30%**.
- **Buyer Avoidance:** Surveys suggest a vast majority of homebuyers (up to 94%) are less interested in properties near towers due to visual and perceived health concerns.
- **Economic Impact:** Significant devaluation can lead to decreased property tax revenue for local municipalities.

I would like to virtually participate in the meeting via Teams so I am requesting a meeting invitation.

Thank you for your consideration,
Jeffrey Peterson



We "OPPOSE" Case #P26CU00005 concerning Cell Tower

From grizzz2004-bb@yahoo.com <grizzz2004-bb@yahoo.com>

Date Sat 5/23/2026 12:16 PM

To DSD Planning <DSDPlanning@pima.gov>

You don't often get email from grizzz2004-bb@yahoo.com. [Learn why this is important](#)

CAUTION: This message and sender come from outside Pima County. If you did not expect this message, proceed with caution. Verify the sender's identity before performing any action, such as clicking on a link or opening an attachment.

Dear Pima County Development Services,

1st of ALL,

Why did you wait so long before you reached out to those in the "Notification Area" making it almost assured that most residents would not have a chance to respond. So any of those homeowners in proposed Green Valley area are snowbirds and may have a hard time receiving your notice in a timely manner that you sent to their Green Valley addresses in time to participate or make their concerns known !!

You may have concocted that you followed legal requirements, but wouldn't have been more ethical and appropriate to give those who live in your area the chance to respond. It seems you may have already decided on the outcome by your actions.

2nd,

Again, it seems that it would have been more ethical and appropriate to have a meeting held in Green Valley where the actual residents live where the proposed cell tower is to be located. We are a retirement community and many, many residents here are not able to drive all the way to Tucson because of safety or other concerns of no longer drive to Tucson.

3rd,

Why did you not post a notice for this in the GREEN VALLEY Newspaper, where all the residents in your Notification area live and the area where the proposed cell tower is to be built. This could be seen to be an obvious intent to not make aware this proposal to the very residents it will impact.

Why would you not want to make it locally aware to the residents in the actual proposal area ?

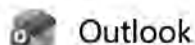
4th,

I am writing in regards to the cell phone tower being proposed in our neighborhood in Green Valley, because historically across our nation it has negatively affected property values close to cell towers and because it typically discourages buyers from making offers or they offer lower prices because of this.

Property Devaluation

- **Marketability:** Realtors and studies indicate that visible cell towers can reduce home property values by up to **20% to 30%**.
- **Buyer Avoidance:** Surveys suggest a vast majority of homebuyers (up to 94%) are less interested in properties near towers due to visual and perceived health concerns.
- **Economic Impact:** Significant devaluation can lead to decreased property tax revenue for local municipalities.

Thank you for your consideration,
J. Goette



DOCUMENTED FactsOPPOSing Case #P26CU00005 concerning Cell Tower affecting Home Values !!!!

From grizzz2004-bb@yahoo.com <grizzz2004-bb@yahoo.com>

Date Tue 5/26/2026 6:26 AM

To DSD Planning <DSDPlanning@pima.gov>

 2 attachments (3 MB)

Bond and Wang - The Impact of Cell Phone Towers on House Prices in-1.pdf; Filippova and Rehm - 2011 - The impact of proximity to cell phone towers on re.pdf;

You don't often get email from grizzz2004-bb@yahoo.com. [Learn why this is important](#)

CAUTION: This message and sender come from outside Pima County. If you did not expect this message, proceed with caution. Verify the sender's identity before performing any action, such as clicking on a link or opening an attachment.

Dear Pima County Development Services,

Attached are several files documenting the NEGATIVE EFFECTS OF CELL TOWERS ON Pima County Home Owner Values !

The attached documents show historically Cell Towers negatively affected property values close to cell towers and because it typically discourages buyers from making offers or they offer lower prices because of this.

Property Devaluation

- **Marketability:** Realtors and studies indicate that visible cell towers can reduce home property values by up to **20% to 30%**.
- **Buyer Avoidance:** Surveys suggest a vast majority of homebuyers (up to 94%) are less interested in properties near towers due to visual and perceived health concerns.
- **Economic Impact:** Significant devaluation can lead to decreased property tax revenue for local municipalities.

Thank you for your consideration,
J. Goette

features

The Impact of Cell Phone Towers on House Prices in Residential Neighborhoods

by Sandy Bond, PhD, and Ko-Kang Wang

abstract

This article examines whether proximity to cellular phone towers has an impact on residential property values and the extent of any impact. First, a survey approach is used to examine how residents perceive living near cellular phone base stations (CPBSs) and how residents evaluate the impacts of CPBSs. Next, a market study attempts to confirm the perceived value impacts reported in the survey by analyzing actual property sales data. A multiple regression analysis in a hedonic pricing framework is used to measure the price impact of proximity to CPBSs. Both the survey and market sales analysis find that CPBSs have a negative impact on the prices of houses in the study areas.

The introduction of cellular phone systems and the rapid increase in the number of users of cellular phones have increased exposure to electromagnetic fields (EMFs). Health consequences of long-term use of cellular phones are not known in detail, but available data indicates that development of nonspecific health symptoms is possible.¹ Conversely, it appears health effects from cellular phone equipment (antennas and base stations) pose few, if any, known health hazards.²

A concern associated with cellular phone usage is the siting of cellular phone transmitting antennas (CPTAs) and cellular phone base stations (CPBSs). In New Zealand, CPBS sites are increasingly in demand as the major cellular phone companies there, Telecom and Vodafone, upgrade and extend their network coverage. This demand could provide the owner of a well-located property a yearly income for the siting of a CPBS.³ However, new technology that represents potential hazards to human health and safety may cause property values to diminish due to public perceptions of hazards. Media attention to the potential health hazards of CPBSs has spread concerns among the public, resulting in increased resistance to CPBS sites.

Some studies suggest a positive correlation between long-term exposure to the electromagnetic fields and certain types of cancer,⁴ yet other studies report inconclusive results on health effects.⁵ Notwithstanding the research results, media reports indicate that the extent of opposition from some property owners

1. Stanislaw Szmigielski and Elizbieta Sobiczewska, "Cellular Phone Systems and Human Health—Problems with Risk Perception and Communication," *Environmental Management and Health* 11, no. 4 (2000): 352–368.
2. Jerry R. Barnes, "Cellular Phones: Are They Safe?" *Professional Safety* 44, no. 12 (Dec. 1999): 20–23.
3. R. Williams, "Phone Zone—Renting Roof Space to Ma Bell," *The Property Business* 12 (April 2001): 6–7.
4. C. M. Krause et al., "Effects of Electromagnetic Field Emitted by Cellular Phones on the EEG During a Memory Task," *Neuroreport* 11, no. 4 (2000): 761–764.
5. Independent Expert Group on Mobile Phones, *Mobile Phones and Health* (Report to the United Kingdom Government, 2000), <http://www.iegmp.org.uk>.

affected by the siting of CPBSs remains strong.⁶ However, the extent to which such attitudes are reflected in lower property values for homes located near CPBSs is not known.

Understanding the impact of CPBSs on property values is important to telecommunications companies both for planning the siting of CPBSs and for determining likely opposition from property owners. Similarly, property appraisers need to understand the valuation implications of CPBSs when valuing CPBS-affected property. The owners of affected property also want to understand the magnitude of any effects, particularly if compensation claims or an award for damages are to be made based on any negative effects on value.

The research here uses a case study approach to determine residents' perceptions towards living near CPBSs in Christchurch, New Zealand, and to quantify these effects in monetary terms according to an increasing or decreasing percentage of property value. The case study uses both an opinion survey and an econometric analysis of sales transaction data. A comparison of the results can be used to help appraisers value affected property as well as to resolve compensation issues and damage claims in a quantitative way. Further, the results provide a potential source of information for government agencies in assessing the necessity for increased information pertaining to CPBSs.

The following provides a brief review of the cellular phone technology and relevant literature. Then, the next section describes the research procedure used, including descriptions of the case study and control areas. The results are then discussed, and the final section provides a summary and conclusion.

Cellular Telephone Technology⁷

Cellular (mobile) telephones are sophisticated two-way radios that use ultrahigh frequency (UHF) radio waves to communicate information. The information is passed between a mobile phone and a network of low-powered transceivers, called mobile phone sites or cell sites. As mobile sites are very low powered they serve only a limited geographic area (or "cell"), varying from a few hundred meters to several kilometers; they can handle only a limited number of calls at one time. When a mobile phone

user on the move leaves one cell and enters another, the next site automatically takes over the call, allowing contact to be maintained.

When a mobile phone call is initiated, the phone connects to the network by using radio signals to communicate with the nearest mobile phone site. The mobile phone sites in a network are interlinked by cable or microwave beam, enabling phone calls to be passed from one cell to another automatically. A mobile phone site is typically made up of a mast with antennas connected to equipment stored in a cabinet. Power is fed into the cabinet by underground cable. The antennas are designed to transmit most of the signal away horizontally, or just below horizontally, rather than at steep angles to the ground.

Mobile phone sites can only accommodate a limited number of calls at any one time. When this limit is reached, the mobile phone signal is transferred to the next nearest site. If this site is full or is too far away, the call will fail.

Cell site capacity is a major issue for telecommunication companies. As the number of people using mobile phones grows, more and more cell sites are required to meet customer demand for reliable coverage. At the end of March 2002, Telecom had more than 1.3 million mobile phone customers and more than 750 mobile phone sites throughout New Zealand. Vodafone had over 1.1 million mobile phone customers.⁸ In areas, such as Auckland (the largest city in New Zealand, with close to a third of the NZ population), where almost complete coverage has been achieved, the main issue is ensuring that there is the capacity to handle the ever-increasing number of mobile phones and calls.

Locating Cellular Phone Sites

For cellular phone service providers, the main goals when locating cell sites are (1) finding a site that provides the best possible coverage in the area without causing interference with other cells, and (2) finding a site that causes the least amount of environmental impact on the surrounding area. Service providers usually attempt to locate cell sites on existing structures such as buildings, where antennas can be mounted on the roof to minimize the environmental impact. If this is not possible, a mast will need to be erected to support the antennas for the new cell site.

6. S. Fox, "Cell Phone Antenna Worries Family," *East & Bays Courier*, November 8, 2002, 1.

7. The information in this section was sourced from Telecom, <http://www.telecom.co.nz>; New Zealand Ministry for the Environment, <http://www.mfe.govt.nz>; and New Zealand Ministry of Health, <http://www.moh.govt.nz>.

8. Vodafone, "Cell Sites and the Environment," http://www.vodafone.co.nz/aboutus/vdfn_about_cellsites.pdf (accessed December 19, 2002) and "Mobile Phones and Health," http://www.vodafone.co.nz/aboutus/vdfn_about_health_and_safety.pdf (accessed December 19, 2002); and Telecom, "Mobile Phone Sites and Safety," <http://www.telecom.co.nz/content/0,3900,27116-1536,00.html> (accessed December 19, 2002).

Service providers prefer to locate cell sites in commercial or industrial areas due to the “resource consent” procedure required by the Resource Management Act 1991⁹ for towers located in residential areas.

Despite the high level of demand for better cell phone coverage, the location of cell sites continues to be a contentious issue. The majority of people want better cell phone coverage where they live and work, but they do not want a site in their neighborhood. Thus, cell sites in or near residential areas are of particular concern. Concerns expressed usually relate to health, property values, and visual impact.¹⁰

In general, uncertainties in the assessment of health risks from base stations are presented and distributed in reports by organized groups of residents who protest against siting of base stations. When the media publishes these reports it amplifies the negative bias and raises public concerns. According to Covello, this leads to incorrect assessment of risks and threats by the public, with a tendency to overestimate risks from base stations and neglect risks from the use of cell phones.¹¹

Assessment of Environmental Effects

Under the Resource Management Act 1991 (RMA), an assessment of environmental effects is required every time an application for resource consent is made. Information that must be provided includes “an assessment of any actual or potential effects that the activity may have on the environment, and the ways in which any adverse effects may be mitigated.”¹² An assessment of the environmental effects of cell sites would take into consideration such things as health and safety effects; visual effects; effects on the neighborhood; and interference with radio and television reception.

Radio Frequency and Microwave Emissions from CPBSs

According to the Ministry for the Environment, the factors that affect exposure to radiation are as follows:

- Distance. Increasing the distance from the emitting source decreases the radiation’s strength and decreases the exposure.

- Transmitter power. The stronger the transmitter, the higher the exposure.
- Directionality of the antenna. Increasing the amount of antennas pointing in a particular direction increases the transmitting power and increases the exposure.
- Height of the antenna above the ground. Increasing the height of an antenna increases the distance from the antenna and decreases the exposure.
- Local terrain. Increasing the intervening ridgelines decreases the exposure.¹⁵

The amount of radiofrequency power absorbed by the body (the dose) is measured in watts per kilogram, known as the specific absorption rate (SAR). The SAR depends on the power density in watts per square meter. The radio frequencies from cellular phone systems travel in a “line of sight.” The antennas are designed to radiate energy horizontally so that only small amounts of radio frequencies are directed down to the ground. The greatest exposures are in front of the antenna so that near the base of these towers, exposure is minimal. Further, power density from the transmitter decreases rapidly as it moves away from the antenna. However, it should be noted that by initially walking away from the base, the exposure rises and then decreases again. The initial increase in exposure corresponds to the point where the lobe from the antenna beam intersects the ground.¹⁴

Health Effects

According to Szmigielski and Sobiczewska, the analogue phone system (using the 800–900 megahertz band) and digital phone system (using the 1850–1990 megahertz band) expose humans to electromagnetic field (EMF) emissions: radio frequency radiation (RF) and microwave radiation (MW), respectively. These two radiations are emitted from both cellular phones and CPBSs.¹⁵

For years cellular phone companies have assured the public that cell phones are safe. They state that the particular set of radiation parameters associated with cell phones is the same as any other ra-

9. The Resource Management Act 1991 is the core of the legislation intended to help achieve sustainability in New Zealand; see <http://www.mfe.govt.nz/laws/rma>.

10. Szmigielski and Sobiczewska; and Barnes.

11. Vincent T. Covello, “Risk Perception, Risk Communication, and EMF Exposure: Tools and Techniques for Communicating Risk Information,” in *Risk Perception, Risk Communication and Its Application to EMF Exposure: Proceedings of the World Health Organization and ICNIRP Conference*, ed. R. Matthes, J. H. Bernhardt, M. H. Repucholi, 179–214 (Munich, Germany, May 1998).

12. Section 88(4), (b), Resource Management Act 1991.

13. Ministry for the Environment and Ministry of Health, *National Guidelines for Managing the Effects of Radiofrequency Transmitters*, available at <http://www.mfe.govt.nz> and <http://www.moh.govt.nz> (accessed May 21, 2002).

14. Ibid.; and Szmigielski and Sobiczewska.

15. Szmigielski and Sobiczewska.

radio signal. However, reported scientific evidence challenges this view and shows that cell phone radiation causes various effects, such as altered brain activity, memory loss, and fatigue.¹⁶

According to Cherry, there is also strong evidence to conclude that cell sites are risk factors for certain types of cancer, heart disease, neurological symptoms and other effects.¹⁷ The main concerns related to EMF emissions from CPBSs are linked to the fact that radio frequency fields penetrate exposed tissues.

Public concern regarding both cell phones and CPBSs in many countries has led to establishment of independent expert groups to carry out detailed reviews of the research literature. Research on the health effects of exposures to RF are reviewed by, for instance, the NZ Radiation Laboratory, the World Health Organization, the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the Royal Society of Canada, and the UK Independent Expert Group on Mobile Phones. The reviews conclude that there are no clearly established health effects for low levels of exposure. Such exposures typically occur in publicly accessible areas around radio frequency transmitters. However, there are questions over the delayed effects of exposure.

While present medical and epidemiological studies reveal weak association between health effects and low-level exposures of RF/MW fields, controversy remains among scientists, producers, and the general public. Negative media attention has fuelled the perception of uncertainty over the health effects from cell phone systems. Further scientific or technological information is needed to allay fears of the public about cell phone systems.

Radio Frequency Radiation Exposure Standards
International Standards. The reviews of research on the health effects of exposures to RF have helped establish exposure standards that limit RF exposures to a safe level. Most standards—including those set by the ICNIRP, the American National Standards Institute (ANSI), and New Zealand—are based on the most-adverse potential effects.

The 1998 ICNIRP guidelines have been accepted by the world's scientific and health communities; these guidelines are both consistent with other stated standards and published by a highly respected and independent scientific organization. The ICNIRP is responsible for providing guidance and advice on the health hazards of nonionizing radiation for the World Health Organization (WHO) and the International Labour Office.¹⁸

The New Zealand Standard. In New Zealand, when a mobile phone site is being planned, radio frequency engineers calculate the level of electromagnetic energy (EME) that will be emitted by the site. The level of EME is predicted by taking into account factors such as power output, cable loss, antenna gain, path loss, and height and distance from the antenna. These calculations allow engineers to determine the maximum possible emissions in a worst-case scenario, i.e., as if the site was operated at maximum power all the time. The aim is to ensure that EME levels are below international and NZ standards in areas where the general public has unrestricted access.

All mobile phone sites in New Zealand must comply in all respects with the NZ standard for radio frequency exposures.¹⁹ This standard is the same as used in most European countries, and is more stringent than that used in the United States, Canada, and Japan. Some local communities in New Zealand have even lower exposure-level standards; however, in reality mobile phone sites only operate at a fraction of the level set by the NZ standard. The National Radiation Laboratory has measured exposures around many operating cell sites, and maximum exposures in publicly accessible areas around the great majority of sites are less than 1% of the exposure limit of the NZ standard. Exposures are rarely more than a few percent of the limit, and none have been above 10%.

Court Decisions

Two court cases in New Zealand have alleged adverse effects due to CPBSs: *McIntyre v. Christchurch City*

16. K. Mann and J. Röschke, "Effects of Pulsed High-Frequency Electromagnetic Fields on Human Sleep," *Neuropsychobiology* 33, no. 1 (1996): 41–47; Krause et al.; Alexander Borbely et al., "Pulsed High-Frequency Electromagnetic Field Affects Human Sleep and Sleep Electroencephalogram," *Neurosci Lett*, 275, no. 3 (1999): 207–210; L. Kelenyi et al., "Effects of Mobile GSM Radiotelephone Exposure on the Auditory Brainstem Response (ABR)," *Neurobiology* 7, no. 1 (1999): 79–81; B. Hocking, "Preliminary Report: Symptoms Associated with Mobile Phone Use," *Occup Med* 48, no. 6 (Sept. 1998): 357–360; and others as reported in Neil Cherry, *Health Effects Associated with Mobil Base Stations in Communities: The Need for Health Studies*, Environmental Management and Design Division, Lincoln University (June 8, 2000); <http://pages.britishlibrary.net/orange/cherryonbasestations.htm>.

