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CITY OF MEDINA

Improving T-Mobile's network within the City of Medina

COMMITMENT TO IMPROVE SERVICE IN THE CITY OF MEDINA

- T-Mobile's network provides critical services to City of Medina residents
- Existing T-Mobile service is limited due to constraints on existing facilities, limited opportunities to place new facilities
- Significant improvements can be made to T-Mobile's service by upgrading and collocating on existing facilities without the placement of new towers
- T-Mobile is flexible on design options for upgrading existing facilities that will accommodate additional frequencies and technologies
- T-Mobile requests the City's guidance on which design options are preferred

IMPORTANCE OF T-MOBILE'S NETWORK IMPROVEMENTS

- Demand for wireless data is expected to grow 20% per year through 2028.
- 97% of Americans have a cell phone and 85% own a smartphone
- Over 72% of households rely on wireless as their only means of telephone communication.
- Over 81% of children live in wireless-only households

240 million calls are made to 911 in the U.S. each year, and in many areas 80% or more are from wireless devices.

Source: National Emergency Number Association (NENA)

https://www.ericsson.com/en/reports-and-papers/mobility-report/dataforecasts/mobile-traffic-forecast
https://www.pewresearch.org/internet/fact-sheet/mobile/
https://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless202305.pdf

QUALITY 5G SERVICE REQUIRES COMBINATION OF FREQUENCY BANDS

High Band

No Plans yet!
Wide bandwidth of spectrum provides vast capacity
Best suited for short range in building and urbanized systems

Mid Band

Provides blend of wide area coverage, capacity, voice, and primary mobility layer for 5G
Ultra Capacity provides network speeds of up to 10X better than low bands

Low Band

Provides robust coverage within buildings, but data capacity limited

EXISTING T-MOBILE SERVICE IN MEDINA

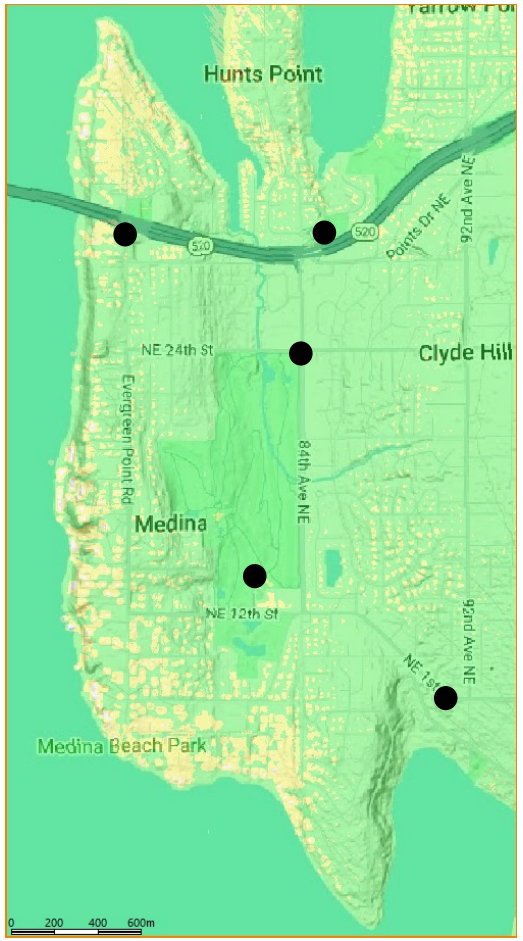
- T-Mobile has two facilities within the City limits
  - Overlake Golf Course (adjacent to maintenance yard)
  - Bellevue Christian School (adjacent to Park & Ride lot)
- Some T-Mobile coverage is provided by facilities located outside of the City
- T-Mobile has FCC Licenses for 7 frequency bands to provide service in Medina
- The existing facility designs are constrained, only support 2 out of 7 frequency bands
- Much of the City does not have reliable, in-building signal levels to support T-Mobile Home Internet and other voice/data services
- Capacity is significantly limited, undermining network speeds and overall reliability of T-Mobile service within the City