17. Cherry.

18. Ministry for the Environment and Ministry of Health.

19. NZS 2772.1:1999, "Radiofrequency Fields Part I: Maximum Exposure Levels – 3kHz to 300GHz." This standard was based largely on the 1998 ICNIRP recommendations for maximum human exposure levels to radio frequency. The standard also includes a requirement for minimizing radio frequency exposure. See National Radiation Laboratory, *Cell Sites* (March 2001), 7; available at <http://www.nrl.moh.govt.nz/CellsiteBooklet.pdf>.

*Council*²⁰ and *Shirley Primary School v. Telecom Mobile Communications Ltd.*²¹ Very few cell site cases have actually proceeded to Environment Court hearings. In these two cases the plaintiffs claimed that there was a risk of adverse health effects from radio frequency radiation emitted from cell phone base stations and that the CPBSs had adverse visual effects.

In *McIntyre*, Bell South applied for resource consent to erect a CPBS. The activity was a noncomplying activity under the Transitional District Plan. Residents objected to the application. Their objections were related to the harmful health effects from radio frequency radiation. In particular, they argued it would be an error of law to decide, based on the present state of scientific knowledge, that there are no harmful health effects from low-level radio frequency exposure. It was also argued that the Resource Management Act contains a precautionary policy and also requires a consent authority to consider potential effects of low probability but high impact in reviewing an application.

The Planning Tribunal considered residents' objections and heard experts' opinions as to the potential health effects, and granted the consent, subject to conditions. It was found that there would be no adverse health effects from low levels of radiation from the proposed transmitter, not even effects of low probability but high potential impact.

In *Shirley Primary School*, Telecom applied to the Christchurch City Council for resource consent to establish, operate, and maintain a CPBS on land adjacent to the Shirley Primary School. This activity was a noncomplying activity under the Transitional District Plan. Again, the city council granted the consent subject to conditions. However, the school appealed the decision, alleging the following four adverse effects:

- Risk of adverse health effects from the radio frequency radiation emitted from the cell site
- Adverse psychological effects on pupils and teachers because of the perceived health risks
- Adverse visual effects
- Reduced financial viability of the school if pupils withdraw because of the perceived adverse health effects

The court concluded that the risk of the children or teachers at the school developing leukemia or other cancers from radio frequency radiation emitted by

the cell site is extremely low, and the risk to the pupils of developing sleep disorders or learning disabilities because of exposure to radio frequency radiation is higher, but still very small. Accordingly, the Telecom proposal was allowed to proceed.

In summary, the Environmental Court ruled that there are no established adverse health effects from the emission of radio waves from CPBSs and no epidemiological evidence to show this. The court was persuaded by the ICNIRP guidelines that risk of health effects from low-level exposure is very low and that the cell phone frequency imposed by the NZ standard is safe, being almost two and one-half times lower than that of the ICNIRP.

The court did concede that while there are no proven health effects, there was evidence of property values being affected by both of the health allegations. The court suggested that such a reduction in property values should not be counted as a separate adverse effect from, for example, adverse visual or amenities effects. That is, a reduction in property values is not an environmental effect in itself; it is merely evidence, in monetary terms, of the other adverse effects noted.

In a third case, *Goldfinch v. Auckland City Council*,²² the Planning Tribunal considered evidence on potential losses in value of the properties of objectors to a proposal for the siting of a CPBS. The court concluded that the valuer's monetary assessments support and reflect the adverse effects of the CPBS. Further, it concluded that the effects are more than just minor as the CPBS stood upon the immediately neighboring property.

Literature Review

While experimental and epidemiological studies have focused on the adverse health effects of radiation from the use of cell phones and CPBSs, few studies have been conducted to ascertain the impact of CPBSs on property values. Further, little evidence of property value effects has been provided by the courts. Thus, the extent to which opposition from property owners affected by the siting of CPBSs is reflected in lower property values is not well known in New Zealand.

Two studies have been conducted to ascertain the adverse health and visual effects of CPBSs on property values. Telecom commissioned Knight Frank (NZ) Ltd to undertake a study in Auckland in 1998/

20. NZRMA 289 (1996).

21. NZRMA 66 (1999).

22. NZRMA 97 (1996).

99 and commissioned Telfer Young (Canterbury) Ltd to undertake a similar study in Christchurch in 2001. Although the studies show that there is not a statistically significant effect on property prices where CPBSs are present,²³ the research in both cases involves only limited sales data analysis. Further, no surveys of residents' perceptions were undertaken, and the studies did not examine media attention to the sites and the impact this may have on saleability of properties in close proximity to CPBSs. Finally, as the sponsoring party to the research was a telecommunication company it is questionable whether the results are completely free from bias. Hence, the present study aims to help fill the research void on this contentious topic in an objective way.

CPBSs are very similar structures to high-voltage overhead transmission lines (HVOTLs); therefore it is worthwhile to review the body of literature on the property values effects of HVOTLs. The only recently published study in New Zealand on HVOTLs effects is by Bond and Hopkins.²⁴ Their research consists of both a regression analysis of residential property transaction data and an opinion survey to determine the attitudes and reactions of property owners in the study area toward living close to HVOTLs and pylons.

The results of the sales analysis indicate that having a pylon close to a particular property is statistically significant and has a negative effect of 20% at 10–15 meters from the pylon, decreasing to 5% at 50 meters. This effect diminishes to a negligible amount after 100 meters. However, the presence of a transmission line in the case study area has a minimal effect and is not a statistically significant factor in the sale prices.

The attitudinal study results indicate that nearly two-thirds of the respondents have negative feelings about the HVOTLs. Proximity to HVOTLs determines the degree of negativity: respondents living closer to the HVOTLs expressed more negative feelings towards them than those living farther away. It appears, however, from a comparison of the results, that the negative feelings expressed are often not reflected in the prices paid for such properties.

There have been a number of HVOTLs studies carried out in the United States and Canada. A major review and analysis of the literature by Kroll and Priestley indicates that in about half the studies, HVOTLs have not affected property values and in the rest of the studies there is a loss in property value between 2%–10%.²⁵ Kroll and Priestley are generally critical of most valuer-type studies because of the small number of properties included and the failure to use econometric techniques such as multiple regression analysis. They identify the Colwell study as one of the more careful and systematic analyses of residential impacts.²⁶ That study, carried out in Illinois, finds that the strongest effect of HVOTLs is within the first 15 meters, but the effect dissipates quickly with distance, disappearing beyond 60 meters.

A Canadian study by Des Rosiers, using a sample of 507 single-family house sales, finds that severe visual encumbrance due to a direct view of either a pylon or lines exerts a significant, negative impact on property values; however location adjacent to a transmission corridor may increase value.²⁷ This was particularly evident where the transmission corridor was on a well-wooded, 90-meter right-of-way. The proximity advantages include enlarged visual field and increased privacy. The decrease in value from the visual impact of the HVOTLs and pylons (on average between 5% and 10% of mean house value) tends to be cancelled out by the increase in value from proximity to the easement.

A study by Wolverton and Bottemiller²⁸ uses a paired-sale analysis of home sales in 1989–1992 to ascertain any difference in sale price between properties abutting rights-of-way of transmission lines (subjects) in Portland, Oregon; Vancouver, Washington; and Seattle, Washington; and those located in the same cities but not abutting transmission line rights-of-way (comparisons). Subjects sold during the study period were selected first; then a matching comparison was selected that was as similar to the subject as possible. The study results did not support a finding of a price effect from abutting an HVTL right-of-way. In their conclusion, the authors

23. Mark Dunbar, Telfer Young research valuer, personal communication with Bond, 2002. The results of these studies have not been made publicly known. The study by Knight Frank of Auckland was conducted by Robert Albrecht.

24. S. G. Bond and J. Hopkins, "The Impact of Transmission Lines on Residential Property Values: Results of a Case Study in a Suburb of Wellington, New Zealand," *Pacific Rim Property Research Journal* 6, no. 2 (2000): 52–60.

25. C. Kroll and T. Priestley, "The Effects of Overhead Transmission Lines on Property Values: A Review and Analysis of the Literature," Edison Electric Institute (July 1992).

26. Peter F. Colwell, "Power Lines and Land Value," *Journal of Real Estate Research* 5, no. 1 (Spring 1990): 117–127.

27. François Des Rosiers, "Power Lines, Visual Encumbrance and House Values: A Microspatial Approach to Impact Measurement," *Journal of Real Estate Research* 23, no. 3 (2002): 275–301.

28. Marvin L. Wolverton and Steven C. Bottemiller, "Further Analysis of Transmission Line Impact on Residential Property Values," *The Appraisal Journal* (July 2003): 244–252.

warn that the results cannot and should not be generalized outside of the data. They explain that

limits on generalizations are a universal problem for real property sale data because analysis is constrained to properties that sell and sold properties are never a randomly drawn representative sample. Hence, generalizations must rely on the weight of evidence from numerous studies, samples, and locations.²⁹

Thus, despite the varying results reported in the literature on property value effects from HVOTLs, each study adds to the growing body of evidence and knowledge on this (and similar) valuation issue(s). The study reported here is one such study.

Opinion Survey Research Objectives and Methodology

Research by Abelson,³⁰ Chalmers and Roehr,³¹ Kinnard, Geckler and Dickey,³² Bond,³³ and Flynn et al.,³⁴ recommend the use of market sales analysis in tandem with opinion survey studies to measure the impact of environmental hazards on residential property values. The use of more than one approach provides the opportunity to compare the results from each and to derive a more informed conclusion than obtained from relying solely on one approach. Thus, the methods selected for this study include a public opinion survey and a hedonic house price approach (as proposed by Freeman³⁵ and Rosen³⁶). A comparison of the results from both of these techniques will reveal the extent to which the market reacts to cell phone towers.

Public Opinion Survey

An opinion survey was conducted to investigate the current perceptions of residents towards living near CPBSs and how this proximity might affect property values. Case study areas in the city of Christchurch were selected for this study. The study included residents in ten suburbs: five case study areas (within 300 meters of a cell phone tower) and five control areas (over 1 kilometer from the cell phone tower). The five case study suburbs were

matched with five control suburbs that had similar living environments (in socioeconomic terms) except for the presence of a CPBS.

The number of respondents to be surveyed (800) and the nature of the data to be gathered (perceptions/personal feelings towards CPBSs) governed the choice of a self-administered questionnaire as the most appropriate collection technique. Questionnaires were mailed to residents living in the case study and control areas.

A self-administered survey helps to avoid interviewer bias and to increase the chances of an honest reply where the respondent is not influenced by the presence of an interviewer. Also, mail surveys provide the time for respondents to reflect on the questions and answer these at their leisure, without feeling pressured by the time constraints of an interview. In this way, there is a better chance of a thoughtful and accurate reply.

The greatest limitation of mail surveys is that a low response rate is typical. Various techniques were used to help overcome this limitation, including careful questionnaire design; inclusion of a free-post return envelope; an accompanying letter ensuring anonymity; and reminder letters. An overall response rate of 46% was achieved for this study.

The questionnaire contained 43 individual response items. The first question acted as an identifier to determine whether the respondent was a homeowner or tenant. While responses from both groups were of interest, the former was of greater importance, as they are the group of purchasers/sellers that primarily influence the value of property. However, it was considered relevant to survey both groups as both are affected by proximity to a CPBS to much the same extent from an occupiers' perspective, i.e., they both may perceive risks associated with a CPBS. It was hypothesized that tenants, being less-permanent residents, would perceive the effects in a similar way, but to a much lesser degree.

Other survey questions related to overall neighborhood environmental desirability; the timing of

29. Ibid., 252.

30. P. W. Abelson, "Property Prices and Amenity Values," *Journal of Environmental Economics and Management* 6 (1979): 11–28.

31. James A. Chalmers and Scott Roehr, "Issues in the Valuation of Contaminated Property," *The Appraisal Journal* (January 1993): 28–41.

32. W. N., Kinnard, M. B. Geckler, and S. A. Dickey, "Fear (as a Measure of Damages) Strikes Out: Two Case Studies Comparisons of Actual Market Behaviour with Opinion Survey Research" (paper presented at the Tenth Annual American Real Estate Society Conference, Santa Barbara, California, April 1994).

33. S. G. Bond, "Do Market Perceptions Affect Market Prices? A Case of a Remediated Contaminated Site," in *Real Estate Valuation Theory*, ed. K. Wang and M. L. Wolverton, 285–321 (Boston: Kluwer Academic Publishers, 2002).

34. James Flynn et al., "Survey Approach for Demonstrating Stigma Effects in Property Value Litigation," *The Appraisal Journal* (Winter 2004): 35–45.

35. A. Myrick Freeman, *The Benefits of Environmental Improvement: Theory and Practice* (Baltimore: John Hopkins Press, 1979).

36. Sherwin Rosen, "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition," *Journal of Political Economy* 82, no. 1 (Jan/Feb 1974): 34–55.

the CPBS's construction and its proximity in relation to the respondent's home; the importance placed on the CPBS as a factor in relocation decisions and on the price/rent the respondent was prepared to pay for the house; how a CPBS might affect the price the respondent would be willing to pay for the property; and the degree of concern regarding the effects of CPBSs on health, stigma, aesthetics, and property values. The surveys were coded to identify the property address of the respondent. This enabled each respondent's property to be located on a map and to show this in relation to the cell site.

Eighty questionnaires³⁷ were distributed to each of the ten suburbs (five case study and five control areas) in Christchurch. Respondents were instructed to complete the survey and return it in the free-post, self-addressed envelope provided. The initial response rate was 31%. A month later, a further 575 questionnaires with reminder letters were sent out to residents who had not yet responded. A total response rate of 46% was achieved. Response rates from each suburb ranged from 33% (Linwood) to 61% (Bishopdale).

The questionnaire responses were coded and entered into a computerized database.³⁸ The analysis of responses included the calculation of means and percentage of responses to each question to allow for an overview of the response patterns in each area.

Case Study and Control Areas

The suburbs of Beckenham, Papanui, Upper Riccarton, Bishopdale, and St Albans were selected for the case study because there is at least one CPBS within each of these communities. Census data, providing demographic and socioeconomic characteristics of geographic areas, was used to select the control suburbs of Spreydon, Linwood, Bromley, Avonhead, and Ilam.³⁹ The control areas are located further away (over 1 kilometer) from the CPBS in their matched case study area. As well as matching demographic and socioeconomic characteristics, each suburb was selected based on its similarity to its matched case study area in terms of living environment and housing stock, distance to the central

business district, and geographic size; the only dissimilarity is that there are no CPBSs in the control areas. (See Appendix I for a location map.)

Demographic statistics show that Bromley and Ilam comprise a younger population (median age about 33), with Bishopdale and Upper Riccarton having an older population (median age about 40). The ethnic breakdown of each suburb indicates that Papanui and Spreydon have the highest proportion of Europeans (about 90%), Bromley has the highest proportion of both Maoris and Pacific Islanders (13.9% and 8.5% respectively), while Ilam, Avonhead, and Upper Riccarton have the highest proportion of Asians (16.1% to 18.5%).⁴⁰

Median household and median family incomes (MHI and MFI) are highest in Ilam and Avonhead (MHI: \$34,751NZ, \$53,405NZ; MFI: \$51,530NZ, \$65,804NZ, respectively) and lowest in Linwood and Beckenham (MHI: \$22,275NZ, \$26,398NZ; MFI: \$29,673NZ, \$33,847NZ respectively).⁴¹ Residents of St Albans West have the highest levels of education (21.7% have a degree or a higher degree) followed by Upper Riccarton (18.7%), Ilam (16.7%), and Avonhead (16.2%). These same suburbs have the highest proportion of professionals by occupational class (20.3% to 27.3%). Residents of Bromley have the lowest education (40% have no qualification) and the lowest proportion of professionals (5.5%).⁴²

In summary, the socioeconomic data shows that Ilam is the more superior suburb, followed by Avonhead, Upper Riccarton, St Albans West, and Papanui. The lower socioeconomic areas are, in decreasing order, Spreydon, Bishopdale, Bromley, Beckenham, and Linwood.

Survey Results

A summary of the main findings from the survey is presented in Appendix II, and the survey results are discussed in the following.

Response Rates

Of the 800 questionnaires mailed to homeowners and tenants in the case study and control areas (400 to each group), 50% from the case study area and 41%

37. Approved by the University of Auckland Human Subjects Ethics Committee (reference 2002/185).

38. The computer program SPSS was selected as the appropriate analytical tool for processing the data.

39. The census is conducted in New Zealand every five years, and the data used to define the control areas is from the latest census conducted in 2001, see Christchurch City Area Unit Profile, 2001 at <http://www.ccc.govt.nz/Census/ChristchurchCityAreaUnitProfile.xls>.

40. Christchurch City Area Unit Profile statistics.

41. \$1NZ = \$0.65US, thus, \$34,751NZ = \$22,588US.

42. The median house price for Christchurch city in August 2003 was \$185,000NZ/\$120,000US (New Zealand national median house price at this time was \$215,000NZ/\$140,000US), <http://www.reinz.co.nz/files/HousingFacts-Sample-Pg1-5.pdf> (accessed March 17, 2004). Median house prices in each individual suburb could not be obtained as the median sales data from the Real Estate Institute of NZ (REINZ) contains more than one suburb in each location grouping.

from the control area were completed and returned. Over three-quarters (78.5%) of the case study respondents were homeowners compared to 94% in the control area.

Desirability of the Suburb as a Place to Live

More than half (58.3%) the case study respondents have lived in their suburb for more than five years (compared to 65% in the control group) and a quarter (25%) have lived in their suburb between 1 and 4 years (compared to 28% in the control group).

Around two-thirds (65% of the case study respondents and 68% of the control group respondents) rated their neighborhoods as either above average or superior as a place to live when compared with other similar named suburbs. The reasons given for this include close proximity to amenities (shops, library, medical facilities, public transport, and recreational facilities) and good schools.