EXISTING T-MOBILE SERVICE IN MEDINA

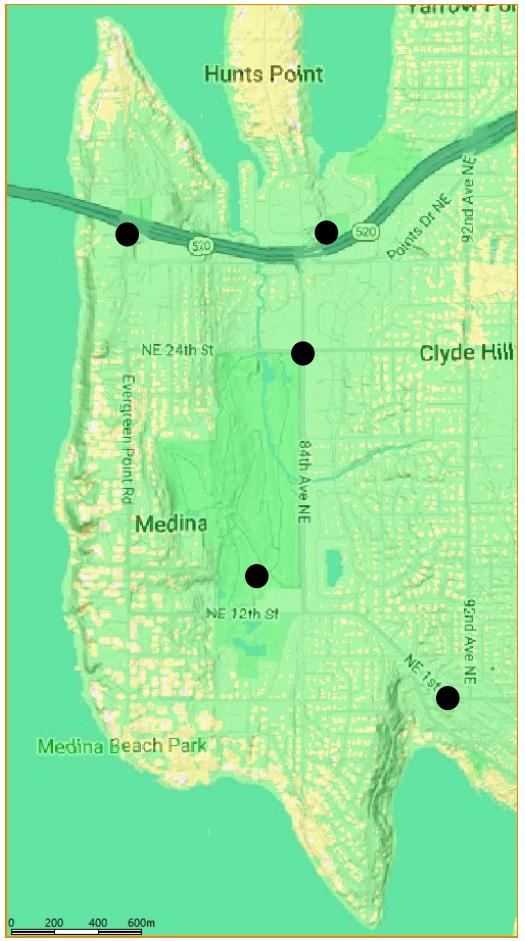
Reliable Coverage
Marginal Coverage

- Existing T-Mobile Facilities

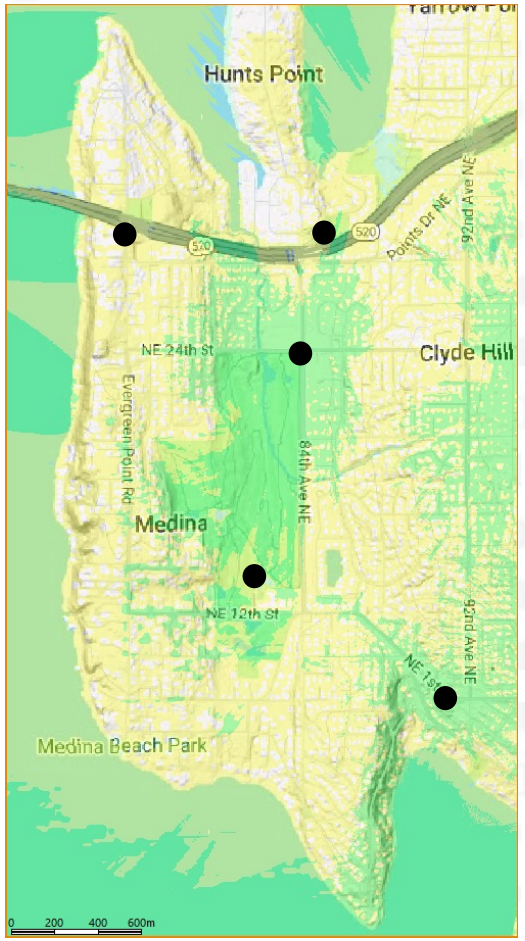
Low band



Mid band



Ultra Capacity



T-Mobile's RF engineers used coverage propagation software systems to predict the coverage provided by the proposed new WCF. The software and T-Mobile's RF engineers considered the general factors outlined below, as well as more project-specific factors such as the type of antenna, antenna tilt, etc. Within coverage areas, network changes, traffic volume, outages, technical limitations, signal strength, customer equipment, obstructions, weather and other conditions may interfere with service quality and availability.

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PROPOSED SERVICE IMPROVEMENTS

- No new tower locations
- Low Impact - Upgrades and collocations on existing sites only
  - Collocation on eight (8) existing Distributed Antenna System node locations
  - Replace existing towers to support new antennas/frequencies, future collocation
- Significant coverage improvements at all frequencies:
  - Low Band (600 MHz, 700 MHz)
  - Mid Band (1900 MHz, 2100 MHz)
  - Mid Band – Ultra Capacity (2.5 GHz)
- Reliable voice/data service, additional capacity that may enable T-Mobile Home Internet
- Up to 10X improvement in network speeds (speeds vary due to network demands and capacity)

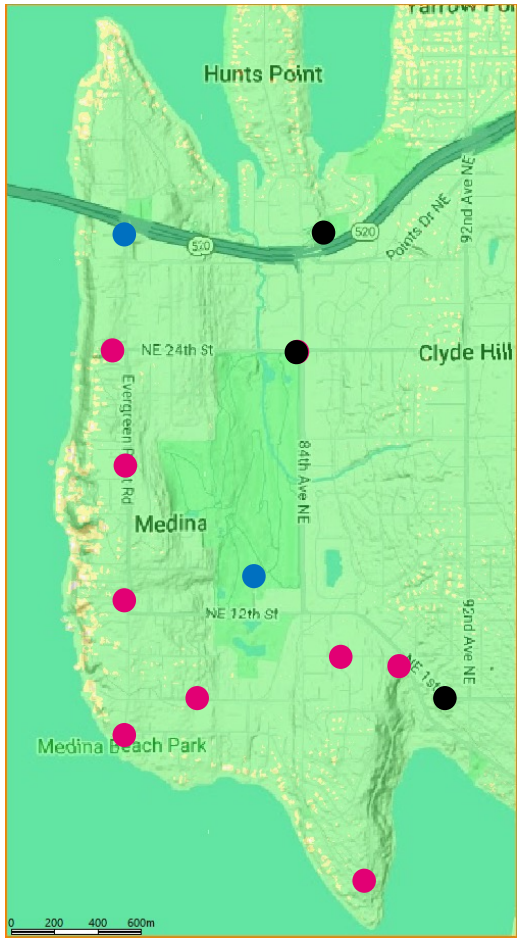
PROPOSED SERVICE IMPROVEMENTS

Reliable Coverage
Marginal Coverage

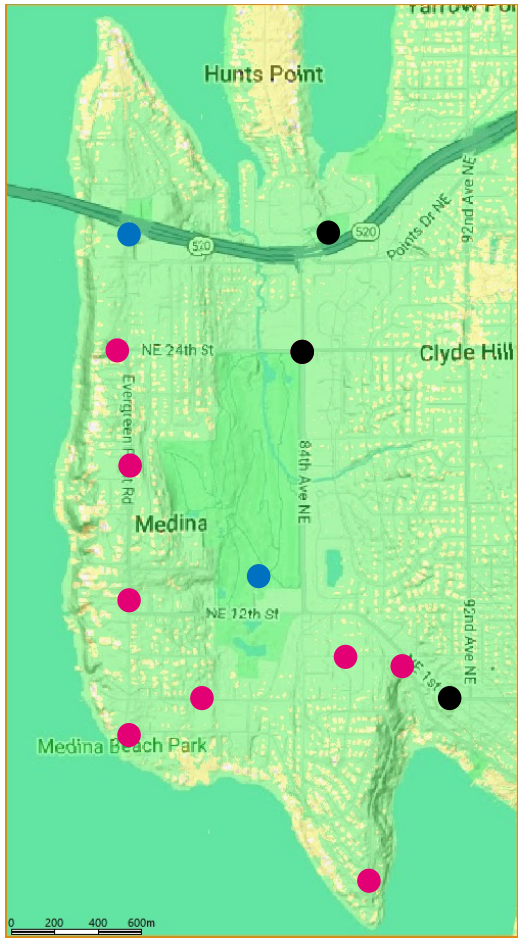
- Existing T-Mobile Facilities
- Collocation on existing Distributed Antenna System
- Upgrades to Existing Sites

T-Mobile's RF engineers used coverage propagation software systems to predict the coverage provided by the proposed new WCF. The software and T-Mobile's RF engineers considered the general factors outlined below, as well as more project-specific factors such as the type of antenna, antenna tilt, etc. Within coverage areas, network changes, traffic volume, outages, technical limitations, signal strength, customer equipment, obstructions, weather and other conditions may interfere with service quality and availability.