Reasons given for rating the case study neighborhoods inferior to other similar neighborhoods include lower house prices, older homes, more student housing and lower-income residents. The reasons given by the control group respondents for an inferior rating include distance from the central business district (Avonhead); smell from the sewerage oxidation ponds and composting ponds (Bromley); and lower socioeconomic area and noise from the airport (Linwood).

Feelings About a CPBS as an Element of the Neighborhood

In the case study areas, a CPBS had already been constructed when only 39% of the respondents bought their houses or began renting in the neighborhood. Some responded that they were not notified that the CPBS was to be built, that they had no opportunity to object to it, and that they felt they should have been consulted about its construction. For the respondents who said that proximity to the tower was of concern to them, the most common reasons given for this were the impact of the CPBS on health, aesthetics, and property values. Nearly three-quarters (74%) of the respondents said they would have gone ahead with the purchase or rental of their property anyway if they had known that the CPBS was to be constructed.

In the control areas nearly three-quarters (72%) of the respondents indicated they would be opposed to construction of a CPBS nearby. The location of a CPBS would be taken into account by 83% of respondents if they were to consider moving. As with the case study respondents, the control group respondents who were concerned about proximity to a

CPBS were most often concerned about the effects of CPBSs on health, aesthetics, and property values.

Impact on Decision to Purchase or Rent

In the case study areas, the tower was visible from the houses of 46% of the respondents, yet two-thirds (66%) of these said it was barely noticeable, and one-quarter said it mildly obstructed their view. When asked in what way the CPBS impacts the enjoyment of living in their home, 37% responded that its impact was related to health concerns, 21% said it impacted neighborhood aesthetics, 20% said it impacted property value, and 12% said it impacted the view from their property.

When asked about the impact that the CPBS had on the price/rent they were prepared to pay for their property, over half the case study respondents (53.1%) said that the tower was not constructed at the time of purchase/rental, and 51.4% of the respondents said the proximity to the CPBS did not affect the price they were prepared to pay for the property. Nearly 3% said they were prepared to pay a little less, 2% said they were prepared to pay a little more. For the control group respondents, 45% of the respondents would pay substantially less for a property if a CPBS were located nearby, over one-third (38%) were prepared to pay just a little less for such a property, and 17% responded that a CPBS would not influence the price they would pay.

Only 10% of the case study respondents gave an indication of the impact that the CPBS had on the price/rent they were prepared to pay for the property; one-third of these felt it would decrease price/rent by 1% to 9%. For the control group, over one-third (38%) of the respondents felt that a CPBS would decrease price/rent by more than 20%, and a similar number (36%) said they would be prepared to pay 10% to 19% less for property located near a CPBS. The responses are outlined in Table 1.

Table 1 Impact of a CPBS on Purchase/Rental Price Decision

Price/Rent Effect	Percent of Case Study Respondents (Control Group Responses)
20% more	5% (3%)
10–19% more	10% (2%)
1–9% more	14% (2%)
1–9% less	33% (19%)
10–19% less	24% (36%)
20% or greater reduction in price/rent	14% (38%)

Interestingly, it would seem that those living farther away from the CPBSs (the control group) are far more concerned about proximity to CPBSs than those living near CPBSs (the case study group); they indicated that a CPBS would have a greater price/rent effect. The possible explanations for this are discussed in the survey results section.

Concerns About Proximity to the CPBS

Most case study respondents were not worried about the effects of proximity to a CPBS related to health (50%), stigma (55%), future property value (61%), or aesthetics (63%). About one-quarter to one-third of these respondents were somewhat worried about the impact of proximity to a CPBS on health (38%), stigma (34%), future property value (25%), or aesthetics (25%). From the list of issues, respondents were most worried about future property value, but only 13.5% of the respondents responded this way.

Here again, control group respondents were much more concerned about the effects of proximity to a CPBS than their case study counterparts. Of the possible concerns about CPBSs on which respondents were asked to comment, control group respondents were most worried about the negative effects on future property values and aesthetics. Nearly half the respondents were worried a lot about these issues. Similar responses were recorded for the possibility of harmful health effects in the future from CPBSs (42% were worried a lot about this) and stigma associated with houses near CPBSs (34% were worried a lot). The responses regarding concerns about living near a CPBS are shown in Table 2.

In both the case study and control areas, the issue of greatest concern for respondents was the impact of proximity to CPBSs on future property values. The main concerns related to CPBSs were the unknown potential health effects, the possible socioeconomic implications of the siting of CPBSs, and how CPBSs affect property values. There also were concerns that the city council was not notifying the public about the possible construction of CPBSs.

Discussion of the Survey Results

The results were mixed, with responses from residents ranging from having no concerns to being very concerned about proximity to a CPBS. In general, those people living in areas farther from CPBSs were much more concerned about issues related to proximity to CPBSs than residents who lived near CPBSs.

Over 40% of the control group respondents were worried a lot about future health risks, aesthetics, and future property values compared with the case study areas, where only 13% of the respondents were worried a lot about these issues. However, in both the case study and control areas, the impact of proximity to CPBSs on future property values is the issue of greatest concern for respondents. If purchasing or renting a property near a CPBS, over a third (38%) of the control group respondents said a CPBS would reduce the price of their property by more than 20%. The perceptions of the case study respondents were again less negative, with a third saying they would reduce the price by only 1%–9%, and 24% saying they would reduce the price by 10%–19%.

The lack of concern shown by the case study respondents may be due to the CPBSs being either not visible or only barely visible from their homes. The CPBSs may be far enough away from respondents’ properties (as was indicated by many respondents, particularly in St Albans West, Upper Riccarton, and Bishopdale) or hidden by trees and consequently not perceived as affecting the properties. The results may have been quite different had the CPBS being more visually prominent.

Alternatively, the apparent lower sensitivity to CPBSs of case study residents compared to the control group residents may be due to cognitive dissonance reduction. In this case, respondents may be unwilling to admit, due to the large amounts of money already paid, that they may have made a poor purchase or rental decision in buying or renting property located near a CPBS. Similarly, the homeowners may be unwilling to admit there are concerns about CPBSs when the CPBSs were built

Table 2 Concerns about Living Near a CPBS*

Concern	Does not worry me	Worries me somewhat	Worries me a lot
Possibility of harmful health effects	50% (20%)	38% (38%)	12% (42%)
Stigma effect	55% (21%)	34% (45%)	12% (34%)
Effect on future property values	61% (15%)	25% (37%)	13% (47%)
Aesthetics	63% (18%)	25% (37%)	11% (45%)

* Percent of case study respondents having that concern (control group respondents). All numbers are rounded.

after they had purchased their homes, because to do so might have a negative impact on property values.

Regardless of the reasons for the difference in responses from the case study and control groups, the overall results show that residents perceive CPBSs negatively. In both the case study and control areas, the impact of proximity to CPBSs on future property values was the issue of greatest concern for respondents. Overall, respondents felt that proximity to a CPBS would reduce value by from 10% to over 20%. The second part of the study outlined below, involving an econometric analysis of Christchurch property sales transaction data, helps to confirm these results.

Respondents' comments added at the end of the survey indicate that residents have ongoing concerns about CPBSs. Although some people accepted the need for CPBSs, they said that they did not want them built in their back yard, or they preferred that they be disguised to blend better with their environment.

Market Study Research Objectives and Methodology

A market study was undertaken to test the hypothesis that in suburbs where there is a CPBS it will be possible to observe discounts to the selling price of homes located near these structures. Such discounts would be observed where buyers of proximate homes view the CPBSs in negative terms due to a perceived risk of adverse effects on health, aesthetics, and property value.

The literature dealing specifically with the measurement of the impact of environmental hazards on residential sale prices (including proximity to transmission lines, landfill sites, and ground water contamination) indicates the popularity of hedonic pricing models, as introduced by Court⁴³ and later Griliches,⁴⁴ and further developed by Freeman⁴⁵ and Rosen.⁴⁶ The more recent studies, including those by Dotzour;⁴⁷ Simons and Sementelli;⁴⁸ and Reichert,⁴⁹ focus on proximity to an environmental hazard and demonstrate that this reduces residential house prices by varying amounts depending on

the distance from the hazard.⁵⁰ However, there are no known published studies that use hedonic housing models to measure the impact of proximity to a CPBS on residential property values.

As in the previous residential house price studies, the standard hedonic methodology was used here to quantify the impact of a CPBS on sale prices of homes located near a CPBS. The results from this study in tandem with the opinion survey results will help test the hypothesis that proximity to a CPBS has a negative impact on property value and will reveal the extent to which the market reacts to CPBSs.

Model Specification

A hedonic price model is constructed by treating the price of a property as a function of its utility-bearing attributes. Independent variables used in the model to account for the property attributes are limited to those available in the data set and known, based on other well-tested models reported in the literature and from valuation theory, to be related to property price. The basic model used to analyze the impact on sale price of a house located near a CPBS, is as follows:

$$P_i = f(X_{1,i}, X_{2,i}, \dots, X_{n,i})$$

where:

P_i = property price at the i th location
 $X_{1,i} \dots X_{n,i}$ = individual characteristics of each sold property (e.g., land area, age of house, floor area, sale date, construction materials, house condition, CPBS construction date, etc.)

The more recent hedonic pricing studies that demonstrate the effects of proximity to an environmental hazard use different functional forms to represent the relationship between price and various property characteristics.⁵¹ In hedonic housing models the linear and log-linear models are most popular. The linear model implies constant partial effects between house prices and housing characteristics, while the log-linear model allows for nonlinear price effects and is shown in the following equation:

43. A. T. Court, "Hedonic Price Indexes with Automotive Examples," in *The Dynamics of Automobile Demand* (New York: General Motors, 1939).

44. Zvi Griliches, ed. *Price Indexes and Quality Change* (Cambridge, Mass.: Harvard University Press, 1971).

45. Freeman.

46. Rosen.

47. Mark Dotzour, "Groundwater Contamination and Residential Property Values," *The Appraisal Journal* (July 1997): 279–285.

48. Robert A. Simons and Arthur Sementelli, "Liquidity Loss and Delayed Transactions with Leaking Underground Storage Tanks," *The Appraisal Journal* (July 1997): 255–260.

49. Alan K. Reichert, "Impact of a Toxic Waste Superfund Site on Property Values," *The Appraisal Journal* (October 1997): 381–392.

50. Only Dotzour found no significant impact of the discovery of contaminated groundwater on residential house prices. This was likely due to the nonhazardous nature of the contamination where the groundwater was not used for drinking purposes.

51. See for example L. Dale et al., "Do Property Values Rebound from Environmental Stigmas? Evidence from Dallas," *Land Economics* 75, no. 2 (May 1999): 311–326; Dotzour; Simons and Sementelli; and Reichert.

$$\ln P_i = b_0 + b_1 \times X_{1i} + b_2 \times X_{2i} + b_3 \times X_{3i} + \dots + b_n \times X_{ni} + a_0 \times D_0 + \dots + a_m \times D_m + e_0$$

where:

$\ln P_i$ = the natural logarithm of sale price

b_0 = the intercept

$b_1 \dots b_n; a_0 \dots a_m$ = the model parameters to be estimated, i.e., the implicit unit prices for increments in the property characteristics

$X_1 \dots X_n$ = the continuous characteristics, such as land area

$D_0 \dots D_m$ = the categorical (dummy) variables, such as whether the sale occurred before (0) or after (1) the CPBS was built

Sometimes the natural logarithm of land area and floor area is also used. The parameters are estimated by regressing property sales on the property characteristics and are interpreted as the households' implicit valuations of different property attributes. The null hypothesis states that the effect of being located near a CPBS does not explain any variation in property sale prices.

The Data

Part of the process for selecting appropriate case study areas was identifying areas where there had been a sufficient number of property sales to provide statistically reliable and valid results. Sales were required for the period before and after the CPBS had been built in order to study the impact of the CPBS on the surrounding properties' sale prices.

Further, due to the multitude of factors that combine to determine a neighborhood's character, such as proximity to the central business district, standard of schooling, recreational facilities provided, standard of housing, proximity to amenities, and the difficulty in allowing for these separately, sales located in areas with comparable neighborhood characteristics were preferred.

Four of the suburbs in the survey case study met the criteria for the market study: St Albans, Beckenham, Papanui, and Bishopdale. No sales data was available for Upper Riccarton after the CPBS was built in this suburb, hence this suburb was not included in the market analysis study. As each CPBS was built at a different date, the sales from each suburb were sepa-

ately analyzed. The uniformity of locational and neighborhood characteristics in each of these suburbs allows the analysis to be simplified and to focus on the properties' physical attributes. The relative homogeneity of housing, locational, and neighborhood attributes was verified through field inspections.

The dependent variable is the property sale price. The data set includes 4283 property sales that occurred between 1986 and 2002 (approximately 1000 sales per suburb).⁵²

The independent data set was limited to those variables that correspond to property attributes known and suspected to influence price. These variables are floor area (m²); land area (ha); age of the house (the year the house was built); tower (a dummy variable indicating whether the sale occurred before or after the CPBS was built); sale date (month and year); time of sale based on the number of quarters before or after the CPBS was built (to help control for movements in house prices over time); category of residential property (stand-alone dwelling, dwelling converted into flats, ownership unit, etc); quality of the principal structure (as assessed by an appraiser); and roof and wall materials. The number of bedrooms was not available in the data set, but would not have been included as an independent variable since the number of bedrooms is highly correlated with floor area.

Since the GIS coordinates of properties for the initial analysis were not available, street name was included as an independent variable instead. To a limited extent, street name helped to control for the proximity effects of a CPBS. It was suspected that houses on a street close to a CPBS may, on average, sell for less than houses on a street farther away from the CPBS.

While views, particularly water views, have been shown in previous empirical studies to be an important attribute affecting sale price, in the present study the flat contour of the landscape where the homes are located, together with the suburban nature of the environment surrounding these, precluded any significant views. Thus, views were not included in the analysis. Further, due to the large number of sales included in the analysis, inspections of each individual property were not made to determine the view, if any, of a CPBS from each house. It was felt that it is not merely the view that may impact on price, but also proximity to a CPBS due to the potential effect this may have on health, cell phone coverage, and neighborhood aes-

52. These sales were obtained from Headway Systems Ltd, a data distribution and system development company. Headway is the major supplier of property market sales information to New Zealand's valuation profession; it is jointly owned by the NZ Institute of Valuers (NZIV) and PT Investments, a consortium of 28 shareholders from within the property industry.

thetics. Hence, view of a CPBS was not included as an independent variable. The variable descriptions are listed in Table 3. Variable codes are shown in Appendix III and basic descriptive statistics for selected quantitative variables are shown in Appendix IV.

Table 3 Variable Descriptions

Variable*	Definition
SLNETX	Sale price of the house (NZ\$)
SITSTX	Street name
CATGYX2	Category of dwelling: D, E, etc. [†]
CATGYX4	Quality of the structure: A, B, C [†]
TIMESOLD.Q	Using the time the cell phone tower was built as a baseline quarter, the number of quarters before (–) and after (+) it was built
AGE	Year the house was built
LANDAX	Land area (ha)
MATFAX	Total floor area (m ²)
WALLCNX	Wall construction: W, B, C, etc. [†]
ROOFCNX	Roof construction: W, B, C, etc. [†]
TOWER	An indicator variable: 0 if before the cell phone tower was built, or 1 after it was built

* Sale price is the dependent variable.

† See Appendix III for explanation of variable codes.

Market Study Results

An econometric analysis of Christchurch property transaction data helped to confirm the opinion survey results. In the analysis of selected suburbs, the sales data from sales that occurred before a CPBS was built was compared to sales data from after a CPBS was built to determine any variance in price, after accounting for all the relevant independent variables.

Empirical Results

The model of choice is one that best represents the relationships between the variables and has a small variance and unbiased parameters. Various models were tested and the results are described in the next section. The following statistics were used to help select the most appropriate model: the adjusted coefficient of determination (adjusted R^2); the standard error of the regression equation; the AIC⁵³ and BIC⁵⁴ statistics; and t -test of significance of the coefficients and F -statistic.

Significance of Variables and the Equation: St Albans

As hedonic prices can vary significantly across different functional forms, various commonly used functional forms were examined to determine the model specification that best describes the relationship between price and the independent variables. Also, to test the belief that the relationship between *Price* and *Land Area* is not a linear function of *Price*, the variable *LANDAX* (land area) was transformed to reflect the correct relationship. Several transformations were tested including: linear of *SLNETX* (sale price) and log of *LANDAX*; log of *SLNETX* and linear of *LANDAX*; and log of *SLNETX* and log of *LANDAX*. All dummy variables remained in their linear form in each model.

It was found that the best result was obtained from using the log of *SLNETX* and log of *LANDAX*, and the linear form of all the dummy variables. Taking the log of an independent variable implies diminishing marginal benefits. For example, an extra 50 square meters of land area on a 550-square-metersite would be worth less than the previous 50 square meters. The log-log model shows the percent change in price for a one-percent change in the independent variable, while all other independent variables are held constant (as explained in Hill, Griffiths, and Judge).⁵⁵

In the semilogarithmic equation the interpretation of the dummy variable coefficients involves the use of the formula: $100(e^{b_n} - 1)$, where b_n is the dummy variable coefficient.⁵⁶ This formula derives the percentage effect on price of the presence of the factor represented by the dummy variable and is advocated over the alternative, and commonly misused, formula of $100 \cdot (b_n)$. The resulting model included all the available variables as follows:

$$\begin{aligned} \log(SLNETX) = & \alpha + \beta_1 \times TOWER + \beta_2 \times SITSTX \\ & + \beta_3 \times CATGYX2 + \beta_4 \times CATGYX4 \\ & + \beta_5 \times TIMESOLD \times Q + \beta_6 \times AGE \\ & + \beta_7 \times \log(LANDAX) \\ & + \beta_8 \times MATFAX \\ & + \beta_9 \times WALLCNX \\ & + \beta_{10} \times ROOFCNX \end{aligned}$$

53. AIC is the Akaike Information Criterion, and is a "goodness of fit" measure involving the standard error of the regression adjusted by a penalty factor. The model selected is the one that minimizes this criterion (Microsoft SPSSPC Online Guide, 1997).