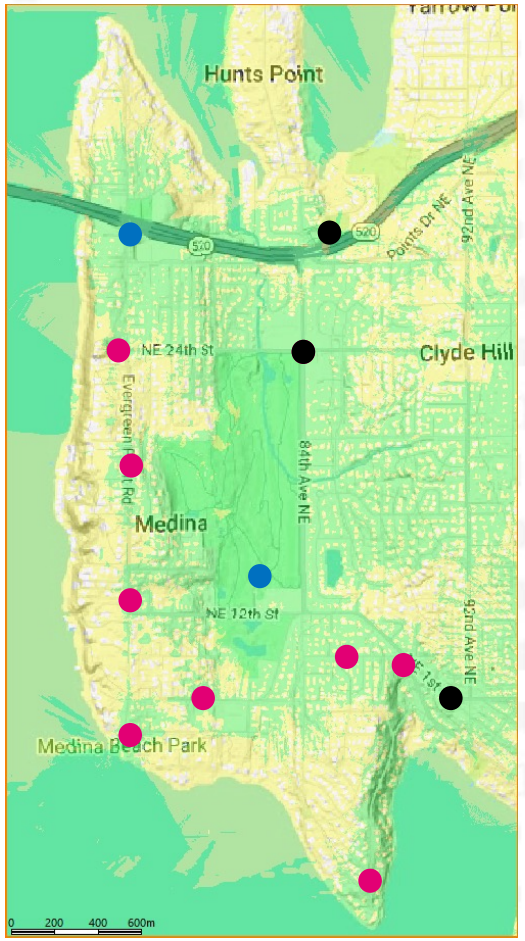
Low band



Mid band



Ultra Capacity



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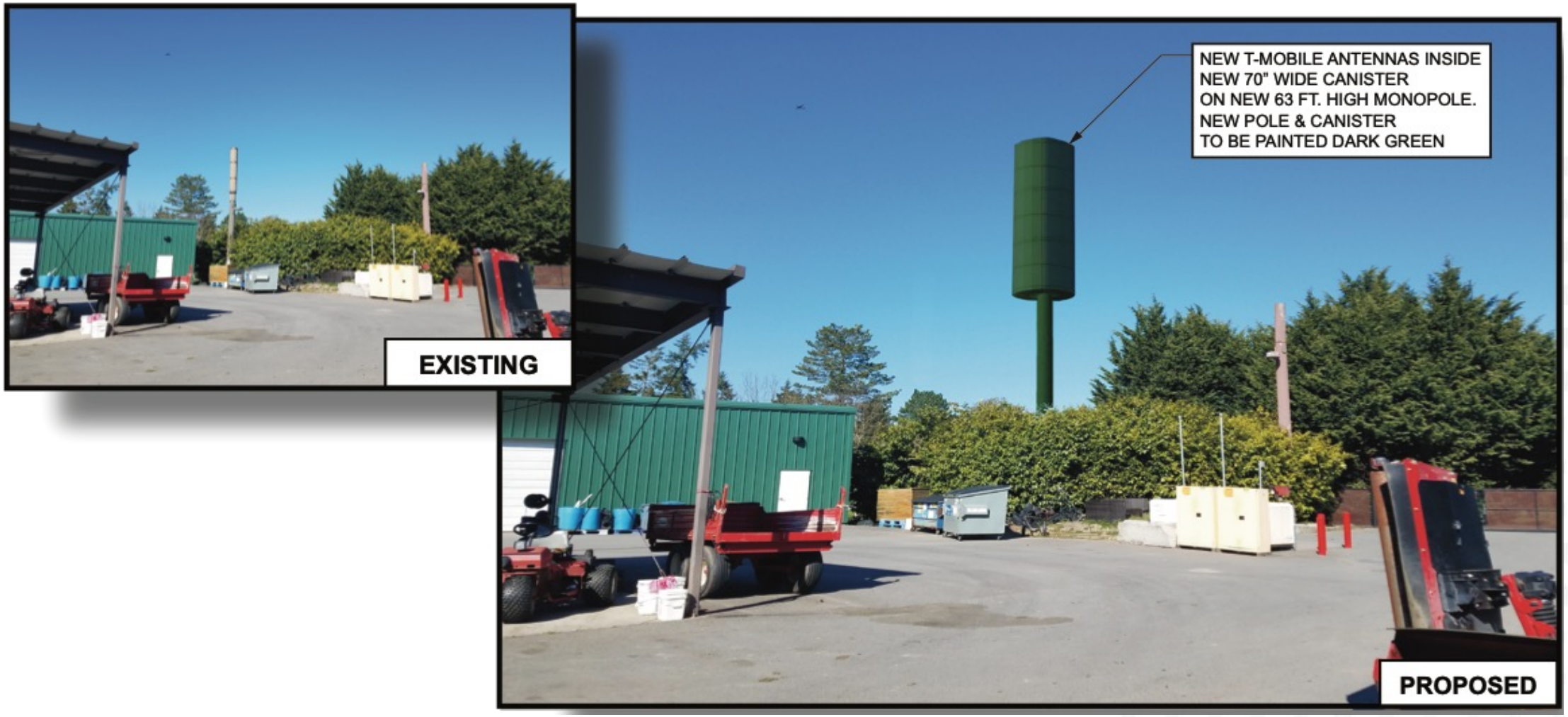
DESIGN OPTIONS

- Connection to existing DAS system (owned/operated by American Tower)
- Existing towers constrain T-Mobile's coverage, frequency and technology improvements
  - Overlake Golf Course – only supports 2100 MHz today
  - Bellevue Christian School – only supports 700 MHz and 2100 MHz today
- T-Mobile is flexible on tower upgrade design options, provided that additional frequencies and engineering requirements are met:
  - Canister Option – Minimum 70" diameter canisters now required to accommodate large multi-band antennas, mechanical tilt of antennas
  - Flush-Mount Option – Antennas/equipment painted to match, tower required to be taller to accommodate multiple elevations of antennas
  - Stealth Tree Option – Antennas concealed within shape of tree, allows for future T-Mobile growth and collocation by other carriers without visual change

OVERLAKE GOLF COURSE – 70” CANISTER DESIGN OPTION



Visual renderings are approximate, actual results may vary

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OVERLAKE GOLF COURSE – FLUSH-MOUNTED ANTENNA DESIGN OPTION

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OVERLAKE GOLF COURSE – STEALTH TREE DESIGN OPTION

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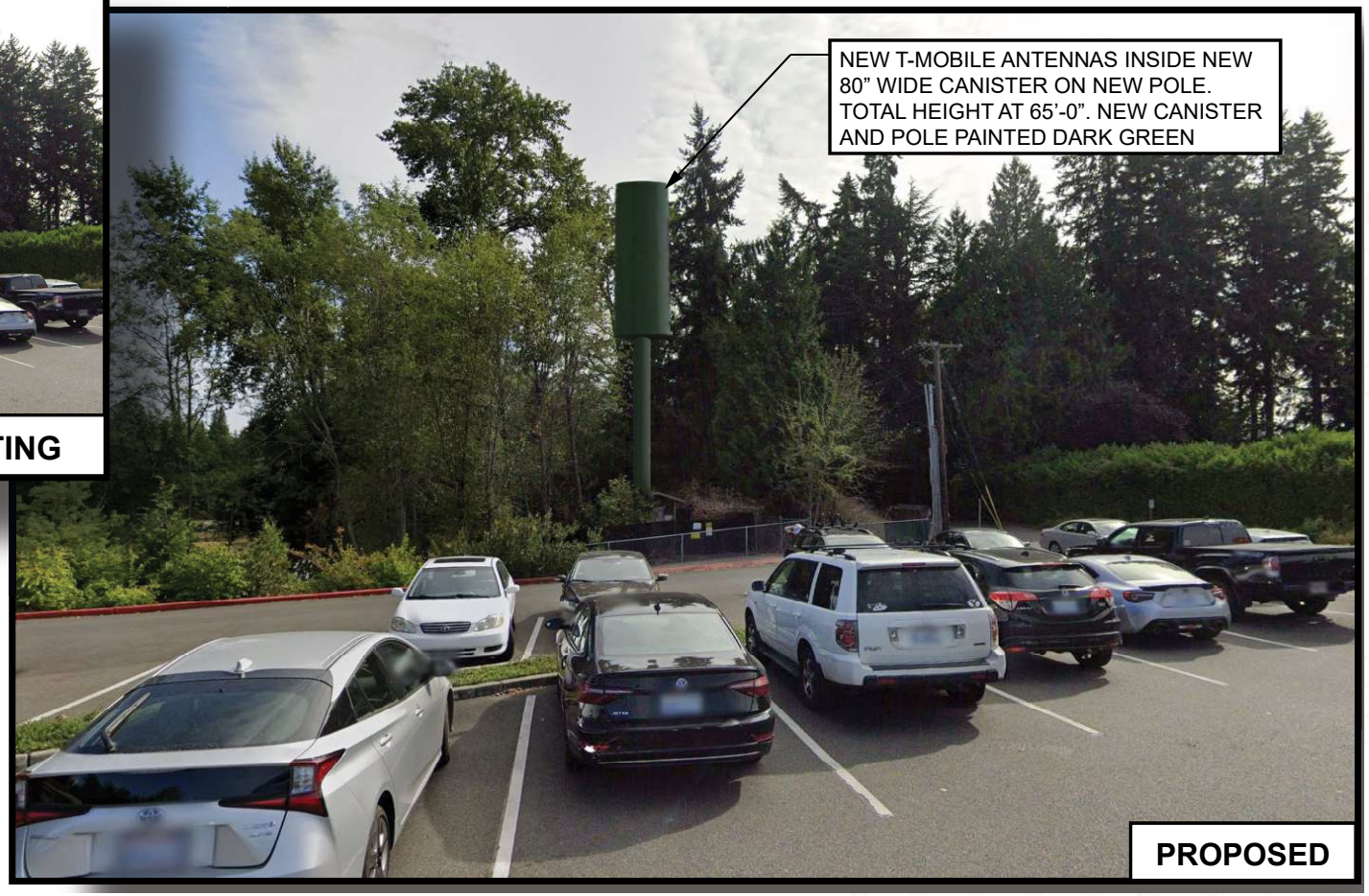
BELLEVUE CHRISTIAN SCHOOL – 80” CANISTER DESIGN OPTION