54. The BIC is the Bayesian Information Criterion. Like the AIC, BIC takes into account both how well the model fits the observed data, and the number of parameters used in the model. The model selected is the one that adequately describes the series and has the minimum SBC. The SBC is based on Bayesian (maximum-likelihood) considerations. (Microsoft SPSSPC Online Guide, 1997).

55. R. Carter Hill, William E. Griffiths, and George G. Judge, *Undergraduate Econometrics* (New York: John Wiley & Sons, 1997).

56. See Robert Halvorsen and Raymond Palmquist, "The Interpretation of Dummy Variables in Semi-Logarithmic Equations," *American Economic Review* 70, no. 3 (1980): 474–475.

From the regression output, the variables *ROOFCNX* and *WALLCNX* were found to be insignificant so these were removed from the model and the regression was rerun. The table in Appendix V summarizes these results. The *F*-statistic (123) shows that the estimated relationship in the model is statistically significant at the 95% confidence level and that at least one of the coefficients of the independent variables within the model is not zero.

Table 4 summarizes the model selection test statistics. Based on the AIC and BIC, the regression that excludes the variables *ROOFCNX* and *WALLCNX* is superior to the regression that includes them (AIC and BIC are minimized). For this reason, the model excluding these variables was selected for analysis, and it is discussed next.

Table 4 Test Statistics — St Albans

	Adjusted <i>R</i> ²	AIC	BIC
Full Model	0.82	-118.38	36.55
Sub Model	0.82	-121.64	5.95

Tests for normality, heteroskedasticity, and multicollinearity generally indicated that the model was adequately specified and that the data were not severely ill conditioned (heteroskedasticity and multicollinearity were diminished when the data were transformed).

The coefficient of determination (*R*²) indicates that approximately 82% of the variation in sale price is explained by the variation in the independent variable set. All variable coefficients had the expected signs,⁵⁷ except for *TOWER*, which was positive. The positive coefficient for *TOWER* shows that, when all the other variables are held constant, after the installation of a CPBS in St Albans, the price of a house would increase by $e^{0.1133} \approx 1.12$ (12%). A possible explanation is that cell phone technology was quite new at the time (1994), and as there had been little in the media about possible adverse health effects from CPBSs, people may have perceived it as a benefit as they were likely to get better cell phone coverage.

The most significant variables were *TIMESOLD.Q* (the quarter in which the sale occurred before or after the CPBS was built), $\log(LANDAX)$ (log of land area), and *MATEFAX* (total floor area) and all have a positive influence on

price. The positive *TIMESOLD.Q* indicates that the market was increasing over time since the CPBS was built (1994), but only to a limited extent (1.38%). The positive log of land area and total floor area shows that prices increase with increasing size.

The regression coefficient on $\log(LANDAX)$ is 0.3285, which indicates that, on average, a 10% increase in *LANDAX* will generate a 3.285% increase in price. The positive coefficient for *MATEFAX* indicates that, when all the other variables are held constant, for each additional m² the price would increase by $e^{0.0022314} \approx 1.0022314$ (0.22% increase).

Significance of Variables and the Equation: Papanui

The same functional form used for St Albans was used for Papanui. From the regression output, the variable *CATGYX2* was found to be insignificant so it was removed from the model and the regression was rerun; Appendix VI summarizes the results. The *F*-statistic (152) shows that the estimated relationship in the model is statistically significant at the 95% confidence level and that at least one of the coefficients of the independent variables within the model is not zero.

Table 5 summarizes the model selection test statistics. Based on the AIC and BIC, the regression that excludes the variable *CATGYX2* is superior to the regression that includes it (AIC and BIC are minimized). For this reason, the model excluding this variable was selected for analysis, and is discussed next.

Table 5 Test Statistics — Papanui

	Adjusted <i>R</i> ²	AIC	BIC
Full Model	0.87	-509.91	-371.99
Sub Model	0.87	-510.57	-381.56

The coefficient of determination (*R*²) indicates that approximately 87% of the variation in sale price is explained by the variation in the independent variable set. This would be considered high in comparison with the amount of explanation obtained in similar hedonic house studies reported in the literature.⁵⁸ All variable coefficients had the expected signs.

The most significant variables were *TIMESOLD.Q*, *MATEFAX* (total floor area), and *TOWER*. The former two have a positive influence on price. The positive *TIMESOLD.Q* indicates that the

57. Note that the variable *AGE* is positive as this variable indicates the year the house was built; therefore, the higher the year, the younger the home. Newer houses have less wear and tear than older homes and sell, on average, for more than older homes.

58. For example, Reichert obtained an adjusted *R*² of 84%; Simons and Sementelli, 78%; Abelson, 68%; Dotzour, 56%–61%.

market was increasing over time since the CPBS was built (2000), but only by 1.4% per quarter. The positive coefficient for *MATEAX* indicates that, when all the other variables are held constant, the price would increase by $e^{0.0042576} \approx 1.00427$ (0.43%), with increasing size. The negative coefficient for *TOWER* shows that, when all the other variables are held constant, after the installation of a CPBS in Papanui, the price of a house would decrease by $e^{-0.2540} \approx 0.79$ (21% decrease).

Significance of Variables and the Equation: Beckenham

The same functional form used for Papanui and St Albans was used for Beckenham. From the regression output, the variable *ROOFCNX* was found to be insignificant so it was removed from the model and the regression was rerun; Appendix VII summarizes these results. The *F*-statistic (214) shows that the estimated relationship in the model is statistically significant at the 95% confidence level and that at least one of the coefficients of the independent variables within the model is not zero.

Table 6 summarizes the model selection test statistics. Based on the AIC and BIC, the regression that excludes the variable *ROOFCNX* is superior to the regression that includes it (AIC and BIC are minimized). For this reason, the model excluding this variable was selected for analysis.

Table 6 Test Statistics — Beckenham

	Adjusted <i>R</i> ²	AIC	BIC
Full Model	0.89	-819.00	-641.39
Sub Model	0.89	-818.66	-650.66

The coefficient of determination (*R*²) indicates that approximately 89% of the variation in sale price is explained by the variation in the independent variable set. Again, as with the model for Papanui this amount of explanation would be considered high.

The most significant variables were *TIMESOLD.Q*, *MATEAX*, and *TOWER*. The former two have a positive influence on price. The positive *TIMESOLD.Q* indicates that the market was increasing over time since the CPBS was built in 2000, but only by 1.91% per quarter. The positive coefficient for *MATEAX* indicates that, when all the other variables are held constant, the price would increase by $e^{0.0042054} \approx 1.00421$ (0.42%), with increasing size. The negative coefficient for *TOWER* shows that, when all the other variables are held constant, after the installation of a

CPBS in Beckenham, the price of a house would decrease by $e^{-0.25019} \approx 0.793$ (20.7% decrease).

Significance of Variables and the Equation: Bishopdale

The same functional form used for the other three suburbs was used for Bishopdale. From the regression output, the variables *ROOFCNX* and *CATGYX* were found to be insignificant so these were removed from the model and the regression was rerun; Appendix VIII summarizes these results. The *F*-statistic (122) shows that the estimated relationship in the model is statistically significant at the 95% confidence level and that at least one of the coefficients of the independent variables within the model is not zero.

Table 7 Test Statistics — Bishopdale

	Adjusted <i>R</i> ²	AIC	BIC
Full Model	0.79	-927.48	-775.71
Sub Model	0.79	-929.32	-796.52

Table 7 summarizes the model selection test statistics. Based on the AIC and BIC, the regression that excludes the variable *ROOFCNX* and *CATGYX* is superior to the regression that includes it (AIC and BIC are minimized). For this reason, the model excluding these variables was selected for analysis.

Again, the most significant variables were *TIMESOLD.Q* and *MATEAX*; the variable of interest, *TOWER*, was not a significant variable in the model so it is not discussed further. The former two variables have a positive influence on price. The positive *TIMESOLD.Q* indicates that the market was increasing over time since the CPBS was built in 1994, but only at 0.98% per quarter. The positive coefficient for *MATEAX* indicates that, when all the other variables are held constant, the price would increase by $e^{0.0039665} \approx 1.004$ (0.40%), with increasing size.

Summary of Results

The above analysis shows that the most significant variables and their impact on price were similar between suburbs. This indicates the relative stability of the coefficients between each model. Interestingly, the impact of *TOWER* on price (a decrease of between 20.7% and 21%) was very similar in the two suburbs where the towers were built in the year 2000. This may be due to the much greater media publicity given to CPBSs after the two legal cases in Christchurch (*McIntyre* and *Shirley Primary School*

in 1996 and 1999, respectively). The two suburbs where *TOWER* was either insignificant or increased prices by around 12%, were suburbs where towers had been built in 1994, prior to the media publicity.

Limitations of the Research

The main limitation affecting this survey was in the selection of the case study areas. Specifically, the areas selected had CPBSs that were not highly visible to residents. If more-visible CPBSs had been selected, the results may have been quite different. Thus, caution must be used in making generalizations from this study or applying the results directly to other similar studies or valuation assignments. Factors that could affect results are the distance of homes from the CPBS, the style and appearance of the CPBS, how visible the CPBS is to residents, the type of home (single family, multifamily, rental, etc.), and the socioeconomic make-up of the resident population.

To help address the proximity factor, a study is in progress examining the role of distance to the CPBSs and price effects; that study uses GIS analysis to determine the impact this has on residential property prices. It is expected that this will provide a more precise estimation of the impact of a CPBS on price.

It must be kept in mind that these results are the product of only one case study carried out in a specific area (Christchurch) at a specific time (2003). The above results indicate that value effects from CPBSs may vary over time as market participants' perceptions change. Perceptions toward CPBSs can change either positively or negatively over time. For example, as the World Health Organization's ten-year study of the health effects from CPBSs is completed and becomes available, consumers' attitudes may become more positive or negative depending on the outcome of that study. Consequently, studies of the price effects of CPBSs need to be conducted over time.

Areas for Further Study

This research has focused on residents' perceptions of negative effects from proximity to CPBSs and how these impact property values, rather than the scientific or technological estimates of these risks. The technologists' objective view of risk is that risk is measurable solely in terms of probabilities and severity of consequences, whereas the public, while taking experts' assessments into account, view risk more subjectively, based on other factors. Further, the results of scientific studies about the health effects of radio frequency and microwave radiation

from CPBSs are not consistent. Residents' perceptions and assessments of risk vary according to a wide range of psychological, social, institutional, and cultural processes, and this may explain why their assessments differ from those of the experts.

Given the public concerns about the potential risks arising from being located nearby a CPBS, it is important for future studies to focus more attention on the kinds of risks the public associates with CPBSs and the level of risk perceived. How far away from the CPBS do people feel they have to be to be safe? What CPBS design, size, and surrounding landscape would help CPBSs to be more publicly acceptable? What social, economic, educational, and other demographic variables influence how people perceive the risks from CPBSs? Do residents that are heavy users of cell phones have a different perception of CPBSs than residents who make little use of this technology? Are these perceived risks reflected in property values and to what extent? Do these perceived risks vary over time and to what degree?

Answers to these questions, if shared among researchers and made public, could lead to the development of a global database to assist appraisers in determining the perceived level of risk associated with CPBSs and other similar structures.⁵⁹ Knowledge of the extent that these risks are incorporated into property prices and how they vary over time will lead to more accurate value assessments of properties in close proximity to CPBSs and other similar structures.

Summary and Conclusions

Focusing on four case study neighborhoods in Christchurch, New Zealand, this article presents the results from both an opinion survey and market sales analysis undertaken in 2003 to determine residents' perceptions towards living near a CPBS and how this may impact property prices. From the results, it appears that people who live close to CPBSs perceive the sites less negatively than those who live farther away.

The issue of greatest concern for survey respondents in both the case study and control areas is the impact of proximity to CPBSs on future property values. Overall, respondents would pay from 10%–19% less to over 20% less for a property if it were in close proximity to a CPBS.

The opinion survey results were generally confirmed by the market sales analysis using a hedonic house price approach. The results of the sales analysis show prices of properties were reduced by around 21% after a CPBS was built in the neighborhood. How-

59. For example, high-voltage overhead transmission lines.

ever, this result varies between neighborhoods, with a positive impact on price being recorded in one neighborhood, possibly due to the CPBS being built in that suburb before any adverse media publicity about CPBSs appeared in the local Christchurch press.

Research to date reports no clearly established health effects from radio frequency emissions of CPBSs operated at or below the current safety standards, yet recent media reports indicate that people still perceive that CPBSs have harmful effects. Thus, whether or not CPBSs are proven to be free from health risks is only relevant to the extent that buyers of properties near CPBSs perceive this to be true. Even buyers who believe that there are no adverse health effects from CPBSs, knowing that other potential buyers might think the reverse, will probably seek a price discount for a property located near a CPBS.

The comments of survey participants indicate the ongoing concerns that residents have about CPBSs. There is the need to increase the public's understanding of how radio frequency transmitting facilities operate and the strict exposure-limit standards imposed on the telecommunication industry. As more information is discovered that refutes concerns regarding adverse health effects from CPBSs, and as information about the NZ safety standards are made more publicly available, the perception of risk may gradually change, eliminating the discounts for neighboring properties.

Additional Reading

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Sandy Bond, PhD, MBS, ANZIV, SNZPI, is a senior member of the New Zealand Property Institute (NZPI), a director on the Board of the International Real Estate Society, and a past president of the Pacific Rim Real Estate Society (PRRES). She was awarded the PRRES Achievement Award in 2002 and the NZ Institute of Valuers' Presidential Citation in 1997. Before commencing her academic career in 1991, she worked as an appraiser in both New Zealand and London, UK.

Contact: dr_sandybond@yahoo.com

Ko-Kang (Kevin) Wang is a recent graduate from the University of Auckland and has been a tutor in the Statistics Department at the university. Wang has recently commenced doctoral studies in Australia.

Contact: Kevin.Wang@anu.edu.au

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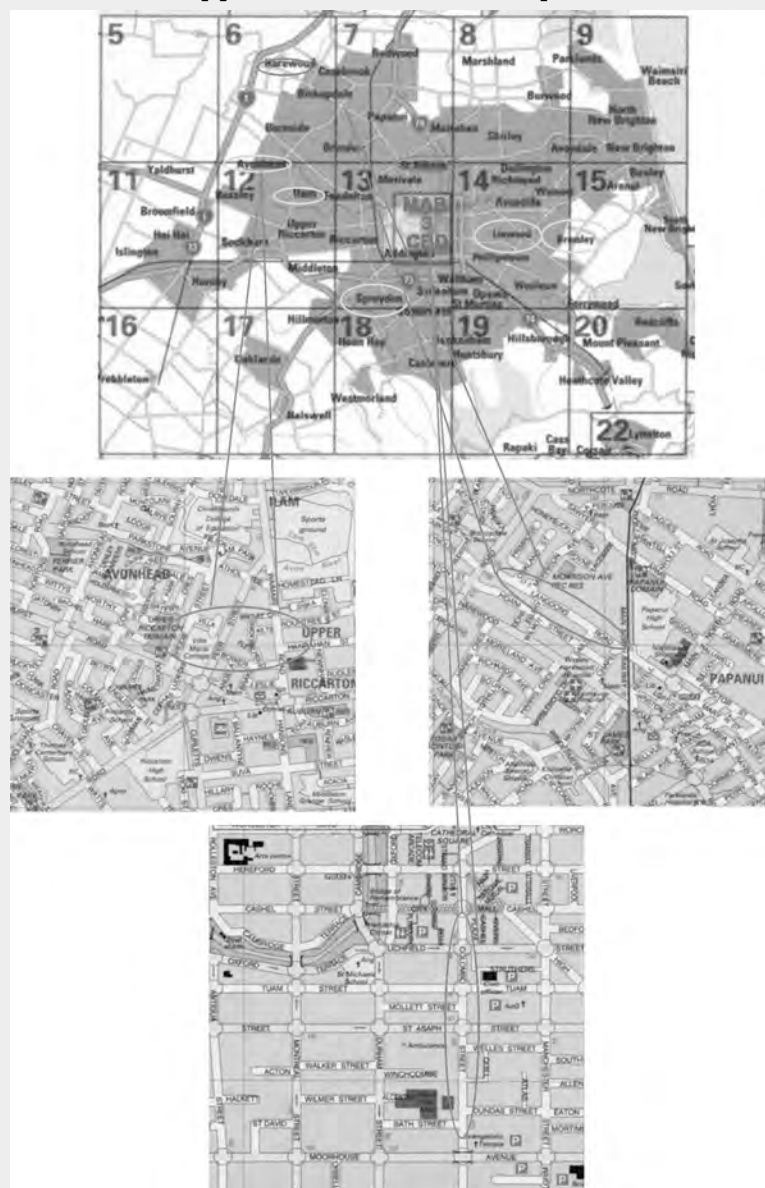
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Appendix I Location Map



Areas circled in white at the top are without a cell phone tower, while areas circled in the bottom three maps have a cell phone tower.
Source: <http://www.ccc.govt.nz/maps/Wises/>

Appendix II Summary of the Survey Results

Variable	Response	Valid Percent (%)	
		Case Study	Control
Occupancy	Homeowner	78.5	94.2
	Tenant	21.5	5.8
How long have you lived there?	Less than 6 months	8.0	2.6
	6 months–1 year	8.6	4.5
	1–4 years	25.1	27.7
	More than 5 years	58.3	65.2
How would you rate the desirability of your neighborhood?	Superior	27.4	30.9
	Above Average	37.4	36.8
	Average	28.5	27.0
	Below Average	5.6	4.6
	Inferior	1.1	0.7
Would you be opposed to construction of a cell phone tower nearby?	Yes		72.1
	No		27.9
When you purchased/began renting was the cell phone tower already constructed?	Yes	39.3	
	No	60.7	
Was the proximity of the cell phone tower a concern to you?	Yes	20.0	
	No	80.0	
Would you have gone ahead with rental/purchase if you had known a cell phone site was to be constructed?	Yes	73.9	
	No	26.1	
Is location of a cell phone tower a factor you would consider when moving?	Yes		83.4
	No		16.6
Is the cell phone tower visible from your house?	Yes	45.7	
	No	54.3	
If yes, how much does it impact on your view?	Very obstructive	9.6	
	Mildly obstructive	24.5	
	Barely noticeable	66.0	
In what way does it impact on the enjoyment of living in your house?	Views	11.8	
	Aesthetics	20.6	
	Health concerns	36.8	
	Change in property value	19.9	
	Other	11.0	
Effect a nearby cell phone tower would have on the price/rent you would pay for the property	Tower wasn't constructed	53.1	
	Pay substantially more	0.0	0.0
	Pay a little more	2.3	0.0
	Pay a little less	2.8	37.6
	Pay substantially less	0.6	45.4
	Not influence price	51.4	17.0
% Effect a nearby cell phone tower would have on the price/rent you would pay for the property	20% higher or more	5	3.2
	10–19% more	10	1.6
	1–9% more	14	2.4
	1–9% less	33	19.2
	10–19% less	24	36.0
	20% or a greater reduction	14	37.6
Concern about the possibility of harmful health effects in the future	Does not worry me	50.3	19.9
	Worries me somewhat	38.0	38.4
	Worries me a lot	11.7	41.7
Concern about the stigma associated with houses near the cell phone sites	Does not worry me	54.6	20.8
	Worries me somewhat	33.9	45.0
	Worries me a lot	11.5	34.2
Concern about the affect on your properties value in the future	Does not worry me	61.3	15.4
	Worries me somewhat	25.4	37.2
	Worries me a lot	13.3	47.4
Concern about the aesthetic problems caused by the tower	Does not worry me	63.3	18.2
	Worries me somewhat	25.4	37.0
	Worries me a lot	11.3	44.8

Appendix III Variable Codes

Category of Dwelling

Code	Definition
D	Dwelling houses are of a fully detached or semi-detached style situated on their own clearly defined piece of land.
E	Converted dwelling houses that are now used as rental flat.
F	Ownership home units which may be single storey or multi-storey and which do not have the appearance of dwelling houses.
H	Home and income. The dwelling is the predominant use, and there is an additional unit of use attached to or associated with the dwelling house that can be used to produce income.
R	Rental flats that have been purpose built.

Quality of the Principal Structure

Code	Definition
A	Superior design and quality of fixtures and fittings is first class.
B	The design is typical of its era and the quality of the fixtures and fittings is average to good.
C	The design is below the level generally expected for the era, or the level of fixtures and fittings is barely adequate and possibly of below average quality.

Building Materials: Walls and Roof

Code	Definition
W	Wood
B	Brick
C	Concrete
S	Stone
R	Roughcast
F	Fibrolite
M	Malthoid
P	Plastic
I	Iron
A	Aluminium
G	Glass
T	Tiles
X	*

Appendix IV Descriptive Statistics

Variable	Mean	Std. dev.	Median	Minimum	Maximum	Range
St Albans:						
Sale Price (\$)	221,957	110,761	200,000	42,000	839,000	797,000
Land Area (ha)	0.0658	0.0331	0.0579	0.0261*	0.3794	0.3533
Floor Area (m ²)	161	70.40	150	50	450	400
Beckenham:						
Sale Price (\$)	116,012	50,037	111,000	21,500	385,000	363,500
Land Area (ha)	0.0601	0.0234	0.0553	0.0164*	0.2140	0.1976
Floor Area (m ²)	115	32.50	110	40	340	300
Papanui:						
Sale Price (\$)	127,661	51,114	119,000	43,000	375,000	332,000
Land Area (ha)	0.0685	0.0289	0.0675	0.0310	0.3169	0.2859
Floor Area (m ²)	122	34.60	110	56	290	234
Bishopdale:						
Sale Price (\$)	136,786	41,390	134,500	56,000	342,000	286,000
Land Area (ha)	0.0679	0.0163	0.0653	0.0400	0.2028	0.1628
Floor Area (m ²)	125	31.20	118	64	290	226

* These small land areas are related to apartments or units in a block of apartments/units that have the land area apportioned on a pro rata basis.

Appendix V Regression Model: St Albans

$\log(\text{SLNETX}) = \text{TOWER} + \text{CATGYX2} + \text{CATGYX4} + \text{TIMESOLD.Q} + \text{AGE} + \log(\text{LANDAX}) + \text{MATFAX} + \text{SITSTX}$

Residuals:	Min	1Q	Median	3Q	Max
	-0.72855	-0.15032	0.01593	0.14263	0.72047
Coefficients:	Estimate	Std. Error	t-value	Pr(> t)	
(Intercept)	9.1781868	0.6769096	13.559	< 2e-16 ***	
TOWER	0.1133186	0.0318188	3.561	0.000395 ***	
CATGYX2D	0.1846417	0.0702520	2.628	0.008776 **	
CATGYX2O	0.0334663	0.1008594	0.332	0.740134	
CATGYX4B	-0.1551409	0.0245485	-6.320	4.75e-10 ***	
CATGYX4C	-0.1483169	0.0722959	-2.052	0.040600 *	
TIMESOLD.Q	0.0136663	0.0008208	16.650	< 2e-16 ***	
AGE	0.0016408	0.0003521	4.660	3.81e-06 ***	
log(LANDAX)	0.3285367	0.0283610	11.584	< 2e-16 ***	
MATFAX	0.0022314	0.0001962	11.373	< 2e-16 ***	
SITSTXAIKMANS RD	0.4029259	0.0533671	7.550	1.41e-13 ***	
SITSTXBEVERLEY ST	0.2330787	0.0803137	2.902	0.003827 **	
SITSTXBRISTOL ST	0.1706840	0.0521716	3.272	0.001124 **	
SITSTXBROWNS RD	0.2492536	0.0720854	3.458	0.000579 ***	
SITSTXCOX ST	0.3055798	0.0581672	5.253	2.00e-07 ***	
SITSTXGORDON AVE	0.0823422	0.0679833	1.211	0.226236	
SITSTXKNOWLES ST	0.1690979	0.0558911	3.025	0.002576 **	
SITSTXMANSFIELD AVE	0.2954242	0.0652983	4.524	7.16e-06 ***	
SITSTXMCDUGALL AVE	0.3303105	0.0623720	5.296	1.60e-07 ***	
SITSTXMURRAY PL	0.3613773	0.0629166	5.744	1.40e-08 ***	
SITSTXOFFICE RD	0.3681146	0.0543368	6.775	2.71e-11 ***	
SITSTX Other	0.0618491	0.0736629	0.840	0.401416	
SITSTXPAPANUI RD	0.1940369	0.0560474	3.462	0.000570 ***	
SITSTXRANFURLY ST	0.1701716	0.0617504	2.756	0.006012 **	
SITSTXST ALBANS ST	0.1458665	0.0571172	2.554	0.010873 *	
SITSTXWEBB ST	0.1895432	0.0725061	2.614	0.009143 **	
SITSTXWESTON RD	0.2084419	0.0527555	3.951	8.60e-05 ***	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Residual standard error: 0.2175 on 677 degrees of freedom
Multiple R-Squared: 0.8253, Adjusted R-squared: 0.8186
F-statistic: 123 on 26 and 677 DF, p-value: < 2.2e-16

Appendix VI Regression Model: Papanui

$\ln(\text{formula}) = \log(\text{SLNETX}) \sim \text{TOWER} + \text{SITSTX} + \text{TIMESOLD.Q} + \text{AGE} + \log(\text{LANDAX}) + \text{MATFAX} + \text{WALLCNX} + \text{ROOFCNX} + \text{CATGYX4}$, data = Papanui.final)

Residuals:	Min	1Q	Median	3Q	Max
	-0.484987	-0.098006	0.003859	0.106253	0.563126
Coefficients:	Estimate	Std. Error	t-value	Pr(> t)	
(Intercept)	5.9482316	0.6998186	8.500	< 2e-16 ***	
TOWER	-0.2339640	0.0240908	-9.712	< 2e-16 ***	
SITSTXHOANI ST	-0.1966982	0.0265429	-7.411	4.26e-13 ***	
SITSTXLANGDONS RD	-0.1192547	0.0281242	-4.240	2.58e-05 ***	
SITSTXLEANDER ST	0.0305555	0.0449437	0.680	0.496853	
SITSTXMATSONS AVE	0.0949636	0.0292461	3.247	0.001231 **	
SITSTXMORELAND AVE	-0.0892332	0.0397622	-2.244	0.025183 *	
SITSTXMORRISON AVE	-0.1984492	0.0289772	-6.848	1.84e-11 ***	
SITSTXOther	-0.1543194	0.0337436	-4.573	5.83e-06 ***	
SITSTXSAILS ST	-0.0761412	0.0433455	-1.757	0.079490 .	
SITSTXSAWTELL PL	0.1840793	0.0393904	4.673	3.66e-06 ***	
SITSTXSAWYERS ARMS RD	0.0872393	0.0201388	4.332	1.73e-05 ***	
SITSTXST JAMES AVE	0.2497688	0.0289940	8.615	< 2e-16 ***	
TIMESOLD.Q	0.0138914	0.0004137	33.575	< 2e-16 ***	
AGE	0.0029307	0.0003512	8.345	4.85e-16 ***	
log(LANDAX)	0.0904764	0.0270812	3.341	0.000886 ***	
MATFAX	0.0042576	0.0002410	17.664	< 2e-16 ***	
WALLCNXC	0.0054100	0.0200666	0.270	0.787558	
WALLCNXF	-0.0980851	0.0464442	-2.112	0.035106 *	
WALLCNXO	-0.1158407	0.0468334	-2.473	0.013655 *	
WALLCNXR	-0.0670051	0.0244382	-2.742	0.006291 **	
WALLCNXW	-0.0679166	0.0192628	-3.526	0.000454 ***	
WALLCNXX	-0.0571365	0.0358369	-1.594	0.111381	
ROOFCNXI	0.1502973	0.1139845	1.319	0.187810	
ROOFCNXO	0.0870092	0.1164152	0.747	0.455111	
ROOFCNXT	0.0954874	0.1138506	0.839	0.401965	
CATGYX4B	-0.0623758	0.0343487	-1.816	0.069872 .	
CATGYX4C	-0.3669901	0.0905659	-4.052	5.74e-05 ***	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Residual standard error: 0.1579 on 604 degrees of freedom
Multiple R-Squared: 0.8718, Adjusted R-squared: 0.8661
F-statistic: 152.2 on 27 and 604 DF, p-value: < 2.2e-16

Appendix VII Regression Model: Beckenham

ln(formula = log(SLNETX) ~ TOWER + SITSTX + CATGYX4 + TIMESOLD.Q + AGE + log(LANDAX) + MATFAX + WALLCNX + CATGYX2, data = Beckenham.final)

Residuals:	Min	1Q	Median	3Q	Max
	-0.64490	-0.09026	0.01142	0.10112	0.40993
Coefficients:	Estimate	Std. Error	t-value	Pr(> t)	
(Intercept)	9.2062865	0.4725194	19.483	< 2e-16 ***	
TOWER1	-0.2301918	0.0182774	-12.594	< 2e-16 ***	
SITSTXBECKENHAM ST	0.1648069	0.0515406	3.198	0.001436 **	
SITSTXBOON ST	-0.0616738	0.0484966	-1.272	0.203817	
SITSTXBRADFORD AVE	0.0923843	0.0494942	1.867	0.062300 .	
SITSTXCOLUMBO ST	0.0623765	0.0467234	1.335	0.182223	
SITSTXDEVON ST	-0.0959430	0.0457562	-2.097	0.036299 *	
SITSTXDUNN ST	-0.0207886	0.0427676	-0.486	0.627031	
SITSTXFISHER AVE	0.2271245	0.0400288	5.674	1.90e-08 ***	
SITSTXLONGFELLOW ST	-0.0186953	0.0451597	-0.414	0.678990	
SITSTXOTHER	-0.0222126	0.0467607	-0.475	0.634888	
SITSTXPERCIVAL ST	-0.0347190	0.0517740	-0.671	0.502663	
SITSTXROXBURGH ST	0.1029109	0.0466753	2.205	0.027729 *	
SITSTXSOMERFIELD ST	0.0186495	0.0428968	0.435	0.663851	
SITSTXSOUTHAMPTON ST	-0.0243265	0.0402926	-0.604	0.546171	
SITSTXSOUTHEY ST	-0.0324513	0.0429880	-0.755	0.450520	
SITSTXSTRICKLAND ST	-0.0819418	0.0407196	-2.012	0.044494 *	
SITSTXTENNYSON ST	0.1165007	0.0393410	2.961	0.003147 **	
SITSTXWEMBLEY ST	0.0648226	0.0458033	1.415	0.157359	
CATGYX4B	0.0275481	0.0373405	0.738	0.460864	
CATGYX4C	-0.1168640	0.0469787	-2.488	0.013049 *	
TIMESOLD.Q	0.0189904	0.0003396	55.928	< 2e-16 ***	
AGE	0.0010988	0.0002426	4.530	6.74e-06 ***	
log(LANDAX)	0.1546535	0.0195655	7.904	8.19e-15 ***	
MATFAX	0.0042054	0.0002138	19.674	< 2e-16 ***	
WALLCNXC	-0.0208433	0.0378338	-0.551	0.581833	
WALLCNXF	-0.1171637	0.0394091	-2.973	0.003031 **	
WALLCNXO	-0.0445073	0.0399745	-1.113	0.265849	
WALLCNXR	-0.1119164	0.0235736	-4.748	2.41e-06 ***	
WALLCNXW	-0.0629968	0.0222366	-2.833	0.004718 **	
WALLCNXX	-0.0992564	0.0398493	-2.491	0.012933 *	
CATGYX2D	0.1445276	0.0399650	3.616	0.000316 ***	
CATGYX2F	0.3069113	0.0744524	4.122	4.11e-05 ***	
CATGYX2R	0.2927391	0.1222453	2.395	0.016847 *	

Signif. codes:0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Residual standard error: 0.1515 on 864 degrees of freedom
Multiple R-Squared: 0.8911, Adjusted R-squared: 0.8869
F-statistic: 214.2 on 33 and 864 DF, p-value: < 2.2e-16

Appendix VIII Regression Model: Bishopdale

ln(formula = log(SLNETX) ~ TOWER + TIMESOLD.Q + AGE + log(LANDAX) + MATFAX + WALLCNX + SITSTX, data = Bishopdale.final)

Residuals:	Min	1Q	Median	3Q	Max
	-0.53633	-0.08893	0.01446	0.08850	0.49048
Coefficients:	Estimate	Std. Error	t-value	Pr(> t)	
(Intercept)	9.0005033	0.6988891	12.878	< 2e-16 ***	
TOWER	0.0262575	0.0182796	1.436	0.151259	
TIMESOLD.Q	0.0097887	0.0004834	20.251	< 2e-16 ***	
AGE	0.0013236	0.0003598	3.679	0.000249 ***	
log(LANDAX)	0.1357753	0.0333622	4.070	5.16e-05 ***	
MATFAX	0.0039665	0.0001855	21.389	< 2e-16 ***	
WALLCNXC	-0.0169935	0.0108641	-1.564	0.118160	
WALLCNXO	0.0785660	0.0336688	2.333	0.019863 *	
WALLCNXR	-0.0693225	0.0300511	-2.307	0.021313 *	
WALLCNXW	-0.0815023	0.0230110	-3.542	0.000420 ***	
SITSTXCARDOME ST	0.0610536	0.0314227	1.943	0.052360 .	
SITSTXCHEDWORTH AVE	0.0330487	0.0317738	1.040	0.298589	
SITSTXCLOTILDA PL	0.2252988	0.0420078	5.363	1.06e-07 ***	
SITSTXCOLESBURY ST	0.0528749	0.0302668	1.747	0.081018 .	
SITSTXCOTSWOLD AVE	0.0604953	0.0286474	2.112	0.035012 *	
SITSTXEASTLING ST	0.0551537	0.0319833	1.724	0.085003 .	
SITSTXFARRINGTON AVE	-0.0001768	0.0238544	-0.007	0.994087	
SITSTXHAREWOOD RD	0.0204412	0.0252674	0.809	0.418753	
SITSTXHIGHTED RD	0.0391760	0.0253953	1.543	0.123302	
SITSTXKILBURN ST	-0.0176756	0.0366951	-0.482	0.630155	
SITSTXKINGROVE ST	-0.0052772	0.0375965	-0.140	0.888406	
SITSTXLEACROFT ST	0.1058243	0.0333633	3.172	0.001571 **	
SITSTXMURMONT ST	0.1825316	0.0365287	4.997	7.12e-07 ***	
SITSTXNEWMARK ST	-0.0342136	0.0272490	-1.256	0.209621	
SITSTXOTHER	0.0525437	0.0253634	2.072	0.038612 *	
SITSTXRALEIGH ST	0.0470151	0.0314032	1.497	0.134740	
SITSTXSTACKHOUSE AVE	0.0235719	0.0278844	-0.845	0.398165	

Signif. codes:0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
Residual standard error: 0.137 on 821 degrees of freedom
Multiple R-Squared: 0.7946, Adjusted R-squared: 0.7881
F-statistic: 122.1 on 26 and 821 DF, p-value: < 2.2e-16

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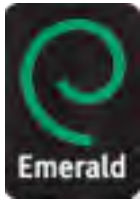
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The impact of proximity to cell phone towers on residential property values

Olga Filippova and Michael Rehm

Department of Property, The University of Auckland, Auckland, New Zealand

Abstract

Purpose – This paper aims to determine if proximity to cell phone towers influences house prices with a focus on isolating the impact of tower aesthetics on nearby property values.

Design/methodology/approach – Sales transaction data from the Auckland Region during 2005-2007 were analysed using a series of hedonic models testing various proximity specifications across two populations of cell towers: residential-only and global (all towers).

Findings – The study could not establish a relationship between cell towers and house prices with the exception of armed monopole towers located in residential areas due to such towers' acute visual disamenity.

Practical implications – The study's findings can be directly applied to residential valuation practice and can assist government regulators and telecommunication companies in siting new cell towers.

Originality/value – This research provides three distinct methodological improvements: unconventional geocoding that improves spatial accuracy, separate analysis of towers in residential areas that enhances internal validity and inclusion of tower mast data to isolate the impact of tower aesthetics.