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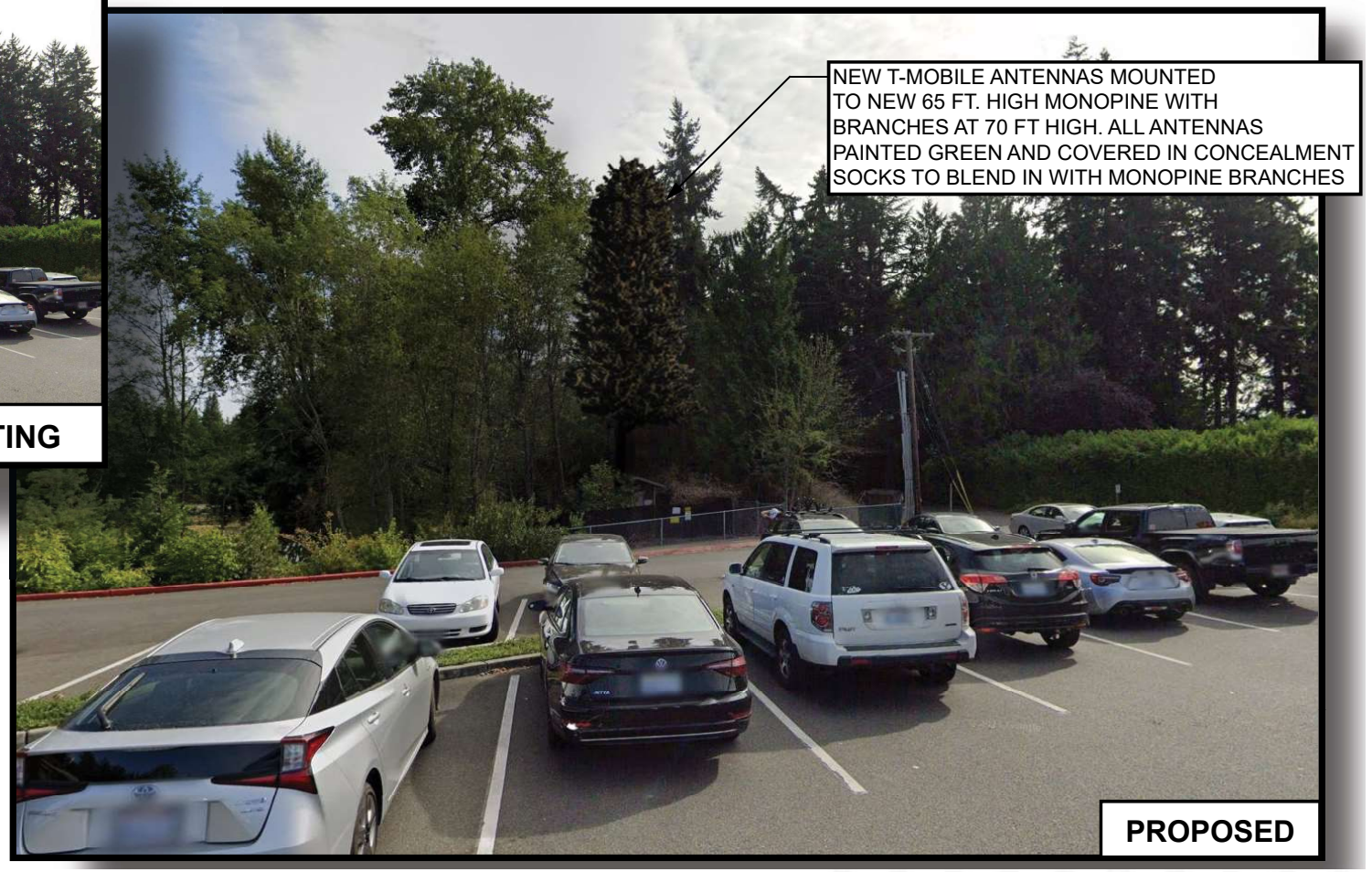
BELLEVUE CHRISTIAN SCHOOL – STEALTH TREE DESIGN OPTION



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THANK YOU!