Keywords Residential house prices, Cell towers, Electromagnetic radio frequency, Housing markets, Environmental stigma, Hedonic pricing model, Mobile communication systems, New Zealand

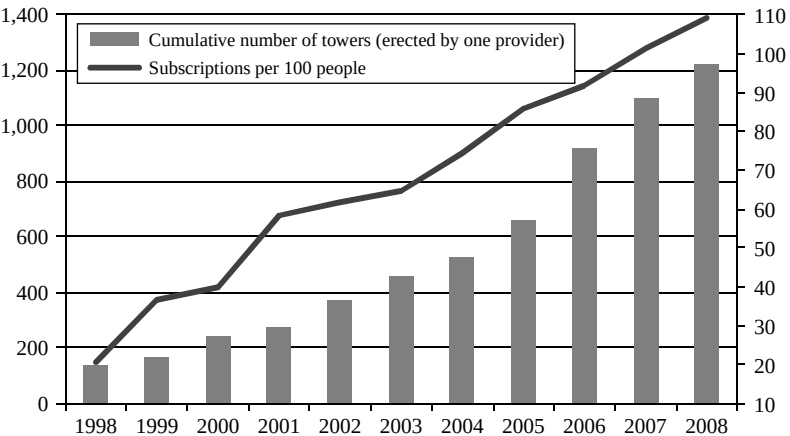
Paper type Research paper

Introduction

New Zealand mobile phone service was launched in 1987. Nearly 20 years later, 86 percent of New Zealand households had access to mobile phones (Statistics New Zealand, 2007). With such high volume of cell phone users, there is a need for more cell phone base stations. As shown in Figure 1, at the end of 2008 there were approximately 1,200 nationwide sites erected by one of the main providers, which represents roughly half of the country's cell towers. This rapid rise in the number of cell towers corresponds with the exponential increase in the use of mobile communications.

In order to provide uninterrupted coverage, towers have been and continue to be erected in residential areas. Despite the public's desire for expanded service, the growth of cell phone networks is often a source of neighbourhood opposition. Residents living in the vicinity of a cell phone tower typically cite health and safety concerns associated with electromagnetic fields (Wikle, 2002; Rorer, 2004). This combined with aesthetic concerns lead to claims of reduced property values (Long, 2000; Wikle, 2002; Rorer, 2004; Nagle, 2009). In an attempt to delay or prevent the siting of cell phone towers in residential areas and near educational facilities, the opposing residents form organised not in my backyard (NIMBY) groups. A high-profile campaign from one such group





Proximity to cell
phone towers

Figure 1.
Relationship between
cell towers and wireless
service subscriptions
in New Zealand

in 2008 put on hold plans for building a cell phone tower near a playcentre in the city of Nelson (Neal, 2009). The group’s petition, which gathered 3,100 signatures and was presented to the New Zealand Parliament, called for no towers within 1km of educational facilities as well as mandatory consultation before towers are erected in residential areas. The emergence of NIMBY groups coincided with the enactment of the National Environmental Standards (NES) for telecommunication facilities in 2008 which removed variability in local consent requirements and provided consistent provisions across the country. Under the NES, the siting of new cell towers alongside roads and road reserves does not require resource consent, as long as it complies with the standards (NZS 2772:Part1:1999). One of the main fears of opposition groups is that with the NES the proliferation of towers would accelerate. In some cases residents concerned about health and visual impacts oppose tower construction by applying to the court.

Two New Zealand cases have proceeded to Environment Court. In both cases, the court ruled that there were no established adverse health effects arising from the proposed cell phone site emissions. Visual effect was ruled out in one case while in the second case the court ordered the telecommunications provider to mitigate aesthetic impacts. Anecdotal evidence in the local press, uniformly suggests a drop in property values. For example, some real estate agents believe a nearby tower can devalue a property by 10-15 percent (Landrigan, 2009) and by up to 50 percent according to one affected homeowner (Manukau Courier, 2008).

Cell phone tower sites are often viewed as a “locally undesirable land use”. As mentioned previously, residents near such sites have greater health and aesthetic fears than more distant residents. These perceptions of uncertainty and risk are a source of “environmental stigma” (Mundy, 1992) which can potentially lead to reductions in property values. There are two predominant econometric methods for quantifying the perceived risk of adverse effects of undesirable land uses: stated and revealed preference (Farber, 1998). Contingent valuation is a variant of the stated method where participants are asked their willingness-to-pay to avoid living near an environmental disamenity. Hedonic pricing models are an example of the revealed preference method. With this method, the model explicitly observes market participants’ agreed compensation associated with adjacent adverse land uses (Farber, 1998). The hedonic method

is the most prevalent technique in the literature. A wide range of studies have shown an adverse effect of location of undesirable land uses (e.g. waste sites, hazardous facilities, power lines) on surrounding property values. Given the relatively recent expansion of wireless communications (Figure 1), sufficient time-series data have yet to be generated. Therefore, the research on the impact of cell phone towers is just now emerging.

The aim of the present study is to improve on the methodology of past research and test the following null and alternative research hypotheses:

- H0.* Residential sales prices are *not* significantly influenced by proximity to cell phone towers.
- H1.* Cell phone towers are a source of environmental stigma and have a significant *negative* price impact on residential properties in close proximity but that impact declines as distance increases.

Literature review

The increasing demand for mobile phone services has led to an increase of cell phone towers. This tower proliferation, particularly when situated close to residential dwellings, is accompanied by public concern about the possible harmful health effects of radiofrequency electromagnetic field (RF) exposure as well as the visual impact of cell phone towers. The main concern among residents living in the vicinity of cell phone towers has been with cancer risk (ICNIRP, 2009). Findings of the only two published studies investigating cancer risks associated with proximity to cell phone towers indicate that living close to a cell phone tower may lead to increased cancer rates. A German study by Eger *et al.* (2004) found an increase in cancer rates among people living within 400 m of a cell tower while an Israeli study by Wolf and Wolf (2004) found that people living within 350 m of a tower had greater incidents of cancer. In spite of these findings, Kundi and Hutter (2009) conclude that both aforementioned studies suffer from methodological limitations and therefore no far reaching conclusions can be drawn. Similarly, results of epidemiological studies on subjective symptoms and well-being provide weak and unconvincing evidence of a causal relationship between RF exposure and any adverse health effects (ICNIRP, 2009). Recent critical assessments of the existing literature on the effects of RF on human health have revealed numerous deficiencies. The studies' critics argue that the methodological shortcomings rule out an association and recommend improvements such as the use of meters capable of monitoring individual exposure (ICNIRP, 2009; Neubauer *et al.*, 2007). In one recent study, Berg-Beckhoff *et al.* (2009) investigated people living in urban areas. For the exposure assessment, a personal dosimeter for RF measurements was used. The results indicated that measured RF emitted from cell phone towers were not associated with health problems such as sleep disturbances and headaches. However, study participants attributed health symptoms to cell phone towers. In other words, there appears to be a perceived health risk associated with proximity to cell towers. Such a perception of risk, irrespective of whether or not it is supported by empirical evidence, may invoke environmental stigma which has the potential to lower property values.

Most of the research that has looked at the impact of cellular technology focuses on legal challenges to cell phone tower siting (Boney, 1998; Foster and Carrel, 1999; Hughes, 1998; Jacobson, 2000; Long, 2000; Nagle, 2009; Rorer, 2004). Specific litigation

issues involve residents and local governments who claim that towers cause health problems and aesthetic disamenity. Two noteworthy New Zealand legal cases that proceeded to Environment Court are *McIntyre and others v. Christchurch City Council A015/96* (1996) and *Shirley Primary School v. Telecom Mobile Communications Limited C136/98* (1998). In both cases, the Environment Court ruled that there are no established adverse health effects arising from the proposed cell phone site emissions.

According to the Ministry for the Environment (2000):

Given that the New Zealand courts operate on a precedent-based system and given the firmness of the Environment Court's decisions, especially relating to health issues, there are likely to be fewer cases in the future unless there was an unacceptable risk of adverse health effects to members of the community.

In contrast, court decisions about claims of visual impacts of cell phone towers proved to be more successful for the plaintiffs. Although no visual effect was found in either McIntyre or Shirley Primary, the Environment Court imposed colour and planting requirements in *Telecom New Zealand Limited v. Christchurch City Council W165/96* (1996) and reserved the North Shore City Council's decision to decline consent on the basis of what the court felt was more than minor adverse visual effects in *North Shore City Council v. Vodafone A206/03* (2003).

Only a handful of empirical studies have investigated the impact of proximity to cell phone towers on property values. McDonough (2003) recognised the lack of such studies and pointed out that similar health and visual impacts are often attributed to high voltage transmission lines (HVTL). Therefore, it is appropriate to briefly review research on the impact of power lines and pylons on property values. Numerous researchers have examined the impact of HVTL on property values. For a comprehensive survey of around 20 international studies (Graeme Horsley Limited, 2008). Two methodological approaches have been employed in the literature, econometric studies using hedonic modelling and perceptual studies investigating public (homeowners) and professional (real estate agents and valuers) attitudes towards HVTLs (Kroll and Priestley, 1992). In the presence of sales data, an hedonic approach remains the most reliable method used to measure HVTL impacts on property values (Rosiers, 2002). In short, adverse value effects due to proximity to an HVTL are observed in most studies (Bond and Hopkins, 2000; Callanan and Hargreaves, 1995; Hamilton and Schwann, 1995; Rosiers, 2002; Sims and Dent, 2005). Previous studies found house price reductions between 1 and 20 percent with this price discount reducing rapidly with increasing distance from the power line. Overall, the negative price effects become negligible beyond around 250 m. The literature suggests that adjacency to or a direct view of HVTL pylons causes an even greater negative impact than proximity to the power lines. Such close proximity to pylons have been found to reduce house prices by up to 27 percent (Bond and Hopkins, 2000; Callanan and Hargreaves, 1995; Colwell, 1990; Hamilton and Schwann, 1995; Rosiers, 2002; Sims and Dent, 2005).

Although the literature on impacts of cell phone towers on house prices is scant, the documented price impacts are in line with the HVTL research. As with several HVTL studies, both perceptual and econometric studies were employed to measure influences of cell phone towers. Furthermore, empirical results mainly indicate a negative price effect which rapidly diminishes with distance from nearby cell towers. Despite these similarities with HVTL research, the cell phone tower studies to date all suffer from poor research designs and model specifications. The first study to focus on cell towers

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was Bond and Wang (2005). In this case study of select suburbs within Christchurch, New Zealand, approximately 4,000 residential sales over a lengthy 17-year period from 1986 through 2002 were analysed using an hedonic equation. This modelling was complemented with an opinion survey of residents. The perceptual study revealed that proximity to a cell phone tower would devalue property from 10 to over 20 percent. However, the empirical results were mixed and of four suburbs, two experienced a significant price decrease of around 21 percent, one suburb had a positive effect of around 12 percent while the fourth suburb had no significant price impact. For a host of reasons, the interpretation of Bond and Wang's results are severely limited. One methodological shortcoming involves the specification of distance to cell tower.

Rather than geocode each sales transaction based on street address, the study's hedonic model incorporates a series of dummy variables representing street names within the study area. Instead of determining the straight-line distance or distance band from the nearest cell tower, properties were simply coded as being located in a particular street. The usefulness of such dummy variables to serve as a proxy for proximity to cell tower is extremely low given properties on the same street can have vastly different proximities to a given tower. As clearly expressed in the HVTL literature, proximity is of paramount importance and needs to be measured accurately. Later, Bond (2007a) "refined" her 2005 study by employing a geographic information system (GIS) to geocode residential sales and tower locations and then compute the straight-line distances between them.

Notwithstanding this improved spatial accuracy, the ultimate weakness in these studies' research designs centre on the specification of variables used to capture the influence of cell towers on house price. Both studies lacked adequate temporal controls, which is critical given the lengthy 17-year time frame (1986-2002). In short, a linear specification was used to control for date of sale while sales transaction prices were adjusted using the consumer price index. This is entirely insufficient given that over the study time frame the market experienced periods of rapid house price appreciation as well as periods of price declines, particularly during the recession following the 1997 Asian Financial Crisis. A non-linear specification such as a series of sale quarter dummy variables, as per the present study, is a far more appropriate approach towards modelling changes in market conditions over time. Compounding this is the fact that each of Bond's variables measuring the effect of cell tower proximity on house price have built-in temporal elements.

For instance, TOWER, which is a dummy variable that categorises all sales within a suburb as either being made prior to the erection of a cell tower or after it had been erected. Such a variable cannot avoid capturing the change in market conditions before and after a particular cell tower was erected. Variations in market conditions over such a long-study time frame are profound and surely dominates the TOWER variable's coefficient thereby making it impossible to decipher whether or not the existence of a particular cell tower had any influence on house prices in that suburb.

A similar temporal conundrum is found in the proximity variables featured in Bond (2007a): inverse distance and 300-m distance bands to cell tower. Both variables are dominated by market changes over time. In the case of the inverse distance variable, all sales prior to the erection of the suburb's cell tower have been coded as zero while later sales feature positive, non-zero values. In the same vein, the set of dummy variables representing vastly oversized 300-m distance bands also feature the improper coding

of sales prior to tower erection. In this case, early sales are inadvertently included in the default condition which is defined as houses located more than 600 m from the suburb's cell tower. In both the inverse distance variable and set of distance band dummy variables the inappropriate coding of early sales forces these variables to act as proxies for changing market conditions over the studies' long 17-year time frame. Hence, it is impossible to confidently interpret these variables' coefficients. In other words, the studies' variables of interest completely lack internal validity.

Recent cell tower research outside of New Zealand includes Bond (2007b) which analysed the house price effects of proximity to cell phone towers in Orange County, Florida, USA. Unfortunately, this study suffers from the same errors as Bond and Wang (2005) and Bond (2007a) in that the variable of interest is the same dichotomous TOWER variable discussed above. Despite including a series of dummy variables accounting for year of sale over the study's 11-year time frame, the TOWER variable would still have been influenced by variations in market conditions making it impossible to accurately interpret.

Banfi *et al.* (2008) considered the impact of three environmental variables, presence of a cell phone tower, noise level and air pollution, on residential rents in Zurich, Switzerland. The study was cross-sectional and investigated 2003 market rents. Therefore, this study is not subject to the same temporal challenges inherent in the above-mentioned longitudinal Christchurch and Orange County studies. Banfi *et al.* found that the presence of a cell phone tower within a 200-m radius discounted rents by nearly 2 percent in the "for-profit" apartment submarket while the impact was insignificant in the "non-profit" submarket. Given the evidence generated in the HVTL body of research, a more "microspatial investigation approach" (Rosiers, 2002) with narrower (e.g. 50-m increments) buffers would have more accurately modelled the non-linear relationship between proximity to cell phone towers and property values.

In summary, a number of scientific reports on the potential health effects of proximity to cell phone towers have been published. Taken together these health studies do not establish clear increases in adverse health effects from RF exposure. In general, public exposure to RF generated by cell phone tower antennae is low and well below established standards. For instance, in a 2009 technical report by the National Radiation Laboratory, ten cell phone sites were tested for RF exposure levels. The maximum exposure in areas around eight of the cell tower sites was below 0.2 percent of the reference level while two of the sites were near 0.4 percent (National Radiation Laboratory, 2009). Given that there is a very weak causal link between health effects and RF exposure, the New Zealand Environment Court has ruled that there are no adverse health effects arising from RF that comply with the New Zealand Standard. On the other hand, visual effects are assessed on a case-by-case basis.

In terms of empirical studies quantifying the impact of cell phone towers on property values, the research to date is fundamentally flawed as discussed above. Unfortunately, these studies have been referenced by government and NIMBY groups alike (Ministry for the Environment, 2007; Expel Cell Towers, 2009; Stop the Worthington Hills Country Club Tower, 2010). The proliferation of these dubious research findings has potentially magnified any environmental stigma associated with cell phone towers. Since no credible study on the house price impact of proximity to cell towers has been conducted to date, the findings of the present study are extremely important to the public as well as government regulators and cell phone service providers.

Data and methodology

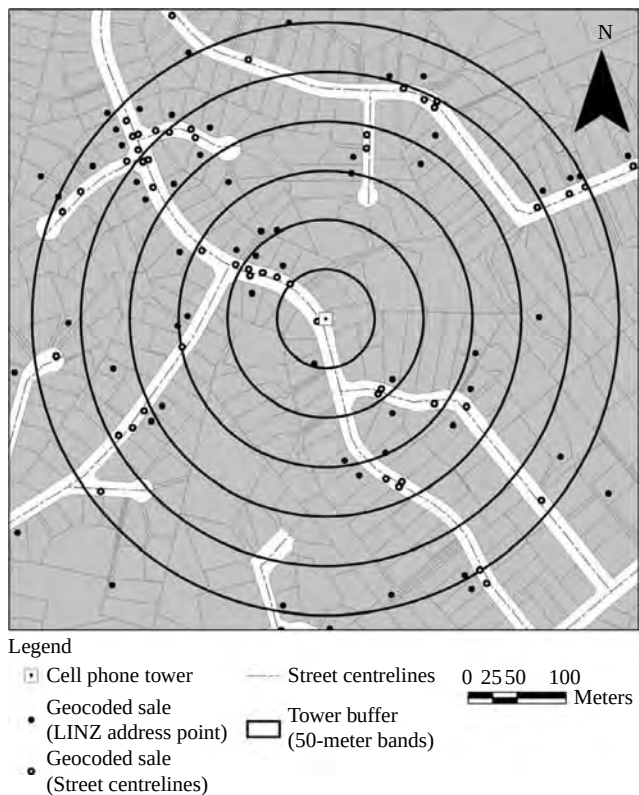
This study analyses residential sales within the Auckland Region focusing on its four largest territorial authorities: Auckland, Manukau, North Shore and Waitakere. The main source of data for this study is PropertyIQ Limited's residential sales transaction database from January 2005 through December 2007. The dataset includes variables related to the structural characteristics of the house (e.g. lot and building size, quality of exterior/interior, period of construction) as well as externalities such as water views. These controls were supplemented with location, distance and road class variables generated through use of a GIS. Only arms-length transactions involving standard residential detached and semi-detached dwellings situated on their own plot of land with freehold interests were selected for analysis. Further transactions were deleted if they were suspected to include data entry errors. Specifically, houses were removed if floor area was less than 30 m² or if the property had missing data for any of the variables included in the analysis. Records outside of a reasonable range (outliers beyond three standard deviations) were also deleted. After data cleaning, approximately 56,000 cases were available for analysis.

Datasets containing the population of cell phone towers were supplied by two New Zealand telecommunication companies, Vodafone and Telecom. Both datasets were combined and in total contained 521 cell sites within the study area. Data on each site included the tower's integration date, precise location (X-Y coordinates), street address, mast type (i.e. monopole, lamppost, etc.) and antenna height.

A GIS was used to calculate the proximity to nearest cell phone tower. It became evident from past studies that spatial accuracy is vital. First, research on HVTL suggests that the effect on house prices virtually disappears beyond 250 m with a non-linear relationship between price and distance to HVTL infrastructure that is subject to steep diminishing returns. In order to maximise spatial accuracy, sales transactions were geocoded to address points maintained by Land Information New Zealand's (LINZ) Landonline GIS-based cadastral system. This method not only increased the geocoding success rate but allowed the resulting sales points to be located within the property's land parcel rather than at an approximate location along a street centreline, which is the conventional geocoding method. Moreover, the LINZ address points tend to be located within the footprint of the house itself. Visually shown in Figure 2, this geocoding method is particularly appropriate for homes that occupy a rear lot at some distance from the street. In terms of spatial error associated with conventional geocoding by street centreline, the median distance between the pairs of geocoded points is 28.6 m with some pairs more than 200 m apart.

Second, previous studies by Bond and Wang (2005) and Bond (2007a) measure the impact of cell phone towers by broadly generalising the year of when the tower was integrated. Clearly this allows for price effects to be estimated where in fact no nearby cell tower existed at the time of sale. To avoid such errors, care was taken to ensure that integration dates of nearest cell towers did not occur after the date of sale.

As previously discussed, the present authors felt it was important to include the tower mast type (e.g. monopole, building mount, lamppost, etc.) into the hedonic model in order to capture any price effects attributed to differing tower aesthetics. However, in some cases data on the mast type was missing. In order to fill in the gaps in the data, a recently introduced online feature on Google Maps, called Street View, was employed to collect data. Street View provides a 360-degree panoramic image of streets



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Figure 2.
Map showing spatial
difference between
geocoding methods

and allows users to “walk down the street”. Once the sites with missing information were identified, site street address was entered to navigate to the tower’s location at which point the mast type was visually identified and coded in the database. Overall, 96 of the 521 cell towers were coded using Google Map’s Street View feature. Table I summarises the data on tower mast type.

An interesting observation was made during the collection of tower mast type data using Google Street View. It was observed that approximately half of the sites for which the data were missing were surrounded by non-residential land uses (e.g. industrial, retail, office). This could indicate an overall trend of tower siting mostly in areas with commercial activities. If the cell site’s adjacent use (i.e. residential v. non-residential) is disregarded in the model, this could potentially bias the model’s proximity estimates.

Mast type	Frequency	%
Monopole	217	42
Building mount/rooftop	202	39
Lamppost	96	18
Other	6	1
Total	521	100

Table I.
Frequency table of cell
towers by mast type
across study area

In other words, when the distance to tower is calculated, this distance could at the same time capture the affect that proximity to non-residential land uses has on house price. Although existing land use studies have produced generally inconclusive results, some researchers have found that convenience associated with nearby commercial land uses, such as easy access to work and shopping venues, outweighs the negative price effects (Bowes and Ihlanfeldt, 2001; Grass, 1992; Nelson and McClesky, 1990). In contrast, Mahan *et al.* (2000) argue that visual and noise pollution override the positive effect of convenience. In addition to these issues, the visual impact of a cell tower will largely depend on the nature of its surroundings. In other words, a tall, armed monopole will be very visually disruptive in a residential neighbourhood but may not be noticeable at all in the midst of industrial parks or big box retail outlets.

In order to isolate the potential price effect due to the aesthetic disamenity associated with cell towers, the authors have elected to identify cell sites that are located within residential-only areas and then conduct a separate analysis of sales inside a predetermined buffer around these “residential” towers. Street View was once again employed in order to determine which cell towers were cited in residential areas. In this process, a total of 46 locations in the study area were coded as “residential” towers, which is approximately 9 percent of all cell towers. Figure 3, shows a map of the study area and shows the locations and types of towers.

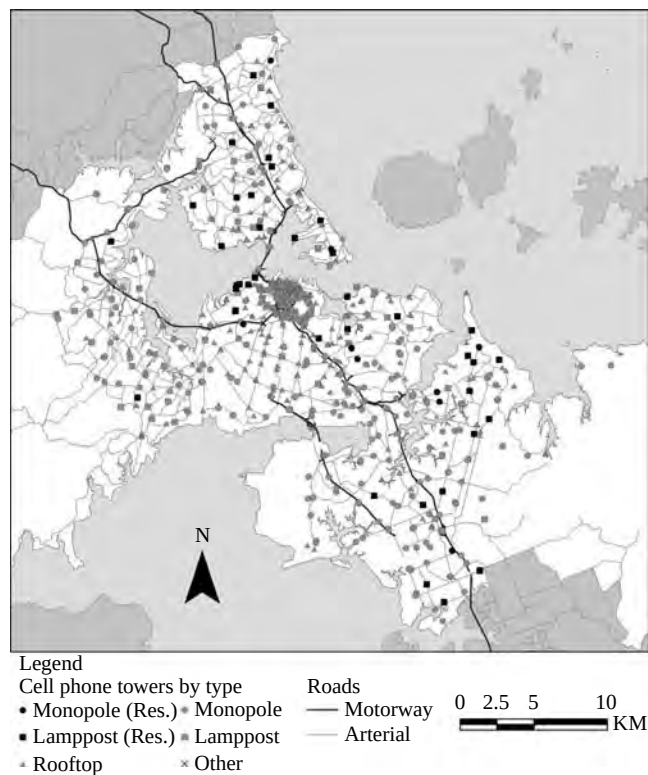
The analysis is therefore organised into two parts. First, sales around towers in residential areas were analysed. Having considered the approach developed in the HVTL literature and the known science on RF levels emitted by a cell tower’s antennae, all properties within a 500-m radius of existing cell phone towers were included in the sample. It is anticipated that houses within 250 m will be subject to a price discount while remaining properties will serve as a form of “control” group.

Second, this analysis is repeated with sales from the “global” sample with distances calculated to nearest cell site irrespective of whether or not the tower is in residential or non-residential area. This way the estimates from two samples can be compared against one another and the global findings can be readily compared to past HVTL findings which have followed the same “global” approach.

Hedonic models have dominated among the HVTL studies and remain the most reliable tool for measuring negative environmental externalities (Rosiers, 2002). Therefore, to determine the impact of proximity to cell phone towers on house prices, a hedonic pricing model was estimated. A log-linear functional form is used where the dependent variable (sale price) is transformed to its natural log form. The present study’s model specifies the sale price of a house to be a function of its structural attributes, local neighbourhood characteristics, time trend variables, and proximity to cell sites. The model’s reduced form in equation (1) is:

$$\ln(SP) = \beta_0 + \sum_{i=1}^n \beta_i S_i + \sum_{j=1}^n \beta_j L_j + \beta_k P_k + \beta_l Q + \varepsilon \quad (1)$$

where SP is the sale price, net of chattels, at which the house was sold; S is a vector of structural characteristics of the house; L is a vector of location variables; P is the distance to cell phone tower; and Q is the quarter of the year in which the property was sold. Model specification follows conventional practice by including the structural attributes of the house (i.e. floor and land area, age, home’s exterior and interior condition) and location (i.e. road category, water view and distance to coast, suburb).



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Figure 3.
Map of study area
showing cell tower
locations

Because the sample is composed over a three-year period, to control for market changes dummy variables indicating quarterly date of sale were added. Earlier work by Rehm *et al.* (2006) showed a non-linear relationship between period of construction and house price using data from New Zealand. Therefore, age is specified as a series of dummy variables by decade of construction. As suggested in previous research (Benson *et al.*, 1998; Bourassa *et al.*, 2004; Filippova, 2009) water views have a considerable influence on house price. This impact varies depending on the distance from the coast. Therefore, variables interacting each of the three view scopes with distance are added to the model. To capture the expected negative effect of noise and air pollution for houses located on busy roads, a dummy variable Road_arterial was included with minor, collector roads being the default category. Lastly, a set of dummy variables representing each area unit (New Zealand Census enumeration units containing between 3,000 and 5,000 residents) serve as proxies for school quality and other neighbourhood amenities not otherwise measured.

Considering the non-linear relationship between cell tower proximity and house price, several functional forms were tested separately:

- continuous natural log of distance;
- distance dummy variables in 50-m bands; and
- interaction distance-mast type variables.

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The first two forms have been used previously in the literature to investigate the impact of HVTL on property values. The log function assumes that the effect is most pronounced in close proximity to the disamenity and dissipates rapidly as distance increases. Although this continuous distance function provides a general direction of the impact relative to the presence of a nearby cell tower, the use of dummy distance variables allows for a more adequate, “microspatial” investigation. Given that the area contained within each subsequent proximity band increases, the authors elected to aggregate the smallest two bands (0-50 m and 50-100 m) into a single dummy variable in order to capture a sufficient number of observations. Finally, the third form attempts capture the influence of differing tower aesthetics by interacting natural log of distance with dummy variables representing tower mast type. These three functional forms were tested on the sample of transactions around towers in residential areas. Additionally, to assess the robustness of the residential sample results, analysis of all residential transactions and cell sites (residential and non-residential locations) using the model specified in equation (1) is performed on global sample of sales. Table II lists and defines all the independent variables included in the analysis. These were regressed against the dependent variable, the natural log of net sales price.

It has been recognised that hedonic price models can potentially suffer from heteroscedasticity where the variances of the error term are unequal. In its presence, although the model gives unbiased estimates, the variance is often underestimates which biases the standard errors and *t*-statistics. The use of the weighted least squares is a common solution but could potentially produce biased estimates of the standard errors with the wrong choice of weights. Fletcher *et al.* (2000) suggested the use of White’s standard errors test to correct for this problem. Therefore, the heteroscedasticity-consistent estimates are reported in this paper.

Results

To examine whether there are variations in house price impacts due to proximity to cell towers, the initial three residential-only models were prepared using alternative proximity specifications employed in the literature. The results of the estimation using the sample of towers in residential areas are reported in Table III. All three residential-only models provide very high-explanatory power with an adjusted *R*² between 0.913 and 0.914. All of the control variables included in the model are significant predictors of sale price. Their magnitude and signs are in line with theoretical expectations. In general, dwelling size, age and presence of water view explain most of the variation in the log of house price. Noteworthy is the high stability of the hedonic prices across the models.

Turning to the variables of empirical interest, distance to cell towers, they are largely found to be statistically insignificant. Residential model I includes the proximity variable Dist_LN, which is the natural log of distance. The variable’s *t*-statistic is only 0.093 indicating an extremely weak relationship between proximity to cell towers and house prices. Residential model II includes a series of dummy variables representing proximity to cell towers. This provides for a more “microspatial approach” in contrast to the continuous variable, Dist_LN. The positive or negative effects of dummy variables on sale price are interpreted in the light of the default condition, which is a proximity band between 300 and 500 m from the nearest cell tower. The only statistically significant dummy variable was for properties located

	Variable name	Variable description
Proximity to tower	Dist_LN	Natural log of distance in meters from the property's LINZ address point to the nearest tower
	<i>Proximity bands</i>	A series of dummy variables corresponding to the distance to the nearest tower in 50 m increments. The default category is over 300 m from a cell tower
	Dist_0_100, Dist_100_150, Dist_150_200, Dist_200_250, Dist_250_300	
	Mast type of nearest tower x Dist_LN Monopole_xDist, Lamppost_xDist, Rooftop_xDist, Bridgemount_xDist	Interaction variable equal to the product of the nearest tower mast type dummy variable and the natural log of distance to nearest tower
Structural	BFA, BFA2	Floor area (m ²), floor area squared
	Land_area	Land area (hectares)
	<i>Decade (vintage) of construction</i>	A series of dummy variables corresponding to the vintage (decade) in which the house was built. The default condition is built in the 2000s
	D1910, D1920, D1930, D1940, D1950, D1960, D1970, D1980, D1990	
	<i>Exterior walls condition</i>	Variable for whether the property's exterior walls were coded by the valuer as being in "poor/fair", "average" or "good" condition. The default condition is "good"
	Ext_Poor_Fair, Ext_Average	
	<i>Interior fixtures and finishes condition</i>	Variable for whether the property's interior fixtures and finishes were coded by the valuer as being in "poor", "average" or "good" condition. The default is "average"
	Int_Poor, Int_Good	

(continued)

Table II.

	Variable name	Variable description
Location	<i>Water view scope</i>	Series of dummies variables for whether a property features a wide, moderate or slight water view from the living room. The default is no water view
	Water_Wide, Water_Moderate, Water_Slight, Water_None [default]	
	<i>Water view scope x distance to coast</i>	Interaction variable equal to the product of the water view dummy variable and the natural log of distance to nearest coast in metres
	Water_WidexLNDist, Water_ModxLNDist, Water_SlightxLNDist	Dummy variable for whether the property’s land plot is steeply sloped or not. The default category is not steep, which includes properties coded in the dataset as featuring either a “level” contour or having an “easy to moderate” fall or rise
	Contour_Steep	
	Road_Arterial	Dummy variable for whether the property is located on an “arterial road” (Road Class 1 as defined by LINZ or “minor arterial road” (Road Class 2) with the default category being an aggregation of Road Class 3 “collector” and Road Class 4 “local” road
	<i>Area unit (suburb)</i> au506901, au506903, etc.	A series of dummy variables indicating the area unit in which a property is located. The area unit containing the most observations serves as the default category
Time	<i>Sale quarter</i> Q1_2005, Q2_2005, etc.	A series of dummy variables for each quarter of when the property was sold. The default condition was fourth quarter 2007

Variable	Residential model I Log distance		Residential model II Distance dummies		Residential model III Distance $\times$ mast type	
	Estimate	White's t	Estimate	White's t	Estimate	White's t
Constant	12.8100	331.820***	12.8129	528.012***	12.8548	299.558***
BFA	0.0029	20.334***	0.0029	20.146***	0.0029	21.161***
BFA2	-8.3×10^{-07}	-2.934***	-8.4×10^{-07}	-2.920***	-8.5×10^{-07}	-3.163***
Land area	2.5424	10.454***	2.5488	10.606***	2.5374	10.478***
Wall_Fair_Poor	-0.1124	-3.776***	-0.1143	-3.864***	-0.1173	-4.080***
Wall_Average	-0.0379	-5.100***	-0.0366	-4.898***	-0.0390	-5.226***
Interior_Good	0.0626	7.868***	0.0613	7.685***	0.0571	7.021***
Interior_Poor	-0.0273	-1.994*	-0.0215	-1.489	-0.0290	-2.127**
D_1910	0.0994	4.220***	0.1021	4.331***	0.0996	4.209***
D_1920	0.0283	1.233	0.0294	1.284	0.0287	1.250
D_1930	0.0226	0.673	0.0212	0.634	0.0290	0.852
D_1940	-0.0856	-3.712***	-0.0851	-3.691***	-0.0875	-3.800***
D_1950	-0.1045	-5.534***	-0.1024	-5.425***	-0.1077	-5.691***
D_1960	-0.1596	-10.607***	-0.1592	-10.585***	-0.1584	-10.512***
D_1970	-0.1743	-12.723	-0.1749	-12.768***	-0.1751	-12.690***
D_1980	-0.1579	-11.843***	-0.1563	-11.799***	-0.1605	-11.950***
D_1990	-0.0884	-7.416***	-0.0885	-7.452***	-0.0912	-7.661***
Contour_steep	-0.0486	-4.080***	-0.0460	-3.932***	-0.0471	-3.976***
Water_Wide	1.4265	10.925***	1.4285	10.999***	1.4387	11.048***
Water_Wide_xDist	-0.2009	-9.285***	-0.2003	-9.314***	-0.2022	-9.380***
Water_Moderate	0.5964	5.530***	0.5858	5.465***	0.5942	5.506***
Water_Mod_xDist	-0.0755	-4.451***	-0.0736	-4.367***	-0.0752	-4.427***
Water_Slight	0.5185	4.766***	0.5468	4.968***	0.5068	4.636***
Water_Slight_xDist	-0.0682	-4.030***	-0.0721	-4.215***	-0.0665	-3.913***
Road_arterial	-0.0347	-4.448***	-0.0350	-4.494***	-0.0352	-4.519***
Q1_2005	-0.2157	-14.575***	-0.2157	-14.600***	-0.2165	-14.604***
Q2_2005	-0.2056	-13.186***	-0.2065	-13.168***	-0.2075	-13.303***
Q3_2005	-0.1781	-12.732***	-0.1793	-12.745***	-0.1758	-12.354***
Q4_2005	-0.1513	-10.660***	-0.1531	-10.692***	-0.1512	-10.714***
Q1_2006	-0.1521	-11.194***	-0.1542	-11.274***	-0.1485	-10.979***

(continued)

Proximity to cell
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Variable	Residential model I Log distance		Residential model II Distance dummies		Residential model III Distance $\times$ mast type	
	Estimate	White's t	Estimate	White's t	Estimate	White's t
Q2_2006	-0.1399	-10.457***	-0.1391	-10.240***	-0.1392	-10.429***
Q3_2006	-0.1211	-10.370***	-0.1219	-10.347***	-0.1196	-10.242***
Q4_2006	-0.1028	-8.983***	-0.1044	-9.052***	-0.1026	-8.956***
Q1_2007	-0.0465	-4.001***	-0.0486	-4.148***	-0.0458	-3.936***
Q2_2007	-0.0094	-0.794	-0.0103	-0.858	-0.0079	-0.666
Q3_2007	0.0145	1.243	0.0123	1.042	0.0166	1.423
Dist_LN	0.0005	0.093				
Dist_0_100			-0.0034	-0.240		
Dist_100_150			-0.0020	-0.150		
Dist_150_200			0.0061	0.587		
Dist_200_250			-0.0206	-2.266**		
Dist_250_300			-0.0016	-0.214		
Lampost_xDist					-0.0064	-0.999
Armed_mono_xDist					0.0221	1.930**
Single_mono_xDist					0.0081	0.697
Adj R^2	0.913		0.913		0.914	

Notes: Significant at: *0.1, **0.05, and ***0.01 levels; $n = 3,168$; $LnSP$ is the dependent variable; all regressions include dummy variables for area units to control for locations; their coefficients are not reported for brevity

in the band between 200 and 250 m from the nearest cell tower. This variable indicates that properties in this particular proximity band are subject to roughly a 2 percent reduction in value. The authors believe this to be an anomaly which is not actually reflecting the influence of proximity to cell towers but some other, unmeasured spatial phenomenon. The oscillating signs and statistical insignificance of all but a single mid-range distance dummy variable indicates that proximity to cell towers in residential areas does not influence house price.

Finally in residential model III, the proximity impact was differentiated by the three cell tower mast types found in residential areas: lamppost, single monopole and armed monopole. The clear difference between the mast types is their visual appearance. As the photos in Plate 1 shows, the lamppost-mounted antennae are far less visually disruptive than the monopole towers, with the armed monopole towers contrasting most greatly with surrounding houses. The interaction variables reflecting distance to the less intrusive lamppost and single monopole are in line with the residential models I and II in that they are statistically insignificant. However, houses sold within close proximity to armed monopoles are found to suffer a price discount. Given that these towers are located within residential areas, it is conceivable that the strong visual impact of the armed monopoles would influence house prices whereas the aesthetically subtler mast types do not. The inclusion of the tower mast types in residential model III is likely the reason why this model produced a slightly higher coefficient of determination.

Figure 4 shows the price premium associated with increased distance from an armed monopole cell tower located in a residential area. In comparison with a house located adjacent to such a tower, a similar house that is positioned 100 m away will sell for approximately 10.7 percent greater, with the marginal price differential diminishing with each additional metre away. It also comes as no surprise that these armed monopole towers were erected in the early years of New Zealand cell phone service. The newest towers located in residential areas are almost exclusively lamppost-type as indicated in the cross-tabulation contained in Table IV.

Proximity to cell
phone towers



Lamppost



Single monopole



Armed monopole

Source: Photos-Vodafone with permission and Justin Smith/Wikimedia Commons

Plate 1.
Photos of the three tower
mast types found in
residential areas

In summary, the proximity coefficients suggest that the presence of cell towers does not significantly affect the sales prices of houses within residential areas, regardless of the distance specification employed. That notwithstanding, proximity to the more visually disruptive armed monopole towers is found to reduce values of nearby houses.

Since the present study has taken a unique approach towards testing the influence of cell towers on property value by focusing on sales transactions within 500 m of towers located in residential areas, the authors felt it important to investigate alternative hedonic models using the global sample of sales throughout the study area, which is the conventional approach in both cell tower and HVTL research. This would enable a direct comparison with past research findings and may identify any issues with this study’s unorthodox analysis of residential-only areas.

Within the global models all transactions were included with distance calculated to the closest cell phone tower, regardless of whether or not the tower was located in a residential area. The global sample results are presented in Table V. The global models’ abilities to predict house prices are on par with the residential-only sample and produced an adjusted R^2 of 0.902 across the three specifications. Similarly, the sign and magnitude of the control variables are consistent with a priori expectations and most are statistically significant at the 0.01 level.

The coefficients of the parameters of interest are quite similar to the residential sample. In global model I, the coefficient for the natural log of distance is statistically insignificant. This corresponds to the findings of the residential-only sample. In global model II, coefficients for the distance dummy variables were similar to the estimates from the residential sample with the exception of the closest proximity band representing sales within 100 m of a cell tower. This dummy variable’s coefficient was negative and statistically significant. Houses located within close proximity are subject

Figure 4.
Line graph showing house price premiums for increased distance away from armed monopole towers in residential areas

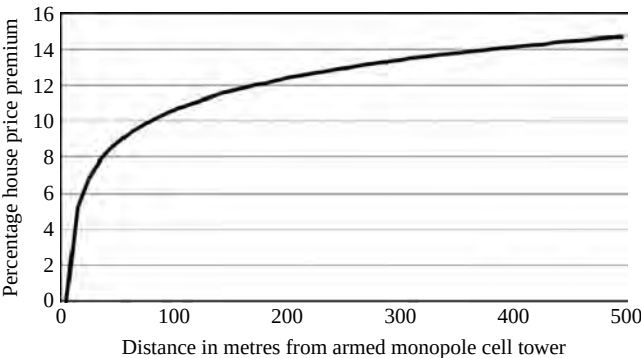


Table IV.
Cross tabulation of residential tower mast types by integration year

Tower type (residential-only)	Integration year	
	1989-2001	2002-2007
Armed monopole	5	0
Single monopole	1	3
Lamppost	3	32
Total	9	35

Variable	Global model I Log distance		Global model II Distance dummies		Global model III Distance × mast type	
	Estimate	White's t	Estimate	White's t	Estimate	White's t
Constant	12.6593	1,263.866 ***	12.6595	2,161.024 ***	12.6638	1,260.469 ***
BFA	0.0030	97.624 ***	0.0030	97.610 ***	0.0030	97.376 ***
BFA2	-8.0×10^{-07}	-12.618 ***	-8.0×10^{-07}	-12.652 ***	-7.9×10^{-07}	-12.407 ***
Land area	1.0954	70.451 ***	1.0969	70.539 ***	1.0944	70.383 ***
Wall_Fair_Poor	-0.0784	-17.170 ***	-0.0786	-17.206 ***	-0.0776	-16.984 ***
Wall_Average	-0.0347	-20.993 ***	-0.0347	-21.016 ***	-0.0347	-21.007 ***
Interior_Good	0.0484	23.150 ***	0.0484	23.126 ***	0.0484	23.157 ***
Interior_Poor	-0.0336	-11.596 ***	-0.0337	-11.618 ***	-0.0338	-11.635 ***
D_1910	0.1103	23.277 ***	0.1104	23.287 ***	0.1106	23.332 ***
D_1920	0.0601	15.461 ***	0.0606	15.578 ***	0.0600	15.423 ***
D_1930	0.0187	3.948 ***	0.0188	3.980 ***	0.0183	3.868 ***
D_1940	-0.0265	-6.623 ***	-0.0265	-6.617 ***	-0.0270	-6.752 ***
D_1950	-0.0333	-11.001 ***	-0.0334	-11.043 ***	-0.0334	-11.010 ***
D_1960	-0.0643	-23.395 ***	-0.0644	-23.420 ***	-0.0641	-23.316 ***
D_1970	-0.0960	-36.486 ***	-0.0963	-36.551 ***	-0.0965	-36.614 ***
D_1980	-0.0870	-30.797 ***	-0.0871	-30.827 ***	-0.0874	-30.940 ***
D_1990	-0.0502	-20.920 ***	-0.0502	-20.913 ***	-0.0504	-20.982 ***
Contour_steep	-0.0395	-14.804 ***	-0.0397	-14.894 ***	-0.0388	-14.528 ***
Water_Wide	0.8372	47.829 ***	0.8371	47.817 ***	0.8348	47.629 ***
Water_Wide_xDist	-0.1048	-32.655 ***	-0.1048	-32.641 ***	-0.1044	-32.479 ***
Water_Moderate	0.4791	26.629 ***	0.4792	26.626 ***	0.4829	26.869 ***
Water_Mod_xDist	-0.0605	-20.390 ***	-0.0605	-20.384 ***	-0.0612	-20.647 ***
Water_Slight	0.2569	16.021 ***	0.2570	16.023 ***	0.2575	16.051 ***
Water_Slight_xDist	-0.0306	-11.576 ***	-0.0306	-11.570 ***	-0.0308	-11.616 ***
Road_arterial	-0.0237	-13.042 ***	-0.0234	-12.905 ***	-0.0236	-12.970 ***
Q1_2005	-0.2303	-74.073 ***	-0.2304	-74.245 ***	-0.2298	-73.566 ***
Q2_2005	-0.2119	-67.413 ***	-0.2119	-67.572 ***	-0.2113	-66.919 ***
Q3_2005	-0.1926	-61.212 ***	-0.1925	-61.278 ***	-0.1920	-60.849 ***
Q4_2005	-0.1681	-52.675 ***	-0.1681	-52.716 ***	-0.1675	-52.387 ***
Q1_2006	-0.1574	-48.877 ***	-0.1574	-48.927 ***	-0.1568	-48.591 ***

(continued)

Proximity to cell
phone towers

Table V.

Variable	Global model I Log distance		Global model II Distance dummies		Global model III Distance × mast type	
	Estimate	White's t	Estimate	White's t	Estimate	White's t
Q2_2006	−0.1391	−44.236 ***	−0.1392	−44.320 ***	−0.1385	−43.951 ***
Q3_2006	−0.1197	−38.262 ***	−0.1198	−38.260 ***	−0.1193	−38.084v ***
Q4_2006	−0.0891	−29.084 ***	−0.0892	−29.124 ***	−0.0888	−28.996 ***
Q1_2007	−0.0444	−14.582 ***	−0.0445	−14.601 ***	−0.0445	−14.604 ***
Q2_2007	−0.0072	−2.323 **	−0.0074	−2.377 **	−0.0074	−2.379 ***
Q3_2007	0.0004	0.117	0.0003	0.102	0.0001	0.041
Dist_LN	0.0001	0.055				
Dist_0_100			−0.0226	−3.526 ***		
Dist_100_150			−0.0025	−0.458		
Dist_150_200			0.0033	0.932		
Dist_200_250			−0.0023	−0.665		
Dist_250_300			0.0022	0.745		
Rooftop_xDist					0.0016	1.284
Lampost_xDist					0.0002	0.170
Monopole_xDist					−0.0008	−0.670
Bridgemount_xDist					0.0006	0.219
Adj R^2	0.902		0.902		0.902	

Notes: Significant at: *1, **0.05, and ***0.01 levels; $n = 55,775$; $LnSP$ is the dependent variable; all regressions include dummy variables for area units to control for locations; their coefficients are not reported for brevity

to a 2 percent reduction in house price in comparison with houses located beyond 300m from a tower. Given that the global sample does not isolate the influence of proximity to non-residential land uses, the authors feel that it is not possible to determine if this coefficient is reflecting the influence of proximity to cell towers or the disamenity of being near commercial and industrial land uses where the vast majority of Auckland's cell towers are located. Based on these hedonic results, it can be interpreted that there are no distinct price effects due to proximity to cell tower. These global model results demonstrate the same lack of evidence observed in the residential sample.

In Global Model III, two additional tower mast types are included: roof top and bridge mount antennae. However, the overall dataset of cell towers did not distinguish between the monopole antenna types (e.g. single versus armed), therefore a broad category "monopole" was used in the global models. All interactive distance-mast type coefficients are statistically insignificant. In other words, the model indicates that there is no statistical evidence of visual impacts of lamppost, monopole and bridge mounted cell towers in the global sample. The reason for the statistically insignificant monopole variable is likely due to the fact that these towers tend to be located in non-residential areas. Therefore, they are not visually disruptive within the context of a shopping centre or industrial park. Overall, the three global models corroborate the findings of the residential-only models and indicate that proximity to cell towers do not affect house prices.

Conclusions

This study investigated the impact of proximity to cell phone towers on residential property values using sales transaction data from the Auckland region. Empirical evidence on the impact of cell phone towers emerged recently with only a handful of published studies. However, severe methodological deficiencies have been identified in the review of literature which impairs the interpretation of evidence published to date. Several key improvements have been implemented in the present study to ensure the internal validity of the findings. One such improvement is the analysis of cell towers located within residential-only areas. This unique approach coupled with an analysis of tower mast types allowed for the isolation of price effects associated with tower aesthetics.

The analysis of towers in residential areas suggest that, irrespective of distance specification, cell phone towers do not significantly influence house prices. An interesting finding was observed in residential model III that tested aesthetic disamenity of different tower mast types. It was found that the most visually disruptive towers, armed monopoles, had a negative influence on house price, with this impact declining with increased distance from the tower. However, there were no discernable differences in the estimated distance-mast type coefficients when applied to the global sample of sales transactions. This was likely due to the fact that the dataset of cell towers for the global sample did not distinguish between single and armed monopole mast types, and the more visually disruptive towers tend to be surrounded by commercial or industrial land uses thereby diluting any aesthetic disamenity. Overall, the hypothesised negative impact of cell phone towers could not be established in this study except for a small minority of armed monopole towers in residential areas due to their pronounced visual impact.

Proximity to cell
phone towers

There are two key limitations to the study's findings. First, although the proximity measurements were accurately measured using a GIS, there was no confirmation made regarding line of sight between each property and the nearest cell phone tower. In other words, a house may have been close to a tower but foliage or nearby buildings may have blocked a direct view of the tower from the property. The second limitation is evident in the results of residential model II which found that a single mid-range proximity band held a statistically significant negative relationship to house price. As previously discussed, the authors deem this an anomaly but it does indicate that the model is not perfect and this particular proximity dummy variable in the residential-only dataset appears to be capturing some unmeasured spatial phenomenon.

The findings of this study help to understand the relationship between house prices and proximity to cell phone towers, providing government regulators and telecommunication companies with information to assist in siting as well as an understanding of the influence that the aesthetic disamenity of certain mast types has on house prices. In terms of existing monopole towers in residential areas, the visual disruption caused by these installations may be reduced or eliminated by camouflaging. This practice is popular in the USA with such cell towers referred to as "stealth towers", which often involves camouflaging towers as evergreen or palm trees.

Future studies should be conducted in other locations in New Zealand as well as overseas in order to determine whether the findings are unique to the Auckland housing market. Finally, several HVTI studies as well as Bond and Wang's (2005) cell phone tower study includes perceptual surveys of valuers and real estate agents. In light of the present study's findings, it would be useful to investigate whether property professionals perceive a reduction of value due to proximity to cell towers. If such a perception does exist, this may lead to underestimation of property valuations and asking prices.

Despite New Zealand having more than one cell phone subscription per capita, the anticipated demand growth for new cell phone towers is phenomenal. This is because nearly all the forthcoming demand involves the transmission of mobile broadband data. As subscribers upgrade from traditional cell phones to "smart phones" designed to take advantage of the high data transfer speeds of third and fourth generation (4G) mobile technology, the need for new telecommunication infrastructure will be rapid and unprecedented. Morgan Stanley Research (2009) has recently estimated that over the next three years there will be 29 percent annual growth in the number of global wireless data users. While according to the Telecommunications Industry Group (2009), New Zealand will require a two-fold increase of cell sites in order to provide a nationwide 4G network. This equates to 2,500 new cell towers. Based on the findings of this study, this proliferation of new cell towers should not have a negative impact on house prices assuming telecommunication providers refrain from erecting visually disruptive, armed monopole towers in residential areas.

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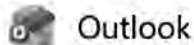
Further reading

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Corresponding author

Olga Filippova can be contacted at: o.filippova@auckland.ac.nz



Case #P26CU00005 OPPOSITION concerning Cell Tower !!!!

From grizzz2004-bb@yahoo.com <grizzz2004-bb@yahoo.com>

Date Tue 5/26/2026 6:30 AM

To DSD Planning <DSDPlanning@pima.gov>

You don't often get email from grizzz2004-bb@yahoo.com. [Learn why this is important](#)

CAUTION: This message and sender come from outside Pima County. If you did not expect this message, proceed with caution. Verify the sender's identity before performing any action, such as clicking on a link or opening an attachment.

Dear Pima County Development Services,

PLEASE CONSIDER THE FOLLOWING DOCUMENTATION CONCERNING THE PROPOSED CELL TOWER IN GREEN VALLEY !

Cell Tower Radiation Health Effects - IAFF

Cell Tower Radiation Health Effects - IAFF

The International Association of Fire Fighters' position on locating cell towers commercial wireless infrastru...

Thank you for your consideration,
J. Goette



May 28, 2026

Pima County Planning Division
Development Services Department
201 N. Stone Avenue Tucson, AZ 85701

RE: Letter of Support – Pacific Coast Towers, Case #P26CU00005

To the Pima County Planning and Zoning Commission,

The Green Valley Council is writing to formally express our support for the proposed Pacific Coast Towers cell tower infrastructure project in Green Valley, Case #P26CU00005.

We place a high value on transparency and community engagement, and we have been thoroughly impressed by the developer throughout this process. We truly appreciate the developer's commitment to our residents, specifically their proactive approach in presenting this project directly to our community. By thoroughly engaging with our residents, they ensured that local concerns were heard, addressed, and incorporated into the planning process.

Their responsiveness to our inquiries and their willingness to adapt to the unique character of Green Valley has been exemplary. We believe that the communication demonstrated by this team sets a positive standard for future development projects in our area.

Given the clear efforts to engage stakeholders and the salient need for the project, the Green Valley Council supports the approval of Case #P26CU00005. We are confident that this project will serve our community effectively while respecting the collaborative process that is vital to the residents of Green Valley.

Sincerely,

Debbie Kenyon, President

David McAllister Romo, Executive Director

Received notice in mail re request for torres blacas holdings conditional permit for wireless.

Please send me materials regarding the request.

For example, what is the permit for specially, what does a conditional permit actually permit, we're any alternatives presented in the commissions review, what is the commissions or staff recommended aternstive, why is the 1000 ft boundary only mostly south of the proposed site and not north, as there are numerous residences to the north.

I dont see any information about this request nor background materials on your website fir me to review the request.

Please email to me ir mail to me at po box 1173 green valley az 85622.

Thank you

Elizabeth Andrews.

Good Morning

My name is John Schmelke and I am the current treasurer of the Sunrise Pointe Homeowners Association. I am here to speak in support of the proposed cell tower. The cell tower will be located on the golf course adjacent to the west entrance of our sub-division and accessed through a proposed easement

While our HOA will benefit financially by allowing this easement, I believe it is equally important given the continued growth in our area that technology is able to keep up with the current and future demand for cell phone/internet use. Our homeowners being the closest will benefit the most.

Our members had the opportunity at our November 2025 board meeting to review the plans, ask questions and express concerns. We believe the response was positive and there is overwhelming support among our homeowners. In addition, the Sunrise Pointe Board of Directors has voted unanimously to support the cell tower.

Thank you.

Good Morning,

I am Reve Carberry and currently am the Member At Large responsible for Landscaping and Grounds on the Sunrise Pointe HOA Board.

My full time residence is on the golf course a few hundred yards east of the proposed cell tower where I have had one bar of cellular service since moving here four years ago. As you might imagine from that statement, I am all in favor of the proposed tower.

In addition, as both a board member and a member of the Sunrise Pointe community, I support any legitimate method of raising funds for the Association. The easement to access the cell tower as proposed would result in funds (to be determined) accruing to the HOA Board. This is a good thing!

I have multiple copies of the Board President's Letter of Support for anyone who is interested and will leave copies for the Commission.

Thank you